

**Performance Measurement Strategy for the
Business-Led Networks of Centres of Excellence (BL-NCE) Program**

Prepared by:

The Networks of Centres of Excellence Secretariat

March 2015

TABLE OF CONTENTS

| | | |
|----------|---|-----------|
| 1 | PROGRAM PROFILE | 1 |
| 1.1 | Need for program | 1 |
| 1.2 | Alignment with government priorities | 2 |
| 1.3 | Target populations | 2 |
| 1.4 | Stakeholders | 3 |
| 1.5 | Governance | 3 |
| 1.6 | Resources | 6 |
| 2 | LOGIC MODEL | 7 |
| 2.1 | Logic Model | 7 |
| 2.2 | Narrative | 9 |
| 3 | PERFORMANCE MEASUREMENT STRATEGY FRAMEWORK | 14 |
| 3.1 | Performance Measurement Strategy Framework | 14 |
| 3.2 | Accountabilities and Reporting | 19 |
| 4 | EVALUATION STRATEGY | 22 |
| 5 | REFERENCES | 27 |

List of acronyms

| | |
|-------------|--|
| BERD | Business expenditures on research and development |
| BL-NCE | Business-Led Networks of Centres of Excellence |
| CECR | Centres of Excellence for Commercialization and Research |
| CFI | Canadian Foundation for Innovation |
| CIHR | Canadian Institutes of Health and Research |
| FAA | Financial Administration Act |
| GDP | Gross Domestic Product |
| HQP | Highly Qualified Personnel |
| IP | Intellectual Property |
| IRDI | Industrial R&D Internship program |
| LOI | Letters of Intent |
| NCE | Networks of Centres of Excellence |
| NOI | Notification of Intent |
| NSERC | Natural Sciences and Engineering Research Council |
| OECD | Organisation for Economic Co-operation and Development |
| PAA | Program Activity Architecture |
| PM Strategy | Performance Measurement Strategy |
| PSAB | Private Sector Advisory Board |
| R&D | Research and Development |
| S&T | Science and Technology |
| SMEs | Small and medium-sized enterprises |
| SSHRC | Social Sciences and Humanities Research Council |
| STIC | Science, Technology and Innovation Council |
| TB | Treasury Board |
| TTO | Technology Transfer Offices |
| UILO | University Industry Liaison Office |

1 Program Profile

1.1 Need for program

Science and Technology (S&T) plays a key role helping Canadians address pressing societal and economic challenges. S&T also supports business innovation, enabling economies to improve their long-term productivity and competitiveness, and in so doing supporting a higher standard of living and quality of life. Canadian private sector investment in research and development and demand for highly skilled workers are low compared to other OECD countries. Improving Canada's performance in this regard may contribute to stronger productivity and enhance economic growth.

Budget 2007 announced a broad range of early actions in support of the S&T Strategy, including three new initiatives to leverage Canada's strong public sector research base to the benefit of business research and innovation and to bridge the gap between research and commercialization. These include Business-led Networks of Centres of Excellence (BL-NCE), Centres of Excellence in Commercialization and Research (CECR), and an Industrial R&D Internship program. All three programs are intended to increase private sector investments in research in Canada, support the training of skilled researchers, and connect the resulting ideas and talent to businesses seeking to bring innovations to market.

The BL-NCE program is a federal grant mechanism to address private sector research and development (R&D) challenges in Canadian research priority areas through the creation of business-led research networks that increase private sector investment in R&D, innovation and competitiveness. Business-Led Networks (BL-Networks) are large-scale collaborative research networks that bring together a group of organizations from the public, private and/or academic sectors with a wide range of research expertise to address specific challenges identified by the private sector. BL-Networks enhance private sector innovation by coupling the right expertise to real-world challenges faced by the private sector. BL-Networks increase private sector investments in Canadian research and accelerate the transfer of ideas from the laboratory into solutions needed by the sector. They differ from existing Networks of Centres of Excellence in that they are solely focused on the needs of the private sector and can fund research carried out in private sector organizations.

The BL-NCE program was initiated as a pilot in 2008. A total of four BL-Networks were launched in 2009 for a four year funding cycle. The first program evaluation completed in 2012¹ supported the rationale for the program and demonstrated a continued need for the BL-NCE program. The program was found to expand the scope of R&D in the industries involved in the funded networks and specifically demonstrated a continued need for a network approach to investment in industrially relevant science and technology funding of research, development and innovation. Economic Action Plan 2012 announced permanent funding for the BL-NCE program.

¹ http://www.nce-rce.gc.ca/ReportsPublications-RapportsPublications/ProgramEvaluations-EvaluationsProgrammes/BLNCE-RCEE/EvaluationReports-2012-RapportsEvaluation_eng.asp

The goal of the BL-NCE program is to address private sector research and development (R&D) challenges in Canadian research priority areas through the creation of business-led research networks that increase private sector investment in R&D, innovation, and competitiveness.

The purpose of the program is to fund large-scale collaborative networks focusing on industry issues. Each Network is proposed and led by the private sector with academia and government partners, and is driven to solve private sector needs. The program focuses on impacts, tangible achievements, applications of research results, and commercialization activities in science and technology priority areas identified by the government.

The 2012 program evaluation identified a need to establish better linkages between network level outcomes to program outcomes and specifically recommended an update to the program logic model and Performance Measurement Strategy (PM strategy) relative to the timeframe in which some expected outcomes can be achieved. The program is now entering its second phase of operation under amended Terms and Conditions (2012) and supports two funding cycles of up to five years in duration. The PM strategy proposed here follows the new Treasury Board (TB) guidelines² and is aligned with the amended BL-NCE program terms and conditions. The PM strategy and logic models have been reviewed and revised based on the findings of the 2012 BL-NCE program evaluation.

It is understood that the PM strategy should be reviewed periodically and revised (if required) to maintain its relevance. The proposed PM strategy will be revised, based on the findings of future summative program evaluation.

1.2 Alignment with government priorities

The program is aligned with the Government "Economic Action Plan 2012" goal to better support business innovation by focusing on private sector needs, and has been made permanent in 2012. (<http://www.budget.gc.ca/2012/rd-dc/bdc1-eng.html>). Funded Networks are in areas of priority for the Government of Canada.

The program supports networks which operate in areas under the jurisdiction of all three federal granting agencies. The program is part of the federal agencies strategic planning and reporting system, and included in their respective Program Activity Architecture (PAA). Each of the Granting Agencies reports on the activities and results under its own jurisdiction.

1.3 Target populations

Business-Led Networks (BL-Networks) are large-scale collaborative research networks that bring together a group of organizations from the public, private and/or academic sectors with a wide range of research expertise to address specific challenges identified by the private sector. The primary target population is the private sector including Small and Medium enterprises (SMEs), innovative researchers from the private, public or academic sectors and Canadian not-for-profits. The private sector participating in the network as members and/or contributing partners is the group that the Government aims to mobilize to achieve the expected results of the BL-NCE program.

²<http://www.tbs-sct.gc.ca/cee/dpms-esmr/dpms-esmr02-eng.asp>

1.4 Stakeholders

Important stakeholders are the private sector, academic institutions, and research-intensive organizations, other levels of government and other federal departments, and non-governmental organizations that collaborate with, and/or contribute to the networks. The Government of Canada is another stakeholder given the role played by the BL-NCE program in delivering the Government's S&T Strategy and its role within the various activities of the Industry Canada Portfolio. The Canadian public can also be considered as an important stakeholder since the program results are expected to have important impacts on the economy and on the quality of life of Canadians.

1.5 Governance

The BL-NCE Program is overseen by a tri-agency NCE Steering Committee made up of the Deputy Minister of Industry Canada (or delegate), the Deputy Minister of Health Canada (or delegate); the Presidents of the three Granting Agencies: the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), Social Sciences and Humanities Research Council (SSHRC), and the President of the Canada Foundation for Innovation (CFI) as an observer.

Day-to-day administration of the BL-NCE Program is provided by the Networks of Centres of Excellence Secretariat (NCE Secretariat). Given the multi-disciplinary nature of the BL-Networks, funding for a given network may flow through more than one Granting Agency, and so the NCE Secretariat will be the primary point of interaction for all applicants throughout the life of the network. The NCE Secretariat provides advice and direction and develops tools and best practices for new and on-going networks, (e.g. detailed program guide, best practice manual, network agreement guide and templates for the funding agreement and annual reporting; training sessions for new networks; organization of annual meetings for all networks to exchange best practices). An NCE liaison staff is assigned to each network as a point of contact for day-to-day operations.

To ensure that the BL-NCE program truly meet the needs of the private sector, a Private Sector Advisory Board (PSAB) has been established to provide advice on the operations and performance of the program and assist with the selection and performance assessment of networks.

The NCE Secretariat runs periodic national competitions through which the Steering Committee approves successful networks on the recommendation of a PSAB and international peer review panels charged with review of proposals.

