



# National Research Council Canada



For the  
period ending  
March 31, 1997



Improved Reporting to Parliament —  
Pilot Document

Canada

©Minister of Public Works and Government Services Canada – 1997

Available in Canada through your local bookseller or by

mail from Canadian Government Publishing – PWGSC

Ottawa, Canada K1A 0S9

Catalogue No. BT31-4/53-1997

ISBN 0-660-60339-X



## Foreword

On April 24, 1997, the House of Commons passed a motion dividing what was known as the *Part III of the Estimates* document for each department or agency into two documents, a *Report on Plans and Priorities* and a *Departmental Performance Report*. It also required 78 departments and agencies to table these reports on a pilot basis.

This decision grew out of work by Treasury Board Secretariat and 16 pilot departments to fulfil the government's commitments to improve the expenditure management information provided to Parliament and to modernize the preparation of this information. These undertakings, aimed at sharpening the focus on results and increasing the transparency of information provided to Parliament, are part of a broader initiative known as "Getting Government Right".

This *Departmental Performance Report* responds to the government's commitments and reflects the goals set by Parliament to improve accountability for results. It covers the period ending March 31, 1997 and reports performance against the plans presented in the department's *Part III of the Main Estimates* for 1996-97.

Accounting and managing for results will involve sustained work across government. Fulfilling the various requirements of results-based management – specifying expected program outcomes, developing meaningful indicators to demonstrate performance, perfecting the capacity to generate information and report on achievements – is a building block process. Government programs operate in continually changing environments. With the increase in partnering, third party delivery of services and other alliances, challenges of attribution in reporting results will have to be addressed. The performance reports and their preparation must be monitored to make sure that they remain credible and useful.

This report represents one more step in this continuing process. The government intends to refine and develop both managing for results and the reporting of the results. The refinement will come from the experience acquired over the next few years and as users make their information needs more precisely known. For example, the capacity to report results against costs is limited at this time; but doing this remains a goal.

This report is accessible electronically from the Treasury Board Secretariat Internet site:  
<http://www.tbs-sct.gc.ca/tb/key.html>

Comments or questions can be directed to the TBS Internet site or to:

Government Review and Quality Services  
Treasury Board Secretariat  
L'Esplanade Laurier  
Ottawa, Ontario, Canada  
K1A 0R5  
Tel: (613) 957-7042  
Fax (613) 957-7044



---

National Research Council Canada    Conseil national  
de recherches Canada

---

***NRC · CNRC***

***Performance Report***

For the period ending 31 March 1997

John Manley  
Minister of Industry

---

**Canada**

## TABLE OF CONTENTS

SECTION I: THE MINISTER'S MESSAGE.....	1
SECTION II: NRC OVERVIEW .....	3
Mandate, Roles, and Responsibilities.....	3
Vision to 2001 .....	3
Business Lines.....	4
SECTION III: NRC PERFORMANCE .....	7
A. Performance Expectations .....	7
B. Performance Accomplishments.....	8
1. NRC Performance.....	8
2. Business Line Performance 1996-1997 .....	10
Business Line: National Research and Development .....	10
Business Line: Support for the National Science and Technology Infrastructure.....	14
Business Line: Program Management .....	17
C. Key Reviews .....	20
SECTION IV: SUPPLEMENTARY INFORMATION .....	23
A. Organisation Chart, as at March 31, 1997 .....	24
B. Financial Summary Tables.....	25
Authorities for 1996-97 – Part II of the Estimates	
Resource Requirements by Organisation and Business Line	
Revenues by Business Line	
Capital Projects by Business Line	
Transfer Payments by Business Line	
Contingent Liabilities	
C. Acts Administered in Whole or in Part by the National Research Council .....	29
D. Listing of Statutory and Council Reports .....	29
E. Contacts for Further Information .....	29

---

## SECTION I: THE MINISTER'S MESSAGE

The Industry Portfolio brings together under the Minister of Industry 13 departments and agencies (see box) with responsibilities for science and technology (S&T), regional development, marketplace services and micro-economic policy. With many of the micro-economic levers available to government, as well as 41% of the S&T funding in the federal government, the Industry Portfolio offers a versatile tool kit for meeting the challenges of the knowledge-based economy as Canada moves into the 21st century.

*The Industry Portfolio is ...*  
Atlantic Canada Opportunities Agency  
Business Development Bank of Canada\*  
Canadian Space Agency  
Competition Tribunal  
Copyright Board Canada  
Federal Office of Regional Development - Québec  
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 establishment of the Portfolio has also created a new capacity for partnership and innovation, both among its members and with stakeholders in the private and public sectors. This capacity can be exploited in every region of the country, since the Industry Portfolio provides programs and services to businesses and consumers with about 15,000 staff, over 500 points of service in every province and territory, and numerous sites in cyberspace.

As Minister responsible for the Industry Portfolio, I have directed the Portfolio members to actively seek opportunities to exploit the synergies available to them as members of a team of organizations with similar objectives and complementary programs. This continuing emphasis on improving collaboration and partnership has helped to ensure that limited resources are focused more effectively on the priority areas identified for the Portfolio: promoting S&T, encouraging trade and investment, and helping small and medium-sized enterprises (SMEs) to grow. Working in partnership in these areas has enabled the Portfolio to make a significant contribution to meeting government objectives.

Of the 13 members of the Portfolio, all except the two crown corporations (the Business Development Bank of Canada and the Standards Council of Canada) are required to provide annual Performance Reports. Reporting on performance is an important element of program management in the Portfolio. Identifying concrete objectives for programs and services, and measuring and reporting on progress over time, provides an accountability framework that enables Portfolio members to assess their effectiveness. As the 11 individual Performance Reports demonstrate, the Portfolio members have solid results to report for 1996-97.

Taken together, these reports provide a comprehensive picture of the Industry Portfolio's performance. I would particularly like to highlight the following key Portfolio achievements:

- the 29 very successful SME Conferences and InfoFairs held across the country, attended by almost 51,000 Canadians;
- the publication of *Your Guide to Government of Canada Services and Support for Small Business 1996-1997*, a compendium of all the services and support available to small businesses from the federal government (over 250,000 copies in circulation);

- the strengthening of the Regional Trade Networks and Regional Trade Plans, which bring federal and provincial governments and the private sector together at the regional level to generate new international opportunities for local businesses;
- the coordinated approach to S&T across the Portfolio as reflected in the Portfolio S&T Action PlanCthe Portfolio members have taken action on 45 of its 49 initiatives;
- the S&T Forum, which brought together, for the first time, the members of all the boards and councils providing expert advice to the Portfolio departments and agencies; and
- innovative approaches to service delivery building heavily on partnerships, such as the Canada Business Service Centres.

The highlights for the National Research Council of Canada (NRC) involving other Portfolio partners include: the official opening of the NRC Innovation Centre in Vancouver; the launching of the Western Medical Technologies Strategy; progress on NRC's new Integrated Manufacturing Technologies Institute in London, Ontario; continued development of the Canadian Technology Network; the introduction of new inventor award programs, programs to support spin-off companies based on NRC technology, and strategic alliances with financial institutions to help NRC spin-offs and client firms access needed capital.

Over the coming year, the Industry Portfolio will continue to build on its synergies and to improve the services and support provided to its wide array of clients.

