



Formative Evaluation of the
Networks of Centres of
Excellence — Centres of
Excellence for Commercialization
and Research Program

FINAL REPORT

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LIST OF ACRONYMS

AAPS	Advanced Applied Physics Solutions Inc.
BIC	Bioindustrial Innovation Centre
CCR	Centre for the Commercialization of Research
CDRD	Centre for Drug Research and Development
CECR	Centre of Excellence for Commercialization and Research
CEPM	Centre of Excellence in Personalized Medicine
CFI	Canadian Foundation for Innovation
CIHR	Canadian Institutes of Health and Research
CPDC	Centre for Probe Development and Commercialization
FA	Full Application
IP	Intellectual Property
IRICoR	Institute for Research in Immunology and Cancer/CECR in Therapeutics Discovery
LOI	Letters of Intent
MI	MaRS Innovation
NCE	Networks of Centres of Excellence
NSERC	Natural Sciences and Engineering Research Council
PC-TRIADD	The Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development
PREVENT	Pan-Provincial Vaccine Enterprise
PROOF	CECR in the Prevention of Epidemic Organ Failure
PSAB	Private Sector Advisory Board
R&D	Research and Development
RBAF	Risk-based Audit Framework
RMAF	Results-based Management and Accountability Framework
S&T	Science and Technology
SPM	Senior Program Managers
SSHRC	Social Sciences and Humanities Research Council
STIC	Science, Technology and Innovation Council
TTO	Technology Transfer Offices

EXECUTIVE SUMMARY

PROFILE OF THE CECR PROGRAM

The Centres of Excellence for Commercialization and Research (CECR) Program is a federal program aimed at supporting the operation of research and/or commercialization centres that bring together people, services and research infrastructure to position Canada at the forefront of breakthrough innovations. The goal of the CECR Program is to increase private sector investment 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 Program aims to create internationally recognized centres of commercialization and research expertise in four priority areas in order to deliver economic, social and environmental benefits to Canadians. The benefit to Canadians is defined by the Program as incremental Canadian economic activity and improved quality of life in Canada through the creation of high quality jobs. As established in the S&T Strategy, the four priority areas of the CECR Program are:

- Environmental science and technologies;
- Natural resources and energy;
- Health and related life sciences and technologies; and
- Information and communications technologies.

The total financial resources for the CECR Program for the five-year period from fiscal years 2007-2008 to 2011-2012 are \$277.65 million. Program funding is intended to support the operating and commercialization costs of funded centres and complement other sources of federal government funding, including funding from the Canadian Foundation for Innovation (CFI) for research equipment and facilities, and funding from the three federal granting agencies for direct and indirect costs of academic research.

For the first competition, held in 2008, 110 eligible letters of intent (LOI) were received. Twenty-five applicants were invited to submit full applications (FA), of which 11 were awarded funding. For the second competition, held in 2009, 34 LOI were received and 15 FA, resulting in six centres receiving funding. To date, 14 of the 17 centres funded focus on both research and commercialization, with three centres focusing solely on commercialization.

EVALUATION ISSUES AND OBJECTIVES

Given the recent implementation of the CECR Program, the evaluation is formative in scope and focuses on identifying areas of design and delivery that could potentially be improved, and any adjustments or changes that could be made to subsequent Program competitions. The evaluation examines the Program's implementation, identifies evidence of early progress toward immediate outcomes and

assesses the extent to which the CECR Program is effectively monitoring performance and managing risk. The time period covered by this evaluation is from 2007-2008 to 2008-2009.

EVALUATION METHODS

This evaluation made use of the following lines of evidence to address the evaluation issues:

- **Documentation review** – The document review collected information to address all the evaluation questions. Two types of documents were reviewed: CECR Program documentation; and documentation from the 11 centres funded as a result of the 2008 competition.
- **File review** – The file review of letters of intent and full applications for the 2008 and 2009 competitions was conducted to provide evidence for the evaluation questions related to implementation and early progress toward immediate outcomes. The documents reviewed include: letters of intent; full applications, and summary and analysis documents from the 2008 and 2009 competitions; 2008-2009 Report on Plans and Priorities for the Canadian Institutes of Health and Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and the Natural Sciences and Engineering Research Council (NSERC); and strategic plan documents for SSHRC and CIHR. The file review was led by NSERC evaluation staff with assistance from SSHRC and CIHR evaluation staff.
- **Key informant interviews** – The key informant interviews collected evidence to address all evaluation questions. Sixty interviews were completed with key informants. Interviews were conducted with the following groups: NCE-CECR senior management and staff (n= 4); members of the Private Sector Advisory Board (n=4); members of Peer-Review Expert Panels (n=7); management of the 11 centres funded by the 2007-2008 competition (n=34); provincial government representatives (n=4); and representatives from centres that submitted unsuccessful full applications in the 2008 competition (n=7).

LIMITATIONS

It is important to note that this evaluation is formative in nature, and the focus is on implementation and early indications of progress toward results rather than the achievement of outcomes by the Program. It was also implemented very early in the life cycle of the Program; the scope of the evaluation was limited to the first two years of the Program (i.e., fiscal years 2007-2008 and 2008-2009). This meant that the evaluation was conducted less than one year after the 11 centres funded by the 2008 competition had received Program grants, and prior to the conclusion of the 2009 competition. Further, as the primary purpose of the evaluation was to improve implementation, this meant that data collection was necessarily focused on available Program data and the views of stakeholders involved with the Program to date. For example, interviews could only be conducted with management from the 11 centres funded by the 2008 competition, and only six provincial representatives were identified to be interviewed based on the involvement of their provinces in the CECR program to date. In light of this context, the following are key limitations to be considered in interpreting the results of this formative evaluation of the CECR Program:

- Although the main focus of the evaluation was not on the review of performance, the evaluation was intended to assess *progress* toward immediate expected results. Given that centres had been in operation for less than one year when data was collected for this evaluation, there was little by way of available output and outcome data, and few outcomes (such as they are evident) can be attributed to the CECR Program. In addition, the first year annual reports from funded centres are due in August 2009, after the completion date of this evaluation.
- The evaluation is limited in its ability to fully address the adequacy and reliability of performance measurement, since the reporting templates for centres developed by the Program have not yet been filled out and submitted by the centres. A full assessment of the completeness and reliability of the performance information can only be reliably undertaken through a review of completed performance measurement templates.
- Due to the available data, budget and time, the data sources were limited to key informant interviews (n=60), a file review of LOI and FA, and a review of Program documentation. This limits the evaluators' ability to triangulate results. The triangulation of results (via a multiple lines of evidence approach that uses data from different collection methods or sources) allows for a more robust and reliable assessment of results which works to improve the validity of evaluation findings.

KEY FINDINGS AND RECOMMENDATIONS

The following presents the key findings and recommendations of the evaluation report. The recommendations are presented in order of evaluation issue and not importance.

IMPLEMENTATION

The findings of the evaluation indicate that the CECR Program has been implemented to date in a manner that will likely achieve its intended objectives. The peer review and excellence-based approach of the CECR Program's selection process was widely praised as a key mechanism to ensure that funded centres will achieve the Program's intended research and commercialization outcomes. Based on the results of the 2008 and 2009 competitions, the Program has funded centres that address all four priority areas of the S&T Strategy, with the majority of centres focused on the health and related life sciences and technologies priority area. Also, the Program has funded centres that represent research fields from the three federal granting agencies; however, the majority of centres represent CIHR and NSERC research fields. Based on the results of the 2008 competition, a few interviewees suggested that the lack of representation of the SSHRC research fields is problematic because they regard a number of SSHRC research fields, such as ethics and business law, as directly relevant to the goal of the Program to deliver economic, social and environmental benefits. It is important that the Program track the research focus and commercialization expertise of both applicants and funded centres to better assess progress towards its

objective to create internationally recognized centres of commercialization and research in the four priority areas.