Selection Process: the NCE Secretariat employs a rigorous competitive process based on a 3 stage process: an administrative review and a two-stage peer review process. Applications to the BL-NCE program first require the submission of a Notification of Intent (NOI) for administrative review. Peer review is initiated at the Letter of Intent (LOI) stage and is followed by the submission of a full application. Each submission will solicit a greater level of detail of the proposed network and will be evaluated against the three selection criteria of the program. The Steering Committee selects successful networks based on the findings of international peer review and the recommendations of the Private Sector Advisory Board (PSAB). To ensure delivery of results and benefits expected from the funded centres, the review process is based on three overarching selection criteria outlined below:

Criterion 1: Benefits to Canada

- Identification of the vision for a given sector and the major R&D and commercialization challenges to be addressed to significantly advance the Canadian competitive advantage of that sector;
- Strengthening of public-private sector collaborations to meet private sector needs;
- Increasing industrial R&D capacity and receptivity to the results of R&D across large, medium and small enterprise;
- Positioning of Canadian firms in high-value segments of production chains;
- Creation, growth and retention of companies in Canada;
- Business and product innovations to capture new markets; and
- Increasing domestic collaboration across a wide array of firms, sectors and regions.

Criterion 2: Track Record and Potential of the Applicants*Past progress:*

- Past achievements of the applicants;
- Evidence of commercialization and/or business application of research results leading to competitive advantage;
- Mechanisms to identify and manage conflicts of interest;
- Ability to address recommendations from previous competitions or competition stages;
- Demonstration of success in past collaborations across firms and in public-private collaboration;
- Demonstration of an increase in business receptivity to the results of R&D across large, medium and small enterprises;
- Management of deviations from previous strategic directions;
- Attraction of top talent to the proposed research and business activities; and
- Record of investment by private and other public partners in the network.

Potential for success:

- Potential to advance the proposed research and business activities;
- Excellence, focus and coherence of a research program;
- Capability of attracting new investments;
- Mechanisms in place to track and manage BL-Network impacts;
- Evidence of capacity to address significant research challenges that meet business needs; and
- Proposed training and exposure of post-graduate and post-doctoral HQP in innovative research.

Criterion 3: Business Plan*Rationale for funding:*

- Value of the partnerships both financially and in advancing the BL-Network;
- Value-add of the network approach;
- Plan to overcome R&D and/or commercialization challenges of the sector;
- Identification of outcomes for the funding cycle; and
- Justification and appropriateness of the budget request.

Description of benefits to private sector participants:

- Plan for the business application for the proposed research;
- Business cases for the involvement of large, medium and/or small enterprise in the BL-Network; and
- Identification of links between firms and researchers and HQP.

Business approach:

- Clear description of the path to market for the research through a market analysis;
- Identification of key risks and mitigation strategies;
- Communication strategies to engage under-represented entities within the current Network membership;
- Identification of future projects and anticipated changes to the technology readiness, stage-gate or maturity level of each;
- Effectiveness of the plan to manage, protect and exploit intellectual property (IP) in the network context; and
- Mechanisms to accelerate commercialization and/or business application of technologies, goods and services within firms.

Application requirements specific to the BL-NCE program are outlined in the program literature on the NCE's Web site and listed below.

Stage 1 – Notification of Intent

- Application form identifying the applicants, estimated budget request;
- Goal of the proposed BL-Network and overview of the 5 to 10 year vision;
- Description of the research areas and alignment with research priority areas of the government;
- Expected results and outcomes and alignment with the BL-NCE program definition of success.

Stage 2 - Letter of Intent

- Cover letter
- Application form identifying the applicants, estimated budget request, private sector stakeholders, and keywords;
- Assessment of the sector/cluster's shared needs over the next 5-10 years and the major R&D and commercialization challenges and barriers to that vision;
- Submission detailing the alignment of the proposed network with the BL-NCE program and research priority areas of the government.

The Private Sector Advisory Board (PSAB) will assess the LOI against the program selection criteria, and recommend a short-list of applicants to the Steering Committee that will be invited to submit a Full Application (Stage 3) which consists of the following:

Stage 3 - Full Application

- Cover letter
- Application form includes applicant information, summaries of requested budgets and matching funds, and applicant signatures;
- A description of the network, its operations, planned activities, expected impact on the private sector and benefit to Canada;
- A description of the applicant track record and potential for success including examples of past collaborations, details of the research program, and the ability to attract investment;
- A business plan describing the rationale for funding, benefits to the private sector and the business approach for the activities of the network;
- A list of members and supporting partners and their duties and respective contributions;
- Letters of support and summary of contributions from partner organizations;
- An itemized budget;
- A description of the project management and governance structure including CVs and/or bios for key personnel involved in the management and governance of the network; and
A description of conflicts of interest, partnership arrangements, contributions and allocations of benefits (such as intellectual property) among parties.

1.6 Resources

The BL-NCE program was made permanent in the 2012 Federal budget. The total financial resources for the BL-NCE Program are 12 Million per year. Program funding is intended to support administration costs by the NCE Secretariat as well as operating, research and commercialization costs of funded networks complementing other funding sources. Matching contributions from partner organizations from the academic, private and public sector are required. The BL-Network receives grant funds from the Granting Agencies and may flow funding to BL-Network Members to complete activities aligned with the purpose for which the grant was provided.

Table 1: Financial resources for the BL-NCE Program

| | <i>Fiscal Year</i> | | | | | |
|------------------------------|--------------------|------------------|------------------|------------------|------------------|-----------------|
| | <i>2014-2015</i> | <i>2015-2016</i> | <i>2016-2017</i> | <i>2017-2018</i> | <i>2018-2019</i> | <i>On going</i> |
| Unallocated Grants | \$11,174,000 | \$11,174,000 | \$11,174,000 | \$11,174,000 | \$11,174,000 | \$11,174,000 |
| BL-NCE Administration | \$826,000 | \$826,000 | \$826,000 | \$826,000 | \$826,000 | \$826,000 |
| Total BL-NCE | \$12,000,000 | \$12,000,000 | \$12,000,000 | \$12,000,000 | \$12,000,000 | \$12,000,000 |

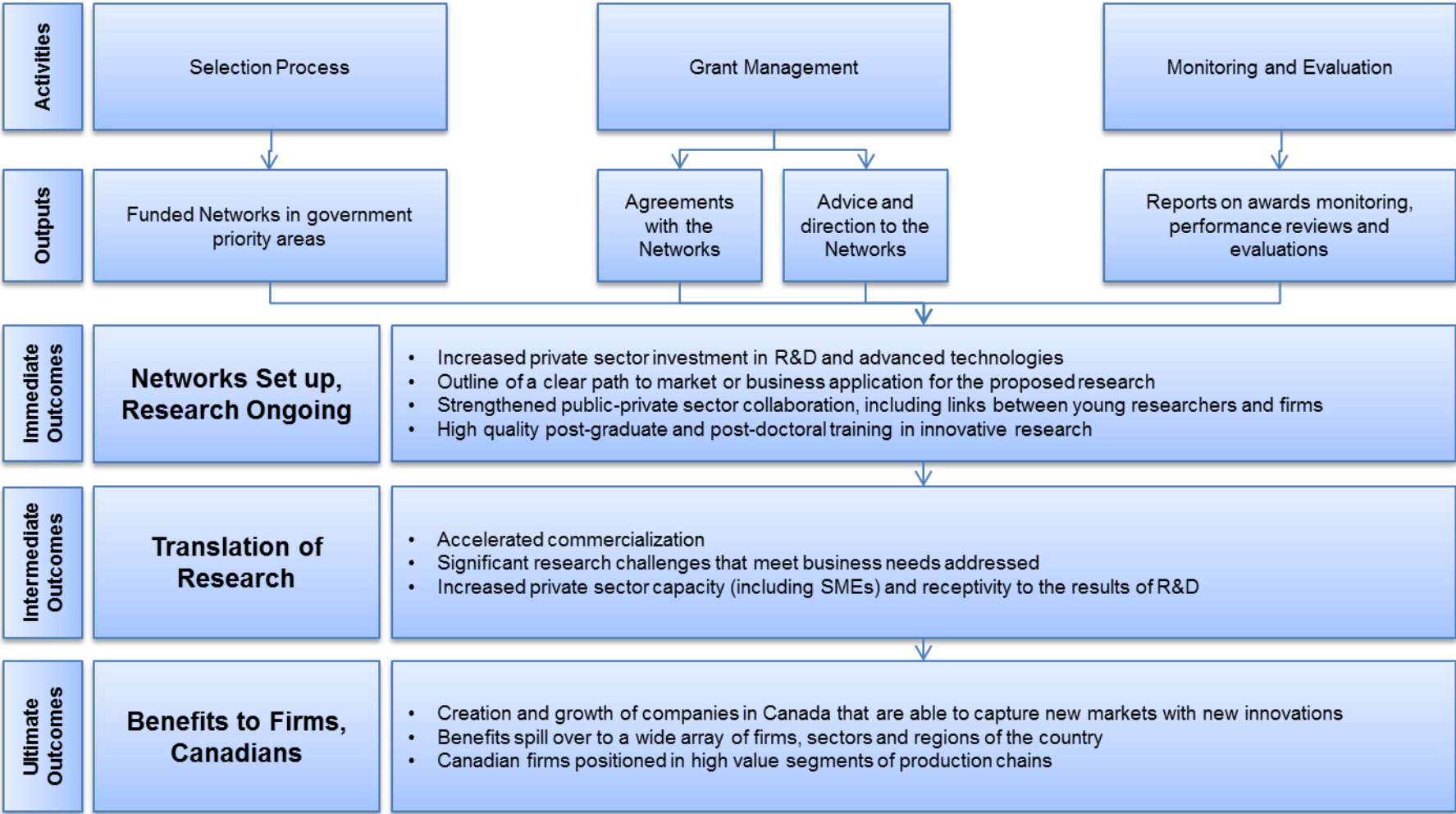
2 Logic Model

2.1 Logic Model

The logic model identifies the linkages between the activities of a program and its ultimate objectives. It delineates the set of activities that make up the program and the sequence of outcomes that are expected to flow from these activities. As such, the logic model serves as a “roadmap”, showing the chain of results connecting activities to the ultimate outcomes, and thus, identifies the steps that will demonstrate progress towards program’s achievements. Four levels of performance are delineated in the logic model presented in Figure 1: activities and outputs, immediate outcomes, intermediate outcomes and ultimate outcomes.

