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National Research Council Canada 2014–15

Report on Plans and Priorities

The Honourable James Moore
Minister of Industry

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ESTIMATES

PART III – Departmental Expenditure Plans: Reports on Plans and Priorities

Purpose
Reports on Plans and Priorities (RPP) are individual expenditure plans for each department and agency. These reports provide increased levels of detail over a three-year period on an organization's main priorities by strategic outcome, program and planned/expected results, including links to related resource requirements presented in the Main Estimates. In conjunction with the Main Estimates, Reports on Plans and Priorities serve to inform members of Parliament on planned expenditures of departments and agencies, and support Parliament's consideration of supply bills. The RPPs are typically tabled soon after the Main Estimates by the President of the Treasury Board.

Estimates Documents
The Estimates are comprised of three parts:

Part I – Government Expenditure Plan – provides an overview of the Government's requirements and changes in estimated expenditures from previous fiscal years.

Part II – Main Estimates – supports the appropriation acts with detailed information on the estimated spending and authorities being sought by each federal organization requesting appropriations.

In accordance with Standing Orders of the House of Commons, Parts I and II must be tabled on or before March 1.

Part III – Departmental Expenditure Plans – consists of two components:
- Report on Plans and Priorities (RPP)
- Departmental Performance Report (DPR)

DPRs are individual department and agency accounts of results achieved against planned performance expectations as set out in respective RPPs.

The DPRs for the most recently completed fiscal year are tabled in the fall by the President of the Treasury Board.

Supplementary Estimates support Appropriation Acts presented later in the fiscal year. Supplementary Estimates present information on spending requirements that were either not sufficiently developed in time for inclusion in the Main Estimates or have subsequently been refined to account for developments in particular programs and services. Supplementary Estimates also provide information on changes to expenditure forecasts of major statutory items as well as on such items as: transfers of funds between votes; debt deletion; loan guarantees; and new or increased grants.

For more information on the Estimates, please consult the [i†] Treasury Board Secretariat website.

Links to the Estimates
As shown above, RPPs make up part of the Part III of the Estimates documents. Whereas Part II emphasizes the financial aspect of the Estimates, Part III focuses on financial and non-financial performance information, both from a planning and priorities standpoint (RPP), and an achievements and results perspective (DPR).

The Management Resources and Results Structure (MRRS) establishes a structure for display of financial information in the Estimates and reporting to Parliament via RPPs and DPRs. When displaying planned spending, RPPs rely on the Estimates as a basic source of financial information.

Main Estimates expenditure figures are based on the Annual Reference Level Update which is prepared in the fall. In comparison, planned spending found in RPPs includes the Estimates as well as any other amounts that have been approved through a Treasury Board submission up to February 1st (See Definitions section). This readjusting of the financial figures allows for a more up-to-date portrait of planned spending by program.

Changes to the presentation of the Report on Plans and Priorities
Several changes have been made to the presentation of the RPP partially to respond to a number of requests – from the House of Commons Standing Committees on Public Accounts (PAC – [[ii]†] Report 15), in 2010; and on Government and Operations Estimates (OGGO – [[iii]†] Report 7), in 2012 – to provide more detailed financial and non-financial performance information about programs within RPPs and DPRs, thus improving the ease of their study to support appropriations approval.

- In Section II, financial, human resources and performance information is now presented at the Program and Sub-program levels for more granularity.
- The report's general format and terminology have been reviewed for clarity and consistency purposes.
- Other efforts aimed at making the report more intuitive and focused on Estimates information were made to strengthen alignment with the Main Estimates.

How to read this document
RPPs are divided into four sections:

Section I: Organizational Overview
This Organizational Expenditure Overview allows the reader to get a general glance at the organization. It provides a description of the organization's purpose, as well as basic financial and human resources information. This section opens with the new Organizational Profile, which displays general information about the department, including the names of the minister and the deputy head, the ministerial portfolio, the year the department was established, and the main legislative authorities. This subsection is followed by a new subsection entitled Organizational Context, which includes the *Raison d'être*, the Responsibilities, the Strategic Outcomes and Program Alignment Architecture, the Organizational Priorities and the Risk Analysis. This section ends with the Planned Expenditures, the Alignment to Government of Canada Outcomes, the Estimates by Votes and the Contribution to the Federal Sustainable Development Strategy. It should be noted that this section does not display any non-financial performance information related to programs (please see Section II).

Section II: Analysis of Programs by Strategic Outcomes
This Section provides detailed financial and non-financial performance information for strategic outcomes, Programs and sub-programs. This section allows the reader to learn more about programs by reading their respective description and narrative entitled "Planning Highlights". This narrative speaks to key services or initiatives which support the plans and priorities presented in Section I; it also describes how performance information supports the department's strategic outcome or parent program.

Section III: Supplementary Information
This section provides supporting information related to departmental plans and priorities. In this section, the reader will find future-oriented statement of operations and a link to supplementary information tables regarding transfer payments, as well as information related to the greening government operations, internal audits and evaluations, horizontal initiatives, user fees, major crown and transformational projects, and up-front multi-year funding, where applicable to individual organizations. The reader will also find a link to the *Tax Expenditures and Evaluations Report*, produced annually by the Minister of Finance, which provides estimates and projections of the revenue impacts of federal tax measures designed to support the economic and social priorities of the Government of Canada.

Section IV: Organizational Contact Information
In this last section, the reader will have access to organizational contact information.

Definitions

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

Budgetary Vs. Non-budgetary expenditures
- Budgetary expenditures – operating and capital expenditures; transfer payments to other levels of government, organizations or individuals; and payments to crown corporations.
- Non-budgetary expenditures – net outlays and receipts related to loans, investments and advances, which change the composition of the financial assets of the Government of Canada.

Expected Result
An outcome that a program is designed to achieve.

Full-Time Equivalent (FTE)
A measure of the extent to which an employee represents a full person-year charge against a departmental budget. FTEs 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 of Canada Outcomes
A set of high-level objectives defined for the government as a whole.

Management Resources and Results Structure (MRRS)
A common approach and structure to the collection, management and reporting of financial and non-financial performance information.

An MRRS provides detailed information on all departmental programs (e.g.: program costs, program expected results and their associated targets, how they align to the government's priorities and intended outcomes, etc.) and establishes the same structure for both internal decision making and external accountability.

Planned Spending
For the purpose of the RPP, planned spending refers to those amounts for which a Treasury Board (TB) submission approval has been received by no later than February 1, 2014. This cut-off date differs from the Main Estimates process. Therefore, planned spending may include amounts incremental to planned expenditure levels presented in the 2014–15 Main Estimates.

Program
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
A structured inventory of a department's programs, where programs are arranged in a hierarchical manner to depict the logical relationship between each program and the Strategic Outcome(s) to which they contribute.

Spending Areas
Government of Canada categories of expenditures. There are [†[iv]] four spending areas (social affairs, economic affairs, international affairs and government affairs), each comprised of three to five Government of Canada outcomes.

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

Sunset Program
A time-limited program that does not have on-going funding or policy authority. When the program is set to expire, a decision must be made as to whether to continue the program. (In the case of a renewal, the decision specifies the scope, funding level and duration).

Whole-of-Government Framework
A map of the financial and non-financial contributions of federal organizations receiving appropriations that aligns their Programs to a set of high level outcome areas defined for the government as a whole.

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Minister's Message

Canada is poised to enjoy continued economic stability in 2014–15, with a focus on balanced budgets. The country's strong consumer-driven marketplace, world-class research hubs, educated and productive workforce, strong financial institutions, and transparent and predictable regulatory environment are just a few of its many competitive advantages.

As Minister of Industry, I am pleased that the Industry Portfolio is building on these strengths by encouraging innovation, modernizing Canada's marketplace policies, and effectively managing programs and services.

In further developing the federal Science, Technology and Innovation Strategy, the Industry Portfolio aims to strengthen the private sector's participation in Canadian science and technology, knowledge and innovation. This year, small and medium-sized enterprises will also be better served by improved access to information, programs and services offered by Industry Canada, the portfolio partners and the Government of Canada.

In 2014–15, the National Research Council of Canada (NRC) will continue to refine its program and service offerings to deliver the support and expertise Canada's innovative companies are seeking. The Government of Canada is confident that the investments that were made to help the NRC refocus its efforts on market-driven research and development services will result in the jobs and commercialized technologies that Canada needs to position itself as a leader in the rapidly changing global economy.

In support of the government's efforts to return to fiscal balance, the Industry Portfolio will continue to ensure financial and human resources are managed responsibly and efficiently.

This year's Report on Plans and Priorities defines our approach to supporting a competitive marketplace; facilitating advancements in science, technology and innovation, and their resulting economic and social benefits; and driving the competitiveness of Canadian businesses and communities. On behalf of the Industry Portfolio, I am confident we will meet our objectives and fulfill the promise of another successful year.

The Honourable James Moore

Minister of Industry

Minister of State's Message

I am pleased to present the 2014–15 Report on Plans and Priorities for the National Research Council Canada (NRC), in my capacity as Minister of State for Science and Technology.