---

John Manley, Minister of Industry

---

## SECTION II: NRC OVERVIEW

### Mandate, Roles, and Responsibilities

#### **National Research Council Act**

NRC is a federal government departmental corporation. Its mandate, according to the National Research Council Act, is to undertake, assist or promote scientific and industrial research in different fields of importance to Canada; to investigate standards and methods of measurement; and to work on the standardisation and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industries.

Under the National Research Council Act, NRC also has the responsibility for “operating and administering any astronomical observatories established or maintained by the Government of Canada”. NRC’s R&D activities include grants and contributions used to support a number of international activities.

NRC is also mandated to provide vital scientific and technological services to the research and industrial communities. This mandate is discharged to some extent through the operation of the Industrial Research Assistance Program, the Canada Institute for Scientific and Technical Information, and the Canadian Technology Network.

The National Research Council Act empowers NRC to “establish, operate and maintain 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.

#### **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

In its Vision to 2001, NRC has taken up the challenge of contributing to Canada’s technological development, competitiveness and prosperity. The vision summarises the organisation’s approach to fulfilling its mandate in light of the economic and social realities facing the country now and in the coming years.

#### **NRC’s Vision:**

*As Canada’s foremost R&D agency, NRC will be a leader in the development of an innovative, knowledge-based economy through science and engineering. This vision will be realised by:*

- *being dedicated to excellence in advancing the frontiers of scientific and technological 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.*



---

## Business Lines

NRC's Program has three business lines, which provide a balance between conducting R&D, offering technical and financial assistance to industry and the scientific community, and supporting the organisation with corporate services. In 1996-97, these were:

- National Research and Development
- Support for the National Science and Technology Infrastructure
- Program Management

### I. National Research and Development

The objective of the National Research and Development Business Line is to undertake and promote research and development to enhance Canada's scientific and engineering capability and investment. In 1996-97, NRC's research activities were organised into five Technology Groups: biotechnology, information and telecommunications technology, manufacturing, construction and infrastructural technologies. As well, NRC has made a commitment to nurture and renew its long-term core research capability through the Steacie Institute for Molecular Sciences and through its involvement in international science facilities and research activities.

#### ***Biotechnology***

Biotechnology research is strategically important to key sectors of Canada's economy, including health, agriculture, food, resources and the environment. NRC's strengths in biotechnology help it serve and interact with industrial and university partners. Institutes in this group include:

- Biotechnology Research Institute
- Institute for Biodiagnostics
- Institute for Biological Sciences
- Institute for Marine Biosciences
- Plant Biotechnology Institute

#### ***Information and Telecommunications Technology***

The Information and Telecommunications Technology Group includes the Institute for Information Technology and the Institute for Microstructural Sciences. The convergence of the multi-billion dollar information and telecommunications sector with the global marketplace has created an environment with extensive risks and rewards. NRC is working with industry to reduce the risks and costs to firms working on the next generations of software and hardware technologies.

#### ***Manufacturing Technologies***

NRC is focusing its manufacturing technology research on three interdependent areas which it believes have the greatest potential for new wealth creation opportunities: design, modelling and simulation technologies; process and development technologies; and monitoring and control technologies. Institutes in the Manufacturing Technologies Group include the:

- Industrial Materials Institute
- Institute for Chemical Process and Environmental Technology
- Integrated Manufacturing Technologies Institute

#### ***Construction Technologies***

Through the Institute for Research in Construction, NRC continues to play a pivotal role in construction-related activities in Canada by: developing cost-effective solutions in construction technology; contributing a means for effective linkages between domestic and international research, technical standards and professional organisations; and supplying a national co-ordinating mechanism for construction technology.

#### ***Infrastructural Technologies***

The institutes in this group represent an area of mandated and long-standing responsibilities for NRC, encompassing physical and chemical metrology; aerospace technologies; ocean engineering and ocean technology; and

---

astronomical observatories. Institutes in this group include the following:

- Institute for Aerospace Research
- Herzberg Institute of Astrophysics
- Institute for National Measurement Standards
- Institute for Marine Dynamics

### **Core Research**

Led by the Steacie Institute for Molecular Sciences (SIMS), NRC's core research activity continues to develop strategic linkages to the other institutes. NRC's core science activities include involvement with the Tri-University Meson Facility (TRIUMF), the Canada-France-Hawaii Telescope, the James Clerk Maxwell Telescope, and the Gemini Telescopes, as well as other international affiliations.

## **II. Support for the National Science and Technology Infrastructure**

The second business line encompasses NRC's assistance to industrial research and the dissemination of scientific and technical information. NRC fulfils this mandate by developing and diffusing scientific knowledge and technology in partnership with industry, governments and universities. This activity is carried out nationally and at regional locations via the Industrial Research Assistance Program and the Canada Institute for Scientific and Technical Information.

The **Industrial Research Assistance Program (IRAP)** is well known for its successes over the years in helping small and medium sized Canadian firms develop and exploit technology. Founded on a national network of Industrial Technology Advisors (ITAs), IRAP contributes technical and financial assistance to help companies improve their technical knowledge and expertise to meet the challenges of a changing and competitive economy. IRAP extends the reach of its ITA network by creating extensive linkages with other government departments and agencies,

helping deliver their programs in some cases.

IRAP is also responsible, in co-operation with IC, for implementing a recent government initiative, the **Canadian Technology Network (CTN)**. CTN is a national network of people who provide comprehensive, easily accessed, user friendly advice to SMEs that need technical and related business help.

The mission of the **Canada Institute for Scientific and Technical Information (CISTI)** is to provide worldwide scientific, technical and medical information to Canadian users to help achieve Canada's economic and social goals. CISTI plays an essential role in Canada's S&T infrastructure, supplying more than 25 products and services to over 13,000 clients across the nation. Also, through its Research Press, CISTI is Canada's largest publisher of scientific journals.

## **III. Program Management**

The third business line includes corporate support and direction, and administrative services, with a focus on effective management of NRC's programs and its resources.

The Program Management business line comprises two components:

- the Executive Support function which provides policy, program and executive support for the co-ordination and direction of NRC's operations and its governing Council, and
- the Program Administration function, supports and enables effective and efficient management of NRC's resources through its specialisation in: finance and information management; human resources; administrative services and property management; and corporate services.

## SECTION III: NRC PERFORMANCE

### A. Performance Expectations

NRC has been an early adopter of the new federal approach to performance assessment. Performance measurement involves a significant shift in corporate culture from the traditional focus on activities, inputs and outputs to focus more directly on applicable results and social and

economic impacts. Accordingly, NRC has developed performance indicators which demonstrate intended impacts and accomplishments for each of its vision elements. Exhibit 1 links some key performance measures to each vision element.