Recommendation 1: The Program should monitor the representation of the four strategic priority areas as well as the research fields of the three granting agencies in both applications to, and centres funded by, the Program. The Program should work to improve awareness of the Program across all research fields to ensure that centres possess the appropriate knowledge and expertise to deliver economic, social and environmental benefits in the four strategic priority areas.

While a majority of interviewees viewed the Program's human and financial resources as adequate, a few suggested that the timing or length of the competition places an unrealistic burden on staff. A few managers also suggested that financial resources will be insufficient in the long term, particularly if they are meant to support the type of large-scale proposals that have been received by the Program to date.

Some modifications were made to the selection process between the 2008 and 2009 competitions to increase the emphasis on two strategic priority areas (information and communication technologies, and environmental science and technologies) by prioritizing these areas and clarifying the funding requirements. The 2009 competition was also modified to increase standardization across Expert Panels.

While most interviewees were satisfied with the selection process and regard it as appropriate, the evaluation found a need for improvement in how provincial representatives are consulted. The NCE Secretariat is expected to consult with the provinces and territories, prior to the call for LOI and after receipt of FAs, to identify potential centres seeking support as well as provincial and territorial priorities. All provincial government representatives interviewed were dissatisfied with the nature and extent of the consultations by the Program during the 2008 and 2009 competitions. Specifically, provincial representatives indicated a preference to be consulted earlier in the selection process (e.g., at the LOI stage) and in a more timely and structured fashion, in order to provide them with the opportunity to determine their support for centres that align with provincial priorities, obtain feedback on unsuccessful applications and support a second application in a later competition.

Recommendation 2: The Program should review the process used to consult provincial government officials to determine how to more appropriately obtain provincial input during the selection process.

EARLY PROGRESS TOWARD INTENDED OUTCOMES

At this early stage in the implementation of the Program, there is limited available evidence to provide a clear indication that the CECR Program has made progress toward intended immediate outcomes. The centres have been in receipt of funding for one year and, thus, have largely focused on implementation activities such as establishing the structure of the organization, hiring and governance.

Annual reports are not yet available that will detail centres' activities and outputs. These reports will be submitted in August 2009.

Overall, the 11 centres funded in 2008 are generally seen by centre management to have been implemented in a manner consistent with the approach proposed in their full applications and corporate plans. The full applications and corporate plans of the CECRs indicate a high degree of partnership with, and support for, the centres by stakeholders. The centres are consortia that feature partnerships among academic and research organizations, university Centres of Excellence, research and development facilities, health institutions, business and industry associations. Many centres have secured provincial government support, and the centres are also often networked with international research institutions.

Interview findings provided a number of early signs that the CECRs are making progress in contributing to most of the intended immediate research and commercialization outcomes of the CECR Program. With many of the operational and administrative aspects of the CECRs in place, the centres are now undertaking research and commercialization activities. As mentioned, for most centres, multi-sectoral partnerships and participation in research and industry networks act as the foundation for research and commercialization activities. Research activities include development and translational research programs, as well as hiring of research talent, and research and internship opportunities for students. With respect to commercialization activities, many centres highlighted commercialization and industry talent represented on their Board and in senior positions in the centre. Activities have focused on identification of commercialization projects to develop over the coming years, and potential investment partners.

While the activities of some centres have been delayed due to implementation challenges, almost all centres have achieved early operational milestones. Implementation challenges identified by centre managers included a variety of operational issues (e.g., negotiating the NCE funding agreement, arrangements with the host organization and incorporation of the organization that proved to be more protracted than anticipated), as well as the significant degree of work undertaken by centres during the first year to further define their business models. Other notable issues included securing the right leadership for the centres and shifting the cultural focus among researchers and some centre stakeholders to a model emphasizing commercialization. The management of intellectual property (IP) may pose a challenge for some centres as they move further toward implementation.

Based on their experiences to date, interviewees from the centres noted some factors that have facilitated the success of centre activities. These success factors are related to centre management and administration, including strong leadership and sound underlying administrative and management processes. Several CECRs benefited greatly from building their centres on the success of a pre-existing team or infrastructure, which supported a more rapid start-up of the centres.

Overall, Program stakeholders are satisfied with the advice and assistance provided by the Program staff. There is evidence of a need to improve the information communicated to applicants and Expert Panel members regarding the goals of the program and the selection process and criteria. While

centre management are generally satisfied with the advice and guidance provided by Program staff, they perceived a need for the Program to enhance the value of advice and guidance provided in order to better facilitate success. Specifically, centre management indicated that the Program staff should provide assistance and guidance (i.e., in the form of best/suggested practices and tools) in operational areas common to centres, and facilitate networking among centres to share the guidance, which would benefit both existing centres and future centres by assisting them to effectively implement research and commercialization activities.

Recommendation 3: The Program should take steps to foster better communication and sharing of ideas and information among Program staff and stakeholders, and across centres. Specifically, the Program should identify and develop lessons learned and best practices for centre operations, and support centres' interest in increased opportunities to network with each other.

While there is evidence the centres are making progress, findings from the evaluation indicate that there is a risk that funded centres may not be able to achieve all of the Program's commercialization outcomes, specifically becoming self-sufficient, within the current time frame of the Program grant. This is a common concern among centre management. On this point, Program documentation indicates that centres with a strong commercialization focus are expected to be self-sufficient by the end of the funding period, while centres with a strong research focus may be eligible for subsequent support (if the Program is extended).¹ On this point, it is important to note that none of the 17 centres funded to date are focused solely on research, with 14 centres focused on research and commercialization, and three focused solely on commercialization. The five-year time frame is having an impact on centres' decisions regarding which commercialization projects to select. Although a few centres are focusing on "early wins," the commercialization cycle can still be lengthy, particularly for the health and related life sciences and technologies priority area (addressed by 11 of the 17 funded Centres).

Recommendation 4: The Program should assess the feasibility of the five-year time frame for Program grants, based on centre type (commercialization, research, or research and commercialization), strategic priority area(s) addressed and centre performance, especially the extent of leveraged funding and the potential value of commercialization projects.

PERFORMANCE MEASUREMENT AND RISK MANAGEMENT

While the annual report template has been developed and shared with centres, the annual reports have not yet been completed and submitted by centres, making it difficult to comment on their overall effectiveness and efficiency. The available evaluation findings, however, indicate that the Program's performance measurement strategy and the annual report template align with the requirements in the Results-based Management and Accountability Framework (RMAF), with the Program's logic model and with the key types of performance information suggested by the centres themselves.

¹ CECR Program Guide (June 2008), p. 7-8. Available on-line:
http://www.nce.gc.ca/comp/Program%20Guide_CECR_June%202008.pdf.

A recurring theme throughout this evaluation relates to the lack of clarity surrounding what is meant by commercialization. This lack of clarity surrounding a key objective of the Program has strong implication for performance measurement since the term “commercialization” is interpreted differently by the Program, centres and other key stakeholders, such as PSAB and Expert Panel members. For example, the definition of commercialization used in the Program’s Funding Agreement was changed between the 2008 and 2009 competitions from a focus on manufacturing to one of transforming knowledge and technology.

In addition, management from a few centres indicated that there is a need to clarify and focus Program objectives relating to commercialization and research. In particular, interviewees perceive a disconnect between the Program research-related objectives and Program guidelines that limit expenditures on research-related activities. The focus of the Program needs to be evident and consistent from the selection process and criteria through to Program guidelines, and performance metrics and monitoring.

The key challenge with respect to performance measurement will likely relate to measurement of success in commercialization, given the lack of a common understanding of how commercialization is defined by the Program.

Recommendation 5: The Program should, in close consultation with the three funding agencies and Industry Canada, define what is meant by commercialization in the context of this Program in a way that is measurable and consistent with the Program’s Terms and Conditions. Furthermore, the Program should ensure its research and commercialization objectives are clearly and consistently presented in Program documentation and communicated to all Program stakeholders.

