NRC·CNRC

Science and innovation at work for Canada

Annual Report 2015-16

National Research Council Canada
Conseil national de recherches Canada

Canada

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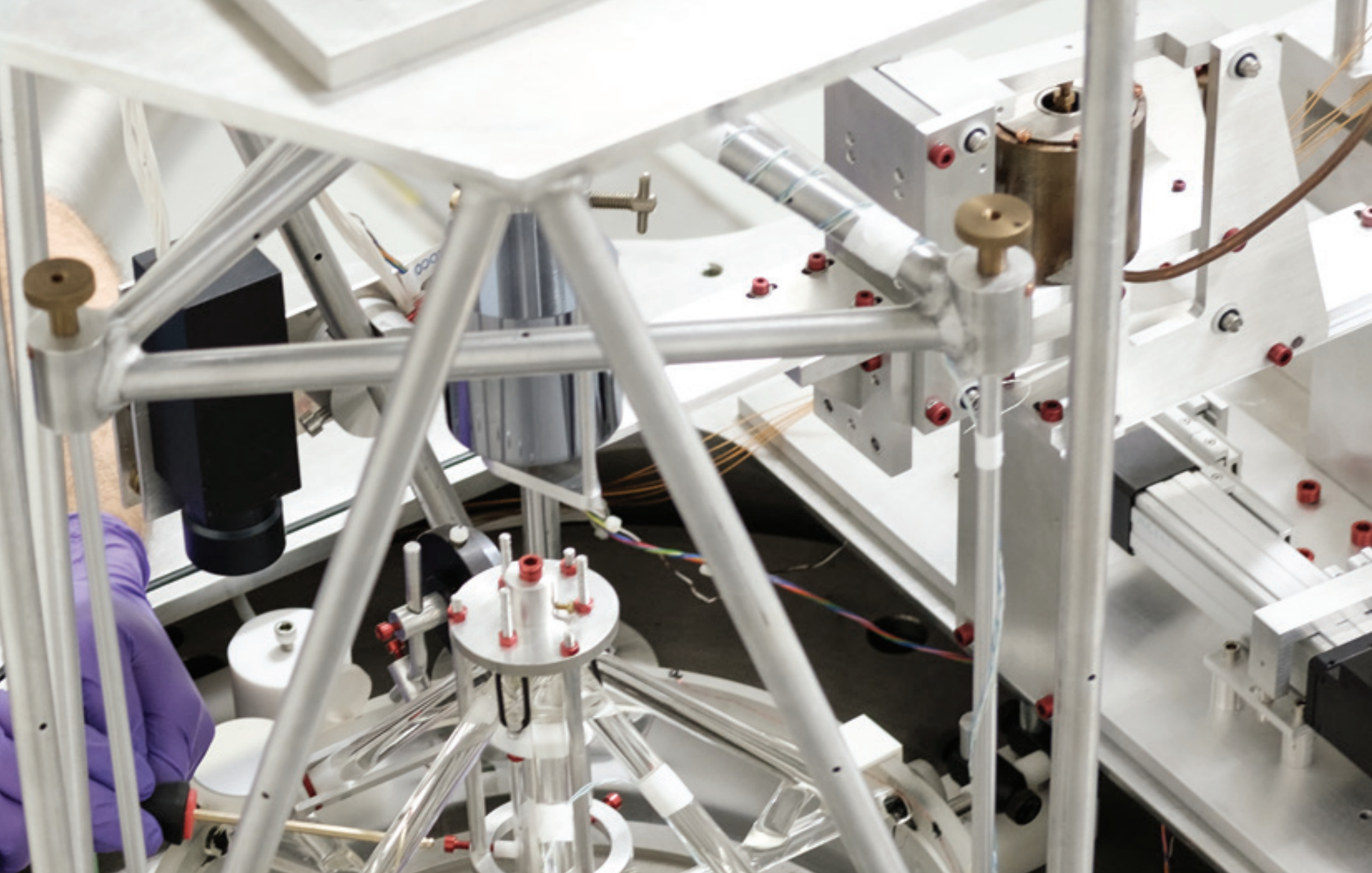

President's message

Upholding NRC's legacy as Canada's leading catalyst for science, technology and innovation

NRC's leadership in science excellence, technology development and industrial innovation has been shaped by a century of historic scientific breakthroughs and research achievements improving the lives of people around the world. Throughout its history, NRC has remained dynamic, evolving in step with Canada's innovation ecosystem and addressing the country's most important scientific challenges.

As a national organization, our breadth of expertise spans a wide variety of scientific fields and industrial sectors. In turn, this enables NRC to play an integral role in establishing and leveraging collaborative relationships that bridge the gap between research, technology deployment and commercialization.