Having spent many years as a nurse working in some of Canada's most remote communities, I have witnessed first-hand that investing in science and technology (S&T) helps improve the lives of Canadians. Our government remains committed to making these investments a priority as we continue to position Canada as a premiere destination for cutting-edge research in today's global economy.

Recent reports show that S&T in Canada is healthy, growing and recognized around the globe for its excellence. Canada's universities, colleges and communities have become powerful magnets for attracting high-quality researchers from abroad. This is crucial because scientific research leads to discovery and inspires change in how people see and do things as we prepare for the challenges of tomorrow.

Our government is committed to encouraging even greater innovation in Canada's industrial core and providing the right conditions for research to grow, develop and mature into concrete results for Canadians. We will achieve this in a variety of ways, such as the transformed National Research Council, in combination with other budget measures and investments.

As we work toward a renewed federal science, technology and innovation strategy to more adequately meet Canada's needs, we look forward to strengthening relationships between researchers and the private sector. Bridging this gap within the innovation eco-system is key to success. Building new partnerships and reinforcing existing ones will lead to more innovations getting to market. Businesses often see fast and long-lasting returns when academic research is integrated with private sector know-how.

Over the next year, the NRC will continue to play a critical role in Canada's innovation system. As the country's national research and technology organization, the NRC is ideally positioned to offer Canada's best and most enterprising companies the services, advice and support they need to take their businesses to the next level.

The significant S&T investments the government has made since 2006 demonstrate that we are building on the country's strengths and positioning Canada as a prime environment for research in which science, technology and innovation thrive. As such, in 2014–15, we will continue to work with all our partners to meet these objectives, to improve the quality of

life of Canadians and ensure the long-term prosperity of Canada's knowledge-based economy.

The Honourable Greg Rickford

Minister of State (Science and Technology) (Federal Economic Development Initiative for Northern Ontario)

President's Message

I am pleased to submit for tabling in Parliament, the 2014–15 Report on Plans and Priorities for the National Research Council Canada. As NRC prepares to enter its second year as Canada's National Research and Technology Organization (RTO), we are encouraged at the progress we have made in delivering innovation support, advice and services that are critical to the success of Canadian industry and to our country's prosperity.

Our full roster of demand-driven programs is now up and running, and we are starting to see results. For example, NRC's Printable Electronics program has already made breakthroughs in printing "scannable" electronics, such as radio-frequency identification (RFID) security features embedded in passports.

In 2014–15, we will focus on effectively managing new R&D initiatives through regular performance tracking and three-year performance reviews. Additionally, as announced in Budget 2013, we are launching the Business Innovation Access Program to help small and medium-sized firms (SMEs) access research, technology and business development services at universities, colleges and other research institutions of their choice. To complement this domestically-delivered support to industry, we will step up our efforts to open key international markets for Canadian firms by participating in technology partnering opportunities and engaging in key international alliances. Finally, we will continue to refine and strengthen our recently launched Concierge Service – helping Canadian SMEs find information and guidance to access federal programs and resources in support of innovation and their subsequent growth. To achieve all this, we will continue to strengthen NRC's client-focused culture of innovation and maximize our impact and outreach by seeking renewal of the funding allocated for the refocused NRC.

The world around us has changed. It is increasingly fast-paced and demanding. Canadian industry needs to be agile, competitive, and global in its outlook. In the coming year, NRC will continue to adapt and change – keeping a pulse on the market and the future – to meet these challenges and opportunities and ensure that Canada is regarded as one of the most productive and innovative nations in the world.

John McDougall
President, National Research Council Canada

Section I: Organizational Expenditure Overview

Organizational Profile

Minister of Industry: The Honourable James Moore

Minister of State (Science and Technology): The Honourable Greg Rickford

President: Mr. John McDougall

Ministerial portfolio: Industry

Year established: 1917

Main legislative authorities: [v†] *National Research Council Act*

Other: N/A

Organizational Context

Raison d'être

National Research Council Canada (NRC) bridges 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. With a presence in every province, 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.

Responsibilities

NRC is a departmental corporation of the Government of Canada, reporting to Parliament through the Minister of Industry. NRC works in partnership with members of the Industry Portfolio to leverage complementary resources to promote the innovation of firms, to exploit synergies in key areas of S&T, to promote the growth of small and medium-sized firms (SMEs) and to contribute to Canadian economic growth. NRC's Council provides independent strategic direction and advice to the NRC President and reviews organizational performance. The President provides leadership and strategic management and is responsible for the achievement of NRC's long-range goals and plans within the guidance of the NRC Council. Each of NRC's seven Vice Presidents is responsible for a number of areas composed of research programs, initiatives, centres, the Industrial Research Assistance Program, and/or corporate common services. Vice Presidents and NRC

managers are responsible for executing plans and priorities to ensure successful achievement of objectives.

NRC Mandate

Under the [ᵛ†] *National Research Council Act*, 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;
- 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.

NRC Vision

To be the most effective research and technology organization in the world, stimulating sustainable domestic prosperity.

NRC Mission

Working with clients and partners, we provide innovation support, strategic research, and scientific and technical services to develop and deploy solutions to meet Canada's current and future industrial and societal needs.

Strategic Outcomes and Program Alignment Architecture (PAA)

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

Crosswalk between NRC's 2013–14 and 2014–15 PAA

2014–15 PAA / 2013–14 PAA	Technology Development and Advancement	Industrial Research Assistance Program (IRAP)	Science Infrastructure and Measurement	Internal Services[1]
Manufacturing Technologies				
ICT and Emerging Technologies				
Industrial Research Assistance (IRAP)				
Health and Life Science Technologies				
Energy and Environmental Technologies				
National S&T Infrastructure				
Scientific, Technical and Medical (STM) Information				
Internal Services				

[1] In 2014–15, Internal Services includes the mandated activities of the National Science Library that were included in 2013–14 as STM Information.

Organizational Priorities

Organizational Priorities

Priority 1	Type[1]	Strategic Outcome
Generate demonstrable results for clients through market-driven research, technology development and innovation support services – with a focus on supporting commercialization – to help Canadian firms thrive in today's globally competitive, innovation-based economy.	New	SO1: Canadian businesses prosper from innovative technologies
Description		
Why is this a priority? • This priority aligns with our Government's commitment to an efficient and competitive marketplace, a healthy and innovative knowledge-based economy, and a competitive and sustainable business community. As Canada's national Research and Technology Organization (RTO), NRC has the ability, experience, and national presence to actively engage with businesses in de-risking technologies, encouraging further investment and adoption by industry, thereby amplifying business innovation and national productivity. • After the diligent design of R&D initiatives specifically targeted to crucial industry needs, NRC will focus in 2014–15 on the first phase of implementation, which includes program		

[1] Type is defined as follows: **previously committed to**—committed to in the first or second fiscal year prior to the subject year of the report; **ongoing**—committed to at least three fiscal years prior to the subject year of the report; and **new**—newly committed to in the reporting year of the RPP or DPR.

execution, client engagement, formal partnering and the building of research consortia.
- There currently are a number of opportunities and challenges affecting Canada's ability to develop sustained economic growth. These include business enterprise R&D expenditures (BERD), innovation and competitiveness (relative to established and emerging competitor nations), and industrial productivity. Through the impacts and benefits generated by its R&D initiatives, NRC's contribution will help build on opportunities in tangible ways.

What are the plans for meeting this priority?
- NRC will form and strengthen strategic partnerships, engage key stakeholders and facilitate networks among industry and innovation players like universities and other government departments, to accelerate the commercialization of products and processes in key technology areas such as photonics. Such collaboration will ensure that resources are leveraged with support from other key players in Canada's innovation system and that research activities will deliver concrete and measurable impacts for Canada. NRC will also work in collaboration with, and provide technical services to, high impact Canadian-based companies in the areas of vaccines, biopharmaceuticals, medical devices, and natural health products.
- NRC will support Canadian industry in accessing global markets by continuing to advance emerging technologies of increasing prominence nationally and globally, such as green technologies for the manufacturing sector, smart buildings and nanotechnology applications, as well as advancing the development of standards aligned with international norms. Through its international framework, NRC will grow Canadian industrial competitiveness by investing in key international alliances (such as [vi†] EUREKA) and facilitating access to global value chains.
- Through NRC IRAP, SME clients will have access to technical and business advice, networking opportunities, and cost-shared merit-based contributions for their innovative projects.

Priority 2	Type	Strategic Outcome
Enhance the generation and commercialization of knowledge in Canada by providing access to scientific infrastructure and measurement services.	Ongoing	SO2: R&D infrastructure for an innovative and knowledge-based economy

Description

Why is this a priority?
- To enhance Canada's capacity to generate new knowledge and translate it into real economic and social value, providing access to high quality scientific services and infrastructure is required. In collaboration with academic, industrial and government partners, R&D infrastructure must be managed effectively and efficiently to ensure they remain at the leading edge and accessible to all Canadians, to promote and strengthen Canada's innovation ecosystem.

What are the plans for meeting this priority?
- NRC enables access to national science infrastructure for Canadian research communities. This infrastructure includes the TRIUMF sub-atomic research facility, and, as mandated by the *National Research Council Act*, astronomical observatories in which Canada has an interest. NRC is also mandated to serve as Canada's national metrology institute, providing measurement standards that underlie domestic and international trade; the services and expertise are routinely accessed by a client base representing more than 700 clients from

industry and government.
- NRC will continue to provide Canada's research and innovation community with tools, including electronic information services that accelerate technology discovery, innovation, and commercialization, through Canada's national science library.

