

National Research Council Canada

2016–17

Departmental Results Report

The Honourable Navdeep Bains, P.C., M.P.,
Minister of Innovation, Science and Economic
Development

The Honourable Kirsty Duncan, P.C., M.P.,
Minister of Science

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Aussi offert en français sous le titre Rapport sur les résultats ministériels 2016 - 2017.

This publication is also available online on the National Research Council (NRC) website at www.nrc-cnrc.gc.ca and on the Public Works and Government Services Canada website at www.publications.gc.ca.

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Cat. No. NR1-11E-PDF
ISSN 2560-9246

Table of contents

Minister's message	1
President's message	3
Results at a glance	5
Raison d'être, mandate and role: who we are and what we do	7
Operating context and key risks	9
Operating context	9
Key risks	10
Results: what we achieved	13
Programs	13
Technology Development and Advancement (TD&A)	13
Industrial Research Assistance Program (IRAP)	17
Science Infrastructure and Measurement (SI&M)	21
Internal Services	24
Analysis of trends in spending and human resources	27
Actual expenditures	27
Actual human resources	29
Expenditures by vote	29
Alignment of spending with the whole-of-government framework	30
Financial statements and financial statements highlights	31
Supplementary information	35
Corporate information	35
Supporting information on lower-level programs	36
Supplementary information tables	37
Federal tax expenditures	37
Organizational contact information	37
Appendix: definitions	39
Endnotes	43

Minister's message

We are pleased to report progress made on making Canada a world-leading centre for innovation and science, helping create good, well-paying jobs, and strengthening and growing the middle class.

The work of the Innovation, Science and Economic Development Portfolio includes promoting innovation and science; supporting the commercialization of more research and ideas; providing more Canadians with the skills to participate in a global and digital economy; helping small businesses grow through innovation, access to capital and trade; promoting increased tourism in Canada; and supporting scientific research and the integration of scientific considerations in our investment and policy choices.

This year, the Portfolio organizations continued their work to deliver on the Government's Budget 2017 commitment to develop an Innovation and Skills Plan. The plan's focus on people and addressing the changing nature of the economy is a focus for the Portfolio's programs.

With a national footprint, a dedicated team of expert personnel and a wide range of collaborative relationships in Canada and around the world, the NRC is able to bring together diverse expertise from a wide range of engineering and scientific fields to tackle national challenges related to business innovation, scientific inquiry and public policy. Through our process of renewal, we look forward to seizing new opportunities for the NRC to refine its role in connecting the various components of the Canadian innovation system and help propel Canada into a position of global leadership in innovation.

It is our pleasure to present the 2016–17 Departmental Results Report for the National Research Council of Canada (NRC).



The Honourable Navdeep Bains
Minister of Innovation, Science and
Economic Development



The Honourable Kirsty Duncan
Minister of Science

President's message

I am pleased to submit for tabling in Parliament, the 2016-17 Departmental Results Report for the National Research Council of Canada (NRC). During this, our centennial year, we celebrated the NRC's many contributions to the prosperity of Canada since 1916 and that have helped shape society domestically and abroad. The NRC's contributions include feeding people in the 1950s through the development of canola; improving health in the 1980s with the discovery of synthetic insulin; connecting people in the 1990s with the creation of optical telecom networks; and advancing green technology in the 2010s by working on the world's first civil jet flight using biofuel. Today, the NRC is further advancing these innovative applications by developing: new, drought-tolerant wheat strains that are pest and heat resilient; a blood brain barrier transit that will potentially help 3.6 million Canadians suffering from multiple sclerosis and Alzheimer's; secure quantum networks, and nanotelecommunications; and multi-story softwood buildings to name a few examples.



Embarking in our second century of operation, we undertook an assessment of how the NRC could best support the Government of Canada's Innovation and Skills Plan. This comprehensive internal-engagement process involved over 3,000 employees, 15 external expert advisors, town-hall discussions across 10 provinces, and 350 consultation sessions to help determine what future role the NRC could play in supporting innovation, creating more opportunities for women researchers and innovators, and supporting mission-driven, breakthrough research in collaboration with universities, other government departments and industry.

Throughout the year, we built on our successes, working in partnership with industry, academia, and other levels of government as we made significant advancements in research and business innovations. Several new technologies were advanced to the point of commitment by industries to deploy or exploit them on the market over the years. Such technology advancements and leading-edge science are critical to Canada's economic growth and responsible environmental stewardship, creating knowledge-intensive jobs and the promise of prosperity for generations of Canadians to come.

Some of the notable achievements of 2016-17 included:

- “Smart drug” packaging with printed electronics that provide automatic reminders for prescription compliance.
- Contributions to advancement of a vaccine candidate for preventing the debilitating disease of the Cytomegalovirus.
- The licensing of 18 new technologies stemming from collaborative research with Canada's aluminum industry.

This past year, the NRC's Industrial Research Assistance Program also continued to support the accelerated growth of over 2,500 innovative small-and-medium-sized enterprises in Canada, with a total of \$250 million in contributions. International partnerships were also expanded with the signing of multiple agreements with international research and technology organizations.

This year was quite unique as we embarked on a journey to renew the NRC, while we continued to forge ahead to solve complex problems in areas of critical importance to Canada. Over the coming years, we will create programs to deliver on government priorities: aligning with the federally-supported Superclusters; focusing on research excellence in disruptive technologies; growing SMEs to scale and export; revitalizing the NRC research environment to include a more diverse workforce and enhancing environmental stewardship.

We look forward to this coming year as we implement some of the recommendations that resulted from our internal dialogue and as we set the stage to develop the next generation of high-impact R&D initiatives in support of the Government's inclusive Innovation and Skills Plan.

Iain Stewart
President

Results at a glance

NRC achieved its performance objectives in alignment with the six areas for action in support of Canada’s Innovation and Skills Plan and in the priority areas expressed in the [President’s mandate from the Ministers](#)ⁱ. Highlights include the following:

Innovation Support – Performance results show that NRC’s Technology Development and Advancement Program (TD&A) contributed to advancing an increasing number of innovative technologies (from 18 in 2015-16 to 25 in 2016-17) toward commercialization or deployment in such areas as manufacturing, information technologies, and health technologies. The Industrial Research Assistance Program (IRAP) received \$50M in new funding and ramped up its performance targets during the year, reflecting its continued success in

supporting business innovation. New initiatives were aimed at helping companies grow quickly, expand into international markets, and support “green” youth employment. Using NRC’s Watt Balance, the Science Infrastructure and Measurement Program released measurements with world-leading levels of precision. NRC is poised to play a significant role in redefining the world standard for the kilogram. NRC’s annual client survey revealed that client satisfaction remained high across NRC, with many clients reporting increased growth, jobs, innovation capacity, competitive advantage, or exports.

Engagement – NRC led and participated in an increasing number of industry consortia to leverage the talents and resources of key players and to help ensure that NRC contributes to what really matters to Canadian industry. In one such example, NRC spearheaded a forum with representatives from the masonry, wood, glass and gypsum industries to improve guidance and tools for establishing compliance to sound transmission requirements in the National Building Code that applies to Canada’s construction market for buildings. This market is valued at more than \$130B per year in Canada alone.

Governance and Management – In support of the continued renewal of NRC and to advance Canada’s Innovation and Skills Plan, NRC completed its internal assessment consultations. NRC also enhanced its hiring strategy, evidenced by a reduction (18 days) in the average time to complete competitive hiring actions. In addition, NRC deployed user-friendly interfaces to deliver Internal Services more effectively and efficiently.

Delivering Innovation Support

NRC’s Meningitis-C vaccine has prevented countless life-threatening afflictions.

Now, NRC scientists have developed the bio-manufacturing process for the Cytomegalovirus Vaccine candidate being developed by Canada’s VBI Vaccines Inc. The disease is cited to affect more births than Down’s Syndrome or Fetal Alcohol Syndrome. It is especially of concern for newborns and people with weak immune systems. Its potential debilitating effects include hearing loss, delayed development, and vision problems.

These and other results were achieved with \$1.049B of 2016-17 actual spending and 3,870 full-time equivalents. For more information on NRC's plans, priorities and results achieved, see the "Results: what we achieved" section of this report.