This year's national and international achievements include: completing our Mid-rise Wood Buildings program, which contributed to potentially creating a new $1-billion market for innovative wood construction products as a result of its support in overcoming barriers to improve the performance and safety of mid-rise wood construction; working with KalGene Pharmaceuticals to optimize a technology licensed to them in 2014 with an NRC-developed therapeutic molecule disease that is showing promise to develop into a drug to fight Alzheimer's disease; enabling the world's first pilot-scale production of boron-nitride nanotubes, a breakthrough that positions Canada as the leading producer of this advanced material which combines ultra-high strength and unique electronic properties with versatile manufacturability.

NRC continues to expand its relationships with key partners nationally and internationally to enhance the support it delivers to Canadian clients. NRC's Industrial Research Assistance Program (NRC-IRAP) exceeded its targets for 2015-2016, providing financial contributions to nearly 2,500 small, innovative Canadian firms and supporting almost 11,000 Canadian jobs in the process.

Investing in the future, NRC and Canada's national laboratory for particle and nuclear physics and accelerator-based science (TRIUMF) signed a new contribution agreement to support the laboratory's Five-Year Plan: 2015–20. This agreement provides $269.5M in operational funding over this period to further advance leading-edge academic and applied research in particle and nuclear physics, materials science, nuclear medicine, and accelerator-based sciences.

NRC's scientific knowledge, technical expertise and innovation capacity uniquely position us to undertake, assist and promote scientific and industrial research in fields of national importance to Canada. As we look back to these achievements, it is important to acknowledge the leadership contributions of John McDougall during his tenure as President. Looking to the future, NRC's focus will remain on collaborating with industry, academia and other government organizations, and conducting an internal assessment on how it can play a leadership role in the advancement of the Government of Canada's Innovation Agenda.

NRC can be depended on to continue delivering on Canada's needs of tomorrow by making sound R&D investments today – helping to build a prosperous and innovative country for another 100 years.

Iain Stewart
President

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NRC Values

Our commitment to shaping Canada's future is anchored in the knowledge that what we do matters. For nearly 100 years, the work we have accomplished for Canada has been diverse, exciting, and challenging. We succeed at delivering creative solutions to clients and partners because our multi-disciplinary approach to problem solving is rooted in shared values that guide our operations.

Impact

We make a positive difference for our stakeholders.

Accountability

We are responsible for our work and our workplace.

Leadership

We value leadership, initiative and the application of best practices in our work.

Integrity

We engage fairly and openly to earn credibility and trust.

Collaboration

We actively collaborate to engage vital knowledge and expertise and to generate better, more efficient solutions.

The four pillars of NRC's success

NRC builds on its strengths by building strong relationships with clients and partners. These types of relationships are forged around NRC's four business lines: strategic research and development; technical and advisory services; scientific infrastructure and NRC's renowned Industrial Research and Development Program (IRAP).

Strategic research and development

NRC helps industry and government tackle strategic national priorities through mission-oriented research and technology development. NRC's programs focus on issues of strategic importance to Canada and showcase NRC's unique value proposition to deliver high impacts within a specified timeframe. These programs are implemented to address the technology needs of existing and emerging sectors and deliver economical and immediately applicable solutions to technical and business challenges affecting the competitiveness of Canadian industry.

Technical and advisory services

NRC delivers technical services that help small and large enterprises overcome workforce constraints and limited resources, accelerate design cycles and identify product performance limits. Experienced on-site professionals help our clients solve immediate technical problems associated with the transfer, adoption and diffusion of technology. Our specialized services range from testing and certifications to calibration, prototyping, demonstrations, scale-up and consulting.

Industrial Research Assistance Program (IRAP)

IRAP provides technology assistance to small and medium-sized enterprises (SMEs), at all stages of the innovation process, to build their innovation capacity and successfully take their ideas to market. Through IRAP's comprehensive services, Canada's SMEs are better equipped to perform research and development, commercialize new products, processes and services, and access new domestic and international markets.

Scientific infrastructure

In locations across Canada, NRC offers Canadian businesses access to unique research facilities as well as the experts to optimize their use. These facilities and the accompanying expertise allow innovative businesses to pursue blue sky R&D opportunities here in Canada, while lowering the risks associated with R&D and accelerating product development. Users of these facilities come from a multitude of diverse fields, including aerospace engineering and manufacturing, astronomy, high-throughput DNA sequencing, photonics, biotechnology and nanotechnology – to name just a few.

Research divisions

NRC has three integrated research and development (R&D) divisions, each with consolidated portfolios that focus on key sectors. The sectors represent areas of economic or scientific value for Canada, in which NRC's capabilities can have a significant impact. This structure allows NRC to easily assemble cross-disciplinary teams in order to quickly respond to emerging markets and industry needs.