This logic model is explained in sub-section 2.2, below.

Figure 1: Logic Model for the BL-NCE program



2.2 Narrative

The goal of the BL-NCE Program is to address private sector research and development (R&D) challenges in Canadian research priority areas through the creation of business-led research networks that increase private sector investment in R&D, innovation and competitiveness. The logic model in Figure 1 above shows how the creation and support of these networks lead to the ultimate expected outcomes of increased private sector R&D investment, creation and growth of innovative companies, spill-over of benefits, and positioning of Canadian firms in high value segments of production chains.

Despite Canada's relatively strong macroeconomic fundamentals, Canadian firms are not harnessing innovation to make competitive gains. Canada lags behind other countries in terms of business expenditures on research and development (BERD).³ As a percentage of GDP, Canada's BERD has been in decline for the past decade.⁴ Canada also fares poorly in other areas related to private sector innovation.

The evidence shows that innovation, in particular as measured in the BERD, is a key driver of productivity, and the main source of national prosperity.⁵ It is in Canada's interest to encourage a change in direction in the BERD. Although BERD measures R&D investments made by business, the source of funding can come from other sources, including government.

Other factors are affecting how research is done in many countries. Research and technology development are accelerating, so that organizations can no longer rely solely on their internal R&D capacity: firms need to augment their R&D capacity by collaborating with other players and institutions, stimulating the emergence of R&D networks.⁶ The literature points to the necessity of engaging a diversity of stakeholders to achieve successful R&D collaboration and long-term results.⁷

Canada has a long tradition of state involvement to promote the economic utilization of scientific research.⁸ It is for these reasons that the BL-NCE program was created; to encourage private sector R&D investment, through collaborative networks bringing together researchers, private sector representatives and others.

While the BL networks were established to address these issues, and ultimately to help influence Canada's economic prosperity at industry sector level, an evaluation of its success should consider the size of federal investment in these networks relative to the size of the industry sectors in which they are situated.

³ STIC 2012

⁴ *Ibid.*

⁵ Council of Canadian Academies 2009, STIC State of the Nation 2012, Conference Board 2014.

⁶ *Ibid.*

⁷ Miotti et al 2003, Faems et al 2005, Belderbos et al 2006, Nieto & Santamaria 2007, Zeng et al 2010.

⁸ Rasmussen 2008.

2.2.1 Activities and Outputs

The activities and outputs shown in the logic model in Figure 1 outline what is carried out by NCE Secretariat staff to deliver the program, and the outputs that are produced from these activities. The activities and outputs are entirely within the control of the Secretariat, and program managers are directly accountable for them.

As identified in the Logic Model, expected outputs from these activities are:

- **Funded networks in government priority areas:** The NCE Secretariat selection process results in the identification of applications for funding which will be successful.
- **Agreements with the networks:** NCE Secretariat concludes agreements with the selected networks.
- **Advice and direction to the networks:** NCE Secretariat supports the networks after the funding agreement has been concluded, through ongoing advice and direction on the framework of the private sector consortium as captured in the required network agreement.
- **Reports on awards monitoring, performance reviews and evaluations:** The NCE Secretariat performs due diligence in ensuring proper accountability from the funded networks.

2.2.2 Immediate Outcomes

Immediate outcomes occur as a result of the activities and outputs produced by the networks. These outcomes are controlled by the target population, and as such, can only be influenced by the NCE Secretariat. They are expected to occur in the first one to five years after the start of the BL-NCE funding to the network.

As identified in the Logic Model, immediate outcomes include:

- **Increased private sector investment in R&D and advanced technologies:** As a program requirement, funds contributed by the NCE Secretariat to the network are leveraged with matching private sector funds, resulting in private sector investment in R&D.
- **Outline of a clear path to market or business application for the proposed research:** The market potential of proposed research projects is detailed and evaluated to ensure commercialization and/ or applicability of the research results to a line of business as an end goal and is considered from the start of the research project.
- **Strengthened public-private sector collaboration, including links between young researchers and firms:** Collaboration within a BL-NCE network occurs at the individual level (e.g., between researchers and business leaders), and at the organizational level (e.g., between a company and a university), and mixtures of the two. It occurs across organizations and institutions and across diverse stakeholder groups. Collaboration encompasses activities around network establishment, ongoing functioning of key network infrastructure such as committees, boards and others, and interactions among research project teams to undertake network-funded research.
- **High quality post-graduate and post-doctoral training in innovative research:** The network-funded research projects involve HQP.

These outcomes flow from the outputs because they are mandated by the funding and network agreements.

Some factors which influence the extent to which the above immediate outcomes are successfully realized include:⁹

- Stage of maturity of applicants.
- Previous experience among network management in working with industry-university R&D partnerships.
- Pre-existing relationships between private sector consortium members (contributors) and university researchers.
- Leadership abilities and skill set of the network's management team.
- Project selection adjudication process.

2.2.3 Intermediate Outcomes

Intermediate outcomes occur as a result of the immediate outcomes. They are further removed from the influence of the NCE Secretariat and subject to external factors. While unique to each network, intermediate outcomes are expected to contribute to the achievement of the program's outcomes, which represent key steps in the result chain toward the achievement of the program's ultimate outcomes. Intermediate outcomes are expected to be achieved within the network's funding period (five to ten years).

As identified in the Logic Model, intermediate outcomes include:

- **Accelerated commercialization:** Commercialization is defined as all activities undertaken to transform knowledge and technology into new goods, processes, or services to satisfy market demands. The acceleration of commercialization is considered to encompass all activities undertaken by contributors or others towards commercialization of an innovation, starting from the point that the research has concluded, until the new product, service or process reaches the market.
- **Significant research challenges that meet business needs addressed:** Research results produced by the network members are used to tackle issues identified as challenges by the private sector network participants.
- **Increased private sector capacity (including SMEs) and receptivity to the results of R&D:** Capacity is defined as the ability of firms participating in the network to invest human and financial resources in R&D to generate new knowledge or deliver new technologies. Receptivity is defined as the ability of firms participating in the network to acquire, assimilate, transform, and exploit R&D results produced by an external source.

The evidence points towards the need for R&D collaboration to encourage innovation and commercialization of new ideas. In today's world organizations can no longer rely on their own internal R&D capacity, as they do not have the internal human talent needed to cover all the

⁹ As identified in the Evaluation of BL-NCE (PMN 2012).

science disciplines required.¹⁰ Firms are compelled to augment their R&D capacity by collaborating with other players and institutions, stimulating the emergence of networks connecting industry, academic and public institutions to manage intellectual property (IP) and solve vexing problems in the natural sciences and engineering areas.¹¹ Collaboration between academic institutions and private firms has been shown to enable “knowledge capture” (referred to here as “receptivity”) by firms, and contributes to their financial success.¹²

Factors affecting successful achievement of intermediate outcomes include:¹³

- A diversity of stakeholder group involvement in network activities.¹⁴
- A culture of collaboration among researchers from all sectors.
- A wide range of skill sets on network boards that include a blend of industry sector, scientific, financial and legal expertise; but majority representation of industry partners on boards as well as project selection committees.
- Trust and relationships built amongst industry, academia and government partners.
- Sound negotiation of foreground IP and resultant access to background IP, if applicable.
- The extent to which a project management process has been formalized to enable go/no-go decision points.

2.2.4 Ultimate Outcomes

Ultimate outcomes are the external consequences that the intermediate outcomes contribute to and reflect the rationale for the program. They represent a long-term vision towards which the networks contribute and are generally independent of network type and specific objectives. Ultimate outcomes are generally achieved after the end of the grant period (greater than ten years).

Together, the networks’ ultimate outcomes in research and commercialization will contribute to the program’s overall ultimate outcomes:

- **Creation and growth of companies in Canada that are able to capture new markets with new innovations:** New start-ups and spin-offs, and greater investment to existing companies, are engendered by promising innovations identified through network research.
- **Benefits spill over to a wide array of firms, sectors and regions of the country:** Spillovers or externalities occur as a result of R&D, creating benefits for consumers, firms, and society at large, beyond the benefits accrued to the innovating companies themselves.
- **Canadian firms positioned in high value segments of production chains:** Canadian companies are engendered by promising innovations identified through network research to produce products of greater value than the value of the product in its previous form, enabling them to construct specific competitive advantages over competitors.

¹⁰ Markman et al 2008.

¹¹ *Ibid.*

¹² Zucker et al 2002.

¹³ As identified in the Evaluation of BL-NCE (PMN 2012), and other sources as noted.

¹⁴ Miotti et al 2003, Faems et al 2005, Belderbos et al 2006, Nieto & Santamaria 2007, Zeng et al 2010.