Raison d'être, mandate and role: who we are and what we do

Raison d'être

The National Research Council of Canada (NRC) helps to close the innovation gap between early stage research and development (R&D) and commercialization, focusing on socio-economic benefits for Canada and increasing national performance in business-led R&D and innovation.

A federal leader in technology development, NRC supports Canadian industry to enhance their innovation capabilities and capacity and become more productive in the development and deployment of innovative products, processes and services for markets of national priority and importance. While keeping a primary focus on business innovation support, NRC also upholds public policy

mandates, and works to advance knowledge to address current and longer term national challenges that require collaborative multi-disciplinary solutions. With a presence in every province¹ and unique infrastructure, NRC combines its strong national foundation with international linkages to help Canada grow in productivity and remain globally competitive. NRC works in collaboration with industry, governments and academia to maximize Canada's overall R&D investment.



Mandate and role

Under the [National Research Council Act](#)ⁱⁱ, NRC is responsible for:

- Undertaking, assisting or promoting scientific and industrial research in fields of importance to Canada;
- Providing vital scientific and technological services to the research and industrial communities;
- Investigating standards and methods of measurement;

¹ Research facilities are located in Edmonton, Penticton, Saskatoon, Vancouver, Victoria, Winnipeg, Boucherville, Gatineau, London, Mississippi Mills, Montreal (two sites), Ottawa (three sites), Chalk River, Saguenay, Charlottetown, Fredericton, Halifax, Ketch Harbour, Moncton, and St. John's.

- Working on the standardization and certification of scientific and technical apparatus, instruments and materials used or usable by Canadian industry;
- Operating and administering any astronomical observatories established or maintained by the Government of Canada;
- Establishing, operating and maintaining a national science library; and
- Publishing and selling or otherwise distributing such scientific and technical information as the Council deems necessary.

For more general information about NRC, see the “Supplementary information” section of this report. For more information on the department’s organizational mandate letter commitments, see the [Ministers’ mandate letters](#).ⁱⁱⁱ

Operating context and key risks

Operating context

Fiscal Year 2016-17 saw a changing international context and some volatility in financial markets, with potential impacts in the longer term on global value chains and Canadian industry. Immediate impacts on NRC included commodity price shifts reducing the engagement of some resource-sector clients in longer-term R&D.

Canada's Innovation Agenda moved the goal posts for NRC's focus, including expectations to work across government and across key sectors to establish Canada as a centre for global innovation. NRC is well positioned to serve as a collaboration hub and bring a more interdisciplinary approach to address strategic priority research areas with different players in the innovation system.

NRC received ongoing support for its work through Budget 2016 with funding for:

- building a new leading-edge wave-making system in St. John's to respond to industry needs in shipbuilding, deep-water mining, and search and rescue;
- integrating climate resilience into building guides and codes;
- supporting technology scale-up and growing global competitiveness of high impact small to medium sized enterprises (SMEs), youth employment, business innovation; and
- research activities in transportation, energy, clean air, the Arctic, photonics and more.

NRC's new President arrived in August 2016 with a mandate to assess the current state of NRC and position it well to support the Skills and Innovation Plan. A Vice-President of Policy and Governance also joined the organization in support of the President's mandate. Other operational changes included the integration of NRC's information management and information technology under a Chief Information Officer, and the establishment of a Client Service Centre to improve the client interface and operational efficiency of NRC's internal services.

The following table presents NRC's progress against key external-oriented risks.

Key risks

Risks	Mitigating strategy and effectiveness	Link to the department's Programs	Link to mandate letter commitments or to government-wide and departmental priorities
<p>Delivery of Results for Clients & Canada: Inability to deliver results at a level and in a manner that sustains stakeholder confidence</p> <p>This risk is carried over from 2015-16, and the actions undertaken (including future directions proposed in the NRC Dialogue) are effective in managing this risk.</p>	<p>NRC's activities in 2016-17 that helped with ongoing mitigation of this risk included:</p> <ul style="list-style-type: none"> enhancing NRC's performance measurement framework to deliver balanced results in support of advancing knowledge, public policy solutions, and business innovation in priority areas including clean technologies, key industry sectors, digital economy, and international trade; ongoing reviews and evaluations to ensure strategic relevance to clients; developing a framework and platform to better manage resources by matching supply to demand of research facilities; development and testing of new tools to support more effective project management and participating in and leading industry fora to enhance cross-functional alliances and engagement of industry and government stakeholders. <p>Indicators:</p> <ul style="list-style-type: none"> NRC's 2016-17 client survey identified that 91% of clients were satisfied with NRC's services, and 91% would work with NRC again (rating 6 and higher out of 10) – slightly lower from 2015-16, but still strong. NRC exceeded by 5 its target of 20 technology deployments for 2016-17 in sectors of relevance such as automotive, aerospace, advanced electronics, and health. Evidence of scientific research that reflects strong international collaboration, and cited significantly more than the world average. Other program results as highlighted in this document. <p>NRC's renewed funding (\$59.6M) for 2016-17 in Budget 2017 enabled NRC to sustain its competencies and capabilities for collaborative research and technology advancement for Canadian industries and other private and public stakeholders.</p>	<ul style="list-style-type: none"> Technology Development and Advancement (TD&A) Industrial Research Assistance Program (IRAP) Science Infrastructure and Measurement (SI&M) 	<ol style="list-style-type: none"> 1. NRC Priority (Generating Results for Clients) 2. NRC Priority (Effective and efficient resource management) 3. Commitments to the Innovation Agenda including clean technologies, key industry sectors, digital economy, and international trade. Mandate to the Minister of Innovation, Science and Economic Development 4. Commitments to innovation support, and engagement of key R&D stakeholders. Ministers' mandate to the President of NRC.

<p>Balanced NRC Security: NRC dependencies on others for implementing security affecting NRC's ability to operate efficiently and effectively, ultimately impacting NRC's credibility and competitiveness.</p> <p>This risk evolved from 2015-16 when it focused on NRC's ability to effectively implement a secured work environment to one that focused on NRC's ability to operate while dependent on external third parties.</p>	<p>NRC's activities in 2016-17 that helped with ongoing mitigation of this risk included:</p> <ul style="list-style-type: none"> Continued collaboration between Shared Services Canada and NRC's IT Security Team, to improve service standards and coordination between the two groups; Enhanced overall security governance structures including: a security management committee (SMC) to review new proposed security policies and practices from a users' perspective, providing oversight and reporting to the senior executive committee (SEC); A refresh of IT risk management practices including better alignment of security assessment with risk and impact. <p>Indicators:</p> <p>NRC's Management Accountability Framework (MAF) established that, in the area of Security Management, NRC:</p> <ul style="list-style-type: none"> Showed excellence in managing organization-wide activities to achieve planned improvements; Understands the associated risks to its programs and services, as well as its operational risks with successful implementation of mitigating measures; and Deploys 98% of all high priority IT updates within established timeframes, reflecting diligence in protecting public assets. 	<ul style="list-style-type: none"> TD&A IRAP SI&M 	<p>See 1 to 4, above.</p>
<p>Global Disruption: Significant instability and economic downturn created by global disruptions impact client ability and/or willingness to invest in R&D.</p> <p>This is a risk carried forward from 2015-16.</p>	<p>This risk was mitigated in 2016-17 by:</p> <ul style="list-style-type: none"> Scanning of R&D activities abroad to inform NRC of significant global developments and insights pertinent to the organization and its clients, and help manage risks and opportunities; NRC IRAP partnerships with other federal organizations (e.g., Global Affairs Canada and Business Development Bank of Canada) to help SMEs expand globally; and a new international relations unit within IRAP also helped focus this effort. <p>Indicators:</p> <ul style="list-style-type: none"> Geopolitical shifts and international trade policy directions (see Operating Context); Shifts in external environment (e.g., commodity prices) affecting NRC client activities. 	<ul style="list-style-type: none"> TD&A IRAP SI&M 	<p>See 1 to 4, above.</p>

Results: what we achieved

Programs

Technology Development and Advancement (TD&A)

Description

This program develops and advances technologies to enhance the prosperity of Canadian industries in support of federal priorities such as the federal Science, Technology, and Innovation Strategy. This includes national-scale flagship technology-development initiatives having sufficient critical mass to contribute demonstrably to national prosperity. To bring new and innovative products and processes to the marketplace, companies must advance the emerging and maturing technologies embodied in applied developments and prototypes to a level where the risk is sufficiently reduced to be acceptable from business, investment, and regulatory perspectives. The program bridges this critical technology gap through mission-oriented research and development services, and specialized technical services such as custom design and fabrication, testing, prototyping, up-scaling, and demonstration in specialized facilities.