Emerging Technologies

The Emerging Technologies division understands, anticipates and builds capacity to address emerging markets essential to Canada's future needs. The division also supports mandated activities in astronomy and metrology for Canada.

Portfolios

- Information and Communications Technologies
- Measurement Science and Standards
- NRC Herzberg Astronomy and Astrophysics
- Security and Disruptive Technologies

Engineering

The Engineering division offers engineering solutions for sector-based industrial growth in Canada.

Portfolios

- Aerospace
- Automotive and Surface Transportation
- Construction
- Energy, Mining and Environment
- Ocean, Coastal and River Engineering

Life Sciences

The Life Sciences division applies technologies to market opportunities that address such issues as aging populations and sustainability.

Portfolios

- Aquatic and Crop Resource Development
- Human Health Therapeutics
- Medical Devices

Research programs

NRC's programs are flexible but finite, designed to draw upon resources from across the organization to meet identified market needs. This means that NRC is constantly renewing and updating its R&D investments to remain in step with what matters most to Canada.

Our programs are market-driven and multi-disciplinary, with a critical mass of expertise and resources to address client needs and achieve desired outcomes. They are managed to ensure that they achieve clearly-defined value propositions, and are continually evaluated and adjusted accordingly. They are expected to deliver economically viable and near-market-ready solutions to technical and productivity challenges for Canada.

Our programs

Emerging Technologies

- Advanced Photonic Components
- Astronomy Technology
- Gallium Nitride (GaN) Electronics*
- Learning and Performance Support Systems
- Measurement Science for Emerging Technologies
- Metrology for Industry and Society
- Multimedia Analytic Tools for Security
- National Institute for Nanotechnology
- Optical Astronomy
- Printable Electronics
- Quantum Photonic Sensing and Security
- Radio Astronomy
- Scientific Support for the National Measurement System
- Security Materials Technologies

Engineering

- Advanced Manufacturing and Design Systems
- Aeronautical Product Development Technologies
- Aeronautics for the 21st Century*
- Air Defence Systems
- Arctic
- Bioenergy Systems for Viable Stationary Applications
- Building Regulations for Market Access
- Civilian Unmanned Aircraft Systems
- Critical Concrete Infrastructure*
- Energy Storage for Grid Security and Modernization
- Fleet Forward 2020
- High-efficiency Mining
- High-performance Buildings
- Industrial Biomaterials*
- Lightweighting of Ground Transportation Vehicles
- Mid-rise Wood Buildings*
- Marine Infrastructure, Energy and Water Resources
- Marine Vehicles
- Rail Vehicle and Track Optimization
- Reducing Aviation Icing Risk
- Vehicle Propulsion Technologies
- Working and Travelling on Aircraft

Life Sciences

- Algal Carbon Conversion
- Bio-based Specialty Chemicals
- Biologics and Biomanufacturing
- Canadian Wheat Improvement
- Health Technologies
- Natural Health Products*
- Therapeutics Beyond Brain Barriers
- Vaccines and Immunotherapeutics

*Programs have either been completed or merged into other programs.

Spotlight on success

NRC's Mid-rise Wood Buildings program (MRWB) successfully achieved its strategic objectives two years ahead of schedule.

By combining the efforts of NRC's experts in building codes and construction R&D, the MRWB program played a critical role in potentially creating a new $1-billion market for innovative wood construction products. The program supported the adoption of mid-rise wood building provisions in the National Building Code of Canada, allowing new applications for Canadian forest products and providing Canadian municipalities with a cost-effective solution to urban densification challenges. In helping industry to overcome technical barriers to improve the performance and safety of mid-rise wood construction, the program helped to create jobs in Canada's construction and forest products industries, and has enabled new lower-cost housing options for Canadian middle-class families.

The program overcame barriers to developing this new market by providing industry and government with the technical information they needed to advocate for the inclusion of mid-rise wood buildings in national and provincial building codes. NRC experts conducted full-scale tests and evaluations on wood buildings in three technical areas: acoustics, building envelope, and fire safety. Information from these tests gave industry, government and regulators the confidence that mid-rise wood buildings would meet building code requirements for performance and safety.

To achieve this success, the program combined three essential strategies:

1. Strong collaboration with and support from industry and government stakeholders to improve the use of Canada's forest resources.

2. Open consultation with public safety stakeholders (e.g. fire services, provincial housing departments) to preserve the safety of building occupants, as well as competing non-wood industries.