It should be noted that the size of the BL-NCE program should be considered relative to the scope of the above ultimate outcomes, when setting expectations about the contribution of this program to overall outcomes. BL networks aim to have an impact on the industry sectors in which they are situated; however, the value of these sectors (in annual GDP) is often tens of thousands of times larger than the value of the federal investments in the BL networks.

There is strong evidence that contribution to R&D affects productivity and, hence, benefits the national economy. A multi-country study by the OECD found that a sustained increase of 0.1 percentage point in a nation's BERD to GDP ratio would eventually translate to a 1.2 per cent higher GDP per capita, other things being equal.¹⁵

The reason for this is that greater investment in R&D leads to "spill-overs", or externalities. Economists and other social scientists have demonstrated that the R&D activities of private firms generate widespread benefits enjoyed by consumers and society at large.¹⁶ The economic value to society of this research often exceeds the economic benefits enjoyed by innovating firms. This excess of the social rate of return over the private rate of return enjoyed by innovating firms is described by economists as a positive externality or spillover.

Factors affecting successful achievement of ultimate outcomes may include:¹⁷

- The commitment of partners.
- Economic pressures in the networks' sectors.
- Other factors in the national and international policy, legal, economic and social environments.

¹⁵ OECD 2003.

¹⁶ Jaffe 1996.

¹⁷ As identified in the Evaluation of BL-NCE (PMN 2012),

3 Performance Measurement Strategy Framework

3.1 Performance Measurement Strategy Framework

On-going performance measurement refers to the systematic collection of information for monitoring how a program is performing at any given point in time. It can be used to report on the level of attainment of planned results and performance trends over time. The key focus of the performance measurement strategy is to establish what indicators will be used to measure progress towards outputs, outcomes, and how, when and by whom information on these indicators will be collected.

Details on the Performance Measurement Strategy Framework are presented in Table 2. Many of the indicators listed in this table are actively being collected through ongoing BL network reporting requirements. Others are collected periodically as part of evaluations of the program.

The initial strategy for the BL-NCE program had been developed during the design phase of the program and reflects the program structure at that time. The formative evaluation suggested a review of the PM strategy, which was completed in 2015. This document presents a revised performance measurement strategy which addresses the recommendations of that evaluation. The proposed PM strategy will be reviewed as it is implemented, and changes made to reflect new program orientations or delivery mechanisms. Data collection methods used will be refined as needed to provide more streamlined information or to include new or missing information.

Table 2 - Performance Measurement Strategy for the BL-NCE Program

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Baseline | Target | Date to Achieve Target | Responsibility for Collection | Timing / Frequency of measurement |
|---|--|--|--|---|--|-------------------------------|-----------------------------------|
| Outputs | | | | | | | |
| Funded Networks in government priority areas | <ul style="list-style-type: none"> Number of funded networks | <ul style="list-style-type: none"> PSAB report/Steering Committee recommendations | 0 | 4-5 per year | N/A | NCE Secretariat | Annually |
| Agreements with networks | <ul style="list-style-type: none"> Number of funding agreements Number of network agreements compliant with program requirements | <ul style="list-style-type: none"> NCE Secretariat NCE Secretariat | 0 0 | 1 per funded network 100% | N/A | NCE Secretariat | Annually |
| Advice and direction to networks | <ul style="list-style-type: none"> % of Network Management who perceived the advice and direction provided by the Secretariat is beneficial | <ul style="list-style-type: none"> Key informants interviews Survey | N/A | 75% favourable | Next evaluation | Program Evaluation | Every 5 years |
| Reports on awards monitoring, performance reviews and evaluations | <ul style="list-style-type: none"> Reports received from all grantees Turnaround time for performance reviews and evaluations | <ul style="list-style-type: none"> NCE Secretariat | 0 | 100% received by due date Report evaluation within 6 months of receipt of report | N/A | NCE Secretariat | Annually |
| Immediate Outcomes | | | | | | | |
| Increased private sector investment in R&D and advanced technologies | <ul style="list-style-type: none"> Percent of partner contributions that are from the private sector Ratio of partner contributions (cash and in-kind) relative to NCE funds for research activities | <ul style="list-style-type: none"> NCE Secretariat financial reporting | Private sector contributions at start of grant | At least 25% of partner contributions are from the private sector 1 | Over life cycle of grant Annually | NCE Secretariat | Annually |
| Outline of a clear path to market or business application for the proposed research | <ul style="list-style-type: none"> % of research projects with a clear path to market | <ul style="list-style-type: none"> Annual reporting | N/A | 100% of projects | Annually | NCE Secretariat | Annually |
| | <ul style="list-style-type: none"> Partners' perceptions on the market potential of proposed/undertaken research | <ul style="list-style-type: none"> Case studies Survey of partners | N/A | 75% of undertaken research is rated high in terms of market potential by >50% of partners | Next evaluation | Program Evaluation | Every 5 years |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Baseline | Target | Date to Achieve Target | Responsibility for Collection | Timing / Frequency of measurement |
|---|--|---|----------|--|------------------------|-------------------------------|-----------------------------------|
| Strengthened public-private sector collaboration, including links between young researchers and firms | <ul style="list-style-type: none"> Number of network members and participants by sector (G2) Number of organizations and people involved in public-private collaboration, by role (G5) Nature of public-private linkages established (G1-6b, G1-6c) Number of projects undertaken (G5) | <ul style="list-style-type: none"> Annual progress reports | 0 | N/A | | NCE Secretariat | Annually |
| | <ul style="list-style-type: none"> % of projects that have academic and private sector collaboration | <ul style="list-style-type: none"> Annual progress reports | N/A | 75% | Over grant cycle | NCE Secretariat | Annually |
| | <ul style="list-style-type: none"> % of stakeholders who perceive collaboration within the network to be strong | <ul style="list-style-type: none"> Survey of partners Survey of researchers Case studies | N/A | 75% of partners and researchers view collaboration as strong | Next evaluation | Program Evaluation | Every 5 years |
| High quality post-graduate and post-doctoral training in innovative research | <ul style="list-style-type: none"> Number of trainees (graduate students, post-doctorate fellows and other HQP) working on BL-NCE projects – by citizenship and gender (G3) | <ul style="list-style-type: none"> Annual progress reports Final reports | 0 | N/A | | NCE Secretariat | Annually |
| | <ul style="list-style-type: none"> Level of satisfaction of HQP from their interactions with the private sector | <ul style="list-style-type: none"> HQP survey | N/A | 60% | Next evaluation | Program Evaluation | Every 5 years |
| Intermediate Outcomes | | | | | | | |
| Accelerated commercialization | Number of policies, processes, technology standards, prototypes developed, patents, copyrights, licences, and brokered negotiations for new business (not yet secured) (G6) | <ul style="list-style-type: none"> Annual progress report | 0 | N/A | | NCE Secretariat | Annually |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Baseline | Target | Date to Achieve Target | Responsibility for Collection | Timing / Frequency of measurement |
|--|---|---|--------------|---|--|-------------------------------|-----------------------------------|
| Significant research challenges that meet business needs addressed | <ul style="list-style-type: none"> Number of refereed and non-refereed contributions, technical papers, white papers, reports, etc., from BL-NCE research. (G4) Percentage of established networks and centres demonstrating knowledge and technology transfer (e.g. number of patents, licenses, copyrights, number of new products or processes, policies created, new capacities established and/or processes or practices affected) | <ul style="list-style-type: none"> Annual progress reports | 0 | N/A 100% | Annually | NCE Secretariat | Annually |
| | <ul style="list-style-type: none"> Extent to which partners agree that business needs are met | <ul style="list-style-type: none"> Surveys of partners, researchers | N/A | 50% | Next evaluation | Program Evaluation | Every 5 years |
| | <ul style="list-style-type: none"> Evidence of participation of industry in decision-making processes for research goals (e.g., private sector representation among members of research planning committees and research projects) (G1-6a) Number of organizations that have benefited from BL-NCE Research (G6) | <ul style="list-style-type: none"> Application Annual progress reports Final reports | N/A 0 | N/A 100% of participating partners | Over life cycle of grant Over life cycle of grant | NCE Secretariat | Annually |
| Increased private sector capacity (including SMEs) and receptivity to the results of R&D | <ul style="list-style-type: none"> Changes in number of employees dedicated to R&D Changes in R&D expenditures Number of firms adopting and exploiting the results of the network research % of organizations that have increased their capacity and receptivity, according to partner perceptions | <ul style="list-style-type: none"> Survey of partners, researchers Case studies | N/A | >0 | Over life cycle of grant | Program Evaluation | Every 5 years |
| Ultimate Outcomes | | | | | | | |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Baseline | Target | Date to Achieve Target | Responsibility for Collection | Timing / Frequency of measurement |
|--|--|--|----------|---------------------------------|------------------------|---|-----------------------------------|
| Creation and growth of companies in Canada that are able to capture new markets with new innovations | <ul style="list-style-type: none"> Number of companies created using network's results/innovations (G6) \$ value of additional investment accessed, attributable to BL (G6) \$ value of revenue generated attributable to BL (G6) \$ value of cost savings attributable to BL (G6) Number of jobs created within consortia (all partners) (G6) Products and services available for market (G6) | <ul style="list-style-type: none"> annual progress reports Final report Case studies Survey of partners, researchers | 0 | Increase over life of the grant | Post-grant | NCE Secretariat Program Evaluation | Annually Every 5 years |
| Benefits spill over to a wide array of firms, sectors and regions of the country | <ul style="list-style-type: none"> Examples of firms, sectors, provinces and regions using results of the network research | <ul style="list-style-type: none"> Case studies Survey of partners | N/A | N/A | Post-grant | Program Evaluation | Every 5 years |
| | <ul style="list-style-type: none"> Examples of policies and practices of the user sector that have been influenced by research findings | <ul style="list-style-type: none"> Case studies Survey of partners | N/A | N/A | Post-grant | Program Evaluation | Every 5 years |
| | <ul style="list-style-type: none"> % of non-participating firms of the same sector adopting innovations from the network | <ul style="list-style-type: none"> Case studies Survey of partners | 0 | N/A | Post-grant | Program Evaluation | Every 5 years |
| | <ul style="list-style-type: none"> Socio-economic impacts (comparison of net present value of actual/projected impacts of selected innovations to costs of development) | <ul style="list-style-type: none"> Partial cost-benefit analysis Survey of partners, researchers | 0 | N/A | Post-grant | Program Evaluation | Every 5 years |
| Canadian firms positioned in high value segments of production chains | <ul style="list-style-type: none"> Changes or diversification in product offerings/exports of partner firms Extent to which product offerings have been moved closer to market | <ul style="list-style-type: none"> Survey of partners Case studies Partial cost-benefit analysis | N/A | N/A | Post-grant | Program evaluation | Every 5 years |