NCE-CECR senior managers provided evidence that indicates the risk management plan in the joint Results-based Management and Accountability Framework (RMAF) – Risk-based Audit Framework (RBAF) is being implemented and managed appropriately. According to NCE-CECR senior management, the results logic and risk assessment have been successfully coordinated to enable performance and risk to be managed in an integrated approach. For example, results measurement and risk management strategies have been synchronized to draw on, where possible, common measures and review processes.

The key risk areas identified in the joint RMAF-RBAF for the CECR Program relate to peer review, matching funds and intellectual property, and potential conflict of interest. The risks most commonly mentioned by centre management include the difficulty in attracting investment and venture capital amidst the current economic downturn, design risks, human resources risks and provincial support risks. The continuous and ongoing communication between the Program and the centres, and the implementation of the Program’s reporting templates and monitoring guidelines, suggest that the tools are in place to help address and sufficiently mitigate these risks, as well as other risks, as they emerge.

Recommendation 6: Based on the annual reports to be submitted by centres for the 2008-2009 fiscal year, the Program should review its performance measurement and risk management system to

ensure it is effectively and efficiently capturing the required information from centres to appropriately monitor and manage Program performance and risk.

1. INTRODUCTION

The Centres of Excellence for Commercialization and Research (CECR) Program is a federal government program aimed at supporting the operation of research and/or commercialization centres that bring together people, services and research infrastructure to position Canada at the forefront of breakthrough innovations. In order to obtain information that can be used to improve design and delivery, as well as monitoring performance and managing risk, the Networks of Centres of Excellence (NCE) Secretariat commissioned EKOS Research Associates to conduct a formative evaluation of the CECR Program. The purpose of this Evaluation Report is to provide a summary of the results of the key informant interviews, the documentation review and the file review for each of the evaluation questions and indicators. The evaluation covers the time period from implementation in June 2007 to approximately April 2009 (when most key informant interviews were conducted). This introductory chapter provides a description of the CECR Program and the context in which it was implemented and operates. This chapter also describe the scope, objectives and methodology of the formative evaluation of the CECR Program.

1.1 CONTEXT

a) Federal Government Priorities in Science and Technology

In November of 2006, the Government of Canada released a long-term, strategic economic plan titled *Advantage Canada: Building a Strong Economy for Canadians*, to strengthen Canada's economy and make Canada a world leader.² This plan acknowledged that Canada already possessed strengths such as the ingenuity and drive of its people, and a strong research base. However, it contended that Canada had to do more to turn ideas into innovation; provide solutions to environmental, health and other important challenges; and improve Canada's economic competitiveness. In order to achieve these goals, the government released its Science and Technology (S&T) Strategy — *Mobilizing Science and Technology to Canada's Advantage* — in 2007.³

According to the S&T Strategy, Canada's productivity gap, relative to its largest trading partner the United States, is widening, and therefore it is necessary for Canada to increase its productivity and competitiveness through innovation. However, this must be accomplished in a manner that is sustainable

² Department of Finance (2006). *Advantage Canada: Building a Strong Economy for Canadians*. On-line: <http://www.fin.gc.ca/ec2006/plan/pltoc-eng.asp>.

³ Industry Canada (2007). *Mobilizing Science and Technology to Canada's Advantage – Summary*. On-line: <http://www.ic.gc.ca/cmb/welcomeic.nsf/532340a8523f33718525649d006b119d/1f5791c88cd2af42852572de00503b97!OpenDocument>.

over the long term. To that end, the approach outlined in this strategy is focused on fostering three distinct Canadian S&T advantages:

- ***Entrepreneurial Advantage:*** To create this advantage, Canada needs a strong private sector commitment to S&T, and must translate knowledge into commercial applications that generate wealth for Canadians and support a good quality of life. The government aims to foster a competitive and dynamic business environment that encourages S&T investments, pursue public-private research and commercialization partnerships, and increase the impact of federal business R&D assistance programs. A policy commitment, highlighted in the strategy, to strengthen public-private research and collaboration partnerships resulted in creation of the CECR Program in *Budget 2007*.
- ***Knowledge Advantage:*** To achieve this advantage, Canada needs to build on its research and engineering strengths, generate new ideas and innovations, and achieve excellence by international standards. The strategy outlines the following key initiatives to create a knowledge advantage: focus strategically on research in areas that are in the national interest from a social and economic perspective; maintain leadership in public R&D performance; enhance value for money, accountability and the responsiveness of the three federal granting agencies; and explore new approaches to federally performed S&T.⁴ In particular, energies and resources are focused on four priority areas: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communications technologies.
- ***People Advantage:*** It is important for Canada to be a magnet for talent to attain this advantage. In order to grow its base of knowledge workers, it is important for the country to develop, attract and retain highly skilled people, because the Canadian population is aging and Canadians can work anywhere in the world.⁵ To do this, the government aims to enhance opportunities for S&T graduates and increase the supply of highly qualified and globally connected S&T graduates that businesses need to succeed.

b) Networks of Centres of Excellence Program

Established by the Government of Canada in 1989 as a joint program of the Natural Sciences and Engineering Research Council of Canada (NSERC), the Social Sciences and Humanities Research Council of Canada (SSHRC), the Canadian Institutes of Health Research (CIHR) and Industry Canada, the NCE Program was put forward as an innovative model to link research and development with wealth creation. The NCE Program was aimed at mobilizing the best talent in the academic, private and voluntary sectors, and applying it to the task of developing the economy and improving the quality of life of Canadians. The NCE Program engages researchers, partners and institutions in nationwide networks, and works with

⁴ Ibid. p. 45.

⁵ Ibid. p. 46.

users in industry and government to create commercial opportunities and develop public policy based on sound evidence.⁶

The mission of the NCE Program is to mobilize research and commercialization to build a healthier, more advanced, more competitive and more prosperous Canada.⁷ The mission is consistent with, and reinforces, the three advantages of the federal government's S&T Strategy. To accomplish its goals, the NCE Program:

- Administers funding competitions on a cyclical basis for its four programs, using an established, independent peer review process;
- Sets clear targets and goals, monitors the progress and achievements of funded organizations to ensure they continue to meet the program's high standards and represent value to the Canadian taxpayer; and
- Maintains close relationships with existing and potential partners in the academic, industry, public and not-for-profit sectors.⁸

In *Budget 2007*, the federal government committed more than \$350 million to greatly expand the NCE Program by creating three new national programs in addition to the NCE Program: the CECR Program, the Business-Led NCE Program and an Industrial Research and Development Internship Program. All three programs are designed to increase private sector investment 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.

Within the context of the new suite of programs, the goal of the original or "classic" NCE Program remains to support research-driven partnerships that mobilize Canada's research talent in the academic, private and public sectors, and apply it to the task of developing the economy and improving the quality of life of Canadians. To achieve this goal, the NCE Program supports networks that are expected to direct leading edge research that is relevant to Canada's socio-economic goals, increase collaboration among researchers in Canada and abroad, transfer findings and knowledge, and train graduates and highly qualified personnel for the private, public and not-for-profit sectors. Networks are funded through funding cycles of up to seven years. The total number of years a network will be funded for is 15 years.

The NCE Program, and the new programs created by *Budget 2007*, are administered jointly by CIHR, NSERC and SSHRC, in partnership with Industry Canada. The NCE Program is overseen by a Steering Committee made up of the Presidents of the three granting agencies, the Deputy Minister of

⁶ Networks of Centres of Excellence Canada (2004). *The Networks of Centres of Excellence Program: 15 Years of Innovation and Leadership*. On-line: <http://www.nce.gc.ca/pubs/history/NCE-histEN.pdf>

⁷ Networks of Centres of Excellence. On-line: <http://www.nce.gc.ca/>

⁸ Networks of Centres of Excellence. On-line: http://www.nce.gc.ca/about_e.htm#a3

Industry Canada and the President of the Canadian Foundation for Innovation (CFI) (as an observer). Day-to-day administration is provided by the NCE Secretariat made up of staff from the three granting agencies.⁹

1.2 CENTRES OF EXCELLENCE FOR COMMERCIALIZATION AND RESEARCH PROGRAM

The CECR Program is a federal mechanism to support the operation of research and/or commercialization centres that bring together people, services and research infrastructure to position Canada at the forefront of breakthrough innovations in priority areas. The goal of the CECR Program is 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. To achieve this goal, the CECR Program aims to create internationally recognized centres of commercialization and research that establish public-private research and commercialization partnerships that deliver economic, social and environmental benefits to Canadians in the four priority areas of the S&T Strategy. The benefit to Canadians is defined by the CECR Program as incremental Canadian economic activity and improved quality of life in Canada. The maximum benefits are to be derived from the creation of high quality jobs in Canada which, according to program documentation, should be an important goal of any commercialization activity. As established in the S&T Strategy, the four priority areas of the CECR Program are: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communications technologies.