3. Reliance on NRC's role as a trusted, independent advisor on construction research and technology.

Innovation through collaboration

Over the last century NRC has set the standard in science, technology and innovation. Today, NRC's role is to spur economic prosperity and develop solutions to meet Canada's current and future industrial and societal needs. To fulfill this role, NRC depends upon an integrated approach and the coordination of efforts across the innovation spectrum, from all layers of government, industry, non-governmental organizations (NGO) and academia.

Collaboration is at the heart of NRC's approach to tackling technological challenges. NRC's multidisciplinary teams actively collaborate to engage vital knowledge and expertise, and to generate better, more efficient solutions.

As part of NRC's mandate to manage the National Science Library, NRC launched the Federal Science Library in March 2016. Carried out in partnership with five other science-based agencies and departments, this initiative provides a single online discovery and access portal for scientific and technical information services. The Federal Science Library will ensure that all science, technology, and medical professionals in the federal government have desktop access to the information they need to work efficiently and productively.

Throughout 2015-16 NRC participated in a number of strategic partnerships with innovation players to develop and deploy solutions to technological challenges. As an example, NRC partnered with the Department of National Defence (DND) and implemented cutting-edge bioremediation technologies to clean up diesel fuel spills at Canadian Forces Station (CFS) Alert.

Through the Algal Carbon Conversion program, NRC partnered with Pond Technologies (formerly Pond Biofuels Inc.) and St Marys Cement on a joint biorefinery to recycle industrial carbon dioxide (CO_2) emissions into algal biomass, renewable biofuels, and other value-added products. The program supports the deployment of algal biorefinery facilities that we anticipate may divert up to 20 per cent of Canadian carbon dioxide emissions from large final emitters by 2060.

The Canadian Wheat Improvement program serves as NRC's contribution to the Canadian Wheat Alliance[1] (CWA), which is improving the yield production, sustainability, and profitability of Canadian wheat for the benefit of farmers and the economy. NRC collaborates with partners such as Syngenta and KWS in the areas of double haploid technologies and works closely with national and international organizations to contribute to the CWA's success.

The strength of these collaboration arrangements is rooted in NRC's drive to push the boundaries that ignite the research and development cycle at various stages of the innovation chain.

[1] Canadian Wheat Alliance, canadianwheatalliance.ca

Impact based on tangible outcome

NRC works to help Canadian businesses stand shoulder to shoulder with some of the world's most innovative companies. We measure our impact based on our relevance to clients and the outcomes for Canada, such as enhanced productivity, more high-quality jobs, additional sales of technology-based products, increased business expenditures on R&D in strategically important areas, and greater scientific contributions from Canada to the world stage.

A healthy future for plant-based omega oils

Growing the demand for a new fish oil alternative

An affordable and sustainable alternative to fish oil, Ahiflower® oil is a game changer in the nutritional oil market. PEI-based Nature's Crops International (NCI) produces this plant-based omega-3 rich dietary oil. To enter the market with this novel trademarked ingredient safely, legally, and responsibly, NCI turned to NRC.

NRC's research team undertook the foundational work needed to validate Ahiflower oil's purity, thereby confirming the oil's ability to provide an optimal daily intake of omega-3+6+9 oils without sacrificing flavour or convenience. Together, NCI and NRC were then able to create a unique and proprietary production method to be used at NCI's refinery.

In the USA, any new food substance must go through a pre-market review by the Food and Drug Administration (FDA) to ensure that it is generally recognized as safe. NRC provided scientific methods that supported the high purity of the oil and which facilitated the FDA review process. This same data also supported Ahiflower oil's recent successful EU Novel Foods status in July 2015. Ahiflower oil is now on the shelves in the USA and EU, while NCI and its Canadian co-branding partners are preparing for Health Canada approvals, with plans to have their product available in Canada by early 2017.

> *"Having the Canadian government-affiliated status and technical acumen of NRC located near our refinery meant that Ahiflower oil could be launched in a timely manner."*
>
> – Steve Howatt,
> Senior Vice President, NCI

Cross-border flooding makes waves in the Prairies

Advanced computer modeling helps to part the waters

North Dakota's spring thaw waters near Manitoba's Pembina River Basin and short-term management efforts have caused contention on both sides of the Canada-U.S. border.

The Canada-U.S. International Joint Commission (IJC) decided to pursue a more advanced and long-term flood management solution, and reached out to NRC and its flood modeling experts.

Using carefully prepared simulations combined with real-world data, NRC's advanced modeling tool proved essential in providing accurate visual depictions of water levels, flow directions and flood extent over the entire Pembina basin, thereby providing the foundation for a long-term flood management solution.