3.2 Accountabilities and Reporting

The BL-NCE Program receives its funding through parliamentary appropriations and has a responsibility to Parliament and to Canadian taxpayers to ensure that the funds entrusted to it are well managed and used effectively, economically, and in the best interest of the research supported by the award. Granting Agencies share this responsibility and include the BL-NCE program in their reports to Parliament. The Secretariat uses NSERC's audit and evaluation functions. NSERC receives annual appropriations for the programs administered by the NCE Secretariat. The costs incurred in developing and implementing the accountability/evaluation framework are included in the operating budget.

The monitoring of BL-NCE grants is an ongoing function of the NCE Secretariat to ensure that funds are used effectively to attain the expected results. These monitoring activities are linked to ongoing performance measures, and the data collected also feed into program evaluations. Program evaluations are required every five years, and make use of ongoing performance monitoring data provided by the Secretariat as well as data provided by the networks.

The Program Evaluation Strategy is described in the next section. The table below provides further details on performance reporting for the BL-NCE program.

Table 3. Performance Reporting for the BL-NCE program

| Type of Report | Purpose | Contents | Frequency of Use/ Timing | Responsibility |
|--|---|--|--------------------------|---|
| Departmental Performance Report | Reporting to Parliament on BL-NCE's program outcomes | Granting Agencies funding received for the BL-NCE programs | Annual | Each of the participating Granting Agency |
| NCE Annual Report Include section on BL-NCE Program | Reporting to NCE Steering and public on the BL-NCE programs activities and outcomes | Summary of statistical, and implementation activities, outcomes and achievements | Annual | NCE Secretariat |
| BL-network corporate annual report | Reporting to the NCE Secretariat and the member organization | Performance and audited statements | Annual | BL-Network |

Robust controls are built into NCE Secretariat's systems and processes. They include clear assignments of responsibility and authority for the approval of grants, budget controls embedded in the NCE grants management database, and multi-faceted monitoring of ongoing grants. Financial controls, which are carried out by the Finance Division (Review and Investigations), within the Common Administrative Services Directorate at NSERC/SSHRC¹⁸ and by the Finance Division at CIHR, are reviewed regularly and modified as needed.

Frameworks for ongoing monitoring of expenditures are in place, as described in detail in the *Tri-Agency Financial Administration Guide* and the *BL-NCE Program Guide*. As specified in the Tri-

¹⁸ NSERC and SSHRC have Common Administrative Services such as the Financial Division, which oversees financial visits for both agencies and the NCE Secretariat.

Agency guide, representatives of the Granting Agencies will visit academic institutions and affiliated networks, periodically to:

- assess whether grantees have the necessary financial/administrative tools to properly and effectively manage their research funds;
- review the effectiveness of procedures, systems and controls in place at the Institution to ensure that the Granting Agencies' policies and requirements are followed;
- review expenditures from grant accounts to ensure that these were made in accordance with the established policies, requirements and guidelines and for the broad purpose intended; and
- share and disseminate information on guidelines and expectations for financial accountability and integrity.

For BL-networks or members not affiliated to institutions, the financial monitoring procedure described above is adapted to reflect the organizational context. In addition, each network is incorporated as a not-for-profit organization and has a Board of Directors that has the overall responsibility for the management, direction, and financial accountability of the network, including the approval of the audited financial statements and annual reports provided to the NCE Secretariat. NCE Secretariat staff sit on each Network's Board of Directors thus monitoring compliance of the program's policies and procedures. Finally, the network's activities are subject to general overview and monitoring by the NCE Steering Committee through the NCE Secretariat and the PSAB Monitoring Committee.

Each participating Granting Agency has its own Internal Audit function; however, program funding administered by the NCE Secretariat falls under the purview of NSERC's internal audit function. NSERC's internal audit function supports the agency's efforts to achieve its corporate objectives, through its independent assessment of NSERC's internal management framework and by providing senior management with assurance regarding its risk management, internal controls, and governance practices, including, but not limited to NSERC's core granting programs. The Auditor General of Canada is NSERC's external auditor and is responsible for conducting an external audit of NSERC's financial statements.

Recipients are asked to provide annual progress reports and a final report to the NCE Steering Committee. Reports are used to determine whether grants are being used for the intended purpose and to monitor the network's performance. These reports indicate major achievements of the BL-Networks over the last year, strategies used to achieve the goal, and any course corrections or deviations from the original objectives. In addition, the annual reports include statistical tables, statements of other sources of funding, audited financial statements and administration reports such as conflict of interest and environmental review report as stipulated by the NCE Secretariat. The PSAB will also be asked to comment on networks' annual performance via the PSAB Monitoring Committee.

The NCE Secretariat is responsible for providing consolidated reports on the overall impact of the program and compiles, revises, and analyses the performance data provided by the BL-networks on a yearly basis and reports on the BL-NCE Program in the annual public report posted in its Web site.

Recipients send progress reports electronically, making data capture and analysis relatively easy and timely, two important features of any good performance measurement system. Reporting requirements are provided to the BL-networks annually. A web reporting system is being developed.

Whenever possible, program data and statistics that are either already available or that can be collected using a file review method will be used. These data sources include survey results or statistics on target population. Data integrity for this type of performance information largely depends on the methods used to collect it by the organizations providing it.

The data sources and collection methods identified in the PM strategy table constitute multiple lines of evidence that can be used to gather the appropriate information for each indicator. Each of these data sources and collection methods are described in this section. Note that data for some indicators will also be collected within the course of evaluation activities; the data sources more appropriate to evaluation are described in the next section.

The NCE Secretariat maintains a database that stores information necessary to manage and monitor the lifecycle of the granting processes, such as information relating to the receipt of the initial application; peer review; final approval, and financial monitoring of grants and information on grantees. The NCE Secretariat database is an invaluable source of information for ongoing performance management, since reports can be developed and generated with updated information when necessary. Information related to the portion of the grant attributable to each of the three granting agencies is also reported in their own respective database.

Measures to ensure data integrity are built into the input process managed by program and agency staff. Data integrity for annual progress reports is based on the quality of the information provided by the centres. The validity of the reporting instruments will be also monitored and any required clarifications will be made to ensure that the questions structuring the reports are clear and unambiguous. The 2012 summative evaluation has made recommendations to review the PM strategy, the annual reporting and logic model. These recommendations are implemented in the current PM strategy as indicated in the NCE Management response to the 2012 BL-NCE program evaluation.

4 Evaluation Strategy

The BL-NCE program, as an ongoing grants program, is to be evaluated every five years in accordance with the *Policy on Evaluation* and as required by section 42.1 of the *Federal Administration Act* (FAA). As a tri-agency program, the evaluation of the BL-NCE program is overseen by the Interagency Evaluation Steering committee, which is comprised of a core membership of the Heads of Evaluation of CIHR, NSERC, SSHRC, and a senior evaluation representative from Industry Canada.

The first evaluation of the BL-NCE program was completed in fiscal year 2011-2012, and examined the relevance and performance (effectiveness, efficiency and economy) of the program as well as implementation to date. Overall, the evaluation concluded that the program was making progress towards its intended outcomes; however, recommended several steps to the program to revise the program's logic model and performance measurement strategy.

The second evaluation of the BL-NCE program is currently taking place, in conjunction with the summative evaluation of the NCE program. The rationale for the this evaluation is to meet the information needs of Deputy Heads (i.e., NCE Steering Committee) and meet the commitments of the *Policy on Evaluation* and FAA.

A draft evaluation framework for a future evaluation of the BL-NCE program is presented in Table 4. This framework is based on the joint evaluation framework developed for the current evaluation of BL-NCE and NCE programs in 2014-2015. The framework outlines the proposed evaluation questions, their associated indicators, and the data sources and data collection methods required to address these indicators. The questions presented in the framework address the information needs of the Deputy Heads, based on consultation with members of the NCE Management and Steering Committees, and the core evaluation issues (i.e., relevance and performance) outlined in the *Policy on Evaluation*. The proposed evaluation questions, indicators and data sources will be reviewed and modified, if necessary, prior to undertaking an evaluation in the future. Findings from the evaluation currently underway are also likely to influence future evaluation designs for this program.