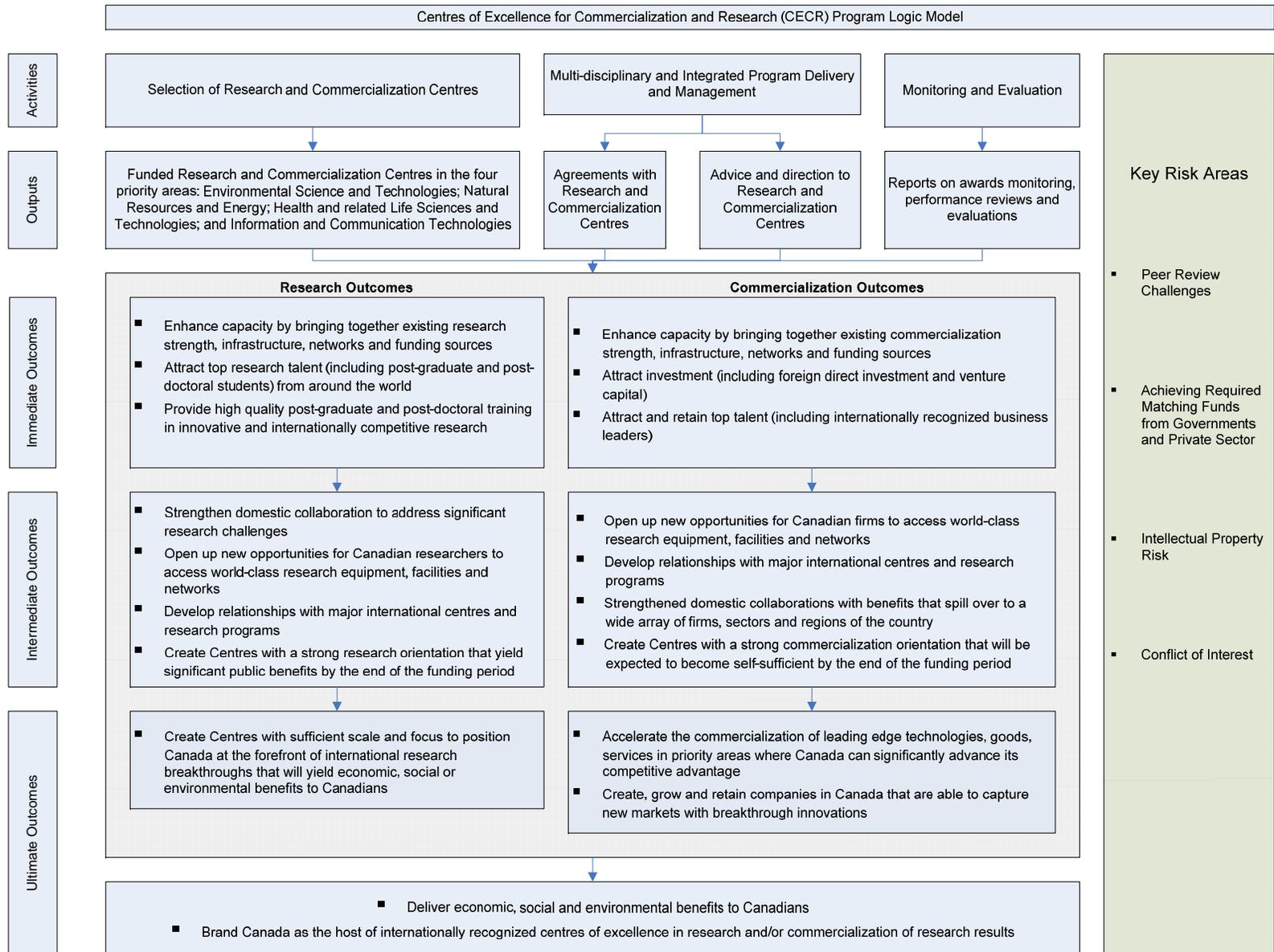
a) Expected Results

To achieve its goal of economic, social and environmental benefits for Canadians, the CECR Program supports the operation of centres designed to produce research-related benefits and commercialization-related benefits. Figure 1.1 presents the CECR Program's logic model which identifies the set of activities that make up the program and the sequence of outcomes that are expected to flow from these activities.¹⁰

⁹ Networks of Centres of Excellence Canada (2008). *NCE Program Guide*. On-line: http://www.nce.gc.ca/comp/NCEprogramguide/programguide-1_e.htm

¹⁰ Joint Results-Based Management and Accountability and Risk-Based Audit Framework for the CECR Program. Networks of Centres of Excellence. p. 11.

Figure 1.1: CECR Program Logic Model



b) Governance

As with the NCE Program, the CECR Program is overseen by the NCE Steering Committee, which carries out centre selection, monitoring and reporting. The day-to-day administration of the CECR Program is provided by the NCE Secretariat; Program Deputy Directors and Senior Program Managers (SPM) manage the CECR Program grants. The NCE Secretariat administers the CECR Program's national competitions through which the NCE Steering Committee recommends centres for funding based on reviews by the Expert Panels and the Private Sector Advisory Board (PSAB). The PSAB is appointed by the NCE Steering Committee and consists of between six and ten prominent members from key economic sectors. The Expert Panels are assembled on an ad hoc basis to review full applications (FA) to the CECR Program.

c) Program Resources

The total financial resources for the CECR Program for the five-year period from 2007-2008 to 2011-2012 are \$277.65 million. Program funding is intended to support the operating and commercialization costs of funded centres and complement other sources of federal government funding, including funding from the CFI for research equipment and facilities, and funding from the three federal granting agencies for direct and indirect costs of academic research. The CECR Program has a projected operating budget of just over \$5 million for the five-year period, with 3.0 full-time equivalents (FTE) assigned in 2007-2008 and 4.5 FTE assigned for the remaining four years.¹¹

d) Selection Criteria and Review Process

The CECR Program's review process features selection criteria for funding and a peer review process designed to align with present and future challenges of the Canadian innovation system, with Canada's needs and government priorities. Applications submitted to the CECR Program in response to national competitions are assessed against three selection criteria: benefits to Canada; track record and potential of applicants; and strength of the business plan. The review process involves two stages: a letter of intent stage and a full application stage.

In Stage I of the review and selection process, applicants submit letters of intent (LOI) that describe the centre, its operations and planned activities, required funding, members and supporting partners, their duties and respective contributions, and expected research and/or commercialization benefits for the project period. Prior to issuing the call for letters of intent, the NCE Secretariat consults provinces and territories to identify centres seeking support in one of the program's four priority areas. LOIs must include letters of support from other key funding organizations, including any provincial governments where they are expected to support the centre during its development, construction or operations. The PSAB

¹¹ Ibid., p. 8.

assesses the LOIs against the Program selection criteria and recommends a short-list of applicants to the NCE Steering Committee for advancement to the full application stage.

Stage II requires the submission of full applications that include complete information on the centre and its intended operations, funding requirements, the partnerships among supporters, their duties and respective contributions, and the expected research and commercialization outcomes and benefits of the centre.