> *"We depend on NRC as a credible, authoritative partner."*
>
> – Glenn Benoy,
> Senior Water Quality and Ecosystem Adviser,
> IJC Canadian Section

Greater scientific contributions on the world stage

Setting the bar for calibration and measurement capabilities

NRC's Measurement Science and Standards (MSS) served 826 clients and 621 of its calibration and measurement capabilities were formally recognized internationally. This work forms the measurement basis for all Canadian exports and receives strong industry support. 2015-16 saw the launch of 15 completely new certified reference

materials (CRM) used to check and validate measurements methods in seafood safety, water quality testing, environmental testing, nutritional supplements, and stable isotope verification. MSS also contributed 48 scientific papers to the metrology literature, and 3221 calibration and other reports to contribute to Canada's knowledge-based economy.

Exploring new horizons in space

Setting a course to Pluto

On July 14, 2015, following a nine-year trek, NASA's New Horizons spacecraft successfully completed its planetary flyby of Pluto to collect data and take pictures that may hold important clues to the early development of the solar system.

Photo: NASA

As Canada's leader in astronomy research, NRC supported this important exploratory mission by providing highly calibrated data collected through the Canada-France-Hawaii Telescope (CFHT) and its MegaPrime camera.

Mission managers relied on the accuracy of the data captured by the MegaPrime camera to help the spacecraft avoid a risk of collision with hazards during its approach.

Given the mission's reliance on astronomical data, NRC will continue to use the precision data from the CFHT to assist with the modeling and calibration required to find and characterize a second solar body suitable for the spacecraft's next encounter expected in 2018-19.

> *"National Research Council of Canada scientists used data collected from the Canada-France-Hawaii Telescope (CFHT) to assemble a detailed navigational star map for the mission, which was used by the Navigation and Hazards teams to keep the spacecraft on-course and safe from harm."*
>
> – @ptalbert https://blogs.nasa.gov/pluto/2016/07/01/from-canada-to-pluto-and-beyond/

Anti-vibration cushion provides smooth flight for aerospace industry

Cushioning the impact of flight vibrations

Military and civilian aircrew routinely fly long hours, often in an environment of relentless jolting and shaking that can cause fatigue and discomfort.

To address these health and safety risks, the Department of National Defence enlisted the assistance of NRC, which has been studying the cause and effects of noise and vibration for more than fifteen years.

The research led to an innovative seat cushion design that integrates traditional foam with a material that dissipates vibrational energy. Initially developed for military use, the seat is now licensed for the commercial helicopter market.

> *"NRC's expertise has been crucial for us to move this valuable technology from the conception stage to market."*
>
> – Peggy McDonald,
> Sales Executive, Dart Aerospace

Delivering on our promise

224 Patents filed

162 Patents issued

NRC delivers on its promise to clients to provide leading-edge and responsive solutions. By helping our clients with our multi-disciplinary capabilities, we are able to play an important role in strengthening Canada's innovation landscape.

We helped our clients in many ways this year, especially in increasing their knowledge and ability to plan and execute research and development, and in accelerating the development of their technologies.

Overall, 92% of clients were satisfied with NRC's services, and 86% of clients state that NRC has an important impact on the future of their business (a 12% bump from the previous year).

Source: Intellectual Property Summary 2015-16

Why clients chose NRC

72% Recognized scientific knowledge

60% Past experience with us

53% Trusted research and testing methods

41% Our reputation

33% Most comprehensive solution

24% Common strategic objectives

18% Price

Revenue by type

45% Service contract

41% Collaborative research project

34% Testing services (fee-for-service)

14% Advice and knowledge transfer

11% Facilities rental

9% Other

7% Technology or software licenses

How NRC helped clients

53% Increased knowledge/ability to plan and execute research and development (R&D)

46% Increased R&D expenditures

34% Improved product/service

28% Accelerated technology development

27% Increased competitive advantage

20% Launched new product/service

19% Increased valuation

12% Created new jobs

Note: Respondents could choose more than one answer.
Source: 2015-16 NRC Client satisfaction survey.

Industrial Research Assistance Program

70 years of propelling Canadian SMEs towards greater prosperity.

Nearly 2,500 firms were funded through IRAP. That's a total of almost **3,000 projects** supporting some **11,000 jobs**.

Accelerating the growth and prosperity of Canada's SMEs through innovation and technology.

One of NRC's four pillars of success is accelerating the growth of Canada's small and medium-sized enterprises (SMEs) through its Industrial Research Assistance Program (IRAP).

A cornerstone of Canada's innovation system, IRAP offers a comprehensive suite of services and funding tailor-made to respond to the challenges faced by this vitally important sector. With offices in each province – a total of 120 service locations across Canada – IRAP's network of 255 Industrial Technology Advisors are available to take the most promising Canadian SMEs to the next level.