Results

TD&A delivered² technical, advisory, and R&D services that addressed industries' short- and long-term problems associated with transfer, adoption, and diffusion of technology and in solving technical problems of national interest.

Changes in commodity prices created both challenges and opportunities for TD&A. Some industry partners, such as those in the oil and gas sector, needed to reduce their engagement in long-term R&D. TD&A rebalanced its research initiatives, seizing on opportunities to optimize value and benefits to Canadians in alignment with the government's Innovation Agenda. For example, to advance Canada's digital economy, TD&A engaged in over 50 fabrication and R&D contracts in advanced photonics, working to develop the telecommunication components that will enable the next generation of higher-speed optical fiber communication systems. Several Canadian clients are commercializing photonics technologies developed in partnership with NRC. Ontario's Ranovus recently announced the world's first 200 gigabit per second optical transceiver that was developed with TD&A assistance to enable robust, cost-effective ultra-high-speed connectivity.

While it generally takes several years or longer for new research initiatives to help bring nascent technologies to the marketplace, an increasing trend of TD&A research initiatives have themselves matured in 2016-17 to the point of demonstrating returns to Canada. Altogether, TD&A saw its efforts for at least 25 technologies advance to the point of clients expressing in 2016-17 their intents to deploy or commercialize them. This exceeded the 2016-17 target as well

² To protect commercial interests, the present report respects constraints on disclosing proprietary work.

as the result from the previous year. Examples of such technology advancements in 2016-17 include:

- Microsintesis Inc. launched YGIA and Nuvio products as a source of novel probiotics for animal gut health for which TD&A contributed by optimizing assays to assess bioactivity and by scaling up proteobiotic production.
- Led the development for Garrtech Inc. for an additive manufacturing process to demonstrate a novel pinch-off design for aluminum tooling used in manufacturing blow-moulded products.
- Developed custom blow-moulding simulation software now adopted by over 14 companies in the Canadian automotive supply chain.
- Invented a novel process for powder-coating with ultrafine and non-flowing particles in collaboration with Polycontrols Inc.
- Developed a cold-spray repair process for aircraft engine shafts in collaboration with Pratt and Whitney Canada.
- NRC test results have influenced the regulatory standards of the US Environmental Protection Agency, resulting in lower permitted limits for greenhouse gas emissions by large vehicles such as trucks and buses.
- VBI Vaccines Inc. received Health Canada approval to commence clinical trials of a cytomegalovirus (“CMV”) vaccine, which was developed with bio-manufacturing assistance from TD&A, for preventing a leading cause of birth defects.
- Developed and transferred technology to the Jones manufacturing company for “smart drug” packaging with printed electronics that provide automatic reminders for prescription compliance.
- Collaboratively supported TM4 Electrodynamics Systems and Rio Tinto Metal Powders in technology advancement of a low-cost manufacturing process for smaller, more efficient and less expensive motors now in production for electric vehicles.

In addition, the Program succeeded in building and enhancing cross-functional industry and government alliances, including a new collaborative forum for enhancing the competitiveness of Canadian armour products and systems, the launch of a partnership with Defence Research and Development Canada and Communications Security Establishment Canada to advance quantum technology solutions for security and telecommunications, and hosting industrial R&D fora such as ALTec^{iv}, which allows its aluminum industry members to share costs and risks associated with R&D, and to gain access to NRC's experts and facilities, all under one roof.

Partnering in Innovation

TD&A's leadership enabled the exclusive licensing of innovations in aluminum technologies to 18 members from the automotive and ground transportation sectors. This win-win arrangement helped expand markets for Canada's aluminum industry while creating new opportunities for Canada's vehicular sectors.

The [2016 evaluation of the Aquatic and Crop Resource Development^v](#) (ACRD) sub-program acknowledged that its industry focus is aligned well with TD&A's Strategic Outcome of businesses prospering from innovative technologies. ACRD's research initiative on [converting carbon emissions into usable biomass^{vi}](#) was commended for addressing issues of national importance: economic development; pressures on natural resources; climate change and the environment.

Likewise, the [2016 evaluation of NRC Ocean, Coastal and River Engineering^{vii}](#) (OCRE) sub-program confirmed that it is well-aligned to NRC's [reporting framework^{viii}](#) and also to the federal government priorities related to Canada's North, shipbuilding, environmental responsibility and economic prosperity.

Client satisfaction remained high. Over 90% of surveyed clients³ reported that the Program met expectations. In terms of meaningful impacts, 81% of respondents reported an increase in jobs, sales, or R&D investment after having received services from TD&A. Of these, 43% reported increased innovation capacity; 11% created jobs while 11% increased sales, 10% increased exports, and 33% reported increased competitive advantage as results of collaborating with NRC. Moreover, 54% reported increased knowledge and ability to plan and execute R&D projects. NRC continues to achieve over 80% client satisfaction in 2016-17 as measured by the "Client/stakeholder feedback on benefits" performance indicator. NRC will be monitoring the client survey results closely to identify trends in this performance indicator, with consideration of such issues as "survey fatigue", lag time for benefits to emerge, and sampling issues given the diversity of NRC's clients and of the Subprogram's services offerings³.

Actual spending totaled \$352M in comparison to planned spending of \$394M. Planned spending includes projects arising from the 2014 Federal Infrastructure Initiative. Given that these projects involved collaborative cross-functional efforts from more than one sub-program⁴, the actual spending was reported under Internal Services rather than TD&A. The variance of \$41.8M is largely explained by this difference in accounting.

³ The 2016-17 survey represented 150 clients across all of NRC service offerings; from large scale R&D and technology development projects to short-term tests. The specific clients and initiatives surveyed vary by year.

⁴ The participating sub-programs included Aerospace, Automotive and Surface Transportation, Aquatic and Crop Resource Development, and Security and Disruptive Technologies. Additional information is available in the Supporting Information on Lower Level programs section, posted on [NRC's website](#)Error! Bookmark not defined..

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Canadian industries commercialize advanced technologies	Technology deployment ⁵ (client commitments to exploit NRC innovations)	20	March 2017	25	18	12
	Client/stakeholder feedback ⁶ on benefits: jobs, sales, R&D	85%	March 2017	81% of 150 respondents	86% of 127 respondents	90% of 117 respondents

Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
382,178,045	394,009,694	492,666,176	352,212,039	(41,797,655)

Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference actual minus planned)
2088.3	2,186.6	98.3

⁵ This is a measure of NRC's success in advancing technologies to the point of client and stakeholder readiness and commitment to exploit technologies commercially. It is counted in terms of the number of clients or stakeholders who expressed (e.g., through press releases or company public reports) a commitment, during the reporting period, to exploit innovations that have already been successfully developed or advanced by or with NRC.

⁶ The proportion of surveyed clients and stakeholders who report an increase in jobs, sales, R&D expenditures or other positive benefits as result of services received from NRC.

Industrial Research Assistance Program (IRAP)

Description

The program contributes to the growth and prosperity of Canadian small and medium sized enterprises (SMEs) by stimulating innovation, adoption and/or commercialization of technology-based products, services, or processes in Canada. This is done through: 1) technical and related business advice and networking facilitated by a cross-Canada network of field professional staff; 2) cost-shared merit-based contributions; and 3) contributions supporting employment of post-secondary graduates. This program uses funding from the following transfer payments: Contributions to Firms; Contributions to Organizations; Youth Employment Program (YEP); and Canada Accelerator and Incubator Program (CAIP).

Results

Budget 2016 provided IRAP an additional \$50M in 2016–17 to deploy its proven suite of funds, advisory services, and initiatives to increase innovation support to yet a larger number of companies. IRAP consequently revised its targets internally for SME jobs supported (from 7,300 to 9,000) and SMEs served (from 1,500 to 2,000).