Vision Element	Performance Indicator
Excellence in areas of S&T knowledge critical to Canada	<ul style="list-style-type: none"> <li>• Peer recognition of excellence</li> <li>• Influence, recognition in international S&amp;T</li> <li>• Identification &amp; investment in S&amp;T areas critical to Canadian needs</li> <li>• Investment, use of scientific facilities</li> </ul>
Client focused R&D to develop/exploit technology	<ul style="list-style-type: none"> <li>• Collaborations &amp; partnerships with industry</li> <li>• Impacts of IRAP assistance to firms</li> <li>• Partner R&amp;D investments</li> <li>• Partner use of R&amp;D, innovation to achieve technical, commercial success</li> <li>• Quality services and support to firms</li> </ul>
Leadership, support to the Canadian System of Innovation	<ul style="list-style-type: none"> <li>• Identification and implementation of key linkages with gov't, industry</li> <li>• Progress of regional initiatives</li> <li>• Influence of IRAP/CISTI networks</li> <li>• NRC influence on industry/gov't innovation strategies, policies</li> <li>• Use and impacts of codes and standards</li> </ul>
Entrepreneurial initiatives to develop, transfer NRC knowledge and technology	<ul style="list-style-type: none"> <li>• Technology incubators, patents, licences</li> <li>• Spin offs and start-ups</li> <li>• Introduction of improved management tools, systems</li> <li>• Introduction of entrepreneurial policies, practices</li> </ul>

### Exhibit I

## B. Performance Accomplishments

### 1. NRC Performance

NRC is addressing the challenges as set out in its 1995-1996 vision. Major initiatives and accomplishments undertaken by NRC are described in the next section of this document.

Since 1995-96, the impact of the government's Program Review budget reductions on NRC has been significant. Reductions in NRC's Main Estimates will continue through 1997-98 and 1998-99. As can be seen in the following chart, the increase in total voted funding for 1996-97, as compared to 1995-96, is largely attributable to Supplementary Estimates.

	Operating (incl. Empl. Benefits)	Capital	Grants Contribution	Main Estimates	Supplementary Estimates	Adjustments to Employee Benefits	Total Voted Funding
94-95	254,007	48,142	130,709	432,858	20,039	-----	452,897
95-96	252,436	49,049	107,683	409,168	15,965	1,055	426,188
96-97	249,415	45,488	112,848	407,751	27,442	859	436,052

Business line actual expenditures as compared to planned spending are found below. The increase between actual and planned spending in 1996-97 is the result of additional expenditures for TRIUMF.

#### NRC Planned versus Actual Spending by Business Line, 1993-94 to 1996-97

(\$ millions)					
Business Line	Actual 1993-94	Actual 1994-95	Actual 1995-96	Total Planned 1996-97	Actual 1996-97
National Research and Development	252.4	264.5	242.6	241.0	229.2
Support for the National Science and Technology Infrastructure Program Management	101.6 79.4	110.7 72.7	113.0 68.6	115.1 51.7	123.5 65.1
<b>Total</b>	433.4 *	447.9 *	424.2 *	407.8 *	417.8*

\* Excludes spending of proceeds from the disposal of surplus crown assets.

\*\* All years exclude revenue expenditures

**Comparison of Total Planned Spending to Actual Expenditures, 1996-97 by Business Line**

<b>(\$ millions)</b>							
Business Line	Full-Time Equivalents (FTE's)	Operating <sup>1</sup>	Capital	Grants and Contributions	Total Gross Expenditures	Less: Revenue Credited to the Vote	Total Net Expendi- tures
National Research and Development	2,137	196.6	41.3	25.8	263.8	22.8	241.0
	2,170	179.5	33.6	41.4	254.5	25.4	229.1
Support for the National Science and Technology Infrastructure	370	46.0	-	81.9	127.9	12.8	115.1
	397	49.0	1.1	82.8	133.0	9.4	123.6
Program Management	565	42.5	6.2	5.2	53.9	2.2	51.7
	530	53.0	9.8	5.1	68.0	2.9	65.1
<b>Totals</b>	3,072	285.1	47.5	112.9	445.6	37.8	407.8
	3,097	281.6	44.5	129.4	455.4	37.6	417.8
<b>Other Revenues and Expenditures</b>							
Revenue credited to the Consolidated Revenue Fund							(0.7)
							(1.9)
Estimated Cost of Services by other Departments							10.1
							9.9
<b>Total Cost of Program</b>							417.2
							425.8

Note: Due to rounding, figures may not add to total shown.  
Shaded numbers denote actual expenditures/revenues in 1996-97

1. Operating includes contributions to employee benefit plans.

---

## 2. Business Line Performance 1996-1997

### ***BUSINESS LINE: National Research and Development***

Vision Elements: **Excellence in areas of S&T knowledge critical to Canada**  
**Client focused R&D to develop/exploit technology**  
**Leadership and support to the Canadian System of Innovation**  
**Entrepreneurial initiatives to develop and transfer knowledge and technology**

#### **Peer recognition of excellence**

*In order to continue to play a valuable and integral role to help Canadian firms succeed and to help improve the lives of Canadians in general, NRC must excel in fields that have been identified as critical to the nation. In the research community, national and international recognition by peers and others are generally considered to be sound indicators of excellence and relevance, and can be measured in a number of ways. In 1996-97:*

- NRC produced 1,206 refereed publications, as well as 1,250 books, book chapters, non-refereed chapters and technical reports;
- staff presented research results at over 700 national and international conferences;
- 22 staff members received prominent national and international awards;
- 96 Fellows were attracted to work on leading-edge research in preparation for knowledge-based jobs;
- NRC won Popular Science's top prize for developing conductive concrete, a material to heat buildings and keep bridges and airport runways clear of ice and snow;
- A breakthrough paper on red-emitting semiconductor quantum dot lasers was published. This technology could replace other laser diodes in a billion dollar market for telecommunications and bar-code scanning;
- A licensee, which used patented spray nozzle technology from NRC to become a leader in air-assisted agricultural spray systems, won an outstanding innovation award from the American Society of Agricultural Engineers.

#### **Influence, recognition in international S&T**

*NRC has responded to the globalisation of the world economy and S&T, the dramatic increase in competition in innovation, and the race to secure world markets by becoming more internationally active and aware. The organisation has been building strategic international S&T to help create new market opportunities for its industrial partners. NRC has led initiatives in France, Singapore and Korea, and has developed a co-location policy to encourage foreign multinationals to situate near NRC facilities. In 1996-97:*

- NRC's participation in the Team Canada Mission to Korea was instrumental in demonstrating Canada's S&T competence and helping achieve the team's goal to promote partnerships;
- NRC's collaborations with Japanese researchers and the Canadian construction industry contributed to Japan's relaxation of standards and regulations, thereby opening up their construction market to Canadian firms;

- NRC participated in two Team Canada missions to Southeast Asia, designed to attract investment to Canada in the form of a semiconductor plant;
- In Singapore, an R&D agreement was reached with the National Science and Technology Board, which has already created a new market opportunity for a NRC industrial partner;
- NRC and France's CNRS have reconfirmed their long-standing agreement and identified 15 potential areas of co-operation;
- NRC headed a successful government mission to the European Union (EU) to help Canadian Small Manufacturing Enterprises (SME's) and other national organisations gain access to the EU's S&T programs;
- As a result of NRC endeavours, a Dutch pharmaceutical multinational firm has built a facility beside the Biotechnology Research Institute in Montreal;
- NRC and the other members of the Saskatoon S&T community have attracted, among others, a US-based firm which is establishing an R&D facility in Saskatoon.