Priority 3	Type	Strategic Outcome
Drive organizational growth to deliver on expected results and enable effective and efficient resource management for a sustainable organization.	Previously committed to	SO1: Canadian businesses prosper from innovative technologies, and SO2: R&D infrastructure for an innovative and knowledge-based economy

Description

Why is this a priority?

- As a national RTO, NRC must be agile and sustainable in order to respond to Canadian industry needs. NRC's new business model requires strong centralized oversight to ensure resources, investments and opportunities are holistically managed with an eye to balancing risk. Resource management effectiveness will ensure that Canadian R&D initiatives produce technologies with international market demand, while maintaining low delivery costs.

What are the plans for meeting this priority?

- The implementation of succession planning, workforce planning and talent acquisition initiatives will help to ensure an agile and sustainable workforce to support the implementation of NRC's strategy.
- Within the program-based management model designed by NRC to meet industry-identified needs and demands, all NRC R&D performance will be tracked quarterly to ensure resources, investments and opportunities are being managed effectively, taking into consideration new or changing risks, while maintaining market-orientation and clear technology deployment paths.
- NRC will transform its common services starting with the optimization of several priority processes in the areas of asset and resource management, information technology, and security.

Risk Analysis

Key Risks

Risk[1]	Risk Response Strategy	Link to Program Alignment Architecture
Delivery of Results for Clients and Canada: Risk that NRC is unable to effectively execute its programs and deliver expected results for clients and Canada. ***Likelihood:*** *Possible*	**The actions below will be undertaken to mitigate this risk:** 1. Initiate first set of 3-year program reviews in 2014–15, to evaluate program performance, outcomes and impacts, and guide decisions on future activities 2. Implement NRC program boards as appropriate, to address any potential challenges with respect to program delivery	SO1: Canadian businesses prosper from innovative technologies and SO2: R&D

Consequence: *Major* ***Rating:*** *High*	3. Implement quarterly progress updates, and track progress against risks and key performance indicators 4. Undertake regular foresight exercises to identify new program opportunities 5. Deliver advanced program/project management training 6. Launch Program Management Audit in 2014–15 **Indicators:** • Program performance data • 3-year program review findings • Client/stakeholder feedback	infrastructure for an innovative and knowledge-based economy
NRC Longer Term Competitiveness & Relevance to Clients: Risk that NRC is not proactively building the longer term capabilities required to attract relevant Canadian and international firms with a Canadian footprint to create future impacts for Canadian industry and the economy. ***Likelihood:*** *Possible* ***Consequence:*** *Moderate* ***Rating:*** *Medium*	**The actions below will be undertaken to mitigate this risk:** 1. Identify new innovative R&D opportunities to deliver future benefits to clients 2. Use and track foresight, client key accounts and competitive/RTO intelligence to understand current and future client needs, markets and investment opportunities to pursue **Indicators:** • Performance relative to global RTOs • Client/stakeholder feedback	
Sourcing and Management of Technical and Business Expertise: Risk that NRC will not be able to source identified gaps in expertise, and/or effectively manage internal supply and demand of existing talent across organization for successful program delivery and future growth. ***Likelihood:*** *Possible* ***Consequence:*** *Moderate* ***Rating:*** *Medium*	**The actions below will be undertaken to mitigate this risk:** 1. Monitor upcoming fiscal year technical and business expertise requirements, and success rates for first choice hires 2. Develop tools to support proactive management of internal competencies and sourcing across NRC, including succession planning 3. Implement NRC program boards as appropriate, to address internal supply and demand issues 4. HR Talent Management Audit scheduled for 2014–15 **Indicators:** • Employee-driven turnover • % first choice hires	

[1] The risks identified in the table are based on externally-focused risks in NRC's Corporate Risk Profile.

Reflecting NRC's organizational priorities, the focus in 2014-15 for performance and risk attention will be on effective and efficient execution of R&D initiatives and delivery of results. This focus serves to support the greater global competitiveness of Canada, as well as its innovative capacity. NRC must also ensure its continued relevance to clients and stakeholders in the longer term and in a sustainable way, with attention towards the

development of future competencies needed. Part of this requires NRC to capture global opportunities for the benefit of Canadian industry. NRC's involvement in EUREKA is an existing starting point from which it can build.

The risk actions identified above will help to strengthen NRC's internal processes and ensure that it has the relevant information to continue to support effective management decision-making, as well as the mechanisms to resolve any efficiency and operational challenges required to deliver on its programs. Existing controls and scheduled audits will additionally help NRC manage its risks to stay on course, while allowing for proactive actions that will enable it to capture future opportunities for growth and sustainability.

NRC's risk management efforts address key risks and opportunities arising from other internal factors including: employee understanding of new roles and responsibilities within the new organizational structures, systems and processes; efficient mobilization and optimized use of resources within a cross-disciplinary, collaborative environment; NRC branding and external communications; and implementation of NRC's strategic emergency management plan.

NRC's robust oversight of environmental factors that affect risks and opportunities also includes: regular monitoring of global developments and trends such as foreign research and technology organizations' activities to support the competitiveness of their clients; monitoring of economic climates in other parts of the world; and Government of Canada (GoC) directions to enhance industrial innovation and commercialization activity and modernize federal processes and services to Canadians.

Planned Expenditures

Budgetary Financial Resources (Planned Spending – dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
896,432,878	918,305,859[1]	853,747,825[2]	857,052,888[2]

[1] Figures for 2014–15 reflect changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (Full Time Equivalents – FTEs)

2014–15	2015–16	2016–17
3,592[1]	3,251[2]	3,293[2]

[1] Figures for 2014–15 reflect changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned figures do not reflect future budget decisions.

Budgetary Planning Summary Table for Strategic Outcomes and Programs (dollars)

Strategic Outcomes, Programs and Internal Services	2011–12 Expenditures	2012–13 Expenditures[1]	2013–14 Forecast Spending[1]	2014–15 Main Estimates[1]	2014–15 Planned Spending[3]	2015–16 Planned Spending[3]	2016–17 Planned Spending[3]
Strategic Outcome 1: Canadian businesses prosper from innovative technologies							
Program 1.1: Technology Development and Advancement	313,814,269	261,874,311	360,108,776	331,740,362	339,266,474	299,502,297	312,611,182
Program 1.2: Industrial Research Assistance Program (IRAP)	146,311,268	244,628,683	294,524,895	260,499,279	270,670,144	270,670,144	259,497,893
Strategic Outcome 1 Subtotal	460,125,537	506,502,994	654,633,671	592,239,641	609,936,618	570,172,441	572,109,075
Strategic Outcome 2: R&D infrastructure for an innovative and knowledge-based economy							
Program 2.1: Science Infrastructure and Measurement	96,359,502	94,893,647	103,532,352	100,720,529	101,777,277	77,521,584	78,864,998
Strategic Outcome 2 Subtotal	96,359,502	94,893,647	103,532,352	100,720,529	101,777,277	77,521,584	78,864,998
Internal Services Subtotal	142,018,543	203,408,271[2]	211,550,322	203,472,708	206,591,964	206,053,800	206,078,815
Total	**698,503,582**	**804,804,912**	**969,716,345**	**896,432,878**	**918,305,859**	**853,747,825**	**857,052,888**

Note: Expenditures in 2011-12, 2012-13 and forecast spending in 2013-14 have been mapped to Strategic Outcomes, Programs and Internal Services based on the 2014-15 Program Alignment Architecture (PAA) crosswalk.

[1] Expenditures reflect changes announced in Economic Action Plan 2012 and 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.

[2] The change from previous year reflects the centralization of NRC's common services.

[3] Planned spending for future years does not reflect future budget decisions.

NRC's expenditure profile has increased since 2011–12 primarily as a result of investments and initiatives announced in Economic Action Plan 2012 and Economic Action Plan 2013. NRC's future expenditure profiles do not reflect future budget decisions.