Since its inception 70 years ago, the program has generated thousands of success stories, demonstrating the impact of "just-in-time" support and resulting benefits to the Canadian economy: increased revenues, increased employment, increased profits, and new jobs and expenditures in research and development (R&D). In 2015-16, nearly 2,500 firms were funded through IRAP contributions for a total of almost 3,000 projects, supporting some 11,000 jobs.

It is results like these that have led NRC to become recognized for delivering Canada's premier industrial assistance program renown globally as one of the best programs of its kind. IRAP continues to improve the capacity and competitiveness of Canadian industry by fostering innovation through the adoption and/or commercialization of technology-based and market-driven products, services and processes, broadening the horizons of talented entrepreneurs and stimulating innovation.

“NRC-IRAP’s financial support and advice allowed us to accelerate R&D and our product commercialization. As a result, our staff increased their technical knowledge, and we quickly positioned ourselves as the leader in social media management. We were then able to hire more employees and push the company to further its innovation capabilities.”

– Simon Stanlake,
VP Technology,
Hootsuite

Joining forces to extend lifespan of cathodic plates

Faced with the need for frequent part replacement and the rising cost of aluminum, Quebec-based Soudures J.M. Tremblay (SJMT) was determined to find a cost-effective way to extend the life of their cathodic plates. Used in the mining industry, these plates are essential to electroextraction operations when separating zinc from a liquid solution of the ore.

SJMT turned to NRC to explore an eco-friendly solution known as friction stir welding (FSW). While global robotic FSW research has typically been limited to a lab environment, NRC's new control technologies offered SJMT an opportunity to deploy a 3D solution directly to the production floor. Seeing an opportunity

for SJMT to grow, NRC linked the company with its Industrial Research Assistance Program (IRAP), where they were able to receive financial support and business advice from industrial technology advisors, including one with extensive experience in the welding field.

In November 2015, following five years of research, development and testing, the very first robotic friction stir welding (FSW) cell in production in Canada was unveiled. This innovation has enabled SJMT to greatly increase its production efficiency and capacity. Having quickly moved from the initial lab concept to the manufacturing floor, the technology has already attracted the attention of the mining, transportation and aerospace sectors, helping to galvanize support for further research and development in the future.

> *"The technical and financial support from NRC has allowed us to grow and further develop our business."*
>
> – Gail Comeau,
> Project Manager, SJMT

Funding, experts and resources help to launch product

The rise in popularity of K-cups has resulted in major problems for the environment, as the plastic, non-compostable coffee pods inevitably end up in the garbage dump.

Thanks to the Government of Canada's Concierge Service, NRC was introduced to G-PAK Technology Inc. The company was able to access funds through IRAP and fully commercialize its idea for a compostable coffee pod for "K-Cup" coffee makers.

G-PAK successfully applied for IRAP funding and received support through the Youth Employment Program, which allowed the company to bring in skilled graduates to help with the prototyping of their product

Photo: G-PAK

as well as developing a market strategy. In parallel, NRC linked the company with one if its Industrial Technology Advisors (ITA) who was able to provide advice and make helpful referrals.

G-PAK's hard work eventually paid off when, in December 2015, it launched a 100% compostable single-serve coffee pod, made entirely from readily renewable material.

> *"The referrals from Concierge to NRC's IRAP made all the difference. It connected us to the right people and the right programs and helped us take advantage of the relevant innovation resources the government had to offer."*
>
> – Darren Footz,
> President, G-PAK

Helping businesses succeed globally

One of the ways NRC strengthens Canadian innovation and expertise is through the establishment and growth of strategic global partnerships. The effects of active international engagement are far-reaching, benefiting industry, researchers, and organizations alike by opening doors to real-time opportunities and potential future collaborations.

In 2015-16, NRC strengthened its international network by securing new relationships with China, India and Brazil. Under the Canadian International Innovation Program (CIIP), Canadian companies can access support and funding to pursue collaborative industrial R&D projects with innovators in these important economies. A first call for proposals, with India, was launched in March 2016, followed by calls for China and Brazil in the summer of 2016.

Delivered in collaboration with Global Affairs Canada, CIIP fosters and supports collaborative industrial research and development projects with high potential for commercialization between Canada and partner countries. It also stimulates bilateral science and technology networking and matchmaking activities to further new partnerships and accelerate the commercialization of research and development.

Services to Canadian SMEs include

Accessing intelligence on technology and markets.

Identifying credible partners via the Trade Commissioner Service network.

Accessing new markets through technology partnering.

Leveraging investment to de-risk R&D projects that support the commercialization of Canadian technology.

Helping to reduce market entry risk as well as the costs associated with technology adaptation, technology co-development and technology validation.