**Identification & investment in S&T areas critical to Canadian needs**  
**Investment, use of scientific facilities**

*Excellent research that will produce a relevant and significant benefit to Canadians requires two prerequisites - highly skilled staff and first-rate equipment and facilities for the use of employees, as well as partners and collaborators. NRC places a high priority on supporting and maintaining its human and physical resources. In 1996-97, NRC*

- offered several training programs to graduate and undergraduate students and guest workers (approximately 1,200) to provide laboratory experience in preparation for pursuing careers in research as well as providing NRC with young, talented staff. Programs include the Women in Engineering and Science (WES) Program (78 students), the Summer Employment and Coop Programs (217 students), the Post-Doctoral Fellowship Program (96 students) and the NRC Research Associateship Program (52 students);
- provided the use of its facilities and services to faculty and students at Memorial University in St. John's, Nfld, and several institute employees supervised students and helped develop courses;
- offered, as part of its regular training activities, several metrology courses to college students;
- managed Canadian astronomy's participation in three major, international science observatories located in Hawaii and Chile - the Canada-France-Hawaii Telescope (\$3.7 million), the James Clerk Maxwell Telescope (\$2.6 million) and the Gemini Telescopes (\$3.5 million);
- initiated two major equipment investments (\$2.3 million), designed to strengthen NRC's capability in gas turbine engine research.

**Collaborations & partnerships with industry**  
**Partner R&D investments**

*An essential element of NRC's vision is to augment the competitiveness of Canadian-based firms by creating technology opportunities for and with them. NRC's research institutes enter into many different kinds of collaborations and partnerships with industry, all designed to advance technical and commercial success of firms through the joint development of new technologies. Collaborative relationships between NRC's research institutes and their partners involve resource commitments by all parties. In 1996-97:*

- NRC's 16 research institutes entered into 110 new, formal partnerships with various objectives and of varying durations;
- The Biotechnology Group increased its number of new, collaborative agreements by 16% over the previous year, while the number of industrial guest workers increased by 123% from 1995-96;
- Income for the Biotechnology Group increased to \$8.7 million, up 38% from the previous year, indicating the industrial relevance of NRC's biotechnology activities to its clients and partners;
- Of the Manufacturing Technology Group's 220 clients last year, two-thirds were small- and medium-sized enterprises (SMEs). These provided opportunities for linkages with other small- and large firms in strategic partnerships;
- NRC's facilities and expertise helped an Ontario firm secure a US contract to develop improved technology for towed acoustic arrays. This project spawned other opportunities for firms in St. John's;
- NRC's played a key role in helping a firm to become Canada's largest manufacturer of printed circuit boards through a research collaboration on complex laminating and coating;
- Clients and partners fully utilised NRC's wind tunnel facility, and staff participated in 60 collaborative projects and 109 fee-for-service contracts;
- Clients and partners made significant usage of NRC's facilities in St. John's, Nfld. including the Ice Tank, the Towing Tank, and the Offshore Engineering Basin;
- The signatory value of new agreements was \$8.4 million, with total cash received from partners from these and previous years' agreements totalling \$8.8 million.

#### **Identification and implementation of key linkages with government, industry**

*The notion that information needs to flow between individual knowledge-producing entities, if firms are to be competitive, has given rise to the concept of innovation systems. Canada has multiple elements in its innovation system, some research-based, investment-based, community-based, etc. NRC plays a vital role in the innovation system in different capacities. For NRC's Technology Groups and institutes, the objective is to identify and establish key linkages between government and industry to undertake strategic, collaborative research. In 1996-97, NRC:*

- created the research focus for the Western Medical Technologies Strategy, recently announced by the Secretary of State (Science, Research and Development) as "...an important step in enhancing Western Canada's innovation strengths and capabilities in technologies which will underpin the health care industries in the 21st century."
- hosted a national conference in Toronto on the ISO standard for the exchange of product model data - STEP. Since then, 15 organisations have shown interest and have volunteered to take on the role of steering and launching a STEP Centre in Canada.

#### **Use and impacts of codes and standards**

*The impact of and use of NRC-developed standards, measurements and model codes is another role that NRC performs in Canada's innovation system. In 1996-97:*

- sales of the national building and fire codes and related documents numbered 21,426, and the quarterly newsletter, *Construction Innovation*, had a circulation of 75,739;
- NRC performed some 4,000 calibrations for Canadian companies, verifying the linkages to national and international standards, thereby ensuring the marketability of the firms' products;



- NRC's involvement with NORAMET and the North American Calibration Co-operation Network helped Canadian firms overcome technical barriers to trade, helping them become more competitive in the North American and global markets;
- A recent study on the economic benefits and role of measurement concluded that the maintenance of measurement standards is an appropriate role of government, and that the social benefits of using primary standards exceed the costs.

### **Technology incubators, patents, licenses**

*In the modern competitive marketplace, research should be applicable to Canada's changing needs. To achieve this vision, NRC needs to attract, work with, and assist research partners and clients. By investing in new facilities which can function as technology incubators, NRC can have a more direct impact on start-up and established R&D firms. In 1996-97, NRC:*

- announced plans to invest \$20 million in federal and private sector funding to build an Industry Partnership Facility in Montreal, in support of Canada's and Quebec's growth in biotechnology;
- announced plans to build a \$6.4 million Industry Partnership Facility in Ottawa to support start-up companies associated with NRC's programs in information technology.

*NRC promotes economic growth by working with industry to develop and apply technology and knowledge either through licenses, joint projects, advice or assistance. In 1996-97:*

- NRC reported 109 new invention disclosures and secured 43 patents on inventions and new technologies.

### **Spin offs and start ups**

*NRC has taken a more proactive approach in encouraging and supporting, whenever feasible, staff who want to spin off technology to existing firms or start up new companies, and can report several successes in 1996-97:*

- NRC announced three new spin-offs involving NRC staff and using NRC technology - CrossLight Software Inc., SiGe Microsystems Inc., and Sussex Research Laboratories Inc.
- The staff of NRC's Centre for Surface Transportation Technology incorporated during the year, and were granted permission to prepare an employee take-over proposal.

*The concept of Technology Centres was developed for NRC programs that have or may have a substantial potential for full cost recovery. In 1995, four centres were created: the Centre for Surface Transportation Technology (CSTT), the Canadian Hydraulics Centre (CHC), the Centre for Fluid Power Technology (CFPT), and the Thermal Technology Centre (TTC).*

- Since 1995, the CSTT, the CHC and the TTC have exceeded their revenue targets. If this trend continues, the Centres will achieve their 1997-98 revenue targets, with cost recovery rates of 80% for CSTT, 121% for CHC, and 60% for TTC.
- NRC decided in late 1996 to terminate the CFPT program and encourage the formation of a new company by former CFPT employees.