IRAP impact remains high. On average, clients reported that their revenue increased yearly by 26% from 2013 to 2015 while their total employees grew yearly by 11%. In all, 88% of 2,912 surveyed firms reported an increase in staffing, revenue, or profit.

NRC-IRAP added the \$10M Youth Employment Program – Green Component to its offerings, ultimately providing internships to over 1,075 youth in the Canadian green economy.

During the third year of the five-year [Canadian Accelerator and Business Incubator Program](#)^{ix} (CAIP), IRAP continued to deliver funding to 16 outstanding accelerators and incubators of innovation. These organizations, in turn, continued to deliver incremental services to early-stage firms and entrepreneurs, promoting investment readiness, sustainability and high growth. A 2016 [evaluation of CAIP](#)^x concluded that it was relevant to the NRC and federal government mandates while complementary to other support initiatives. IRAP committed to implementing the report's recommendations for further improving program delivery.

IRAP ramped up partnerships with other government departments and agencies, now numbering fourteen, to support partner's objectives in delivering in part their programs to support innovative SMEs advance their technologies to commercialization. New partners in 2016-17 include the BC Innovation Council, the Government of Saskatchewan and Defence Research and Development Canada.

IRAP delivered the CanExport Program along with the Trade Commissioner Service of Global Affairs Canada (GAC) to help SMEs offset export development costs. This meshed with IRAP's increased mandate to help companies expand into international markets.

Developed, implemented and operated by IRAP in collaboration with federal and provincial partners, [Concierge](#)^{xi} continued to provide a single access point where small and medium-sized enterprises (SMEs) found high-quality, timely advice to help them innovate and accelerate growth. In 2016-17 Concierge addressed the individual needs of over 4,700 SMEs in comparison to a target of 4300.

The [Accelerated Growth Service](#)^{xii} (AGS) was announced in the 2016 Federal Budget, and launched in September 2016. The initiative partnered with 10 delivery organizations, and 2 departments to coordinate support for businesses across federal departments and agencies. IRAP and its Concierge service engaged with over 150 clients and led 42% of the client teams in its first year of operation. IRAP leveraged its proven infrastructure to achieve a program-best 85% on-time delivery performance.

Through the successes of 2016-17 and earlier years, IRAP has learned the importance of maintaining a workforce of highly experienced and specialised field professional staff (called Industry Technology Advisors) who can link clients to appropriate players in all aspects of the innovation process including planning, technology development, financing, regulatory approval, and marketing. The following are some examples of successes realized during 2016-17 following support from IRAP.

Helping Companies Grow

NRC-IRAP was instrumental in helping Vancouver-based Nano One economize its processes for making innovative battery-components technology for immediate commercial application. The market is expected to grow to \$50 billion by 2020 from its current \$35 billion as the demand for batteries evolves to larger applications including electric vehicles and storage of electricity from “green” sources.

- EnviroSpan benefitted from IRAP’s advisory services that connected the firm with the right partners to move their product to market. After working with Lethbridge College and the City of Lethbridge to validate the environmental benefits and cost-saving features of its modular culvert systems, Enviro Span significantly increased its sales and distribution network both domestically and abroad.
- RateHub, which provides information on mortgages and other financial products, grew its revenues by more than 100% annually.
- Nova Scotia’s 4Deep expanded its market for submersible microscopes to India and abroad following support from CanExport.
- Miovision, which markets “smart” connectivity of municipal traffic signals, became one of Canada’s fastest growing technology companies according to Deloitte.
- StickerYou, which markets custom decals worldwide, quadrupled its workforce while skyrocketing its revenues by more than 1800%.
- More than 40,000 Canadians now benefit from m-Health’s wearable heart-monitors that collect data needed for diagnosing heart conditions and for helping determine the cause

of strokes or mini-strokes, giving Canadians better and faster healthcare options for heart issues, especially those in remote communities.

Details on these and other IRAP success stories are available on the [IRAP website](#)^{xiii}.

Actual spending totalled \$323M in comparison to planned spending of \$270M. The difference of \$53M is due largely to increased appropriations announced in Budget 2016 resulting in increased contributions to firms, organizations, and youth (\$55.4M, \$0.5M, and \$9.9M, respectively), offset by a transfer of \$10M of operating funds to grants and contributions funds that allowed for increased grants and contributions.

The actual FTE deployment of 369 fell short of the planned deployment of 410. The difference is primarily due to the difficulty in recruiting Industry Technology Advisors because of their unique skill set. Beyond this specific challenge, IRAP staffing follows the regular fluctuations of recruiting staff, retirements and turnover.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Innovative businesses grow in Canada	Small- to medium-sized enterprise jobs supported (through contributions)	7,300	March 2017	12,216	10,980	9,240
	Small- and medium-sized enterprises served (SMEs funded through the Contributions to Firms transfer payment program)	1,500	March 2017	2,555	2,341	2,564
	SME client feedback ⁷ on growth: jobs, revenues, net operating profit	In development	March 2017	88%	87%	82%

⁷ This is the percentage of surveyed IRAP clients funded through Contribution to Firms transfer payment program and who reported having experienced growth in terms of: 1) employees or; 2) revenue from goods and services or; 3) net operating profit. Data is compiled from an on-line survey completed by firms 6 months following their fiscal year end. The survey is administered for 5 years following project completion, therefore some time is required to develop a baseline against which a target can be based. Pending development of the performance target, IRAP will be aiming for client growth (revenue, jobs) exceeding that of a comparable non-client control group.

Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
269,541,644	269,541,644	330,154,053	322,990,061	53,448,417

Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
410.0	369.4	(40.6)

Science Infrastructure and Measurement (SI&M)

Description

This program manages national science facilities and infrastructure critical to research, development and innovation by Canadian scientific and technological communities. This includes operating and administering Canada's astronomical observatories. It also fosters development and maintenance of Canada's metrological infrastructure system that provides industries and researchers access to reliable measurements that are traceable to recognized national standards maintained by the program. The program helps clients make the most of this infrastructure by facilitating access to a wide range of Canadian and international user communities and by participating in networks. In addition, the program provides stewardship of the TRIUMF sub-atomic research facility. This program uses funding from the following transfer payment: TRIUMF (Canada's National Laboratory for Particle and Nuclear Physics).

Results

Client satisfaction was high with 91% of respondents reporting 8 or more on a scale of 1 to 10. These results are aligned with the performance results of the National Science Infrastructure (NSI) sub-program, which saw increased downloads of astronomy data and increased scientific publications by the users of the sub-program's telescopes.

The Program provided Canadian researchers with access to critical science infrastructure, including leading-edge observatories and one of the world's largest accessible collections of astronomical data. Canada's international telescopes continued to have high subscription rates demonstrating the relevance and demand for telescope access. The 2016 [evaluation of the NSI sub-program](#)^{xiv} found that NSI is relevant to the NRC and federal government mandates in alignment with the needs of Canadian astronomers. In 2016-17, an international team including NRC researchers discovered a new dwarf planet (RR245) beyond Neptune using astronomy infrastructure that the Program jointly owns and administers.

The Program provided traceable measurements defining the national measurement standards in line with international requirements, thus enabling Canadian industry's entry and ongoing presence in international markets. In 2016-17, the Measurement Science and Standards sub-program launched nine new [Certified Reference Materials](#)^{xv}, increasing the number available to 79. Sold to 526 unique clients in 66 countries, these reference materials are used to confirm metrological traceability of products and to ensure quality control in seafood safety, water quality testing, environmental testing, nutritional supplements, and stable isotope verification.

The Program remained on track in providing major metrological contributions towards the world's redefinition of the standard kilogram. In 2016-17, results from [NRC's Watt Balance](#)^{xvi} exceeded the requirements for redefinition, having the lowest published uncertainty (i.e., highest precision) so far by any national metrology institute in the world. These results will ensure that Canada's leadership is recognized in redefining the international system of units (SI) planned for 2018. From conducting high-precision experiments to optimizing computers and fiber-optic networks, scientists worldwide will benefit from a measurement system based on fundamental constants that remain the same today and into the next century.

Leadership in Standardization

The kilogram is the only standard measure still defined by a physical object—a chunk of metal in Paris. Unfortunately, its mass changes over time.

NRC has led the world in redefining the mass standard in terms of electrical force that counterbalances a weight. The research involves redefining a fundamental physical constant (Planck's Constant); cited by the esteemed *Nature* scientific journal as one of the toughest challenges known to physics.