Alignment to Government of Canada Outcomes

2014–15 Budgetary Planned Spending by [vii †] Whole-of-Government-Framework Spending Areas (dollars)

Strategic Objective	Program	Spending Area	Government of Canada Outcome	2014–15 Planned Spending
SO1: Canadian businesses prosper from innovative technologies	1.1 Technology Development and Advancement	Economic Affairs	Strong Economic Growth	339,266,474
	1.2 Industrial Research Assistance Program (IRAP)			270,670,144
SO2: R&D infrastructure for an innovative and knowledge-based economy	2.1 Science Infrastructure and Measurement		Innovative and Knowledge-based Economy	101,777,277

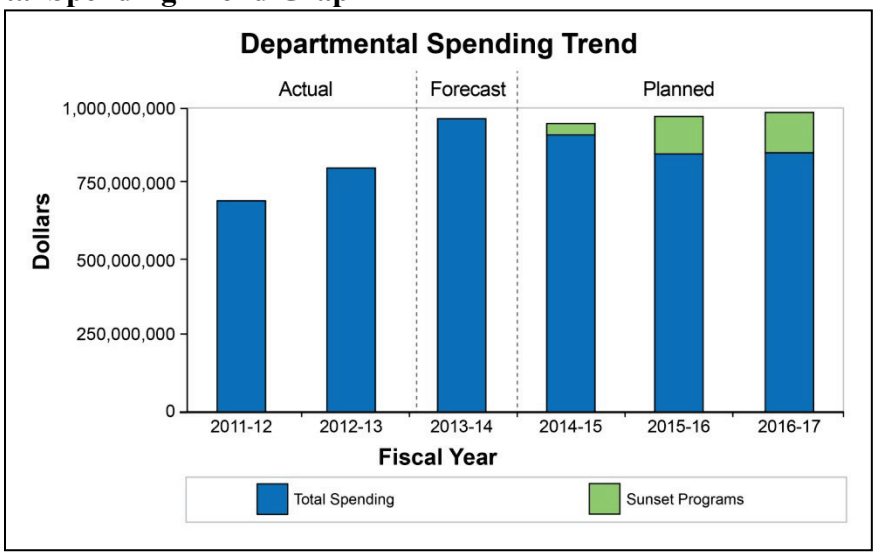
Total Planned Spending by Spending Area (dollars)

Spending Area	Total Planned Spending
Economic Affairs	**711,713,895**[1]
Social Affairs	**N/A**
International Affairs	**N/A**
Government Affairs	**N/A**

[1] Planned spending excludes the cost of Internal Services.

Departmental Spending Trend

Departmental Spending Trend Graph



Planned spending for future years does not reflect future budget decisions. Future years reflect the sunset of funding for targeted initiatives including $121M over two years for

NRC's refocusing, as announced in Budget 2013, as well as the Digital Technology Adoption Pilot Program (DTAPP), TRIUMF and the Genomics Research and Development Initiative.

Estimates by Vote

For information on the National Research Council's organizational appropriations, please see the [[viii]†] *2014–15 Main Estimates publication*.

Contribution to the Federal Sustainable Development Strategy (FSDS)

NRC ensures that its decision-making process includes a consideration of the FSDS goals and targets through the strategic environmental assessment (SEA). An SEA for policy, plan or program proposals includes an analysis of the impacts of the proposal on the environment, including on the FSDS goals and targets. The results of SEAs are made public when an initiative is announced or approved, demonstrating that environmental factors were integrated into the decision-making process.

Section II: Analysis of Programs by Strategic Outcomes

Strategic Outcome 1: Canadian businesses prosper from innovative technologies

Program 1.1: Technology Development and Advancement

Description: *This program develops and advances technologies to enhance the prosperity of Canadian industries in support of federal priorities such as the federal Science and Technology 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 accepted from the 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.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
331,740,362	339,266,474[1]	299,502,297[2]	312,611,182[2]

Note: Amounts shown are greater than the totals of corresponding Sub-Programs due to the cost of activities which are managed accounted for at the Program level, and provide direct support to the Sub-Programs.
[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
2,007[1]	1,666[2]	1,708[2]

Note: Amounts shown are greater than the totals of corresponding Sub-Programs due to FTEs accounted for within activities at the Program level, which provide direct support to the Sub-Programs.
[1] Planned figures for 2014-15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Result	Performance Indicators	Targets	Date to be Achieved
Canadian industries commercialize advanced technologies	Client/stakeholder deployment of technology	14[1]	March 2015
	Client/stakeholder feedback on benefits: jobs, sales, R&D	80%[2]	March 2015

[1] Number of unique press releases, company public reports, and NRC Key Accounts in which an NRC client or stakeholder expresses, during the reporting period, a commitment to exploit innovations that have already been successfully developed or advanced by NRC.
[2] 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.

Planning Highlights

This program will deliver targeted research, technology development and demonstration, and direct technology support to Canadian industry – elements that are crucial for Canadian companies to thrive in a highly competitive global market. In 2014–15, the program will manifest NRC's commitment of keeping Canadian industry at the forefront of its planning activities and service delivery so that NRC innovative activities are aligned with industry needs and capacity to deploy to commercial success in technology-intensive areas of national priority. Rigorous program and project management practices will be deployed to ensure program success and value to Canadians. A direct outcome of NRC's new program-based structure will be newfound efficiencies in R&D delivery and results for clients.

NRC's suite of new and integrated performance indicators are logically aligned to the expected results of this Program and its Sub-Programs. Assigned targets for all performance indicators and impacts will be subjected to continuous oversight, and a historical baseline will be established for future comparison, as information becomes available over the year.

Sub-program 1.1.1: Aerospace

Description: *This sub-program advances product and process technologies to enhance the prosperity of the aerospace industry sector in Canada that is striving to remain competitive in the face of razor-thin margins and increasing regulatory demands. The sector is important to the Canadian economy as a major contributor to manufacturing trade and for hundreds of thousands of skilled jobs at all levels of the supply chain. It is also important for its impacts on the transportation costs of materials and products that drive the economy. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services in specialized facilities, such as testing and prototyping, for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
53,592,200	54,793,852[1]	48,492,441[2]	50,501,464[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
313[1]	259[2]	265[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements of aerospace process and product technologies	Client/stakeholder financial investment in technology development, $million	$37.0M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.05M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Working and travelling on aircraft* – technologies designed to meet the needs of the travelling public and aircrew as they use or work on aircraft. The aim will be to make Canada's aerospace industry more competitive by helping it develop and deliver the innovative technologies required to deliver the safe, comfortable, and connected air travel that today's travelling public requires and demands. For example, working with industry, NRC will develop, design and evaluate optimized helicopter seat cushions or active seat concepts for reduced aircrew whole body vibration as well as commercialize NRC-developed dimmable window technologies (known as microblinds) through a Canadian SME for aircraft cabin application. NRC will also develop test procedures and collect flight test biomechanical data through full body vibration analysis to better understand neck strain for helicopter aircrew.
- *Reduction in aviation icing risks* – Over the past number of years, large commercial aircraft have experienced challenges due to high concentrations of atmospheric ice crystals into their engines at cruise altitudes. In response to these critical safety incidents, the aviation industry and safety authorities have begun to invest in research to gain a sound physical understanding of the mechanisms causing such power losses. Ultimately, this information will be used by industry to develop solutions to prevent these events from occurring and by safety authorities to develop certification tests to ensure that future engines resist this hazard. In 2014–15, NRC will complete the development of a novel engine ice sensor and utilize it for the first-ever detailed investigation of ice build-up characteristics in a state-of-the-art engine at representative atmospheric conditions.

Sub-program 1.1.2: Automotive and Surface Transportation

Description: *This sub-program provides technical knowledge and it advances product and process technologies for producing more fuel-efficient, affordable, and environmentally-responsible ground vehicles and for delivering engineering solutions to complex technology challenges facing surface transport industries including heavy vehicle and rail. This is important for reducing transportation infrastructure and costs and for enhancing Canada's share of ground vehicle supply chains and for enhancing the prosperity of the ground vehicle industry sector in Canada as it is faced with growing environmental concerns, competitive pressures, and stringent regulations. The Canadian economy relies on ground vehicle industries as major economic drivers, accounting for a significant portion of manufacturing trade, and therefore must remain competitive. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services, such as testing, prototyping and system integration, for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
44,791,652	45,698,353[1]	40,785,199[2]	42,636,990[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
248[1]	207[2]	212[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements in ground vehicle process and product technologies	Client/stakeholder financial investment in technology development, $million	$27.0M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.45M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Launch of the ALTec Consortium* – Automakers need innovative ways to build lighter vehicles and meet aggressive new fuel efficiency requirements such as the [ix†] Corporate Average Fuel Economy (CAFE) regulations. The ALTec multi-party collaboration is the cornerstone of NRC's focus in developing, validating and deploying advanced aluminium and multi-material technologies for the fabrication of lightweight vehicles. The ALTec consortium aims at bringing together a minimum of 15 collaborators across the supply chain of production from primary metal, semi-finished products, Tier 1 and Tier 2 suppliers and OEMs. The R&D activities under ALTec will lead to technology for heat-quench forming of panels, semi-solid casting of structural components, new high strength aluminium materials, a database on coatings performance and a prototype commercial part.
- *Green composites for mass transit* – technologies that will help manufacturers evolve from using petroleum-based products to renewable bio-based materials. NRC's sound expertise in industrial biomaterials and cellulosic fibre composites is a strong asset to develop value-added materials from residual biomass generated by the agriculture sector. NRC will introduce flax and hemp fibres in a thermoset polyester matrix to develop lighter and stronger bio-based composite materials at a lower cost for the ground transportation industry. In this endeavour, NRC is partnering with at least seven companies for collaboration, all from Canadian industry. The results and benefits will help in the market penetration of biocomposites, as well as the creation of an effective

sustainable Canadian supply chain of bio-based materials with consistent quality at a competitive cost.