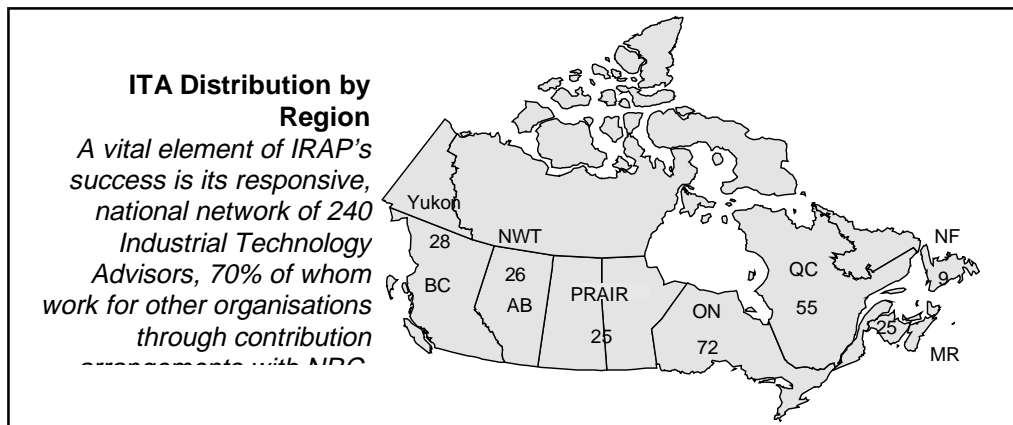
## **BUSINESS LINE: Support for the National Science And Technology Infrastructure**

Vision Elements: **Client focused R&D to develop/exploit technology**  
**Leadership and support to the Canadian System of Innovation**  
**Entrepreneurial initiatives to develop and transfer knowledge and technology**

**Collaborations and partnerships with industry**  
**Partner R&D investments**  
**Quality services and support to firms**  
**Partner use of R&D, innovation to achieve technical commercial success**  
**Impacts of IRAP assistance to firms**

*This business line seeks to provide clients with a valuable range of services and products that will ultimately contribute to the economic viability of their companies. By providing quality services and support to firms through value-added collaborations and partnerships with industry, the Industrial Research Assistance Program and the Canada Institute for Scientific and Technical Information have become high profile, success stories over the years. In 1996-97:*

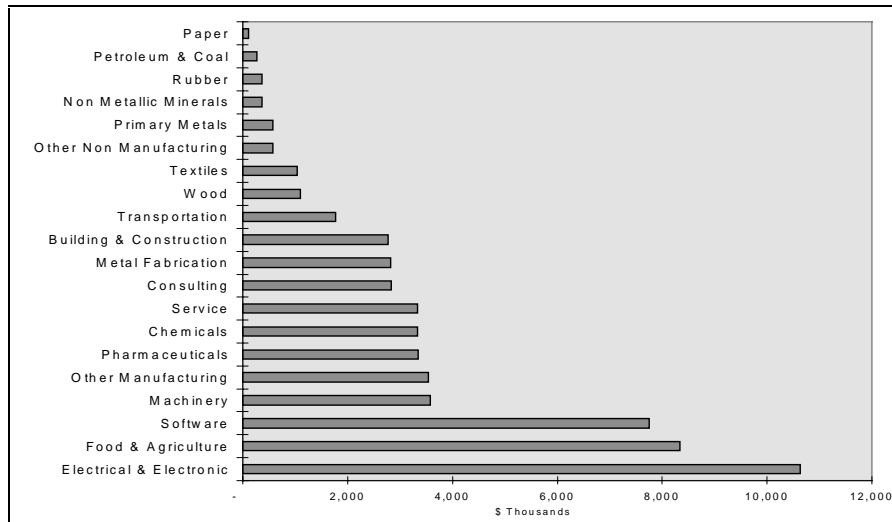
- CISTI continued to refine its product and service lines by launching the NRC Virtual Library, the NRC Expertise Database and a new Web-based database service platform.
- IRAP provided technical and financial support services to over 10,000 firms.
- IRAP expended \$28 million in providing client firms with technical assistance, advice, and referrals.



*Decisions to provide innovation financing through IRAP involve the sharing of costs and risks with the recipient firms. An important measure of IRAP's success is the extent to which its client firms achieve technical/commercial success as a direct result of the assistance received through the program. In 1996-97:*

- About 30% of IRAP's clients received cost-risk shared innovation financing, with 80% of that funding directed at firms with fewer than 50 employees;

- Innovation financing totalling \$58.5 million was provided for 3,558 R&D projects, amounting to approximately 35% of the project costs;
- A survey of 500 IRAP-funded clients reported that most of them received technical and commercial benefits as a result of the assistance received, with follow-up case studies confirming that IRAP was a major contributor to the success of the client firms.



**IRAP  
Contribution by  
Industrial  
Sector ((1996-  
97)**

*IRAP financial assistance benefits several important sectors of the economy. However, it is focused largely on Canada's most innovative, high-tech sectors.*

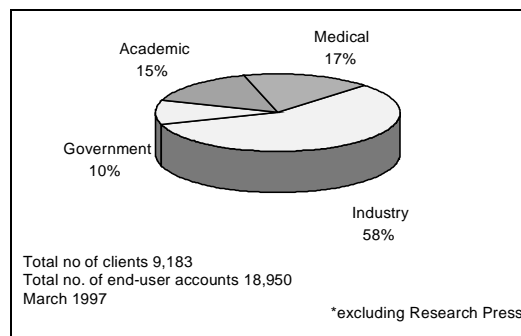
**Identification and implementation of key linkages with government and industry  
Influence of IRAP/CISTI networks**

*IRAP, CTN and CISTI all aim to develop key linkages among industry and other government organisations, and consequently, to have a beneficial and substantial impact on Canada's innovation system. In 1996-97:*

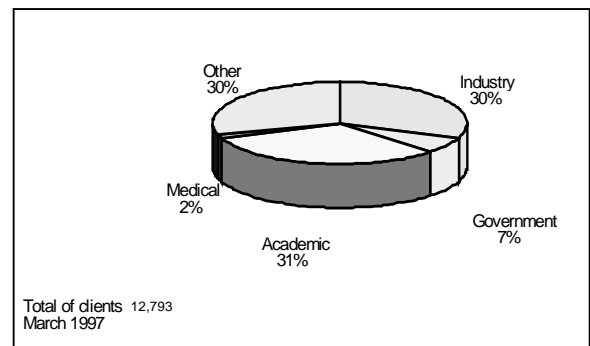
- CISTI introduced its redesigned Document Delivery Service which will expand the supply of its documents to Canadians and will include other libraries around the world.

*As in past years, CISTI continued to be an innovation leader in document retrieval via its collaborations with NRC's Institute for Information Technology, resulting in the introduction of several new technologies during the year. The following charts demonstrate CISTI's linkages with both public and private sector participants in the Canadian Innovation System.*

**CISTI's Clients by Market Segment 96-97**



**Research Press Clients by Market Segment 96-97**



- One of the most effective ways that IRAP establishes innovation system linkages is through its network of Industrial Technology Advisors (ITAs), 70% of whom directly work for over 125 different public and private organisations. IRAP provides SMEs, representing all sectors of Canada's economy, with access to relevant and current S&T information - it raises awareness of the other players in Canada's Innovation System, and shares knowledge about SME innovation needs with other players. IRAP's network of 240 ITAs spans some 85 cities across Canada in 160 office locations.
- In developing the Canadian Technology Network (CTN), there was close collaboration with Industry Canada and economic development organisations like Atlantic Canada Opportunities Agency (ACOA), Federal Office of Regional Development (Quebec) (FORD-Q), FedNor, Western Economic Diversification (WD), and Business Development Bank of Canada (BDC).
- The CTN's 500 member organisations offered firms more than 4,000 different kinds of assistance, including expertise, technology and specialised facilities and services.
- On average, CTN members transferred to its users some 65,000 kilobytes of information via 13,000 Internet site visits to the CTN website.