Full applications are distributed by the NCE Secretariat to the relevant federal granting agencies, CFI and other relevant organizations for review and consultation. In addition, the Secretariat meets with provincial government officials to identify provincial priorities and to seek feedback on the proposals received from each respective province. Expert Panels comprised of domestic and international experts evaluate each proposal separately, meet with proponents and provide an in-depth written assessment of the proposals. The PSAB reviews the Expert Panel reports and provides reports and funding recommendations to the NCE Steering Committee which approves the applications to be funded, followed by final approval by Treasury Board.

e) Funded Centres

The CECR Program funds successful applicants in the form of grants over a maximum of a five-year period, which provides support for the following eligible expenditures: operating costs, salary costs, knowledge dissemination/sharing costs and commercialization costs. The grants are administered by the NCE Secretariat and centres follow the rules of the CECR Program Guide and the rules of the Tri-Agency Financial Administration Guide.¹² Organizations eligible for CECR Program grants are not-for-profit corporations created by universities, colleges, not-for-profit research organizations, firms and other interested non-government parties. As a condition of eligibility, organizations applying to the CECR Program must have an established Board of Directors responsible for the approval of its annual financial reports and audits. Prior to the release of the award, a Funding Agreement, which outlines the terms and conditions for funding under the CECR Program, is signed by representatives of the granting agencies, the designated representative of the host organization and the centre director. At the end of the funding period, centres with a strong commercialization focus are expected to become self-sufficient. Centres with a strong research orientation that yield significant public benefits within the funding period may be eligible for subsequent support.¹³

Centres are required to establish an administrative structure capable of managing a complex research and/or commercialization program. Each centre's Board of Directors has the overall responsibility for its management, direction and financial accountability, including the approval of its annual financial report and audit. The Board of Directors is accountable to the NCE Steering Committee for the CECR funds

¹² Ibid., p. 4.

¹³ Ibid., p. 2.

it manages. The membership of the Board must reflect the interests and concerns of the various stakeholders involved in the centre.

Each Centre has a centre director who reports to the Board of Directors. The centre director is responsible for the strategic direction and operation of the centre, including: providing progress and financial reports; recruiting centre personnel; acting on behalf of the centre with the NCE Secretariat; and promoting the centre's objectives and activities to all relevant stakeholders, including the general public. To ensure the effective management of communications, each centre is required to develop a communications plan to enhance interest in the centre and its activities, and to promote the centre and the CECR Program to the broad spectrum of sectors that may benefit.

f) 2008 and 2009 CECR Program Competitions

The first competition of the CECR Program was held in 2008 and received 110 eligible letters of intent. Twenty-five applicants were invited to submit full applications, with 11 centres awarded funding. In the 2009 competition, 34 LOIs were received, with 15 FAs invited and six centres funded. Table 1.1 presents a list of the 17 centres funded; 11 centres funded in the 2008 competition and six centres funded in the 2009 competition by type of centre, location and grant value. To date, the Program has awarded a total of \$225.8 million to the 17 centres; 15 of the centres funded focus on both research and commercialization, with three centres focusing solely on commercialization. A brief description of the 17 centres funded to date may be found in Appendix B.

Table 1.1: CECR Centres Funded in 2008 and 2009

Name of Centre	Centre Type	Location	Value of Grant (millions)
2008 Competition			
1. Advanced Applied Physics Solutions Inc. (AAPS)	Research & Commercialization	Vancouver, B.C.	\$14.95
2. Bioindustrial Innovation Centre (BIC)	Commercialization	Sarnia, Ont.	\$14.95
3. Centre for the Commercialization of Research (CCR)	Research & Commercialization	Ottawa, Ont.	\$14.95
4. Centre for Drug Research and Development (CDRD)	Research & Commercialization	Vancouver, B.C.	\$14.95
5. Centre for Excellence in Personalized Medicine (CEPMed)	Research & Commercialization	Montreal, Que.	\$13.80
6. Centre for Probe Development and Commercialization (CPDC)	Research & Commercialization	Hamilton, Ont.	\$14.95
7. Institute for Research in Immunology and Cancer – Commercialization of Research (IRICoR)	Research & Commercialization	Montreal, Que.	\$14.95
8. MaRS Innovation (MI)	Commercialization	Toronto, Ont.	\$14.95
9. The Prostate Centre’s Translational Research Initiative for Accelerated Discovery and Development (PC-TRIADD)	Research & Commercialization	Vancouver, B.C.	\$14.95
10. Pan-Provincial Vaccine Enterprise (PREVENT)	Research & Commercialization	Saskatoon, Sask.	\$14.95
11. CECR in the Prevention of Epidemic Organ Failure (PROOF)	Research & Commercialization	Vancouver, B.C.	\$14.95
2009 Competition			
12. Tecterra (formerly known as Centre of Excellence for Integrated Resource Management - CEIRM)	Research & Commercialization	Calgary, Alta.	\$11.68
13. Canadian Digital Media Network (CDMN)	Research & Commercialization	Waterloo, Ont.	\$10.72
14. Centre of Excellence in Energy Efficiency (C3E)	Research & Commercialization	Shawinigan, Que.	\$9.62
15. Centre for Surgical Invention and Innovation (CSII)	Research & Commercialization	Hamilton, Ont.	\$14.80
16. Green Centre Canada (GCC)	Commercialization	Kingston, Ont.	\$9.10
17. Oceans Network Canada Centre for Enterprise and Engagement (ONCCEE)	Research & Commercialization	Victoria, B.C.	\$6.58

1.3 OBJECTIVES AND SCOPE OF THE EVALUATION

Given the recent implementation of the CECR Program, the evaluation is formative in scope and focuses on identifying areas of the design and delivery that could potentially be improved, and the adjustments and changes that could be made to subsequent Program competitions. The evaluation examines the CECR Program’s implementation, identifies evidence of early progress toward immediate outcomes and assesses the extent to which the Program is effectively monitoring performance and managing risk. The time period covered by this evaluation is fiscal years 2007-2008 and 2008-2009. The evaluation matrix, including issues, questions and indicators can be found in Appendix A.

1.4 METHODOLOGY

a) Documentation Review

The document review collected information to address all the evaluation questions. Two types of documents were reviewed: CECR Program documentation; and documentation from the 11 centres funded in the 2008 competition. Overall, CECR Program documentation provided by the Project Authority includes:

- CECR Program Information: Information on the rationale for, and design of, the Program (e.g., CECR Joint Results-based Management and Accountability Framework–Risk-based Audit Framework [RMAF-RBAF]); the governance structure; lists of CECR Program staff, Expert Panel Membership and Private Sector Advisory Board Membership; CECR Program Guide, and program agreement and reporting documents (e.g., funding agreement, annual corporate plan guidelines, annual report template).
- 2007-2008 Competition Information: Document pertaining to the first competition process (e.g., forms and guidelines for completing letters of intent and full applications).
- Government of Canada S&T policy documents: There are three documents which present the federal government's policy framework relating to science and technology: *Mobilizing Science and Technology to Canada's Advantage (S&T Strategy)*; the *Budget Plan 2007 – Chapter 5: A Stronger Canada Through a Stronger Economy*; and, the 2006 Economic Plan: *Advantage Canada: Building a Strong Economy for Canadians*.