SI&M provided \$53.7M in transfer payments to [TRIUMF](#)^{xvii}, a joint venture by a consortium of 19 Canadian universities, which functions as Canada's particle accelerator centre. The funding was used for leading-edge academic and applied research in subatomic physics, materials science, nuclear medicine, and accelerator-based science. In 2016-17, TRIUMF participants published 329 manuscripts in scientific journals to advance knowledge on such subjects as the properties of anti-matter. In the medical domain, TRIUMF undertook clinical trials for its cyclotron-produced technetium-99m, a critical medical isotope that is important in cancer diagnostics.

Actual spending totalled \$126M in comparison to planned spending of \$169M. The difference of \$43M is mainly caused by project delays beyond NRC's control associated with Canada's participation in the construction of the Thirty-Metre Telescope (TMT) in Hawaii. The TMT is an international collaboration to construct one of the most advanced optical telescopes on Earth, extending astronomers' vision to the most distant reaches of the universe. NRC has reprofiled \$46.6M in TMT grants and contributions from 2016-17 to 2017-18. Further information is available below in the Analysis of Trends in Spending and Human Resources section.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
National science infrastructure and measurement standards services are valued by user communities	Client/user satisfaction	85%	March 2017	91% ⁸	86%	Not available ⁹

Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
167,739,242	168,670,448	205,311,893	125,604,143	(43,066,305)

Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
278.4	291.0	12.6

Information on the NRC's lower-level programs is available on [NRC's website](#) and in the [TBS InfoBase](#).^{xviii}

⁸ Representing 12 respondents from 38 surveyed clients.

⁹ Results were not available as this was a new performance indicator, however a qualitative result (i.e., "high") was available in a related evaluation report.

Internal Services

Description

Internal Services are those groups of related activities and resources that the federal government considers to be services in support of programs and/or required to meet corporate obligations of an organization. Internal Services refers to the activities and resources of the 10 distinct service categories that support Program delivery in the organization, regardless of the Internal Services delivery model in a department. The 10 service categories are: Management and Oversight Services; Communications Services; Legal Services; Human Resources Management Services; Financial Management Services; Information Management Services; Information Technology Services; Real Property Services; Materiel Services; and Acquisition Services.

Results

In 2016-17, NRC implemented a new service delivery model for internal services featuring better user-interfaces for more efficient access, tracking, and monitoring. With this new model, NRC saw a significant improvement in the resolution of service requests related to technical support and NRC Support Services (general inquiries, complaints). Out of a total of 77,052 service requests received in 2016-17, the number of those resolved immediately (i.e., within 24 hours) improved by over 21% compared to 2015-16.

Over 80% of corporate IT systems were moved to the new environment managed by Shared Services Canada. A restructuring exercise in 2016-17 led to the integration of two NRC branches responsible for knowledge, information and technology services as well as access to information and privacy. The consolidated branch deployed a document collaboration platform, published data sets on the Government of Canada Open portal, strengthened NRC's record-keeping practices (e.g., with establishment of official retention periods, training and awareness-building for Information Management), and improved employee skills in information and data security.

Client Relationship Management systems were upgraded and business processes were simplified for better access to information and tracking of client opportunities and needs and for the future introduction of a paperless agreement approval process.

Human resource management progressed toward a more modern and effective hiring function. This included a new service delivery model that aligns hiring resources to business units, allowing for a more strategic approach. It also included the implementation of an employee referral program and access to specialized services to facilitate the hiring of foreign workers. Altogether, these improvements contributed to a reduction of 18 days in the average time to complete competitive hiring actions.

Towards an effective learning and development (L&D) framework to equip staff to meet planned results, NRC:

- implemented a new L&D governance model including a Learning Advisory Committee and an enhanced core L&D team;
- introduced a new business case process for endorsing enterprise-wide learning;
- prepared for the launch of a new learning management system; and
- onboarded cohorts into Leadership Programs while NRC further assessed related needs and opportunities.

Public-facing communications activities were held across the country celebrating NRC's 100 years of contribution to the advancement of knowledge, science excellence, and support for business innovation. The Royal Canadian Mint launched a \$20 coin commemorating NRC's Dominion Radio Astrophysical Observatory. NRC also contributed to Canada's heritage by donating to the Canada Science and Technology Museum the first Canadian national flag that was [colour-standardized by NRC^{xix}](#).

The actual spending of \$248M exceeded the planned spending of \$234M. The variance of \$14M is mainly due to project funding approved subsequent to the 2016-17 Departmental Plan as well as project costs sourced from NRC's cumulative statutory revenue authority (excluded from planned spending and included within total authorities available for use). Specifically, NRC internal services carried forward \$10.8M in capital from 2015-16 to 2016-17 for projects funded through the 2014 Federal Infrastructure Initiative, received \$2.9M in additional funding following the 2016 Federal Infrastructure Initiative and spent over \$9M of its cumulative statutory revenues on Information Technology security requirements.

Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
234,199,645	234,199,645	279,488,728	247,934,222	13,734,577

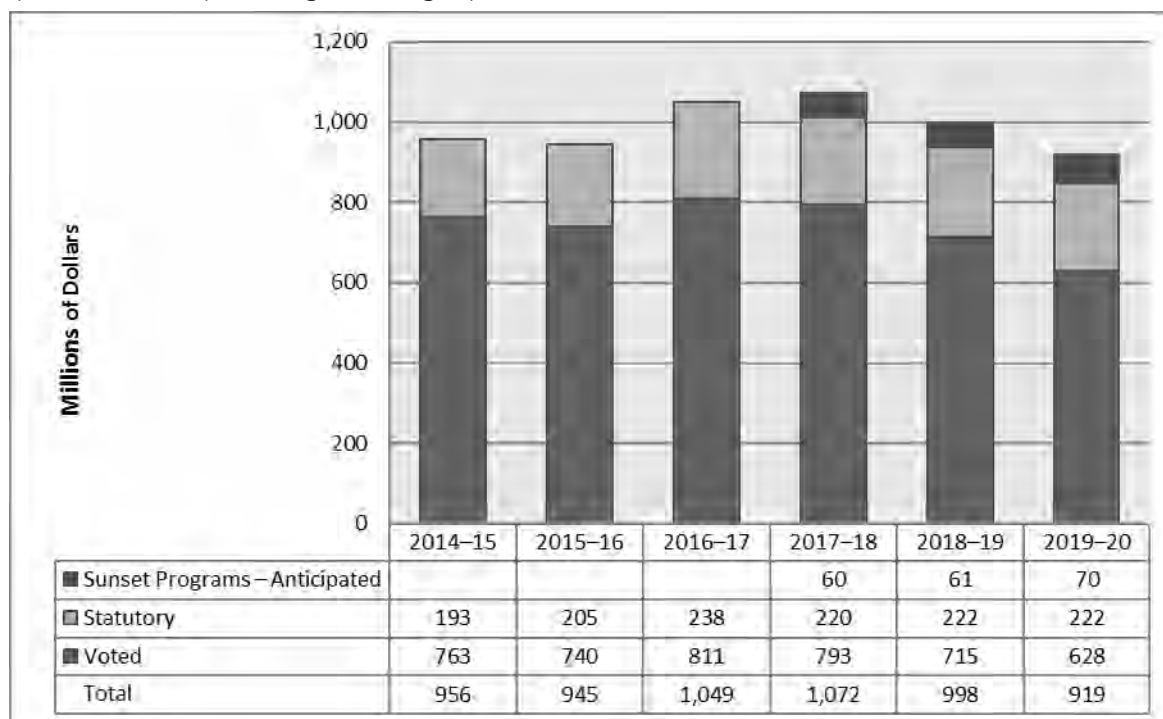
Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
972.3	1023.3	51.0

Analysis of trends in spending and human resources

Actual expenditures

Departmental spending trend graph



Budgetary performance summary for Programs and Internal Services (dollars)