### **Spin-offs and start ups**

#### **Introduction of improved management tools**

#### **Introduction of entrepreneurial policies, practices**

*IRAP and CISTI promote entrepreneurial initiatives to enhance the transfer of NRC knowledge and technology in a manner that creates jobs and wealth in Canada. In 1996-97:*

- CISTI created a spin-off company, Toth Information Systems, to commercialise the CRYSTMET database and to provide software support in the development of complex S&T databases for commercial use. The company employed 5 people on a full and part time basis and is currently exporting its services to the Far East.
- CISTI in collaboration with NSI Inc., developed a new cost saving system, IntelliDoc, to transfer documents electronically in real-time.
- New entrepreneurial initiatives have streamlined costs for document reproductions in collaboration with Xerox Canada Inc.

---

## **BUSINESS LINE: Program Management**

Vision Elements: **Leadership and support to the Canadian System of Innovation Entrepreneurial initiatives to develop and transfer knowledge and technology**

### **Identification and implementation of key linkages with government, industry**

*NRC's Program Management functions provide support by developing key linkages with government and industry at a corporate level. In 1996-97:*

- NRC played a major role in launching the R&D Impact Network as a partnership between the federal government, the Canadian Research Management Association and the Conference Board of Canada;
- NRC continued to provide value-added services in the area of intellectual property management to other government organisations on a cost recovery basis.

### **NRC influence on industry/government innovation strategies**

*Integrating key players in Canada's system of innovation is one of NRC's core vision elements. One way of doing this is by strengthening the links across the Industry Portfolio and for member departments and agencies to act in concert on certain initiatives. NRC assumed a leadership role in establishing and institutionalising a portfolio approach to S&T activities among the Industry Portfolio members. In 1996-97:*

- NRC chaired the S&T Management Committee for the Industry Portfolio's (S&T MCIP) since its inception in January 1996. Its mandate is to anticipate, review and elaborate on strategic issues related to S&T for the Portfolio; develop priorities in advanced manufacturing technologies and information and telecommunications technologies; and ensure co-ordination of initiatives, communications and evaluation.
- NRC has co-chaired and spearheaded the Evaluation and Performance Group, an S&T MCIP sub-committee, which has produced a state-of-the-art S&T performance framework that is being considered for implementation both within the Portfolio and government-wide.
- NRC organised the Industry Portfolio Forum on Science and Technology, held in March 1997. The 120 council and board members of Portfolio organisations, and 100 Portfolio executives and senior managers who attended described the event as successful, an excellent example of portfolio co-ordination in action.
- NRC co-ordinated the writing and the production of *the Industry Portfolio S&T Progress Report* distributed at the Forum.

### **Progress of regional initiatives**

*One of the Vision to 2001 core elements involves NRC's leadership in Canada's System of Innovation, which recognises that innovation is largely a local phenomenon. NRC management, institutes, and IRAP combined their efforts to maximise the organisation's involvement in community innovation activities. The organisation made great strides during 1996-97 in helping communities across Canada focus their technology needs.*

- NRC is working directly with the provinces and municipalities to promote innovation and facilitate linkages with NRC's programs and institutes.

- In January 1997, NRC opened its Innovation Centre on the UBC campus, and released its action plan for BC, specifying the Centre's focus on wood products research, information technology and biosciences.
- The Western Medical Technologies Strategy was developed and announced by the federal and Manitoba governments on April 4th. The initiative is now moving into the implementation phase.
- Significant progress was made in the National Capital Region by fulfilling many technology-based commitments outlined in the December 1995 Action Plan developed by the Ottawa-Carleton Economic Development Corporation, the Ottawa Carleton Research Institute, and NRC, including the creation of a Regional Innovation Forum.
- NRC, in collaboration with universities and industry, assisted in the launching of a re-training program (O-Vitesse) to address the shortage of software scientists and engineers in the National Capital Region.
- NRC has been playing a lead role in two projects involving municipal, provincial and national partners, the Centre d'excellence en réhabilitation de sites de Montréal and the Technical Guide for Urban Infrastructure for Canada.

### **Introduction of entrepreneurial policies, practices**

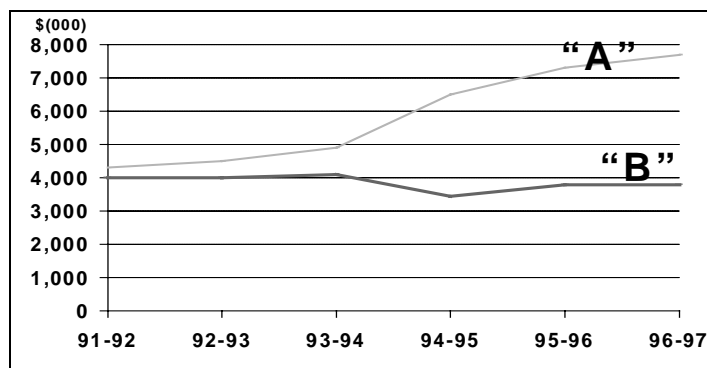
#### **Introduction of management tools, systems**

*In 1996-97, NRC made considerable headway with its entrepreneurship initiative. It revised corporate policies affecting entrepreneurship; created training and development tools for staff; revised incentive processes to encourage entrepreneurs; and began to investigate access to seed funding and venture capital opportunities for spin-off projects. For example:*

- The **Inventor and Innovator Award Program** was revised to allow staff who help develop and commercialise intellectual property to share royalty income with inventors.
- The **Entrepreneurship Lunch-time Speaker Series** was launched, featuring high-profile business leaders speaking on research and commercialisation issues.
- The **Industrial Partnership Award Program** was launched to recognise (via cash awards) staff who forge or participate in collaborative partnerships with industry.
- The **Entrepreneurship Leave** program was introduced, allowing leave for staff to start up their own businesses to commercialise technology.
- The **Industrial Secondment Program** was launched to encourage staff exchanges between NRC and industry.
- The **New Ventures Screening Board** was set up, comprised of NRC and industry representatives who will consider all spin-off proposals.
- A number of spin-off companies were created.
- An agreement was struck with the **Canadian Science and Technology Growth Fund** to provide easier access to venture capital for NRC spin-offs and other firms.

*In addition to fulfilling its corporate and administrative responsibilities, the Program Management business line also practices an entrepreneurial approach in its policy development and business practices. Taking a more aggressive, entrepreneurial approach to NRC's activities includes streamlining management practices and processes in order to generate cost efficiencies and improve effectiveness. The impacts of corporate actions during 1996-97 to refine various processes are demonstrated as follows:*

- Procurement costs throughout NRC have been substantially reduced through the increased use of acquisition cards, such as Mastercard. Under the old system, each procurement transaction cost \$125. Now, all transactions are electronically compiled and paid once a month, resulting in an annual cost avoidance of close to \$180,000.
- Through training in problem solving techniques and electronic tools, a team of employees has found a way to dramatically reduce NRC's shipping costs by: 20% on the cost per shipment; and 57% on the cost per hundred weight.
- The purchase of a corporate license for Netscape software has saved \$48,000. Similarly, the corporate licensing of Microsoft applications has saved the organisation well over \$400,000.
- Despite the fact that new programs in various research institutes need new equipment that use more electricity, NRC's energy costs have either been kept under control or reduced through conservation, use of efficient equipment and constant monitoring.