Sub-program 1.1.3: Ocean, Coastal and River Engineering

Description: *This sub-program develops and advances technologies and standards for safe and effective operations in Canada's vast ocean, coastal and river environments, including the Arctic. This is important for lowering barriers for natural resource development and for enhancing the prosperity of the Canadian marine transportation and water resource sectors facing costly challenges of harsh environments (ice, wind, waves, currents), extreme weather events (floods, "100 year wave"), and coastal erosion. Results are achieved by working with Canadian industry through multi-disciplinary collaborative research and development services in addition to specialized technical services, such as testing, prototyping, numerical modeling, and system integration in specialized facilities, for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
15,307,805	15,648,736[1]	13,919,925[2]	14,366,004[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
81[1]	66[2]	68[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements of process and product technologies for ocean, coastal and inland water engineering	Client/stakeholder financial investment in technology development, $million	$12.0M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.05M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Arctic* – technologies to ensure sustainable and low impact development of the North, while increasing the quality of life for Northerners, who are specifically challenged with respect to resource development, transportation, construction and marine safety. NRC will explore the feasibility of developing models and tools to predict and assess ice loads and risks for ships and structures operating in the Arctic. It will also contribute to development of international standards (ISO) and applied technologies for next-generation arctic lifeboats. With regards to community infrastructure, NRC will

examine technologies to deliver effective building systems including requirements for potable water, waste treatment and energy usage.

- *Marine infrastructure, energy and water resources* – addressing challenges related to port and harbour infrastructure, renewable marine energy resources and the management of Canada's fresh water systems to mitigate environmental incursions and the effects of climate change. The focus of the coming year will be on capacity-building in terms of highly qualified personnel and new facilities, along with the development of decision and predictive tools.
- *Marine vehicles* – advanced control technologies that will optimize ship operational efficiencies, reducing fuel consumption and emissions. Further, the initiative will improve upon existing technologies and designs for new vessels that enable safe operation for offshore resource exploration and development in harsh and arctic conditions including managed ice. In the coming year, NRC will engage with clients to generate data and develop preliminary numerical models for vessel performance and control systems and continue to support the various initiatives under the National Shipbuilding and Procurement Strategy.

Sub-program 1.1.4: Energy, Mining and Environment

Description: *This sub-program develops and advances technologies and techniques for enhancing the innovation capacity and growth of Canada's natural resources and utility sectors. These sectors are important contributors to Canada's GDP that are challenged by volatile global markets and growing environmental pressures. To remain sustainable, industries in these sectors require technologies to reduce production costs. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized advisory and technical services for transferring or advancing technologies into industrial solutions for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
24,412,109	25,045,360[1]	21,845,149[2]	22,648,712[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
164[1]	135[2]	139[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements of process and product technologies for the natural resources and utility sectors	Client/stakeholder financial investment in technology development, $million	$10.0M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.06M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas that ultimately aim to achieve positive outcomes and impacts on productivity, risk mitigation, competitiveness in global markets, and further operations in the mining, energy and environmental sectors within the next six to seven years:

- *Energy storage for grid security and modernization* – next generation technology to enable more effective use of existing grid infrastructure, to integrate renewables and to gain the full benefits of smart grid technology.
- *Bioenergy for viable stationary applications* – improved economics for use of locally-sourced waste biomass and municipal solid waste to displace diesel use in off-grid communities and industrial sites.
- *High efficiency mining* – increased extraction efficiency from lower grade ores, to offset steadily declining Canadian reserves of higher grade, more profitable, mineral deposits.

Sub-program 1.1.5: Construction

Description: *This sub-program provides technical knowledge and it advances product and process technologies to enhance the prosperity of the Canadian construction industry sector as it faces critical challenges in responding to expectations for better performing and more affordable buildings and infrastructure while striving to remain competitive in the global marketplace. The success of this sector is critical as a major contributor to Canada's GDP, employing millions of individuals, and managing assets valued in the trillions of dollars. Results are achieved through multi-disciplinary collaborative research and development and standardization services in addition to specialized technical services – such as testing, product and process validation, prototyping, and system integration in field and in specialized facilities – for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
26,256,968	26,912,137[1]	23,495,869[2]	24,547,338[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
166[1]	136[2]	140[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements of process and product technologies	Client/stakeholder financial investment in technology development, $million	$12.0M	March 2015

for the construction industry sector	Licensing and royalty revenue from NRC clients, $million	$0.64M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas aimed at validating the performance of complex materials, products and services, and also find methods of reducing costs and increasing productivity throughout the construction life-cycle:

- *Building regulations and market access* – Through 2014–15, NRC will develop performance targets and benchmarks for a series of technical guides for the evaluation of new products and building components, which bring increased energy efficiency and cost savings to the built environment. Research and development activities planned for this period will support provincial governments by providing technical review of model building regulations, which provinces and territories are responsible for modifying or adopting, and implementing. NRC will also respond to industry demand for tools that enable business growth and address specific opportunities such as healthy indoor environments.
- *High performance buildings* – addressing the need for increased energy efficiency and energy retrofit technologies for commercial and institutional buildings. NRC will enable industry to manufacture and demonstrate new energy harvesting technologies, together with advanced systems to operate buildings with greater energy efficiency and performance reliability, without compromising occupant health or satisfaction. In 2014–15, NRC will enable Canadian firms to make significant technical advances and demonstrate new products in two important and growing market segments for energy retrofits: roofing systems and intelligent building operation.
- *Mid-rise wood buildings* – NRC will work with construction product manufacturers and building owners to develop technologies that support the increasing demand for cost-effective wood buildings between five and 12-stories in height. In 2014–15, NRC will complete performance validations of generic wood-based wall assemblies to give builders of midrise buildings a new set of energy-efficient design options with known performance characteristics. In the long term, this will support future work on technical standards and technologies that meet the objectives of the National Model Building Code, a guideline that provinces and territories have the responsibility to either implement in its entirety or adapt to suit their jurisdictional needs.
- *Critical concrete infrastructure* – developing and validating high-performance concrete materials and composite structural systems to extend the service-life of concrete bridges and reduce the life-cycle operation and maintenance costs of both new and existing bridges and infrastructure. Key deliverables for 2014–15 will include hybrid glass-carbon fibre-reinforced polymer systems for strengthening concrete bridges against blast and impact loads, and low-permeability, high-performance concrete using low-cost, local materials.

Sub-program 1.1.6: Aquatic and Crop Resource Development

Description: *In collaboration with industry, this sub-program develops improved varieties of crops and develops technologies for maximizing crop value and converting biomass to enhance the prosperity and global market share of the Canadian agriculture, bio-product, and natural health*

product industry sectors. This includes development and validation of value-added goods – from natural ingredients and health products through to chemicals and industrial oils and other products – for leveraging Canada's abundance of aquatic and crop resources. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
36,282,214	37,095,459[1]	32,752,213[2]	34,277,587[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
214[1]	177[2]	181[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements in agricultural crops and related value-added products	Client/stakeholder financial investment in technology development, $million	$5.5M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.32M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Natural health products* – providing custom science solutions to Canada's Natural Health Products industry for: the extraction, purification and identification of bioactives; analysis and characterization of functional ingredients; pre-clinical efficacy and safety testing; assistance with product formulation; and standards and methods that support product integrity. These will ultimately support the development of the industry's products, growth of the natural health products industry and increase consumer confidence in the safety and efficacy of natural health products in Canada. Solutions developed under the program will reinforce Canada's international reputation for quality and safety by supporting domestic companies in meeting or exceeding Canada's stringent regulatory requirements as defined by Health Canada's Natural Health Products Directorate.
- *Algal carbon conversion* – collaborating with key partners, including industry, towards building and testing a pilot Algal Carbon Conversion facility. The facility will use marine algae to convert carbon dioxide emissions into biomass that can in turn be converted to biofuel and other valuable end products. Successful deployment will

propel Canada to a world-leading position in managing carbon emissions and resources and help create and expand markets for Canadian photobioreactor producers.

- *Canadian wheat improvement* – collaborating with NRC's Canadian Wheat Alliance partners (Agriculture and AgriFood Canada, the University of Saskatchewan and the province of Saskatchewan) to accelerate the development of higher-yielding abiotic-resistant wheat varieties requiring less input. The aim is to increase the profitability and global competitiveness of Canadian wheat farmers within the next ten years. Increased emphasis will be placed on the direct engagement of private sector companies and farmer associations.
- *Biomass transformation* – exploring the potentials of increasing the utility of existing biomass and developing new feedstocks for bio-based chemicals, improving existing transformation processes through incremental advances that enhance efficiency and profitability, and co-developing new products and processes that create commercial opportunities for Canadian companies.
- *Crop development technology* – crop development services and specialized equipment on a fee-for-service basis for Canada's plant agriculture sector. This will include marker-assisted selection, cell culture methods, analytical technologies, DNA technologies metabolite analysis, and hormone profiling.