Programs and Internal Services	2016–17 Main Estimates	2016–17 Forecast spending	2017–18 Planned spending	2018–19 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2015–16 Actual spending (authorities used)	2014–15 Actual spending (authorities used)
TD&A	382,178,045	394,009,694	289,847,651	283,483,638	492,666,176	352,212,039	326,830,511	344,930,416
IRAP	269,541,644	269,541,644	269,123,074	262,028,318	330,154,053	322,990,061	288,919,078	271,824,267
SI&M	167,739,242	168,670,448	200,135,68	157,755,761	205,311,893	125,604,143	116,379,686	106,451,583
Subtotal	819,458,931	832,221,786	759,106,411	703,267,717	1,028,132,122	800,806,243	732,129,275	723,206,266
Internal Services	234,199,645	234,199,645	253,702,382	233,818,243	279,488,728	247,934,222	212,948,320	232,498,650
Total	1,053,658,576	1,066,421,431	1,012,808,793	937,085,960	1,307,620,850	1,048,740,465	945,077,595	955,704,916

NRC's actual spending trend over the last three years was relatively consistent with increases in 2016-17 largely associated with the implementation of various Budget initiatives and growth in statutory spending. Specifically, IRAP received \$60M in contribution funding following Budget 2016, of which \$50M represented additional resources to help SMEs innovate and grow, with the

balance received to support the Youth Employment Strategy creating new green jobs for youth. In addition to NRC's contribution spending, NRC also incurred capital expenditures of \$39M in excess of its base reference level in 2016-17 as a result of Budget 2014 and Budget 2016 Federal Infrastructure funding. Furthermore, as stipulated within the NRC Act section 5(e), NRC may expend any money received by the Council through the conduct of its operations. Consequently, fluctuations in activities to deliver research and technical services with external partners directly influence NRC's statutory spending levels. The following variance explanations provide additional details between 2016-17 plans to actuals and year-over-year results.

Actual spending of \$1.049B in 2016-17 in comparison to planned spending of \$1.066B represents an overall decrease of \$17.7M (1.7%). The variance from 2016-17 plans is attributable to expenditure decreases of \$36.7M in capital and \$13.9M in operating expenses, offset by increases of \$20.9M in grants and contributions and \$12.1M in statutory spending. The most significant cause of decreased spending in capital results from \$35.6M in funding reprofiled from 2016-17 to future years for projects financed by Federal Infrastructure initiatives. The decrease in operating spending of \$13.9M is mainly associated with a \$10.0M exchange from IRAP's operating authorities to its contribution funding to support a larger number of Canadian SMEs. These decreases were offset by an overall increase in grants and contributions and statutory spending. The increase of \$20.9M in grants and contributions resulted from the implementation of Budget 2016 funding, the in-year operating to contribution funding exchange, offset by a \$46.6M funding reprofile from 2016-17 to 2017-18 due to project delays outside of NRC's (and Canada's) control in the construction of the Thirty Meter Telescope (TMT). The increase of \$12.1M in statutory spending primarily results from increases in technical and research services provided in 2016-17.

Actual spending of \$1.049B in 2016-17 in comparison to 2015-16 and 2014-15 actual spending of \$945.1M and \$955.7M respectively, represents overall increases of \$103.6M and \$93.0M. The year-over-year spending variances are primarily due to additional costs incurred to deliver Budget initiatives with expenditure growth in grants and contributions of \$40.6M from 2015-16 (\$74.9M from 2014-15) and capital of \$24.2M from 2015-16 (\$38.3M from 2014-15).

In addition to spending increases in grants and contributions and capital infrastructure, NRC incurred a net operating and statutory expenditure increase of \$38.5M in 2016-17 when compared to 2015-16 and a net expenditure decrease of \$20.1M when compared to 2014-15. The growth in net operating and statutory expenditures for 2016-17 was primarily caused by growth in service activities and service levels. The net decrease from 2014-15 results from increase in service activities offset by significant one-time costs associated with the ratification of collective agreements. Specifically, NRC incurred additional expenditures in 2014-15 of \$16.7M for retroactive pay, \$22.7M for one-time severance pay and \$11.8M to implement salary payments in arrears by the Government of Canada.

Actual human resources

Human resources summary for Programs and Internal Services
(full-time equivalents)

Programs and Internal Services	2014–15 Actual	2015–16 Actual	2016–17 Forecast	2016–17 Actual	2017–18 Planned	2018–19 Planned
TD&A	1999.6	2055.4	2088.3	2,186.6	1,831.1	1,874.7
IRAP	356.9	356.0	410.0	369.4	411.0	409.0
SI&M	269.9	277.2	278.4	291.0	290.5	294.8
Subtotal	2626.4	2688.6	2776.8	2,847.0	2,532.6	2,578.5
Internal Services	950.7	980.0	972.3	1,023.3	1,005.3	1,005.3
Total	3577.1	3668.6	3,749.0	3,870.3	3,537.9	3,583.8

Actual FTE in 2016-17 (3,870) increased in comparison to 2016-17 forecast FTE (3,749). The increase is mainly due to growth in staffing to support program delivery across NRC.

Actual FTE in 2016-17 (3,870) increased in comparison to actual FTE in 2015-16 (3,669) and actual FTE in 2014-15 (3,577). The increase is mainly due to growth in staffing level to support program delivery across NRC.

Actual FTE in 2016-17 (3,870) is higher in comparison to planned FTE in 2017-18 (3,538) and planned FTE in 2018-19 (3,584). The variance is caused by the sunsetting of the funding to sustain operations at the National Research Council of Canada. This funding, as announced in Budget 2017, was renewed for one year in 2017-18. The funding was accessed through the Supplementary Estimates (A) and was not included in the 2017-18 Planned FTE and the 2018-19 Planned FTE. This sunsetter provides funding for approximately 400 FTEs.

Expenditures by vote

For information on NRC's organizational voted and statutory expenditures, consult the [Public Accounts of Canada 2017](#).^{xx}

Alignment of spending¹⁰ with the whole-of-government framework

Alignment of 2016–17 actual spending with the [whole-of-government framework](#)^{xxi} (dollars)

Program	Spending area	Government of Canada activity	2016–17 Actual spending
TD&A	Economic Affairs	Strong Economic Growth	352,212,039
IRAP			322,990,061
SI&M		Innovative and Knowledge-based Economy	125,604,143

Total spending by spending area (dollars)

Spending area	Total planned spending	Total actual spending
Economic affairs	832,221,786	800,806,243
Social affairs	0	0
International affairs	0	0
Government affairs	0	0

¹⁰ Spending reported in these two tables excludes the cost of Internal Services.

Financial statements and financial statements highlights

Financial statements

NRC's audited consolidated financial statements for the year ended March 31, 2017, are available on [NRC's website^{xxii}](#).

Financial statements highlights

Condensed Consolidated Statement of Operations (audited) for the year ended March 31, 2017 (dollars)

Financial information	2016–17 Planned results	2016–17 Actual	2015–16 Actual	Difference (2016–17 actual minus 2016–17 planned)	Difference (2016–17 actual minus 2015–16 actual)
Total expenses	1,023,517,000	1,064,791,000	978,168,000	41,274,000	86,623,000
Total revenues	177,725,000	202,479,000	185,598,000	24,754,000	16,881,000
Net cost of operations before government funding and transfers	845,792,000	862,312,000	792,570,000	16,520,000	69,742,000

NRC incurred total expenses of \$1.065B in 2016-17, an increase from the \$978M spent in 2015-2016. NRC's major expense components are salaries and employee benefits (\$449M) and grants and contributions (\$329M), representing 73% of total expenses. The \$87M increase is primarily due to an increase in grants and contributions of \$37M, an increase in salary and benefits of \$26M due to increase in continuing full-time employee expenses and retroactive pay liability, an increase of \$15M in professional services and an increase of \$8M in utilities, materials and supplies. Most of the other expense categories appearing in the financial statements were stable in comparison to 2015-2016. The planned

Expenses by Type (2016-17)

Type	Percent of total expenses
Salaries and employee benefits	42
Grants and contributions	31
Utilities, materials and supplies	8
Professional and special services	8
Amortization	5
Other	6

Revenues by Type (2016-17)

Type	Percent of total Revenues
Technical Services	48
Research Services	28
Intellectual property, royalties and fees	4
Rentals	3
Sales of goods and information products	4
Other	13

expenses, as reported in NRC's Future Oriented Financial Statements in the 2016-2017 Report on Plans and Priorities (RPP), were \$1.024B. The variance between planned and actual results of \$41M is primarily due to an increase in grants and contributions (\$53M for IRAP contributions to firms, \$10M youths) and an increase of \$21M of professional and special services which was partially offset by: a decrease of \$23M of salaries and employee benefits, a decrease of \$16M of utilities, materials and supplies.