In 2014-15, NRC renewed Canada's associate membership in EUREKA – an intergovernmental and transnational network for market-driven industrial research and development across 41 member states, including the European Union (represented by the European Commission) and the associated states of South Africa and South Korea. With its flexible and decentralized approach, EUREKA gives Canadian innovators rapid access to skills, expertise and facilities across Europe and beyond, in addition to access to public and private funding schemes. Twenty-nine of Canada's submitted project proposals were approved in 2015-16 – an increase over the 25 proposals approved during the previous fiscal year. Canada ranked fourth among EUREKA member nations in both Network and Cluster projects in 2015-16.

EUREKA serves as a catalyst, providing Canadian innovators with the support and contacts required to develop viable new products, services or processes through transnational collaborations.

EUREKA also gives Canadian industry a competitive advantage, providing companies with critical access to:

- global value chains;
- key foreign markets; and
- the potential for greater capital.

For small and medium-sized enterprises (SMEs) in particular, the potential to collaborate on the development of products, processes and services with like-minded counterparts in other countries, represents an opportunity to "de-risk" their research and development pursuits through specialized knowledge, technology and facilities.

Did you know?

Interesting facts about EUREKA

The **largest network of its kind** in the world, EUREKA promotes innovation across borders.

EUREKA has **41 full member countries** and three associated members: South Korea, Canada, and South Africa. It also includes the European Union.

Since its inception 30 years ago, EUREKA has supported more than **5,900 projects** worth over **$54 billion dollars**. These projects achieved an **88% success** rate and involved **9,500 SMEs**.

Canada's success in EUREKA

Since Canada joined EUREKA in 2012, our country's rate of **approved proposals has grown quickly**, demonstrating the value of Canadian contributions.

In **less than four years**, Canada has received approval for **53 network projects valued at $77 million dollars**.

Collaborative projects underway involve **76 Canadian SMEs, 3 large firms** and **5 universities**, with partners from Finland, France, Germany, Israel, South Korea, Spain, Sweden, Switzerland, Turkey and the United Kingdom, among others.

NRC's leadership

Council Members
(2015-2016)

John R. McDougall (President)

Maria Aubrey (Acting President)

Thomas (Tom) Jenkins (Chair)

Carolyn Cross

Karimah Es Sabar

Nannette de Gaspé Beaubien

Maurice Guitton

Jay Josefo

Raymond Leduc

Stephen Mooney

Lois Scott

Peter Vanexan

Senior Executive Committee
(2015-2016)

John R. McDougall,
President

Maria Aubrey,
Acting President

Pam Bjornson,
Acting Vice-President, Business and Professional Services

Bogdan Ciobanu,
Vice-President, Industrial Research Assistance Program (IRAP)

Isabelle Gingras,
Vice-President, Human Resources

Michel Piché,
Vice-President, Corporate Management and Chief Financial Officer

Dr. Ian Potter,
Vice-President, Engineering

Dr. Roman Szumski,
Vice-President, Life Sciences

Dr. Dan Wayner,
Vice-President, Emerging Technologies

Financials

Maria J. Aubrey
President (Acting)

Ottawa, Canada
June 29, 2016

Michel Piché,
M.P.A.,CPA, CMA, CIA
Vice-President,
Corporate Management
and Chief Financial Officer

National Research Council Canada

Consolidated Statement of Financial Position

As at March 31

(in thousands of dollars)

	2016	2015
FINANCIAL ASSETS		
Due from Consolidated Revenue Fund	282,505	315,929
Accounts receivable	51,167	36,754
Inventory for resale	5,274	3,877
Cash and investments	9,497	3,099
Total gross financial assets	**348,443**	**359,659**
Financial assets held on behalf of Government		
Accounts receivable	(90)	(68)
Total financial assets held on behalf of Government	**(90)**	**(68)**
Total net financial assets	**348,353**	**359,591**
LIABILITIES		
Accounts payable and accrued liabilities	168,395	178,698
Vacation pay and compensatory leave	27,911	28,883
Lease inducements	35,302	37,850
Deferred revenue	9,010	9,136
Employee future benefits	34,553	36,446
Total liabilities	**275,171**	**291,013**
Departmental net financial assets	**73,182**	**68,578**
NON-FINANCIAL ASSETS		
Prepaid expenses	11,257	9,631
Endowment fund investments	5,070	5,006
Inventory for consumption	6,107	4,014
Tangible capital assets	532,651	512,941
Total non-financial assets	**555,085**	**531,592**
Departmental net financial position	**628,267**	**600,170**

The financial statements included in this annual report are excerpts of NRC's Consolidated Financial Statements and accompanying notes that can be found at **www.nrc-cnrc.gc.ca**