Sub-program 1.1.7: Medical Devices

Description: *This sub-program applies expertise in biochips, nano-materials, micro-devices, in vitro diagnostics, imaging, optical bio-photonics, medical simulation, and radio-frequency engineering and electronics to develop and advance technologies for enhancing the prosperity of the medical device industry as it strives to respond to increasing demands for equipment and supplies that are faster, more accurate, more informative, more affordable and less invasive. The industry is important for its growing contribution to Canada's GDP and its contribution to effective and efficient health care. Results are achieved through provision of industry-driven technical services and multi-disciplinary collaborative research.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
10,426,754	10,678,459[1]	9,355,772[2]	9,781,379[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
65[1]	54[2]	55[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements in	Client/stakeholder financial investment in	$3.5M	March 2015

medical devices for the marketplace	technology development, $million		
	Licensing and royalty revenue from NRC clients, $million	$0.06M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on technical, R&D and validation services and infrastructure to Canadian medical device developers in the following areas:

- *Bioanalytical microdevices* – leveraging NRC's established and distinctive competencies to help companies developing "labs on a chip" or cassettes, which will replace current, more expensive vitro diagnostic assays.
- *Minimally invasive hardware and/or software devices* – working with companies to develop diagnostic devices that are inexpensive, reliable, accurate, minimally-invasive, less time consuming and easily adaptable by clinicians.
- *Implantable/orthopaedic devices* – working with SMEs to ensure their products take advantage of improved biomaterials for stronger, more fatigue-resistant, and highly biocompatible devices that will lead to faster patient recovery and increased safety and comfort for the patient – all of which are essential to succeed in this competitive landscape.
- *Modeling and IT devices* – product development services that address emerging business opportunities in surgical efficiency technologies, medical technology software, health IT and homecare rehabilitation.

Sub-program 1.1.8: Human Health Therapeutics

Description: *In collaboration with industry, this sub-program develops vaccines and biologics for enhancing the prosperity of the Canadian bio-therapeutics industry, and to provide more effective treatments to Canadians. Activities include developing biologic materials for treating and preventing infectious and chronic diseases, and technologies to deliver therapeutics from circulation in the blood to the central nervous system. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services for transferring or advancing technologies into deployed solutions and improved practices for the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
41,060,487	42,092,378[1]	36,736,746[2]	38,345,007[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.

[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
278[1]	231[2]	237[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.

[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Improved and more affordable vaccines and biologics for the marketplace	Client/stakeholder financial investment in technology development, $million	$11.3M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$1.60M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Better vaccines for high risk populations* – collaborating with Canadian vaccine developers and manufacturers to de-risk a pipeline of vaccines (and vaccine technologies) to ultimately commercialize new or improved vaccines against diseases such as influenza, pneumonia and Hepatitis C. This strategy will translate into better and more successful Canadian vaccines on the market.
- *Biologics – subsequent entry biologics* – supporting early stage innovation gaps in development of biologics[2] that are used to treat diseases for which no other treatment is effective. Biologics are usually given to patients identified through a companion diagnostic as likely to respond positively, and work much like a homing mechanism by seeking out and neutralizing only the gene products that play an active role in the disease. They therefore have few side effects, which reduces hospitalization times for chronic disease. With its expertise and infrastructure for antibody generation, molecular modeling, cell culture optimization, *in vitro* and *in vivo* activity assays and bioprocessing, NRC is well poised to co-develop with Canadian-based industry and to help them bridge innovation gaps. NRC will also provide fee-for-service, and develop industrial solutions which will facilitate the deployment of innovative products, processes and services and increase the market valuations of Canadian companies.
- *Therapeutics beyond brain barriers* – validating NRC technologies that permit treatment of diseases beyond the blood brain barrier (BBB). NRC has developed a customizable pipeline of carriers for delivering therapeutics beyond brain barriers. Coupled with these carriers, biologics should be able to cross the BBB, penetrate the brain, and elicit the desired therapeutic response. NRC will be collaborating with industrial partners to reach proof-of-mechanism, and in the longer-term, to reach proof-of-concept and bring carrier-conjugated biologics to market for poorly served CNS indications. The deployment of NRC's BBB carriers will support a global competitive advantage for Canadian SMEs developing therapeutics for targets within the CNS.

Sub-program 1.1.9: Information and Communications Technologies

Description: *In support of Canada's digital economy, this sub-program applies leading-edge expertise in software development, semiconducting materials and photonic device design and fabrication to design, validate, demonstrate and deliver both physical and software solutions that lead to new market opportunities for industries in Canada's information and communication*

[2] Biologics are protein-based therapeutics or vaccines (produced by biologic processes) that work with remarkable precision to support the body's natural immune system.

technology (ICT) sector that seek to profit from an explosive growth of data and from escalating needs for greater connectivity and for revolutionary ways to use computers to make decisions, synthesize information, and discover new knowledge. This is important for increasing Canada's global share of the growing ICT market. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services in state-of-the-art facilities for transferring or advancing technologies into deployed solutions and improved practices for the marketplace. This includes custom manufacturing of novel components for innovative photonic, electronic, and opto-electronic devices.

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
36,736,274	37,529,288[1]	33,306,330[2]	34,765,691[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
186[1]	150[2]	154[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancements of process and product technologies for the information and communications technology sectors	Client/stakeholder financial investment in technology development, $million	$8.3M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.95M	March 2015

Planning Highlights

During the next three to five years, NRC will focus on advancing technologies in the following areas:

- *Multimedia analytic tools for security* – creating software-based analytic solutions that will enable users to access critical needles in the information "haystack" with greater precision and speed. In collaboration with industry partners, NRC will work towards developing technologies (e.g. analytics, language processing, and data mining) with multiple applications, thus contributing to new products for global markets while supporting national security priorities and language industries.
- *Learning and performance support systems* – leveraging NRC's expertise in e-learning and analytics to support skills development through personalized training and enhanced access to learning sources. Working with industrial partners from the Oil and Gas sector and technology providers, NRC will develop software technologies that integrate resources currently offered in various formats into platforms enabling immediate access to training and professional development.

- *Advanced photonic communication* – bringing industry partners together to explore new opportunities for business and technology deployments, opening the door to innovative discoveries that will pave the way for advanced optical communication and create new opportunities for revenue in the Canadian communications sector. The [x†] technologies developed will support the exponentially-growing global demand for telecommunication services and the growth of photonics in emerging ICT markets by providing world-class engineering and manufacturing assistance, commercial grade foundry services and pilot-run production facilities. Targeted emerging markets include next generation optical communication components to enable Canadian companies to scale up fibre optic communication network capacity, with an emphasis on new technologies that can be deployed within five years to meet the anticipated data traffic growth.
- *Gallium Nitride (GaN) electronics* – technologies and devices for the next generation of radio frequency power transistor technology, which offers greater power and efficiency and wider bandwidth than today's solutions. NRC will also offer semiconductor foundry services to key industry players, helping to strengthen the Canadian supply chain for GaN electronics.
- *Printable electronics (PE)* – technology for creating functioning devices on all kinds of flexible surfaces – such as paper, plastic or cloth – enabling lower-cost digital manufacturing. This portable technology will reduce costs and encourage innovation across a wide array of applications, enabling customised manufacturing and potentially reducing the amount of inventory that businesses need to carry. PE is an emerging field involving several Canadian industries: ICT, materials, digital manufacturing, and printing, presenting a transformative opportunity to add intelligence to printed products. NRC's long-term goal is to position the packaging, commercial and security printing industries to be early adopters of emerging PE solutions to make them global leaders. To achieve this objective, in 2014–15 NRC will work with the newly formed industry PE Consortium to strengthen Canadian technical capacity in this field and operate a product development and demonstration centre to provide Canadian industry with the expertise and equipment they need to mitigate risk and succeed in manufacturing products.

Sub-program 1.1.10: Security and Disruptive Technologies

Description: *This sub-program builds and validates emerging technology platforms (such as nanotechnology, quantum technologies and the convergence of nano-, bio- and information technologies) that can be applied in a range of industries to sustain Canada's industrial competitiveness by opening new markets and value networks for Canadian industries in tomorrow's economy. Efforts focus on applications for addressing national security challenges because security and defence innovation players are amongst the earliest adopters of such technologies from which broader commercial adaptations ultimately evolve, replacing existing technologies. Results are achieved through multi-disciplinary collaborative research and development services in addition to specialized technical services in state-of-the-art facilities for ultimately introducing disruptive and transformational technology solutions into practice and the marketplace.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
27,804,724	28,315,928[1]	25,372,886[2]	26,780,132[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
171[1]	148[2]	151[2]

[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Advancement of process and product technologies in security and other industry sectors	Client/stakeholder financial investment in technology development, $million	$3.5M	March 2015
	Licensing and royalty revenue from NRC clients, $million	$0.12M	March 2015

Planning Highlights

During the next three to five years, NRC will work with key collaborators in industry and in other research organizations to accelerate the development of new technologies and to help clients bring innovations to market in the following areas:

- *Quantum photonics sensing and security* – quantum solutions in photonic-based cyber-security as well as natural resources measurement challenges. Quantum sensing and cyber security align NRC's strength in photonics with Canada's strength in natural resources exploration, extraction and processing, as well as capabilities in quantum information research. NRC will draw on its expertise in advanced materials and photonics, working with private and public sector partners in the natural resource industries. In 2014–15, NRC will work in collaboration with industry, government organizations and universities to develop quantum photonic sensing technologies, enabling the Canadian photonics industry to develop communication and measurement solutions for the security and natural resources sectors.
- *Security materials technology* – a "one-stop-shop" for nano-materials solutions, including testing and performance evaluation, contributing to develop and deliver cost-effective, highly efficient, next-generation, nano-materials and armour systems. In 2014–15, NRC will focus on developing core capabilities in nano-modified and hybrid engineered materials, processes, modelling and characterization. Targeted applications focus on improving the performance-to-weight ratio for armoured vehicles and personal protective equipment.
- *Nanotechnologies* – accelerating the commercialization and responsible deployment of nanotechnologies in Canadian industries by transforming nanotechnology breakthroughs into scalable materials and processes, as well as prototypes that can be

manufactured industrially. NRC will continue to invest and work with researchers and entrepreneurs on the next wave of nanotechnology developments. NRC will also continue to contribute to the large-scale international cooperative effort to develop new and improved measurement standards and reference materials that encompass nanoscale features. To assist in the responsible introduction of new technologies to national and international markets, NRC will develop measurement solutions (including leading the production of selected nanocellulose reference materials and documentary standards) that will underpin nanoscience applications, contribute to a greater understanding of nanomaterials in the environment, and promote safe and responsible utilization of nanotechnologies.