Some of the evaluation issues will be measured in part by the indicators identified in the performance measurement strategy presented in Section 3 above. To avoid duplication, the table below displays the indicators that will be measured through evaluation activities only. It is understood that the data collected on an ongoing basis will also be used to answer evaluation questions.

It should be noted that the networks currently funded by the BL-NCE program are quite diverse with respect to the model and approach used, scope of the knowledge or technology generated, the sectors in which they operate, and the partners, clients, end-users and markets reached. As a result, the proposed indicators and data collection methods have been designed in such a way to accommodate the variability across networks.

Table 4. Evaluation Strategy for the BL-NCE Program

| Evaluation Issue/Question | Indicator | Data Source | Data Collection Method |
|--|---|--|--|
| Relevance: Continued need for program, alignment with federal government priorities, roles and responsibilities | | | |
| 1. To what extent is there a continued need for the NCE and BL-NCE programs to fund a network approach to research, development and innovation? (TBS CEI1) | 1. Assessment of advantages of network approach to research and training | <ul style="list-style-type: none"> ▪ Program documents Ts&Cs, PM strategy ▪ NCE documents, progress reports, performance reports, PSAB's reports, etc., ▪ Federal government policy documents, S&T Strategy | <ul style="list-style-type: none"> ▪ Document review |
| | | <ul style="list-style-type: none"> ▪ Program management and staff ▪ Selection committee members¹⁹ ▪ NCE Secretariat management ▪ Industry Canada representative ▪ NCE and BL-NCE network management²⁰ | <ul style="list-style-type: none"> ▪ Key informant interviews |
| | | <ul style="list-style-type: none"> ▪ NCE network management ▪ NCE and BL-NCE researchers, ▪ Comparable researchers²¹ ▪ NCE and BL-NCE partners ▪ Comparable partners²² | <ul style="list-style-type: none"> ▪ Surveys researchers and partners ▪ Case studies |
| | 2. Extent to which research networks would have formed and operated in absence of program funding | <ul style="list-style-type: none"> ▪ NCE network management, BL-NCE network management ▪ NCE and BL-NCE researchers ▪ Comparable researchers | <ul style="list-style-type: none"> ▪ Document review |
| | | | <ul style="list-style-type: none"> ▪ Key informant interviews |
| | 3. Assessment of specific/unique needs addressed and/or not | <ul style="list-style-type: none"> ▪ Program documents ▪ NCE Secretariat documents | <ul style="list-style-type: none"> ▪ Document review |

¹⁹ Committee members to be interviewed should include national and international members.

²⁰ Network management could include the following: network director/manager, network staff, members of boards of directors and members of relevant network committees (e.g., advisory, scientific, selection)

²¹ Comparable researchers could include researchers from both comparable network research programs (e.g., networks funded by the BL-NCE, NCE program and NSERC's SNG program) and comparable non-network research programs; the comparable partners will be defined in the evaluation plan document.

²² Comparable partners could include partners from both comparable network research programs and comparable non-network research programs; the comparable partners will be defined in the evaluation plan document.

| Evaluation Issue/Question | Indicator | Data Source | Data Collection Method |
|---|--|--|---|
| | addressed by the program (e.g., needs of researchers, partner organizations and receptor community) | <ul style="list-style-type: none"> ▪ Program management and staff ▪ Selection committee members ▪ NCE Secretariat management ▪ Industry Canada representative ▪ NCE network management, BL-NCE network management ▪ NCE and BL-NCE researchers ▪ NCE and BL-NCE partners | <ul style="list-style-type: none"> ▪ Key informant interviews ▪ Surveys of researchers and partners ▪ Case studies |
| | 4. Evidence that the program is responding to the need for multidisciplinary and multisectoral networks | <ul style="list-style-type: none"> ▪ Program management and staff ▪ Selection committee members ▪ NCE Secretariat management ▪ NCE network management, BL-NCE network management ▪ NCE BL-NCE researchers, ▪ NCE BL-NCE partners | <ul style="list-style-type: none"> ▪ Document review ▪ Key informant interviews ▪ Surveys of researchers and partners ▪ Case studies |
| | 5. Assessment and comparison of program objectives, design, delivery and participants (e.g., researchers, partners, HQP) with other federal research network funding programs (i.e., complementarity, duplication, participation in comparable programs by researchers and partners) | <ul style="list-style-type: none"> ▪ Program administrative data ▪ Program files ▪ Available data on comparable programs ▪ Program documents ▪ NCE Secretariat documents ▪ Other federal government program information ▪ Provincial and municipal government program information | <ul style="list-style-type: none"> ▪ Administrative data review ▪ File review ▪ Comparable program data review ▪ Document review ▪ Key informant interviews ▪ Surveys of researchers, partners, HQP ▪ Case studies |
| 1.1 Is there a necessary role for the federal government in providing the NCE | 1. Assessment of the federal government's role and responsibilities in delivering the | <ul style="list-style-type: none"> ▪ Program documents ▪ NCE and BL-NCE documents ▪ Federal government policy documents | <ul style="list-style-type: none"> ▪ Document review |

| Evaluation Issue/Question | Indicator | Data Source | Data Collection Method |
|---|---|--|--|
| and BL-NCE programs? (TBS CEI3) | program | <ul style="list-style-type: none"> ▪ Program management and staff ▪ Selection committee members ▪ NCE Secretariat management ▪ Industry Canada representative ▪ NCE and BL-NCE network management | <ul style="list-style-type: none"> ▪ Key informant interviews |
| 1.2 To what extent are the NCE and BL-NCE programs aligned with federal government priorities and granting agencies' strategic outcomes? (TBS CEI2) | 2. Assessment of the alignment of program objectives with federal government priorities and funding (planned budget) | <ul style="list-style-type: none"> ▪ Program documents ▪ NCE documents ▪ Federal government policy documents | <ul style="list-style-type: none"> ▪ Document review |
| | 3. Comparison of program grant and partner funding to other federal government funding initiatives in research areas of funded networks | <ul style="list-style-type: none"> ▪ Program management and staff ▪ NCE Secretariat management ▪ Industry Canada representatives | <ul style="list-style-type: none"> ▪ Key informant interviews |
| | | <ul style="list-style-type: none"> ▪ Program administrative data ▪ Program documents ▪ NCE Secretariat documents ▪ Granting agency documents ▪ Federal government program documents ▪ Federal government policy documents ▪ Federal government budget documents ▪ Statistics Canada data | <ul style="list-style-type: none"> ▪ Administrative data review ▪ Document review |
| Performance (Effectiveness): Achievement of expected outcomes | | | |
| Please refer to PM strategy, Section 3, above | | | |
| Performance (Efficiency and Economy): Demonstration of Efficiency and Economy | | | |
| 5. To what extent are efficient and effective means being used to deliver the program? (TBS CEI5) | 1. Ratio of administrative costs of networks to total program administrative costs for the program and comparable programs | <ul style="list-style-type: none"> ▪ Program administrative and financial data ▪ Administrative and financial data for comparable programs ▪ Program files ▪ Network documents | <ul style="list-style-type: none"> ▪ Administrative data review ▪ File review ▪ Document review ▪ Comparable program data review |
| | 2. Program operational efficiency and network-level benefit on | <ul style="list-style-type: none"> ▪ Program administrative and financial data ▪ Program files | <ul style="list-style-type: none"> ▪ Document review ▪ File review |

| Evaluation Issue/Question | Indicator | Data Source | Data Collection Method |
|---------------------------|--|--|--|
| | investment | <ul style="list-style-type: none"> ▪ Network documents | <ul style="list-style-type: none"> ▪ Operational efficiency study ▪ Partial cost-benefit study |
| | 3. Comparison of efficiency and effectiveness of comparable programs and delivery models (e.g., application process, review process, administration and reporting) | <ul style="list-style-type: none"> ▪ Program administrative data ▪ Program files ▪ Network documents ▪ Program management and staff ▪ NCE Secretariat management ▪ Selection committee members | <ul style="list-style-type: none"> ▪ Administrative data review ▪ File review ▪ Document review ▪ Comparable program data review ▪ Key informant interviews |
| | 4. Perceptions of efficiency and effectiveness of program (e.g., added value vs. trade-offs, worthwhile investment for partners to access university research) | <ul style="list-style-type: none"> ▪ Program management and staff ▪ Network researchers ▪ Comparable researchers ▪ Network partners ▪ Comparable partners ▪ NCE and BL-NCE network management | <ul style="list-style-type: none"> ▪ Key informant interviews ▪ Surveys of researchers and partners ▪ Case studies |
| | 5. Total costs per leading-edge research finding relevant to the need of user sectors | <ul style="list-style-type: none"> ▪ Program administrative and financial data ▪ Administrative and financial data for comparable programs ▪ Program files ▪ Network documents | <ul style="list-style-type: none"> ▪ Administrative data review ▪ File review ▪ Document review ▪ Comparable program data review |