Consolidated Statement of Operations and Departmental Net Financial Position

For the Year Ended March 31

(in thousands of dollars)

	2016 Planned Results	2016	2015
EXPENSES			
Technology Development and Advancement	306,544	337,274	336,160
Industrial Research Assistance Program	262,857	290,006	269,267
Science Infrastructure and Measurement	101,230	119,916	106,267
Internal Services	269,926	230,972	254,174
Total expenses	**940,557**	**978,168**	**965,868**
REVENUES			
Research services	66,607	52,084	46,205
Technical services	89,892	88,573	75,029
Intellectual property, royalties and fees	6,990	9,060	7,498
Sales of goods and information products	4,246	6,603	4,168
Rentals	4,491	6,513	5,604
Grants and contributions	2,774	16,587	2,414
Lease inducement revenue	2,548	2,548	2,548
Other	350	3,730	3,332
Revenues earned on behalf of Government	(150)	(100)	(75)
Total revenues	**177,748**	**185,598**	**146,723**
Net cost of operations before government funding and transfers	**762,809**	**792,570**	**819,145**
GOVERNMENT FUNDING AND TRANSFERS			
Net cash provided by Government	743,612	805,025	762,586
Change in due from Consolidated Revenue Fund	–	(33,424)	44,287
Services provided without charge by other government departments and agencies	45,582	49,173	49,578
Transfer of transition payments for implementing salary payments in arrears	–	(60)	(11,708)
Transfers from/to other government departments	–	(47)	93
Net revenue from operations after government funding and transfers	**26,385**	**28,097**	**25,691**
Departmental net financial position – Beginning of year	**600,170**	**600,170**	**574,479**
Departmental net financial position – End of year	**626,555**	**628,267**	**600,170**

National Research Council Canada

Consolidated Statement of Change in Departmental Net Financial Assets

For the Year Ended March 31

(in thousands of dollars)

	2016 Planned Results	2016	2015
Net revenue from operations after government funding and transfers	**26,385**	**28,097**	**25,691**
CHANGE DUE TO TANGIBLE CAPITAL ASSETS			
Acquisition of tangible capital assets	(40,703)	(76,380)	(49,977)
Amortization of tangible capital assets	60,000	55,479	56,786
Proceeds from disposal of tangible capital assets	–	188	309
Net loss on disposal of tangible capital assets including adjustments	–	1,885	643
Transfers from/to other government departments	–	47	(93)
Other adjustments	–	(929)	(713)
Total change due to tangible capital assets	**19,297**	**(19,710)**	**6,955**
Change due to inventory for consumption	**–**	**(2,093)**	**(9)**
Change due to endowment fund investments	**(100)**	**(64)**	**(126)**
Change due to prepaid expenses	**–**	**(1,626)**	**1,539**
Net change in departmental net financial assets	**45,582**	**4,604**	**34,050**
Departmental net financial assets – Beginning of year	**68,578**	**68,578**	**34,528**
Departmental net financial assets – End of year	**114,160**	**73,182**	**68,578**

Consolidated Statement of Cash Flows

For the Year Ended March 31

(in thousands of dollars)	2016	2015
OPERATING ACTIVITIES		
Net cost of operations before government funding and transfers	792,570	819,145
Non-cash items:		
Amortization of tangible capital assets	(55,479)	(56,786)
Net loss on disposal of tangible capital assets	(1,885)	(643)
Services provided without charge by other government departments and agencies	(49,173)	(49,578)
Transition payments for implementing salary payments in arrears	60	11,708
Other adjustments to tangible capital assets	929	713
Variations in Consolidated Statement of Financial Position:		
Increase in accounts receivable and advances	14,391	6,599
Increase in inventory for resale	1,397	945
Increase (decrease) in prepaid expenses	1,626	(1,539)
Increase (decrease) in inventory for consumption	2,093	9
Decrease (increase) in accounts payable and accrued liabilities	10,303	(37,548)
Decrease in vacation pay and compensatory leave	972	95
Decrease in lease inducements	2,548	2,548
Decrease in deferred revenue	126	744
Decrease in employee future benefits	1,893	15,717
Cash used in operating activities	**722,371**	**712,129**
CAPITAL INVESTING ACTIVITIES		
Acquisitions of tangible capital assets	76,380	49,977
Proceeds from disposal of tangible capital assets	(188)	(309)
Cash used in capital investing activities	**76,192**	**49,668**
INVESTING ACTIVITIES		
Income from endowment fund investments	173	204
Awards granted from endowment fund	(109)	(78)
Increase in CFHT and TIO cash and investments	6,398	663
Cash used in investing activities	**6,462**	**789**
Net cash provided by Government of Canada	**805,025**	**762,586**