NRC generates revenue which can be reinvested in operations. NRC's total revenues, as per its consolidated financial statements, were \$203M in 2016-17, an increase from \$186M in 2015-2016. NRC's major revenue components were Research Services (\$56M) and Technical Services (\$97M), representing 76% of revenues. The planned revenue, as reported in NRC's Future Oriented Financial Statements in the 2016-2017 RPP was \$178M. The variance between planned and actual revenues is largely attributed to the fact that planned results exclude the accounting impact of consolidation. More specifically, over \$17M of the \$25M variance results from consolidating the financial statements of government partnerships for Canada's participation in the Thirty-Meter-Telescope and the Canada-France-Hawaii Telescope. The remaining variance is primarily associated with increases of \$2.4M in Sales of goods and information products, \$2.2M in proceeds on disposal of land, \$0.7M in Intellectual property royalties and fees, as well as \$0.5M in rental charges.

Condensed Consolidated Statement of Financial Position (audited) as at March 31, 2017 (dollars)

Financial Information	2016–17	2015–16	Difference (2016–17 minus 2015–16)
Total net financial assets	356,715,000	348,353,000	8,362,000
Total liabilities	302,286,000	275,171,000	27,115,000
Departmental net financial assets	54,429,000	73,182,000	(18,753,000)
Total non-financial assets	614,721,000	555,085,000	59,636,000
Departmental net financial position	669,150,000	628,267,000	40,883,000

NRC's consolidated net financial assets totaled \$356M as at March 31, 2017, an increase of \$8M from the March 31, 2016 balance of \$348M. The balance is made up of the Due from the Consolidated Revenue Fund (CRF), accounts receivable, inventory for resale, and cash and investments. The increase is primarily due to a \$13M increase of the Due from the CRF which is

partially offset by a decrease in accounts receivable of \$9M, as well as an increase of \$4M in cash and investments (Canada-France-Hawaii Telescope and Thirty-Meter Telescope).

NRC's consolidated liabilities consist of accounts payable and accrued liabilities, vacation and compensatory leave, lease inducements, deferred revenue and employee future benefits. The balance as at March 31, 2017 of \$302M represents a \$27M increase from the March 31, 2016 balance of \$275M. The increase is primarily due to a \$33M increase in accounts payable and accrued liabilities payable to external parties, a \$3M decrease in lease inducements, and a decrease of \$3M in the employee future benefits liability.

Net Financial Assets as at March 31, 2017

Type	Percent of total net financial assets
Due from the Consolidated Revenue Fund	83
Accounts receivable and advances	12
Inventory for resale	1
Cash and investments	4

NRC's strong financial position is also reflected in its Departmental Net Financial Position at March 31, 2017 which improved by \$41M over the previous year to \$669M. The consolidation of the accounts for the Thirty-Meter Telescope contributed to the increase for an amount of \$10M based on the aggregate pledge by all current parties.

Liabilities as at March 31, 2017

Type	Percent of total liabilities
Accounts payable and accrued liabilities	66
Vacation pay and compensatory leave	10
Lease inducements	11
Deferred revenue	3
Employee future benefits	10

Supplementary information

Corporate information

Organizational Profile

Appropriate ministers:

The Honourable Navdeep Bains, P.C., M.P., Minister of Innovation, Science and Economic Development;

The Honourable Kirsty Duncan, P.C., M.P., Minister of Science; and

The Honourable Bardish Chagger, P.C., M.P., Minister of Small Business and Tourism and Leader of the Government in the House of Commons.

Institutional head: Mr. Iain Stewart, President

Ministerial portfolio: Innovation, Science and Economic Development

Enabling instrument: [National Research Council Act](#)ⁱⁱ, R.S.C. 1985, c. N-15

Year of incorporation / commencement: 1916

Other: NRC is a departmental corporation of the Government of Canada, reporting to Parliament through the Minister of Innovation, Science and Economic Development in collaboration with the Minister of Science and Minister of Small Business and Tourism. NRC works in partnership with members of the Innovation, Science and Economic Development Portfolio to leverage complementary resources to promote science and integrated innovation, to exploit synergies in key areas of science and technology, to promote the growth of small and medium-sized enterprises and to contribute to Canadian economic growth. NRC's Council provides independent strategic direction and advice to the NRC President and it reviews organizational performance. The President provides leadership and strategic management and is responsible for the achievement of NRC's long-range goals and plans in alignment with government priorities as reflected in his [Mandate letter](#)ⁱ. Each of NRC's Vice Presidents is responsible for a number of areas composed of research sub-programs, initiatives, centres, the Industrial Research Assistance Program, and/or a corporate branch. Vice Presidents and NRC managers are responsible for executing plans and priorities to ensure successful achievement of objectives.

Reporting framework

NRC's Strategic Outcomes and Program Alignment Architecture of record for 2016–17 are shown below.

1. Strategic Outcome: Canadian businesses prosper from innovative technologies

1.1 Program: Technology Development and Advancement

1.1.1 Sub-Program: Aerospace

1.1.2 Sub-Program: Automotive and Surface Transportation

1.1.3 Sub-Program: Ocean, Coastal and River Engineering

1.1.4 Sub-Program: Energy, Mining and Environment

1.1.5 Sub-Program: Construction

1.1.6 Sub-Program: Aquatic and Crop Resource Development

1.1.7 Sub-Program: Medical Devices

1.1.8 Sub-Program: Human Health Therapeutics

1.1.9 Sub-Program: Information and Communications Technologies

1.1.10 Sub-Program: Security and Disruptive Technologies

1.2 Program: Industrial Research Assistance Program (IRAP)

2. Strategic Outcome: R&D Infrastructure for an innovative and knowledge-based economy

2.1 Program: Science Infrastructure and Measurement

2.1.1 Sub-Program: National Science Infrastructure

2.1.2 Sub-Program: Measurement Science and Standards

Internal Services

Supporting information on lower-level programs

Supporting information on results, financial and human resources relating to NRC's lower-level programs is available on [InfoBase](#).

Supplementary information tables

The following supplementary information tables are available on NRC's [website](#)

- ▶ Departmental Sustainable Development Strategy
- ▶ Details on transfer payment programs of \$5 million or more
- ▶ Horizontal initiatives
- ▶ Internal audits and evaluations
- ▶ Response to parliamentary committees and external audits
- ▶ User fees, regulatory charges and external fees

Federal tax expenditures

The tax system can be used to achieve public policy objectives through the application of special measures such as low tax rates, exemptions, deductions, deferrals and credits. The Department of Finance Canada publishes cost estimates and projections for these measures each year in the [Report on Federal Tax Expenditures](#).^{xxiii} This report also provides detailed background information on tax expenditures, including descriptions, objectives, historical information and references to related federal spending programs. The tax measures presented in this report are the responsibility of the Minister of Finance.

Organizational contact information

National Research Council Canada

NRC Communications

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Ottawa, Ontario, Canada K1A 0R6

Phone: (613) 993-9101 or toll-free 1-877-NRC-CNRC (1-877-672-2672)

Fax: (613) 952-9907

TTY number: (613) 949-3042

E-mail: info@nrc-cnrc.gc.ca

Appendix: definitions

appropriation (crédit)

Any authority of Parliament to pay money out of the Consolidated Revenue Fund.

budgetary expenditures (dépenses budgétaires)

Operating and capital expenditures; transfer payments to other levels of government, organizations or individuals; and payments to Crown corporations.

Core Responsibility (responsabilité essentielle)

An enduring function or role performed by a department. The intentions of the department with respect to a Core Responsibility are reflected in one or more related Departmental Results that the department seeks to contribute to or influence.

Departmental Plan (Plan ministériel)

Provides information on the plans and expected performance of appropriated departments over a three-year period. Departmental Plans are tabled in Parliament each spring.

Departmental Result (résultat ministériel)

A Departmental Result represents the change or changes that the department seeks to influence. A Departmental Result is often outside departments' immediate control, but it should be influenced by program-level outcomes.