5 References

- Belderbos, R., Carree, M., Lokshin, B., 2006. *Complementarity in R&D cooperation strategies. Review of Industrial Organization* 28(4), 401-426.
- Caulfield T, Harmon SHE, Joly Y (2012). *Open science versus commercialization: A modern research conflict?* *Genome Medicine*, 4, 17.
- Conference Board of Canada: *How Canada Performs: Business Enterprise R&D Spending*: Retrieved from <http://www.conferenceboard.ca/hcp/details/innovation/berd.aspx> Aug 2014.
- Council of Canadian Academies (2009). *Innovation and business strategy: Why Canada falls short*. Report of the Expert Panel on Business Innovation. Ottawa: Author.
- Faems, D., Looy, V.B., Debackere, K., 2005. *Inter-organizational collaboration and innovation: toward a portfolio approach*. *Journal of Product Innovation Management* 22(3), 238-250.
- Jaffe AB, National Bureau of Economic Research (1996). *Economic analysis of research spillovers: Implications for the advanced technology program*.
- Markman GD, Siegel DS, Wright M (2008). *Research and technology commercialization. Journal of Management Studies*, 45, 8.
- Miotti, L., Sachwald, F., 2003. *Co-operative R&D: why and with whom?: An integrated framework of analysis*. *Research Policy* 32(8), 1481–1499.
- Nieto, M.J., Santamaria, L., 2007. *The importance of diverse collaborative networks for the novelty of product innovation*. *Technovation* 27(6–7), 367-377.
- NSERC (2005). *Research Means Business*. Natural Science and Engineering Research Council.
- OECD (2003). *The Sources of Economic Growth in OECD Countries*. Paris: OECD.
- Performance Management Network Inc. (2012). *Evaluation of the Business-Led Networks of Centres of Excellence (BL-NCE) Program*. Natural Sciences and Engineering Research Council.
- Rasmussen E (2008). *Government instruments to support the commercialization of university research: Lessons from Canada*. *Technovation*, 28, 506-517.
- STIC *State of the Nation 2012*: <http://www.stic-csti.ca/eic/site/stic-csti.nsf/eng/00065.html#innovation>
- Zeng, S.X., Xie, X.M., Tam, C.M., 2010. *Relationship between cooperation networks and innovation performance of SMEs*. *Technovation* 30(3), 181–194.
- Zucker LG, Darby MR, Armstrong JS (2002). *Commercializing knowledge: University science, knowledge capture, and firm performance in biotechnology*. *Management Science*, 48(1), 138-153.

Barney, J (March 1991). "*Firm resources and sustained competitive advantage*". *Journal of Management* 17 (1): 99–120.