The following centre-specific documentation was provided by the Project Authority for each of the 11 centres funded in the 2008 competition:

- Full Application: This document provides a full overview of the centre's vision, approach, goals and objectives; strategic/business plan; stakeholder organizations, contributions and benefits to Canada; incremental social and economic benefits; and letters from stakeholders.
- Expert Panel Report: This document provides a record of the expert panel review, including panel membership, brief description of the centre, assessment by criterion, budget and conclusion.
- Private Sector Advisory Board Report: This document provides a record of PSAB deliberations upon reviewing the Expert Panel report and endorsement of the application.
- Updated Corporate Plan: This document provides a description of the centre's organization, business model, proposed activities and projects, research and development activities, business development activities, administration, centre development time lines and targets, risks and financial plan.

b) File Review

The file review of letters of intent and full applications from the 2008 and 2009 competitions was conducted to provide evidence to answer evaluation questions related to implementation and early progress toward immediate outcomes. The review involved assessing the extent of alignment of LOIs and FAs with the priority and sub-priorities of the S&T strategy, and strategic plans of CIHR, NSERC and SSHRC. The review also assessed the representation of the research fields of the three federal granting agencies in the LOIs and FAs. This involved reviewing the documentation to identify the proposed areas for research and/or commercialization, then comparing these against the priority and sub-priority areas of S&T strategy and broad research areas supported by, as well as the plans and priorities of, the three granting agencies. The file review included the following documentation: LOIs and FAs from the 2008 and 2009 competitions; summary and analysis documents from the 2008 and 2009 competitions; 2008-2009 Report on Plans and Priorities for CIHR, NSERC and SSHRC; and strategic plan documents for CIHR and SSHRC. The file review was lead by NSERC evaluation staff, with assistance from CIHR and SSHRC evaluation staff.

c) Key Informant Interviews

Interview guides were designed to address all of the pertinent evaluation issues and questions. Each interview question was coded to an evaluation issue, question and indicator. This is intended to ensure that all evaluation issues and questions are responded to, while keeping in mind the response burden on interviewees. The first five interviews conducted were considered pre-tests of the interview questions.

All interviewees were sent the finalized guide by e-mail in advance of their appointments, to permit preparation for the interview, along with an introductory e-mail introducing the evaluation and providing some background on the project. Interviews with key informants located in the National Capital Region were conducted in person (although if a respondent had a preference for a telephone interview, the choice was accommodated). For six of the funded centres, the key informant interviews were conducted in person during site visits to the centre, with attempts made to schedule all interviews with centre management to coincide with these visits. Interview questions were open-ended, to allow the interviewees to explain their responses in depth and detail. Interviews were an average of 45 to 60 minutes in duration.

All interviews were conducted in the preferred official language of the interviewee. All interviewees were reminded that their comments would be kept strictly confidential. Representatives from the NSERC evaluation team observed five of the six site visits to interview centre management and staff.

Interviews were conducted with the following respondent groups:

- NCE-CECR senior management and staff: These key informants provided information on the management and operation of the program to address evaluation issues related to design and implementation, performance measurement and risk management.

- Members of the Private Sector Advisory Board: These interviewees provided information on the design and operation of PSAB and the CECR Program selection process. Twelve Board members participated in either the 2007-2008 CECR Program competition or the 2008-2009 CECR competition, with five members participating in both competitions. The sampling strategy for members of PSAB included a balance of the PSAB members that have participated in both competitions because they have more experience with the CECR Program and, likely, greater knowledge of the operation and activities of the Board, and PSAB members with backgrounds in the four priority areas of the CECR Program. In the event that the priority Board members could not be interviewed, alternate PSAB members were selected from among the remaining seven members in a manner to ensure representation from both competitions and the four priority areas.
- Members of Peer-Review Expert Panels: There were 14 Expert Panels for the 2007-2008 CECR competition and eight Expert Panels for the 2008-2009 CECR competition. Each Expert Panel consists of a chair and four to seven members. The sampling strategy for members of Expert Panels included a balance of members who have participated in both competitions, to draw on their increased experience with the Program's operation of the panels and review process (i.e., better able to speak to any changes or modifications to the operation of the panels between the first and second competitions), and members who chaired panels in the first competition of both funded and unfunded full applications.
- Management of the 11 centres funded by 2008 competition: These interviewees provided information on the progress the centres have made in implementing their business plans, factors hindering or facilitating success, and the identification of best practices and lessons learned. The priority candidates for interviews from each centre were the centre director, the chair of the Board of Directors and other members of senior management responsible for centre operations (e.g., Technology Transfer Director, Commercialization Manager, and Vice-President of Partnerships). In the case of six centres, the interviews were conducted during site visits; however, due to location and availability of some centre representatives, some interviews were conducted by phone.
- Provincial government representatives: These interviewees provided information on the CECR Program's consultation with provinces to identify provincial priorities and secure input on the proposals from their provinces.
- Representatives from centres that submitted unsuccessful full applications in the 2008 competition: These interviews provided information on the application process, as well as information on the counterfactual (i.e., the impact of no CECR funding). The sampling strategy for these interviews was intended to achieve a balance of representatives from the provinces from which applications to the CECR Program originated and which pertained to the priority areas of the Program.

Sixty interviews were completed with key informants. Table 1.2 provides a summary of the number of interviews (targeted and completed) for each respondent group.

Table 1.2: Distribution of Key Informant Interviews

Respondent Group	Number of Interviews Targeted	Number of Interviews Completed
CECR Centres	33	34
NCE-CECR Management	3	4
PSAB Members	5	4
Expert Panel Members	7	7
Provincial Government Representatives	6	4
Unfunded Applicants	6	7
Total	60	60

The analysis of the key informant interview is qualitative in nature. To ensure a common understanding of the terms used in our analysis, we have used the following guidelines in analysing and reporting on interview results:

- “A few interviewees” = less than 25 percent;
- “A minority of interviewees” = 25 to 49 percent;
- “A majority of interviewees” = 50 to 75 percent;
- “Most interviewees” = over 75 percent; and
- “Almost all interviewees” = 95 percent or more.

1.5 LIMITATIONS

It is important to note that this evaluation is formative in nature, and the focus is on implementation and early indications of progress towards results rather than the achievement of outcomes by the Program. It was also implemented very early in the life cycle of the Program; the scope of the evaluation was limited to the first two years of the Program (i.e., fiscal years 2007-2008 and 2008-2009). This meant that the evaluation was conducted less than one year after the 11 centres funded by the 2008 competition had received Program grants, and prior to the conclusion of the 2009 competition. As the primary purpose of the evaluation was to improve implementation data collection necessarily focused on available Program data and the views of stakeholders involved with the Program to date. For example, interviews could only be conducted with management from the 11 centres funded by the 2008 competition, and only six provincial representatives were identified to be interviewed based on the involvement of their provinces in the CECR program to date. In light of this context, the following are key limitations to be considered in interpreting the results of this formative evaluation of the CECR Program:

- Although the main focus of the evaluation was not on the review of performance, the evaluation was intended to assess *progress* toward immediate expected results. Given that centres had been in operation for less than one year when data was collected for this evaluation, there was little by way of available output and outcome data, and few outcomes (such as they are evident) can be attributed to the CECR Program. In addition, the first year annual reports from funded centres are due in August 2009, after the completion date of this evaluation.
- The evaluation was limited in its ability to fully address the adequacy and reliability of performance measurement, since the reporting templates for centres developed by the Program have not yet been filled out and submitted by the centres. A full assessment of the completeness and reliability of the performance information can only be reliably undertaken through a review of completed performance measurement templates.
- Due to the available data, budget and time, the data sources were limited to key informant interviews (n=60), a file review of LOI and FA, and a review of Program documentation. This limits the evaluators' ability to triangulate results. The triangulation of results (via a multiple lines of evidence approach that uses data from different collection methods or sources) allows for a more robust and reliable assessment of results which works to improve the validity of evaluation findings.

1.6 ORGANIZATION OF THE REPORT

This Evaluation Report includes four additional chapters. Chapter Two presents findings from the key informant interviews, the documentation review and the file review with respect to evaluation questions related to implementation. Findings related to early progress toward intended outcomes are presented in Chapter Three. Chapter Four discusses results with respect to performance measurement and risk management. Chapter Five presents the evaluation report's conclusions and makes recommendations for the Program's future implementation.

2. IMPLEMENTATION

This chapter explores issues relating to the implementation of the CECR Program to date. These include the alignment of Program delivery to objectives, representation of priority S&T areas and research fields, perceived adequacy of program resources (human and financial) and the CECR Program's selection process.

2.1 ALIGNMENT OF PROGRAM ACTIVITIES AND OBJECTIVES

The goal of the CECR Program is to create internationally recognized centres of commercialization and research expertise in order to deliver economic, health, social and environmental benefits to Canadians in the four priority areas of S&T strategy: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communications technologies. In order to explore the extent of alignment of program activities with objectives, NCE-CECR senior management, Private Sector Advisory Board members and Expert Panel members were all asked to comment on the extent to which the Program has funded centres that will result in benefits in these four areas, and the extent to which the Program has been implemented in a manner to achieve this goal.