*“A” - Projected energy costs without cost reduction activities*

*“B” - Actual energy costs*

**Energy (Electricity, Gas and Oil) - Montreal Road Site**

## C. Key Reviews

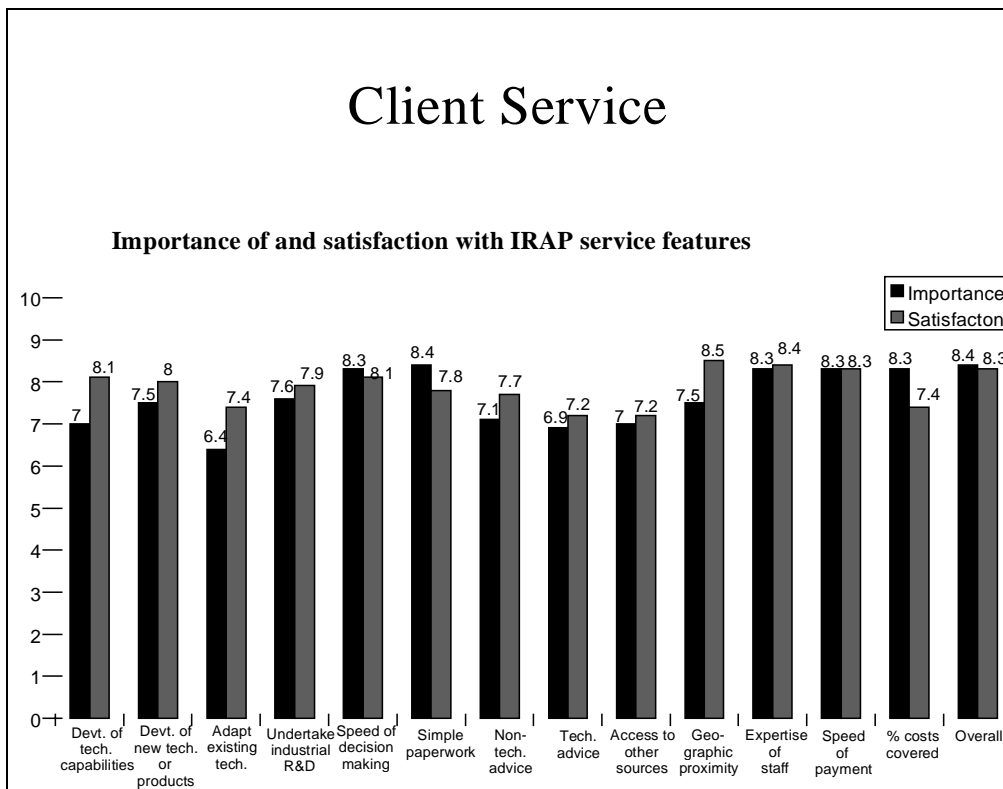
A major assessment of IRAP was completed in November 1996. Various aspects of IRAP's performance were probed.

Information on many program characteristics, including service standards and the impact of IRAP advice and funding assistance on clients' technical and commercial change, was gathered through a survey of 500 recent IRAP-funded clients.

The study indicated that IRAP's balanced approach to advice and funding is important to the performance of the program. Firms rated advice provided by IRAP to be important or very important to project

success, and over half (55%) rated advice at least equal in importance to funding. The incremental value of funding was also high, with 74% of projects having major difficulty or unable to proceed without IRAP financial assistance.

The following table presents a summary of funded project clients' ratings of the importance of and satisfaction with various IRAP service features. Key characteristics related to staff expertise, minimum bureaucracy, and development of firm capabilities, technology or products received ratings of 8 or over on a scale of 1-10.



**Weighted results, ratings of 1 - 10 with 10 being highest.**



---

The surveys provided evidence that IRAP is responsible for significant positive impact on firm performance. About 85% of clients of larger funded projects reported improved technical capabilities, and of those, 70% stated that IRAP was important or very important in achieving those changes. Similar results were reported with respect to firms' overall performance. Clients identified significant economic benefits linked to IRAP, with 82% reporting that increased export sales have occurred or will occur, and of those almost 60% reported that those sales were due "a lot to IRAP".

Overall, based on the information in the study and other relevant analysis such as

the 1995 study "Economic Impact Assessment of IRAP" by the Manitoba Bureau of Statistics and studies by Professor Richard Lipsey of Simon Fraser University, the Review Committee which directed the study reported that "there is clear evidence that IRAP continues to be successful in supporting Canadian small and medium establishments to become more innovative, technically capable and competitive". IRAP's success is due to its technical and innovation expertise, information available from IRAP and its network, and its focus on the firm.