Program 1.2: 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: IRAP Contributions to Firms; IRAP Contributions to Youth Employment Strategy; Contributions to Organizations; and Contributions for the Digital Technology Adoption Pilot Program.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
260,499,279	270,670,144[1]	270,670,144[2]	259,497,892

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including for the Business Innovation Access Program, which will help small and medium-sized enterprises commercialize products or services more quickly and effectively by improving access to research, technology and business development services at universities, colleges and other non-profit research institutions of their choice.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
402	402	402

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Innovative businesses grow in Canada	Small- to medium-sized enterprise jobs supported	9,000	March 2015
	Small- and medium-sized enterprises served	2,200[1]	March 2015
	SME client feedback on growth: jobs, revenues, net operating profit	Under development[2]	Under development[2]

[1] Pertains to funded clients.
[2] This is a new indicator that will be measured on a five-year interval. Its target will be set after baseline data becomes available.

Planning Highlights

In 2014–15, NRC will continue to assist SMEs through the provision of non-repayable funding for cost-shared innovative projects based on merit. NRC IRAP Industrial Technology Advisors provide SMEs with technology and business advice without charge and connect them with partner organizations that can provide further assistance such as financing, research and development and technology transfer. NRC will also continue to support job creation in Canadian SMEs through the Youth Employment Program.

The NRC IRAP program will expand in order to increase support to innovative SMEs. The new Concierge Service provides a single access point where innovative Canadian SMEs can access information on funding, expertise, facilities and equipment to help them grow through innovation. The new Canada Accelerator and Incubator Program (CAIP) is a five-year non-repayable contribution program aimed at establishing a critical mass of outstanding business incubators and accelerators that can develop innovative, high-growth firms, which themselves represent superior early-stage investment opportunities. NRC will also implement the Business Innovation Access Program, which will enable SMEs to tap into a Canada-wide network of technical and business expertise at universities, colleges, and research institutions and facilities.

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

Program 2.1: Science Infrastructure and Measurement

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).*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
100,720,529[1]	101,777,277[1]	77,521,584[2]	78,864,998[2]

[1] Planned spending for 2014–15 reflects changes announced in Budget 2013, including an investment of $121 million over two years for the National Research Council's strategic focus to help the growth of innovative businesses in Canada.
[2] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
256[1]	261[2]	265[2]

Note: Amounts shown include FTEs accounted for within activities at the Program level, which provide direct support to the Sub-Programs.
[1] Planned figures for 2014–15 reflect changes announced in Budget 2013.
[2] Planned figures do not reflect future budget decisions.

Performance Measurement

Expected Results	Performance Indicator	Target	Date to be Achieved
National science infrastructure and measurement standards services are valued by user communities	Client/user satisfaction, as determined by the percentage of surveyed clients who respond positively	85%	March 2015

Planning Highlights

NRC manages national science infrastructure and scientific services that support Canadian excellence in R&D, as well as metrological infrastructure that underpins measurements critical to enable trade in the global economy. NRC will work with academic, industrial and government partners, to ensure that national S&T facilities will be managed effectively and efficiently, remaining accessible to Canadians in accordance with NRC's assigned mandate and evolving national needs. In addition, the program will leverage its infrastructure to provide Canadians access to international R&D facilities, user communities and networks.

NRC will continue to work with its partners to ensure that national S&T facilities remain at the leading edge through ongoing technology development. Canadian and international user communities will continue to have access to an array of national and international facilities to conduct their scientific research. NRC provides stewardship over facility maintenance and access as well as developing supporting tools and instrumentation, often in collaboration with industry. NRC also develops the measurement standards that allow emerging technologies to be commercialized and companies to access international markets.

TRIUMF, Canada's national laboratory for particle and nuclear physics, is owned and operated by a consortium of 11 Canadian universities in conjunction with 7 associate member universities. TRIUMF operations are supported by NRC as well as the Natural Sciences and Engineering Research Council, Natural Resources Canada, the Canada Foundation for Innovation and the Government of British Columbia. TRIUMF will continue to support the Canadian and international particle and nuclear physics community in alignment with the subatomic physics Long Range Plan, by:

- supporting the extraction and analysis of data from the T2K experiment in Japan, the ATLAS and ALPHA experiments at the European Laboratory for Particle Physics (CERN) and developing the Canada-Japan ultracold-neutron project that will move to TRIUMF;
- supporting the development of Canadian leadership in nuclear medicine and molecular imaging through the production and delivery of medical isotopes for the Pacific Parkinson's Research Centre program and the British Columbia Cancer Agency;
- working toward the completion of the Advanced Rare IsotopE Laboratory (ARIEL) which will house a superconducting electron linear accelerator (e-linac) to produce isotopes. Once completed, the e-linac together with the main cyclotron at TRIUMF will offer Canada global leadership in the production and study of rare isotopes for physics and medicine.

NRC’s suite of new and integrated performance indicators are logically aligned to the expected results of this Program and its two Sub-Programs. Assigned targets for all performance indicators will be reviewed after one year after a historical basis becomes available.

Sub-program 2.1.1: National Science Infrastructure

Description: *This sub-program manages Canada's astronomical observatories as mandated in the National Research Council Act, and it compiles and disseminates astronomical data while leveraging access to international observatories for Canadian researchers in astrophysics. This sub-program uses funding from the following transfer payment: Contributions to the International Astronomical Observatories Program.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
31,247,290	31,721,875	32,528,048	33,214,920

Human Resources (FTEs)

2014–15	2015–16	2016–17
116	118	120

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Canadian scientists have access to astronomical observatories and data	User access and downloads of astronomy data[1]	4,000	March 2015
	Scientific publications by telescope users	300	March 2015

[1] Pertains to number of unique users.

Planning Highlights

During the next three to five years, NRC will focus on the following areas of infrastructure in astrophysics:

- *Radio astronomy* – continued infrastructure and scientific support for researchers, including through facilities such as the Dominion Radio Astrophysical Observatory (DRAO), the Atacama Large Millimeter/submillimeter Array (ALMA) and for the remaining life cycle of the James Clerk Maxwell Telescope (JCMT). NRC will support development activities related to the preconstruction phase of the Square Kilometre Array (SKA) telescope, a global project planned to be built after 2018. Working with collaborators, NRC will develop infrastructure components by improving the design and cost of production to optimise mass production of the units. NRC will continue support on ALMA, including participating in the development of the proposed Band 1 receivers for the telescope. The new frequency range for Band 1 will maximize the receiver suite's scientific impact by enabling ALMA to probe chemical differentiation in cloud cores, complex carbon chain molecules, extra-galactic radio recombination lines as well as gathering other significant data.
- *Optical astronomy* – infrastructure and scientific support for the user community of optical telescopes including the Canada France Hawaii Telescope (CFHT) and the Gemini Observatory. NRC will also operate the Canadian Astronomy Data Centre (CADC), a dedicated data management facility serving astronomy researchers. The CADC will continue to work with partners to enable the more advanced data processing and data mining capabilities required by the astronomy community as they deal with increasingly large data sets.
- *Astronomy technology* – designing and fabricating instruments and related observatory infrastructure for operating telescopes in collaboration with industrial partners. Building on existing technical and industrial expertise, NRC will continue to work on adaptive optic technologies that will be applicable to a range of facilities, including the Gemini Observatory and CFHT. Working with industry and universities, NRC will investigate new adaptive optics components, algorithms and system concepts for next generation instruments. Related work in system controls will involve collaborative investigations of new precision opto-mechanics, segmented mirror control, integrated modeling and cryogenics.