Departmental Result Indicator (indicateur de résultat ministériel)

A factor or variable that provides a valid and reliable means to measure or describe progress on a Departmental Result.

Departmental Results Framework (cadre ministériel des résultats)

Consists of the department's Core Responsibilities, Departmental Results and Departmental Result Indicators.

Departmental Results Report (Rapport sur les résultats ministériels)

Provides information on the actual accomplishments against the plans, priorities and expected results set out in the corresponding Departmental Plan.

Evaluation (évaluation)

In the Government of Canada, the systematic and neutral collection and analysis of evidence to judge merit, worth or value. Evaluation informs decision making, improvements, innovation and accountability. Evaluations typically focus on programs, policies and priorities and examine

questions related to relevance, effectiveness and efficiency. Depending on user needs, however, evaluations can also examine other units, themes and issues, including alternatives to existing interventions. Evaluations generally employ social science research methods.

full-time equivalent (équivalent temps plein)

A measure of the extent to which an employee represents a full person-year charge against a departmental budget. Full-time equivalents are calculated as a ratio of assigned hours of work to scheduled hours of work. Scheduled hours of work are set out in collective agreements.

government-wide priorities (priorités pangouvernementales)

For the purpose of the 2017–18 Departmental Plan, government-wide priorities refers to those high-level themes outlining the government's agenda in the 2015 Speech from the Throne, namely: Growth for the Middle Class; Open and Transparent Government; A Clean Environment and a Strong Economy; Diversity is Canada's Strength; and Security and Opportunity.

horizontal initiatives (initiative horizontale)

An initiative where two or more federal organizations, through an approved funding agreement, work toward achieving clearly defined shared outcomes, and which has been designated (for example, by Cabinet or a central agency) as a horizontal initiative for managing and reporting purposes.

Management, Resources and Results Structure (Structure de la gestion, des ressources et des résultats)

A comprehensive framework that consists of an organization's inventory of programs, resources, results, performance indicators and governance information. Programs and results are depicted in their hierarchical relationship to each other and to the Strategic Outcome(s) to which they contribute. The Management, Resources and Results Structure is developed from the Program Alignment Architecture.

non-budgetary expenditures (dépenses non budgétaires)

Net outlays and receipts related to loans, investments and advances, which change the composition of the financial assets of the Government of Canada.

performance (rendement)

What an organization did with its resources to achieve its results, how well those results compare to what the organization intended to achieve, and how well lessons learned have been identified.

performance indicator (indicateur de rendement)

A qualitative or quantitative means of measuring an output or outcome, with the intention of gauging the performance of an organization, program, policy or initiative respecting expected results.

performance reporting (production de rapports sur le rendement)

The process of communicating evidence-based performance information. Performance reporting supports decision making, accountability and transparency.

planned spending (dépenses prévues)

For Departmental Plans and Departmental Results Reports, planned spending refers to those amounts that receive Treasury Board approval by February 1. Therefore, planned spending may include amounts incremental to planned expenditures presented in the Main Estimates.

A department is expected to be aware of the authorities that it has sought and received. The determination of planned spending is a departmental responsibility, and departments must be able to defend the expenditure and accrual numbers presented in their Departmental Plans and Departmental Results Reports.

plans (plans)

The articulation of strategic choices, which provides information on how an organization intends to achieve its priorities and associated results. Generally a plan will explain the logic behind the strategies chosen and tend to focus on actions that lead up to the expected result.

priorities (priorité)

Plans or projects that an organization has chosen to focus and report on during the planning period. Priorities represent the things that are most important or what must be done first to support the achievement of the desired Strategic Outcome(s).

program (programme)

A group of related resource inputs and activities that are managed to meet specific needs and to achieve intended results and that are treated as a budgetary unit.

Program Alignment Architecture (architecture d'alignement des programmes)

A structured inventory of an organization's programs depicting the hierarchical relationship between programs and the Strategic Outcome(s) to which they contribute.

results (résultat)

An external consequence attributed, in part, to an organization, policy, program or initiative. Results are not within the control of a single organization, policy, program or initiative; instead they are within the area of the organization's influence.

statutory expenditures (dépenses législatives)

Expenditures that Parliament has approved through legislation other than appropriation acts. The legislation sets out the purpose of the expenditures and the terms and conditions under which they may be made.

Strategic Outcome (résultat stratégique)

A long-term and enduring benefit to Canadians that is linked to the organization's mandate, vision and core functions.

sunset program (programme temporisé)

A time-limited program that does not have an ongoing funding and policy authority. When the program is set to expire, a decision must be made whether to continue the program. In the case of a renewal, the decision specifies the scope, funding level and duration.

target (cible)

A measurable performance or success level that an organization, program or initiative plans to achieve within a specified time period. Targets can be either quantitative or qualitative.

voted expenditures (dépenses votées)

Expenditures that Parliament approves annually through an Appropriation Act. The Vote wording becomes the governing conditions under which these expenditures may be made.

Endnotes

- i Mandate letter to NRC President, http://www.nrc-cnrc.gc.ca/eng/about/corporate_overview/mandate.html
- ii National Research Council Act, <http://laws-lois.justice.gc.ca/eng/acts/N-15/index.html>
- iii. Mandate letters to the Ministers, <http://pm.gc.ca/eng/mandate-letters>
- iv ALTec Aluminum industry forum, <http://www.nrc-cnrc.gc.ca/eng/solutions/collaborative/altec.html>
- v ACRD sub-program evaluation, http://www.nrc-cnrc.gc.ca/eng/about/planning_reporting/evaluation/2016_2017/acrd.html
- vi ACRD sub-program Algal Carbon Conversion, http://www.nrc-cnrc.gc.ca/eng/solutions/collaborative/algal_index.html
- vii OCRE sub-program evaluation, http://www.nrc-cnrc.gc.ca/eng/about/planning_reporting/evaluation/2016_2017/ocre.html
- viii NRC's Reporting Framework, internal link within the present document.
- ix CAIP initiative of IRAP, <http://www.nrc-cnrc.gc.ca/eng/irap/caip/index.html>
- x CAIP evaluation, http://www.nrc-cnrc.gc.ca/eng/about/planning_reporting/evaluation/2016_2017/caip.html
- xi Concierge initiative of IRAP, <http://www.nrc-cnrc.gc.ca/eng/irap/concierge/index.html>
- xii Accelerated Growth Service, <https://www.canada.ca/en/atlantic-canada-opportunities/news/2017/01/backgrounder-accelerated-growth-service.html>
- xiii IRAP success stories, <http://www.nrc-cnrc.gc.ca/eng/irap/success/2017/index.html>
- xiv NSI sub-program evaluation, <http://www.nrc-cnrc.gc.ca/eng/irap/concierge/index.html>
- xv NRC certified reference materials, http://www.nrc-cnrc.gc.ca/eng/solutions/advisory/crm_index.html
- xvi NRC's Watt Balance, <http://www.nrc-cnrc.gc.ca/obj/gen/centennial-centenaire/files/assets/basic-html/page-129.html>
- xvii TRIUMF, <http://www.triumf.ca/>
- xviii. TBS InfoBase, <https://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#start>
- xix Canadian flag, colour-standardized by NRC, <http://www.nrc-cnrc.gc.ca/eng/about/centennial/flag.html>
- xx. Public Accounts of Canada 2017, <http://www.tpsgc-pwgsc.gc.ca/recgen/cpc-pac/index-eng.html>
- xxi. Whole-of-government framework, [https://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#tag-nav/~\(current_branch~'GOCO~sort_key~'name~sort_direction~'asc~open_nodes~\(~'tag_SA0001~'tag_SA9999~'tag_SA0002~'tag_SA0003~'tag_SA0004~'tag_SA0005\)\)](https://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#tag-nav/~(current_branch~'GOCO~sort_key~'name~sort_direction~'asc~open_nodes~(~'tag_SA0001~'tag_SA9999~'tag_SA0002~'tag_SA0003~'tag_SA0004~'tag_SA0005)))
- xxii NRC financial statements, performance reports, and plans, <http://www.nrc-cnrc.gc.ca/eng/reports/index.html>
- xxiii. Report on Federal Tax Expenditures, <http://www.fin.gc.ca/purl/taxexp-eng.asp>