Appendix: Indicator Data Sources

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|---|--|--|---|
| Outputs | | | |
| Funded Networks in government priority areas | Number of funded networks | PSAB report/Steering Committee recommendations | [N/A] |
| Agreements with networks | Number of funding agreements | NCE Secretariat | [N/A] |
| | Number of network agreements compliant with program requirements | NCE Secretariat | |
| Advice and direction to networks | % of Network Management who perceived the advice and direction provided by the Secretariat is beneficial | Key informants interviews Survey | Based on your experience, to what extent are you satisfied with the following aspects of the <PROGRAM> program? Advice and guidance provided by NCE Secretariat staff |
| Reports on awards monitoring, performance reviews and evaluations | Reports received from all grantees Turnaround time for performance reviews and evaluations | NCE Secretariat | [N/A] |
| Immediate Outcomes | | | |
| Increased private sector investment in R&D and advanced technologies | Percent of partner contributions that are from the private sector | NCE Secretariat financial reporting | SOA, G8 - Contributions to the BL-NETWORK. Table with the following column headers: Name of Contributing Organization; Cash Contributions; In-Kind Contributions. Row headers as follows: Amount of support; Describe purpose of contribution |
| | Ratio of partner contributions (cash and in-kind) relative to NCE funds for research activities | | |
| Outline of a clear path to market or business application for the proposed research | % of research projects with a clear path to market | Annual reporting | 7a) Please explain how the BL-Network activities have assisted the private sector organizations to outline a clear path to market or business application for the research, and accelerate the commercialization of the research results in the past fiscal year. Please provide examples of new or improved practices, policies, regulations, processes, standards, products, goods, services, prototypes, and/or technologies that have resulted from these activities. |
| | Partners' perceptions on the market potential of proposed/undertaken research | Case studies Survey of partners | |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|---|---|--------------------------------------|---|
| Strengthened public-private sector collaboration, including links between young researchers and firms | Number of network members and participants by sector (G2) | Annual progress reports | <p>Network members and participants. Table with the following column headers:</p> <ul style="list-style-type: none"> • Lang • Sector* • Salutation** • First Name • Last Name • Title • Organization Name • Address Ln 1 • Address Ln 2 • City • Province • Postal Code • Country • Area Code • Number • Ext • Role • E-mail <p>*Sector: U = University only; I = Industry; Fed = Federal government; Prov = Provincial government; Admin Ctr = Network Administration Ctr; O = Others **Please select: Mr., Mrs., Ms., Dr., Prof. Mme, M.</p> |
| | Number of organizations and people involved in public-private collaboration, by role (G5) | Annual progress reports | <p>G5 - Links between researchers and private sector organizations. Table with the following column headers:</p> <ul style="list-style-type: none"> • Project Name • Organizations Involved • People Involved • Role in Project (dropdown list with the following items: Research Advisory/Consultant; Mentor; Commercialization; Ethics Oversight; Training; Other -Please explain) • Does this project involve a new public-private collaboration? If yes explain. • If the Role is "Other" please explain |
| | | Survey of partners | <p>Please indicate the extent to which your organization was involved in each of the following phases of this project. Planning of research to address needs of partner organizations; Development of research questions; Decision-making regarding research design / methodology; Development of data collection tools / equipment; Analysis / interpretation of research findings; Exchange / dissemination of knowledge and / or technology; Use / application of knowledge and / or technology</p> |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|------------------------------|---|--------------------------------------|--|
| | | Survey of researchers | <p>Including your organization, please identify the types of organizations involved in your project. (University; Private sector; Canadian government (federal, provincial, municipal); Foreign government; Hospital or other health provider; Not-for-profit organization (including associations or societies); Other (please specify)</p> <p>Please indicate the extent to which you had collaborated with these organizations prior to your project. (Worked with all organizations previously; Worked with some organizations previously; Worked with none of the organizations previously)</p> <p>Please indicate which type of organization is leading the following phases of your research project. If more than one organization is leading, please select all that apply. (Planning of research to address needs of partner organizations; Development of research questions; Decision-making regarding research design / methodology; Development of data collection tools / equipment; Analysis / interpretation of research findings; Exchange / dissemination of knowledge and / or technology; Use / application of knowledge and / or technology)</p> |
| | Nature of public-private linkages established (G1-6b, G1-6c) | Annual progress reports | <p>G1-6b) In the past fiscal year, has the BL-Network established links with new private sector organizations? If yes, please describe how the network engaged the organization and how it is (or will be) involved in the Network.</p> <p>G1-6c) How has the network expanded collaborations between organizations and linked organizations who have not previously worked together? Provide examples of how these collaborations occurred and whether these new collaborations are occurring between private sector organizations and/or with public and academic organizations.</p> |
| | | Survey of researchers, partners | To date, has your project resulted in or is likely to result in the following: Multidisciplinary research collaborations; Multisectoral research collaborations; International collaborations |
| | Number of projects undertaken (G5) | Annual progress reports | <p>G5 - Links between researchers and private sector organizations. Table with the following column headers:</p> <ul style="list-style-type: none"> • Project Name • Organizations Involved • People Involved • Role in Project (dropdown list with the following items: Research • Advisory/Consultant; Mentor; Commercialization; Ethics Oversight; Training; Other -Please explain) • Does this project involve a new public-private collaboration? If yes explain. • If the Role is "Other" please explain |
| | % of projects that have academic and private sector collaboration | Annual progress reports | See above |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|------------------------------|--|--------------------------------------|--|
| | % of stakeholders who perceive collaboration within the network to be strong | Survey of researchers | Overall, to what extent do you consider the collaborations with each of the following organizations involved in your project to be successful? (University; Private sector, etc.) What do you feel were the main reasons why the collaborations on your project were successful or unsuccessful? |
| | | Survey of partners | Overall, to what extent do you consider the collaborations on this project to have been successful? What do you feel were the main reasons why the collaborations on this project were successful or unsuccessful? |
| | | Survey of researchers, partners | Based on your experience to date, please indicate the extent to which you agree or disagree with the following statements regarding <NETWORK>: <NETWORK> constitutes a web of communication; <NETWORK> identifies key issues in the field(s) addressed by the network; <NETWORK> identifies interests of members; <NETWORK> works together to get things done; <NETWORK> leverages money for research; <NETWORK> identifies mutual needs; In <NETWORK>, we share resources to address common issues; In <NETWORK>, we reach mutual goals together; In <NETWORK>, we merge tangible resources to create something new (e.g. knowledge, technology, process, product, service); <NETWORK> is committed for a long period of time to achieving results; Members of <NETWORK> have unified under a single structure (e.g. governance, management); Members of <NETWORK> have relinquished their autonomy to support a common organization / entity |
| | | Case studies | To what extent has this research network contributed to achieving the following intended outcomes of the NCE/BL-NCE program? facilitated the necessary multidisciplinary, multisectoral and international collaborations between the research community and partner organizations to address research challenges? |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|--|--|--|--|
| High quality post-graduate and post-doctoral training in innovative research | Number of trainees (graduate students, post-doctorate fellows and other HQP) working on BL-NCE projects – by citizenship and gender (G3) | Annual progress reports Final reports | <p>G3 - List of Network Researchers and Highly Qualified Personnel (HQP) Working on Network Research. Table with the following column headers:</p> <ul style="list-style-type: none"> • Organization Name • Research Personnel or HQP Type (drop-down list with the following items: Network Researchers; Research Associates; Postdoctoral Fellows; Master Student; PhD Student; Undergrad Student; Clinician; Health Professional) • Research/Commercialization Project Names • Ratio of Time: BL-NCE Grant Funds • Ratio of Time: Other Funds • Citizenship (drop-down list with the following items: Canadian/Permanent Resident; Foreign) • Gender (drop-down list with the following items: Male; Female; Prefer not to answer) • Degree Status* (drop-down list with the following items: Ongoing; Complete) • If Complete, please select post network employment sector* (drop-down list with the following items: University, Canadian; University, Foreign; Industry, Canadian; Industry, Foreign; Government, Canadian; Government, Foreign; Other Canadian; Other Foreign; Unemployed) • First Name • Last Name • Phone Number • Email • City • Province • Country • If other selected for Sector(F:I), Please specify here <p>* Applicable to students and post-doc fellows only</p> |
| | | Surveys of researchers, partners | Please indicate whether <NETWORK> has resulted in or is likely to result in the following impacts related to highly qualified personnel (HQP) and research personnel: Training of HQP. |
| | Level of satisfaction of HQP from their interactions with the private sector | HQP survey | |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|-------------------------------|---|--------------------------------------|--|
| Intermediate Outcomes | | | |
| Accelerated commercialization | Number of policies, processes, technology standards, prototypes developed, patents, copyrights, licences, and brokered negotiations for new business (not yet secured) (G6) | Annual progress report | <p>G6 - Indicators of impacts resulting from BL-Network funding. Table with the following column headers: How many; and (for the last nine rows only) Total value (where applicable). Rows in the table:</p> <ul style="list-style-type: none"> • Number of organizations that have benefitted from BL-NCE Research • Policies • Processes • Technology standards • Prototypes developed • Jobs created in Canada • Jobs maintained in Canada • Patent applications filed • Patents issued • Copyrights • Licenses • Brokered negotiations for new business (not yet secured) • Revenue generated • Revenue generated outside of Canada • Cost savings • Additional investment accessed (Canadian) • Additional investment accessed (Foreign) • Products available for market (developed by the network, or with the help of the network) • Services (offered by the network, or with the help of the network) • Other |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|---|--|--|---|
| <p>Significant research challenges that meet business needs addressed</p> | <p>Number of refereed and non-refereed contributions, technical papers, white papers, reports, etc., from BL-NCE research. (G4) Percentage of established networks and centres demonstrating knowledge and technology transfer (e.g. number of patents, licenses, copyrights, number of new products or processes, policies created, new capacities established and/or processes or practices affected)</p> | <p>Annual progress reports</p> | <p>G4 - Publications and Guest Speaker invitations Number of invitations as guest speakers at conferences and congresses with business, user sector Contributions. Table with the column header "Number" and the following rows:</p> <ul style="list-style-type: none"> • Refereed Contributions • 1 Articles in refereed publications (published or accepted) • 2 Other refereed contributions • Non-refereed contributions • Technical Paper • White Paper • Report • Other Specialized Publications • Total All Publications <p>Subsequent table asks for details of publications including name, type, target audience, size of distribution, and purpose/expected impact</p> |
| | | <p>Survey of partners, researchers</p> | <p>To date, has your project resulted in or is likely to result in the following: Creation of new knowledge; Creation of new technology; Extension / application of existing knowledge; Extension / application of existing technology; Creation of new research methodologies</p> <p>Please indicate how the results of your project have been shared with members of <NETWORK>. Select all that apply: Informal discussions and / or correspondence; Formal correspondence; Shared drives / electronic space (e.g., extranet); Meetings; Direct involvement of personnel from network organizations in the project; Reports; Presentations; Annual conferences / general meetings; Other, please specify; Project results not shared</p> <p>Please indicate how the results of your project have been mobilized. Select all that apply: Refereed publications (e.g., journal articles, conference papers / presentations); Joint refereed publication by academic and private sector researchers; Non-refereed publications; Network agreement regarding intellectual property / commercialization; Filing of patent applications; Patent issued; Filing of licensing applications; License issued; Execution of non-disclosure or confidentiality agreements; Filing for protection of copyright or trademark; Other, please specify; Project results not mobilized</p> |
| | | <p>Survey of researchers</p> | <p>What type of network organization(s) are you working with to mobilize your research results (University; Private sector; etc.)</p> |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|--|--|---|--|
| | Extent to which partners agree that business needs are met | Survey of partners, researchers | To date, has your project resulted in or is likely to result in the following: Research collaborations required to address the needs of network organizations To what extent has <NETWORK> addressed your organization's research needs? Please explain in what way <NETWORK> is addressing / not addressing your research needs. |
| | Evidence of participation of industry in decision-making processes for research goals (e.g., private sector representation among members of research planning committees and research projects) (G1-6a) Number of organizations that have benefited from BL-NCE Research (G6) | Annual progress reports Final reports | G1-6a) In the past fiscal year, how have private sector organizations been involved in the development of the network's strategic directions and the decision-making process for research goals? G6 - Indicators of impacts resulting from BL-Network funding: Number of organizations that have benefitted from BL-NCE Research |
| | | Application | |
| Increased private sector capacity (including SMEs) and receptivity to the results of R&D | Changes in number of employees dedicated to R&D | Survey of partners | |
| | | Case studies | |
| | Changes in R&D expenditures | Survey of partners Case studies | |
| | | Survey of researchers, partners | Please indicate whether <NETWORK> / your project funded by <NETWORK> has resulted in or is likely to result in the following: Impact on processes and / or practices of network organizations (with follow-up question on types of impact) |
| | % of organizations that have increased their capacity and receptivity, according to partner perceptions | Case studies | |
| | | Survey of partners, researchers | Please indicate whether <NETWORK> / your project funded by <NETWORK> has resulted in or is likely to result in the following: Impact on research and development (R&D) of network organizations (with follow-up question on types of impact) |
| Case studies | | | |
| Ultimate Outcomes | | | |
| Creation and growth of companies in Canada that are able to capture new markets with new innovations | Number of companies created using network's results/innovations (G6) | Annual progress reports Final report Case studies | G6 - Indicators of impacts resulting from BL-Network funding Start-up / Spinoff companies (Insert rows as needed). Table with the following column headers: <ul style="list-style-type: none"> • Name • Startup or Spinoff? • City, Province • Creation date • Capitalization (if available) |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source | |
|---|---|---|--|---|
| | | Survey of researchers, partners | Please indicate whether your project funded by <NETWORK> has resulted in or is likely to result in the following: Creation of a spin-off or start-up company Please indicate the number of spin-off or start-up companies that resulted from your <NETWORK> research? | |
| | \$ value of additional investment accessed, attributable to BL (G6) | Annual progress reports Final report Case studies Survey of partners | G6 - Additional investment accessed (Canadian); & Additional investment accessed (Foreign): How many; Total value (Indicate investment attributable to BL) | |
| | \$ value of revenue generated attributable to BL (G6) | Annual progress reports Final report Case studies Survey of partners | G6 - Revenue generated; & Revenue generated outside of Canada: How many; Total value (Indicate revenue attributable to BL) | |
| | \$ value of cost savings attributable to BL (G6) | Annual progress reports Final report Case studies | G6 – Cost savings: How many; Total value (Indicate revenue attributable to BL) | |
| | | Survey of partners | | |
| | Number of jobs created within consortia (all partners) (G6) | Annual progress reports Final report Case studies Survey of partners | G6 - Jobs created in Canada: How many? | |
| | Products and services available for market (G6) | Annual progress reports Final report Case studies | G6 - Products available for market (developed by the network, or with the help of the network); Services (offered by the network, or with the help of the network): How many; & Total value (name all products/services) | |
| | | Survey of researchers, partners | | Please indicate whether <NETWORK> / your project funded by <NETWORK> has resulted in or is likely to result in the following: Impact on products and / or services of network organizations (with follow-up question on types of impacts) |
| | | Survey of partners | | |
| Benefits spill over to a wide array of firms, sectors and | Examples of firms, sectors, provinces and regions using results of the network research | Case studies Survey of partners | | |

| Program Outputs and Outcomes | Indicators | Data Source / Data Collection method | Question appearing in data source |
|---|--|---|---|
| regions of the country | Examples of policies and practices of the user sector that have been influenced by research findings | Case studies Survey of partners | |
| | % of non-participating firms of the same sector adopting innovations from the network | Case studies Survey of partners | |
| | Socio-economic impacts (comparison of net present value of actual/projected impacts of selected innovations to costs of development) | Partial cost-benefit analysis | |
| | | Survey of researchers, partners | Please indicate whether <NETWORK> / your project funded by <NETWORK> has resulted in or is likely to result in the following: Economic, social, cultural benefits Please describe the types of economic, social, health and / or environmental benefits that resulted from your <NETWORK>-funded research. |
| Canadian firms positioned in high value segments of production chains | Changes or diversification in product offerings/exports of partner firms Extent to which product offerings have been moved closer to market | Survey of partners Case studies Partial cost-benefit analysis | |