Sub-program 2.1.2: Measurement Science and Standards

Description: *As mandated under the National Research Council Act and also the Weights and Measures Act, this sub-program investigates and determines standards and methods of measurement for Canada's national measurement system. This national metrological system is critical for underpinning trade and commerce in the global economy. The sub-program supports international metrological treaties and arrangements to establish and maintain foreign recognition and acceptance of Canada's standards and measures that are critical for participation in multi-lateral and free-trade agreements. The sub-program provides a wide variety of calibration and measurement services that underpin the accuracy of millions of measurements conducted annually in public and private sector testing and calibration laboratories. In addition, the sub-program provides expert assessments and formal recognition of the measurement capabilities of industrial calibration laboratories. This is important for providing Canada's trading partners confidence in the reliability of Canadian industries' measurements and test certifications of compliance to regulatory and product standards that govern trade. The sub-program also develops measurement standards for emerging technologies that open new global market opportunities for Canadian industries.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
23,356,585	23,908,500	24,533,574	25,084,160

Human Resources (FTEs)

2014–15	2015–16	2016–17
133	136	138

Performance Measurement

Expected Results	Performance Indicators	Targets	Date to be Achieved
Internationally-recognized national system of measurement that meets Canada's evolving needs	Clients served	725	March 2015
	International recognition of calibration and measurement capabilities	600[1]	March 2015
	Scientific and other publications in metrology	1,500	March 2015

[1] The number of calibration and measurement capabilities recognized internationally during the reporting period, measured by the number of approved calibration and measurement capabilities of this Sub-Program as published in the [[xi],†] Key Comparisons Database of the Bureau international des poids et mesures.

Planning Highlights

During the next three to five years, NRC will focus on the following areas of national metrological infrastructure that will provide the evidence basis for standardization, reliable testing and production methodologies, as well as internationally recognized certification and accreditation schemes:

- *Metrology for industry and society* – providing metrology services that enable vital Canadian sectors, where high precision and credible measurement have a significant impact on market success, to better compete, conform and connect with present technologies on a global stage. The aim is to improve the productivity (and in particular efficiency, quality, safety) of clients in the target sectors of Energy, Health, and Industrial Processing. NRC will strive to ensure Canadian companies better meet

supply chain requirements and are well-positioned to meet global market access requirements. NRC will also work to strengthen the national measurement system, ensuring it is capable of responding effectively to evolving national measurement needs.

- *Measurement science for emerging technologies* – identifying, developing and advancing the next generation of measurement capabilities that will be required to effectively support Canadian industry and society. NRC will continue to facilitate Canada's entry into global markets for new technologies by developing measurement standards for emerging areas such as the environment, biotechnology and nanotechnology (see also Sub-Program 1.1.10, Security and Disruptive Technologies). For example, in 2014–15, NRC will work to develop methods to assess the purity and other key measurements of carbon nanotubes and nanocellulose.
- *Scientific support for the national measurement system* – providing scientific advice to improve and inform national decision-making for commerce, standards development, regulations and trade agreements. NRC will strengthen relationships with federal and provincial government stakeholders, and assimilate market insights and policy intelligence gathered through networking and participation in domestic and international forums.

Internal Services

Description: *Internal Services are groups of related activities and resources that are administered to support the needs of programs and other corporate obligations of an organization. These groups 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; Acquisition Services; and Other Administrative Services. Internal Services include only those activities and resources that apply across an organization and not to those provided specifically to a program.*

Budgetary Financial Resources (dollars)

2014–15 Main Estimates	2014–15 Planned Spending	2015–16 Planned Spending	2016–17 Planned Spending
203,472,708	206,591,964	206,053,800[1]	206,078,815[1]

[1] Planned spending does not reflect future budget decisions.

Human Resources (FTEs)

2014–15	2015–16	2016–17
928	923[1]	918[1]

[1] Planned spending does not reflect future budget decisions.

Planning Highlights

NRC will effectively manage its programs and projects using its SAP business system, to enable efficient planning and track performance. In 2014–15, formal three-year performance reviews will be launched to support program performance and outcomes, in order to inform future program initiatives. NRC will continue to enhance its ability to identify the most strategic opportunities for working with Canadian industry through the development of its expertise and capacity in competitive market intelligence and foresight.

NRC will finalize its communications activities around a new service delivery model aligned with the priorities and approaches of the refocused NRC. Additionally, and over the next three years, the NRC Electronic Working Environment investment project will implement an electronic records and corporate information management system to ensure that all corporate information of business value is collected, stored and made accessible to support future business decisions and meet Government of Canada directives.

An initiative will be launched in 2014–15 to actively engage and support the capability development of the NRC supervisor group, to equip supervisors to be more successful in their roles. Implementation will focus on learning and engagement activities that bring NRC supervisors together as a community, to facilitate the sharing of best management practices and tools. To support a positive culture of recognition, a revitalized NRC rewards and recognition program will be implemented in 2014–15 that will introduce more flexible program components, with a focus on meaningful recognition approaches. To ensure work is properly assessed and compensated, efforts to convert more groups to a modern job evaluation system will continue in 2014–15 with a focus on the Technical Officer category, which represents over 1000 employees. The plan is to introduce the [†[xii]] Hay Plan and move to a highly generic approach.

In 2014–15, NRC will design, build and implement the first tranche of the transformation of NRC's common services (Finance, Human Resources, Administrative and Property Services, and Information Technology and Security), focusing on seven priority processes (Procure-to-pay, Invoice-to-cash, Record-to-report, Hire-to-retire, Asset management, IT client services, and Security). It will be implemented through the optimization of these seven end-to-end integrated transactional processes supported by technology enablement, a client interaction framework and a new service delivery model. The design and build phases will be completed and implemented in 2014.

Section III: Supplementary Information

Future-Oriented Statement of Operations

The future-oriented condensed statement of operations presented in this subsection is intended to serve as a general overview of the National Research Council's operations. The forecasted financial information on expenses and revenues are prepared on an accrual accounting basis to strengthen accountability and to improve transparency and financial management.

Because the future-oriented statement of operations is prepared on an accrual accounting basis and the forecast and planned spending amounts presented in other sections of this report are prepared on an expenditure basis, amounts will differ.

A more detailed future-oriented statement of operations and associated notes, including a reconciliation of the net costs of operations to the requested authorities, can be found on [xiii†] NRC's website.

Future-Oriented Condensed Statement of Operations
For the Year Ended March 31 (dollars)

Financial information	Estimated Results 2013–14	Planned Results 2014–15	Change
Total Expenses	1,014,419,000	998,383,000	(16,036,000)
Total Revenues	165,436,000	200,058,000	34,622,000
Net cost of operations	848,983,000	798,325,000	(50,658,000)

NRC's 2014–15 planned expenses reflect changes in planned grants and contribution expenses, salaries and benefits, and an increased spending of externally generated revenues. The increase of revenue spending is primarily due to the increase of NRC's 2014–15 planned revenues to $200M, an increase of $34.6M from the 2013–14 estimated revenues of $165.4M in line with NRC's focus on increasing its external revenue generating activities to strengthen its future financial sustainability.

List of Supplementary Information Tables

The supplementary information tables listed in the *2014–15 Report on Plans and Priorities* can be found on [xiv†] NRC's website.

- Details on Transfer Payment Programs (TPP)
- Disclosure of TPPs under $5 million
- Greening Government Operations
- Upcoming Internal Audits and Evaluations over the next three fiscal years

Tax Expenditures and Evaluations

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 publishes cost estimates and projections for these measures annually in the [[xv]†] *Tax Expenditures and Evaluations* publication. The tax measures presented in the *Tax Expenditures and Evaluations* publication are the sole responsibility of the Minister of Finance.

Section IV: Organizational Contact Information

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Endnotes

i Treasury Board Secretariat Estimates Publications and Appropriation Acts, http://www.tbs-sct.gc.ca/ems-sgd/esp-pbc/esp-pbc-eng.asp

ii Selected Departmental Performance Reports for 2008-2009 – Department of Industry, Department of Transport. Report of the Standing Committee on Public Accounts, September 2010, http://www.parl.gc.ca/HousePublications/Publication.aspx?Mode=1&Parl=40&Ses=3&Language=E&DocId=4653561&File=0

iii Strengthening Parliamentary Scrutiny of Estimates and Supply. Report of the Standing Committee on Government and Operations Estimates, June 2012, http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=5690996&Language=E&Mode=1&Parl=41&Ses=1

iv Whole-of-government framework, http://www.tbs-sct.gc.ca/ppg-cpr/frame-cadre-eng.aspx

v Justice Laws website, http://laws-lois.justice.gc.ca/eng/acts/N-15/index.html

vi Eureka Network, http://www.eurekanetwork.org

vii Treasury Board Secretariat, http://www.tbs-sct.gc.ca/ppg-cpr/frame-cadre-eng.aspx

viii Treasury Board Secretariat 2014–15 Main Estimates, http://www.tbs-sct.gc.ca/ems-sgd/esp-pbc/me-bpd-eng.asp

ix National Traffic Highway Safety Administration (US), Corporate Average Fuel Economy, http://www.nhtsa.gov/fuel-economy/

x National Research Council Canada, http://www.nrc-cnrc.gc.ca/eng/solutions/collaborative/apc_index.html

xi Bureau international des poids et mesures, Key Comparisons Database, http://kcdb.bipm.org/

xii The Hay Group, http://www.haygroup.com/downloads/ww/wp-Job_Evaluation.pdf

xiii National Research Council Canada, http://www.nrc-cnrc.gc.ca/eng/reports/2014_2015/rpp_index.html

xiv National Research Council Canada, http://www.nrc-cnrc.gc.ca/eng/reports/2014_2015/rpp_2014/rpp_table_index.html

xv Department of Finance Canada, http://www.fin.gc.ca/purl/taxexp-eng.asp