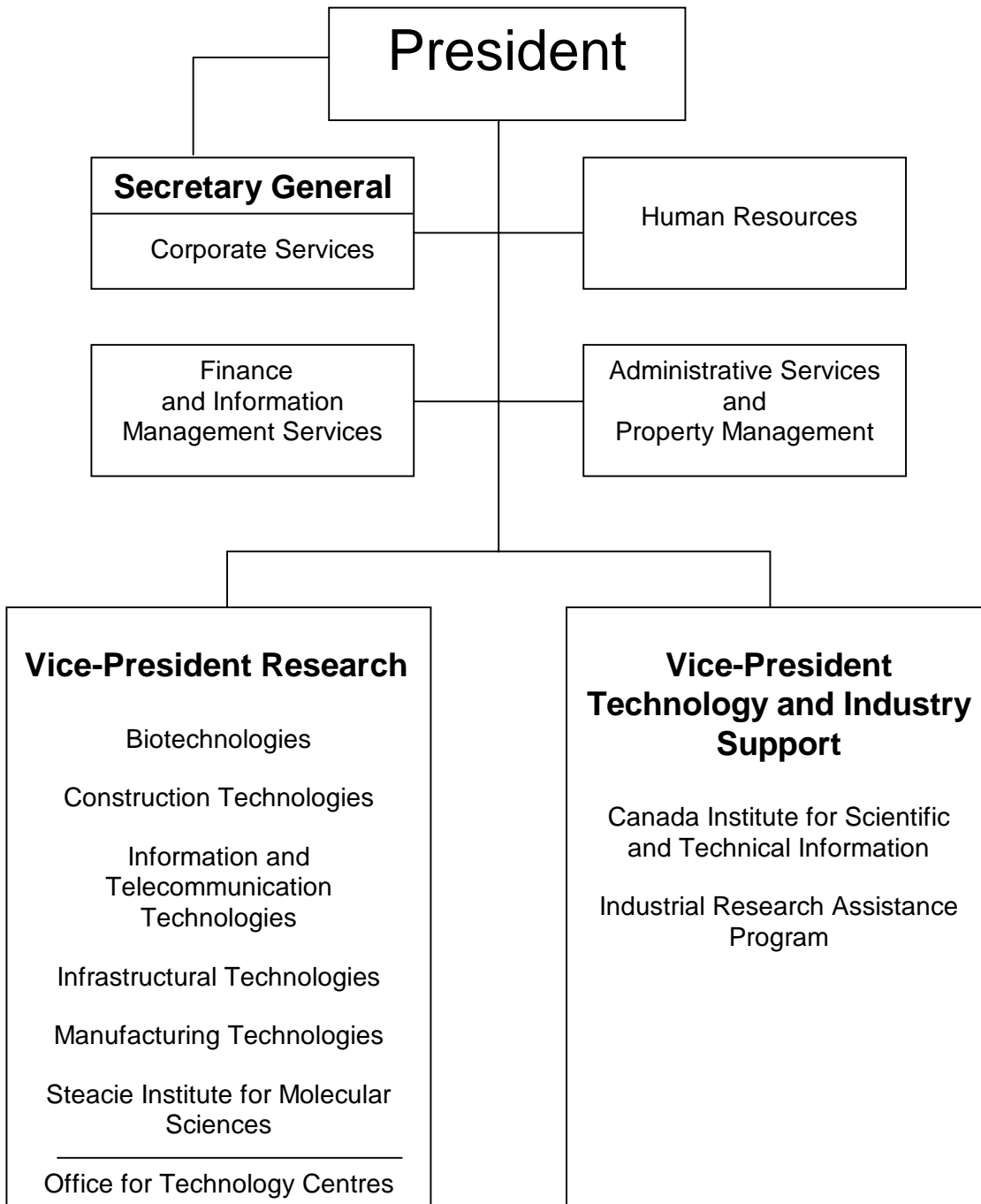
---

## **SECTION IV: SUPPLEMENTARY INFORMATION**

- A. Organisation Chart**
- B. Financial Summary Tables**
- C. Acts Administered in Whole or in Part by the National Research Council**
- D. Listing of Statutory and Council Reports**
- E. Contacts for Further Information**

---

**A. Organisation Chart, as at March 31, 1997**



---

## B. Financial Summary Tables

### Authorities for 1996-97 - Part II of the Estimates: Financial Requirements by Authority

Vote	(millions of dollars)	1996-97	1996-97
		Main Estimates	Actual
<b>National Research Council Program</b>			
80	Operating Expenditures	227.0	221.9
85	Capital Expenditures	45.5	43.2
90	Grants and Contributions	112.8	129.4
(S)	Contributions to Employee Benefit Plans	22.4	23.3
Total		407.8	417.8

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

## Resource Requirements by Organisation and Business Line

Comparison of Total Planned Spending to Actual Expenditures 1996-97 by Organisation and Business Line (\$ millions)				
Organisation	Business Lines			Totals
	National Research and Development	Support for the National Science and Technology Infrastructure	Program Management	
Research Institutes	263.8			263.8
	254.5			254.5
Industrial Research Assistance Program		96.1		96.1
		97.9		97.9
Canada Institute for Scientific and Technical Information		31.8		31.8
		35.1		35.1
Corporate Branches			44.8	44.8
			55.3	55.3
Executive Offices			9.1	9.1
			12.6	12.6
<b>TOTALS</b>	263.8	127.9	53.9	445.6
	254.5	133.0	68.0	455.4
<b>% of TOTAL</b>	59.2%	28.7%	12.1%	100.0%
	55.9%	29.2%	14.9%	100.0%

Note: Due to rounding, figures may not add to total shown.  
Shaded numbers denote actual expenditures in 1996-97.

### Revenues by Business Line

<b>(\$ millions)</b>					
Business Line	Actual 1993-94	Actual 1994-95	Actual 1995-96	Total Planned 1996-97	Actual 1996-97
<b>Revenue credited to the Vote (Actual for 1993-94 &amp; 1994-95, Total Planned for 1996-97) Spending of Revenues Pursuant to the NRC Act (Actual for 1995-96 &amp; 1996-97)</b>					
National Research and Development	16.2	21.1	14.8	22.8	25.4
Support for the National Science and Technology Infrastructure	11.1	11.2	12.3	12.8	9.4
Program Management	6.7	2.8	2.7	2.2	2.9
<b>Total Revenues</b>	<b>34.0</b>	<b>35.1</b>	<b>29.8</b>	<b>37.8</b>	<b>37.7</b>

### Capital Projects by Business Line

<b>(\$ millions)</b>					
Business Line	Actual 1993-94	Actual 1994-95	Actual 1995-96	Total Planned 1996-97	Actual 1996-97
National Research and Development	30.1	34.1	27.1	39.2	32.3
Support for the National Science and Technology Infrastructure	1.8	1.2	0.4		1.1
Program Management	18.5	14.3	9.4	6.2	9.8
<b>Total Capital Projects</b>	<b>50.4</b>	<b>49.6</b>	<b>36.9</b>	<b>45.5</b>	<b>43.2</b>

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

### Transfer Payments by Business Line

<b>(\$ millions)</b>					
Business Line	Actual 1993-94	Actual 1994-95	Actual 1995-96	Total Planned 1996-97	Actual 1996-97
<b>GRANTS</b>					
Program Management	5.0	5.2	5.2	5.2	5.1
<b>Total Grants</b>	5.0	5.2	5.2	5.2	5.1
<b>CONTRIBUTIONS</b>					
National Research and Development	44.0	50.2	43.6	25.8	41.5
Support for the National Science and Technology Infrastructure	68.4	76.2	79.2	81.9	82.8
<b>Total Contributions</b>	112.4	126.4	122.8	107.7	124.3
<b>Total Transfer Payments</b>	117.4	131.6	128.0	112.9	129.4

*Note: The increase between actual and planned spending in 1996-97 is the result of additional expenditures for TRIUMF and Gemini Telescopes.*

### Contingent Liabilities (\$ millions)

List of Contingent Liabilities	Current Amount of Contingent Liability
1. Breach of Contracts	12.9
2. Breach of Confidence	*
3. Claim for Damages	1.5
4. Claim for Damages	0.9
5. Claim for Damages	*
6. Claim for Return of Deposit and Damages	0.2
<b>TOTAL</b>	15.5

\* Claim amount not specified.

---

## **C. Acts Administered in Whole or in Part by the National Research Council**

The National Research Council is responsible for administering the *National Research Council Act*. The latest revision to the NRC Act is R.S.C. 1985, c. N-15 (never amended).

NRC has responsibility for calibration and certification of standards of measurement under the *Weights and Measures Act*, and also provides technical support to the Canadian Commission on Building and Fire Codes.

The *Atomic Energy Control Act* makes provision for the Atomic Energy Control Board to establish a granting program through NRC, but this possibility is not currently a practice.

## **D. Listing of Statutory and Council Reports**

Annual Report 1996-1997

Vision Update 1997

Assessment of the Industrial Research Assistance Program - November 1996

## **E. Contacts for Further Information**

Jack Smith  
Manager, Planning and Assessment  
Corporate Services  
National Research Council Canada  
Montreal Road  
Ottawa, Ontario  
K1A 0R6  
Phone: (613) 993-7496  
e-mail: jack.smith@nrc.ca

Christiane Pagé  
Manager, Public and International Relations  
Corporate Services  
National Research Council  
Montreal Road, Ottawa  
K1A 0R6  
Phone: (613) 993-4806  
e-mail: christiane.page@nrc.ca