Senior management interviewed noted that the peer review process has played a key role in the selection of CECRs. The CECR Program's peer review process ensures a thorough review by domestic and international experts from academia, as well as the private and public sectors. The PSAB, whose members possess a strong business background in combination with research knowledge or experience, is a key feature that is designed to incorporate a commercialization focus into the review and selection process. Furthermore, senior management interviewed noted that the CECR Program was developed to specifically address gaps in knowledge translation, as well as a lack of operational funding for large-scale research centres.

Senior management noted that the bulk of centres funded through the first competition were related to health research and development, despite the fact that the Program had clearly identified four target areas. However, senior management indicated that centres funded in the second competition relate directly to information and communication technologies or environment sciences.

A minority of Expert Panel members (three of seven interviewed) also underlined the fact that the centres funded by the 2008 competition are somewhat over-representative of health and life sciences, and that information and communication technologies (ICT) and/or environmental sciences are somewhat under-represented. These interviewees, however, further noted that these industries are less mature or more fragmented, and do not lend themselves as well to this type of coordinated funding. They did agree,

however, that the sectoral and geographical representations of centres have improved after the second competition. One interviewee (a PSAB member) argued that it is important that the CECR Program place excellence before representation, and believes that an increasing number of good proposals will come forth from other sectors as they mature (although this may not occur within the five-year funding cycle of the Program).

The view that the funded centres from the 2008 competition have a high representation of the health and life sciences is corroborated by the findings of the file review. Findings of the file review indicate that ten of 11 centres funded in 2008 address the health priority area and two centres each addressed environment and information and communication technologies. In the case of the 2009 competition, findings indicate that for the six centres funded: five centres identify information and communication technologies as a priority area; and three identify environmental science and technologies as a priority area. Table 2.1 presents the findings of the file review regarding the number of letters of intent, full applications and funded centres by S&T Strategy priority area for the 2008 and 2009 competitions.

Table 2.1: Number of letters of intent, full applications and funded centres by S&T Strategy priority area for 2008 and 2009 competitions

S&T Strategy Priority Areas (PA)	PRIMARY AREA								
	Letters of Intent (LOI)			Full Applications (FA)			Funded Centres (FC)		
	#	% of PA	% of LOI	#	% of PA	% of LOI	#	% of PA	% of LOI
2008 and 2009	n=144			n=40			n=17		
Natural Resources and Energy	34	21	24	8	18	20	4	20	24
Health and Related Life Sciences and Technologies	48	29	33	16	36	40	11	55	65
Information and Communication Technologies	43	26	30	13	30	33	2	10	12
Environmental Science and Technologies	22	13	15	6	14	15	3	15	18
Other	10	6	7	0	0	0	0	0	0
Not reported	6	4	4	1	2	3	0	0	0
Total	163*	100		44*	100		20*	100	

* Note: Due to the fact that more than one priority area can be addressed by a single LOI, FA or funded centre, the total number of priorities addressed is larger than the total number of LOIs, FAs or funded centres.

To date, for the 144 letters of intent submitted to the CECR Program: one-third (33 percent) identified health and related life sciences and technologies as a primary area; just under one-third (30 percent) identified information and communications technologies; roughly one-quarter (24 percent) identified natural resources and energy; and 15 percent identified environmental science and technologies. For the 44 full applications, four in ten (40 percent) identified health and related life sciences and technologies as a primary area; one-third (33 percent) identified information and communications technologies; one in five (20 percent) identified natural resources and energy; and 15 percent identified environmental science and technologies. Of the 17 centres funded by the two competitions, 11 identify health and related life sciences

and technologies as a primary priority area; four identify natural resources and energy; three identify environmental science and technologies; and two centres identify information and communications technologies.

The file review also included a review of the granting agency strategic plans of CIHR, NSERC and SSHRC, to assess the extent of alignment of the funded centres with the agency strategic plans based on the research and commercialization activities. The objective of the CECR Program, to connect ideas and talent to businesses that can bring innovations to the market, is consistent with: CIHR's strategic outcome focused on knowledge translation and commercialization in health research; NSERC's strategic outcome of innovation through funding research in strategic areas, funding university-industry-government partnerships and supporting commercialization; and SSHRC's strategic outcome for knowledge mobilization through the transfer, dissemination and use of social science and humanities knowledge via research communication and interaction. In terms of the centres funded to date, the proposed activities of 11 centres are focused on research in, and the commercialization of, health and related life sciences and technologies. These centres align primarily with, and will contribute to the achievement of, the strategic outcome of CIHR; however, the involvement of researchers and professionals from NSERC and SSHRC domains will likely play an important role in these centres. Similarly, researchers and professionals from CIHR and SSHRC domains may play an important role in centres addressing the natural resources and energy priority area, which align with and support the achievement of NSERC's strategic outcome of innovation. While largely aligned with the research domains of NSERC, centres addressing the priority of area of environmental science and technologies will likely need the expertise of researchers and professionals with backgrounds in CIHR and SSHRC disciplines. The priority area of information and communication technologies aligns with strategic outcomes of NSERC and SSHRC.

A minority of PSAB and Expert Panel members interviewed agreed that the Program is on track to achieving its goals based on the implementation and centre selection to date. A minority of PSAB and Expert Panel members interviewed (four out of eleven) further stated that it is too soon to tell what benefits will result from the CECRs, and underscore the importance of evaluation or review in assessing outcomes. They stated that only time will tell which centres will be successful (based on outputs and outcomes), and what factors contribute to success.

A few PSAB and Expert Panel members also stated that they do not believe that all CECRs will be successful in achieving their objectives or those of the Program. Here, respondents cited the example that there is never a 100 percent success rate for new start-ups within industry. Finally, one Expert Panel member suggested that the benefits may vary based on the fact that each centre appears to be quite different, and the stage of commercialization for each centre differs across centres.

A few PSAB and Expert Panel members interviewed believe that the selection criteria in general are not sufficiently stringent in terms of economics and commercialization, and argued that greater focus is necessary here if the Program is to be successful. For example, one Expert Panellist noted that it would be preferable to have greater information on the government's commercialization objectives relating to these centres, suggesting that the current criteria are too broad and leave too much scope for

interpretation. Another Expert Panel member suggested that panellists are more interested and experienced in research, naturally focusing their attention there, while it may be preferable to invite additional panellists with an interest and experience in commercialization. Another interview respondent argued that the CECR Program is not sufficiently differentiated from the original NCE program and that a stronger focus on commercialization is required.

The Science, Technology and Innovation Council's (STIC) 13 sub-priority areas were introduced after the second competition and were therefore not included in either competition. Senior management confirmed that these will be incorporated in subsequent competitions.

Table 2.2 presents information on the alignment of centres with the S&T Strategy priority and sub-priority areas. While the alignment of centres with priority and sub-priority areas has improved, it remains strongly focused on health, with the focus areas of 11 funded centres aligned with the priority area of health and related life science technologies, and the sub-priority area of biomedical engineering and medical technologies.

Table 2.2: S&T Strategy Priority and Sub-Priority Areas Addressed by Funded Centres

S&T Priority and Sub-Priority Areas	Funded Centres*		Total (n=17)
	2008 Competition (n=11)	2009 Competition (n=6)	
Health and Related Life Sciences and Technologies	10	1	11
Biomedical Engineering and Medical Technologies	10	1	11
Health in an Ageing Population	2	0	2
Regenerative Medicine	0	0	0
Neuroscience	0	0	0
Natural Resources and Energy	3	3	6
Biofuels, Fuel Cells and Nuclear Energy	3	2	5
Arctic	0	0	0
Energy Production in the Oil Sands	0	1	1
Environmental Science and Technologies	2	3	5
Water (Health, Energy, Security)	0	3	3
Cleaner Methods of Extracting, Processing and Using Hydrocarbon Fuels	0	2	2
Information and Communications Technologies	2	5	7
New media, Animation and Games	1	1	2
Wireless Networks and Services	1	2	3
Broadband Networks	0	2	2
Telecom Equipment	0	2	2

* **Note:** Includes both primary and secondary priority areas for funded centres. In cases where centres indicated the same S&T priority for primary and secondary priorities, the secondary priority area was not counted.

Overall, evaluation findings indicate that the Program has been designed and implemented in a manner to achieve intended objectives. The CECR Program has, over the 2008 and 2009 funding cycles, been successful in funding centres that address all of the priority areas. There are indications that the lack of representation of some priority and sub-priority areas is beyond the immediate control of the Program.

2.2 REPRESENTATION AMONG RESEARCH FIELDS

NCE-CECR senior management, PSAB and Expert Panel members were asked to indicate the extent to which they believe the CECR Program is inclusive and representative of the research fields of the three federal granting agencies.

Expert Panel and PSAB members are divided in their assessment of the representation of CIHR, NSERC and SSHRC within the CECR Program. A minority believe that all three agencies are represented and that the Program is fairly balanced.

On the other hand, a majority of NCE senior management (including the representative from SSHRC) believe that SSHRC is less well represented within the CECR Program. Of these respondents, a few argued that the under-representation of the social sciences and humanities is simply a reflection of reality and not a shortcoming of the Program. However, the SSHRC representative interviewed noted that there is a need to change thinking about research and commercialization, both among health and natural sciences and engineering scientists as well as social science researchers, particularly when it comes to including experts in areas such as ethics, business development and business law. Some respondents perceived that there are simply fewer applicants from SSHRC research fields or fewer opportunities for commercialization in these research fields. A few respondents, however, believe that the Program and its selection criteria are biased towards sectors with greater infrastructure, and suggest a need for a greater focus on the humanities and social sciences. They identified a potential need for different funding criteria, or possibly a need to nurture this community's ability to prepare proposals. Finally, one Expert Panel member noted that the Program is over-representative of the health and medical fields, but stated that this is partly attributable to the fact that this is a more mature research sector with better capacity to respond to CECR competitions even though, according to one respondent, the projects are often longer term and higher risk. Finally, a representative from SSHRC interviewed for this evaluation indicated that SSHRC intends to try to stimulate interest in the Program among its researchers.

Senior management interviewed commented that the process is application-driven and is focused on the excellence in the proposal and not necessarily on the area of the research (within the four priority areas). They further stated that the centres must incorporate elements from all three, with the commercialization/business focus and ethics being directly linked to SSHRC. One senior manager commented that the problem is not in how the Program is structured, but how we think about research, noting that the three areas (as represented by the three funding agencies) are not well integrated. This perspective is echoed by the representative from SSHRC.

The file review confirms the view that SSHRC research fields were less represented within the application process and centres funded by the Program's first competition. Table 2.3 presents the findings of the letters of intent and full applications review to assess the representation of research fields of the three federal granting agencies from the 2008 and 2009 competitions in the proposals.

When taken together, the results of the 2008 and 2009 competitions provide an overall assessment of the representation of each agency research fields in the proposals at each stage of the selection process. At the LOI stage, research fields from NSERC make up the majority, followed by CIHR, then SSHRC, with the representation of SSHRC research fields doubling between the 2008 and 2009 competitions. In terms of the percentage of LOIs for both competitions, NSERC research fields are present in three-quarters of the LOIs, CIHR research fields in roughly four out of ten, and SSHRC research fields in approximately one out of five. At the full application stage, research fields from NSERC and CIHR make up the majority in the 2008 competition, with NSERC research fields present in all FAs for the 2009 competition. Overall, NSERC research fields are represented in three out of four FAs, CIHR research fields in roughly one-half, and SSHRC research fields in slightly less than three in ten. In terms of research fields represented in funded centres, research fields from CIHR and NSERC are present in 11 centres each, with SSHRC research fields present in two centres. For the 2008 competition, 10 of the 11 funded centres involve research fields from CIHR, while for the 2009 competition all six funded centres involve research fields from NSERC.

Table 2.3: Agency Research Fields Represented in LOI, FA and Funded Centre for the 2008 and 2009 CECR Program Competitions

Research Field (RF) Represented	Letters of Intent (LOI)			Full Application (FA)			Funded Centres		
	#	% of RF	% of LOI	#	% of RF	% of FA	#	% of RF	% of Centres
2008	(n=110)			(n=25)			(n=11)		
NSERC	78	56	71	15	43	60	5	33	45
CIHR	46	33	42	15	43	60	10	67	91
SSHRC	16	11	15	5	14	20	0	0	0
Sub-total	140*	100		35*	100		15*	100	
2009	(n=34)			(n=15)			(n=6)		
NSERC	32	60	94	15	60	100	6	67	100
CIHR	9	17	26	4	16	27	1	11	17
SSHRC	12	23	35	6	24	40	2	22	33
Sub-total	53*	100		25*	100		9*	100	
2008 & 2009	(N=144)			(N=40)			(N=17)		
NSERC	110	57	76	30	50	75	11	46	65
CIHR	55	28	38	19	32	48	11	46	65
SSHRC	28	15	19	11	18	28	2	8	12
Total	193*	100		60*	100		24*	100	

* **Note:** The total number of research fields represented is larger than the total number of LOIs, FAs and funded centres (n, N) because research fields from more than one granting agency can be present in a single LOI, FA or funded centre.

Based on evaluation findings, it is clear that research areas of CIHR are very well represented among the 17 funded centres, particularly in the 2008 competition. There are indications that Program managers across all three agencies are aware of this and the need to work together towards better integrating research areas associated with SSHRC into the Program. However, although not necessarily indicative of a trend, file review findings show that the representation of SSHRC research fields increased in the 2009 competition.

2.3 ADEQUACY OF PROGRAM RESOURCES

NCE-CECR senior management, PSAB and Expert Panel members were all asked to indicate the extent to which Program resources (human and financial) are adequate to achieve the overall goal of the Program.

In terms of human resources, almost all Expert Panel and PSAB members who commented on the adequacy of human resources stated that the administration of the Program is adequately resourced, and further commented on the “excellent job” staff are doing. Only one Expert Panel member noted that staff appear “frazzled” and overburdened by the end of a funding competition. Similarly, one senior management respondent interviewed indicated that the time frame for a CECR competition is too short, which places a burden on staff. This respondent noted that a regular NCE competition extends over a period of roughly 18 months, while a CECR competition has been completed in closer to eight months. Finally, two PSAB members interviewed suggested a need to increase the number of PSAB members, and one suggested adding a co-chair. They suggested increasing the number of members to lighten the burden and avoid the potential for “burn-out” given that their time is already stretched to capacity. Furthermore, one suggested that a co-chair would be helpful in the event that the chair could not attend a meeting.

There appear to be varying opinions on the adequacy of financial resources available to the CECR Program. Two of three senior managers interviewed argued that the funding to the Program will be insufficient to allow the currently funded centres to continue to be fully operational beyond the five-year grant period. These respondents noted that the Program has received applications from two types of centres to date: commercial research and large scale research. The large-scale research projects require more significant financial resources. These respondents argued that additional financial resources will be required to fund these large-scale projects, or suggest that there may be a need for two funding streams with separate criteria for these different centres.

Three of the six Expert Panel members interviewed felt that there is insufficient emphasis placed on commercialization in the current allocation of resources. One argued that more money should be going to fewer CECRs, with greater emphasis on commercialization and a limit to the amount spent on operating costs. Another suggested a need for greater input from individuals with commercialization expertise. Although the question of resources was not asked specifically of centres, at least one centre did believe that not all centres were sufficiently focused on commercialization (and were more closely linked to research objectives). This issue is discussed later in the report under the section on performance measurement.

The views of key informants reflect on this point, the findings of the file review, which found that of the 17 centres funded to date; 15 indicated a focus on research and commercialization and three indicated a focus on commercialization.

One Expert Panel member interviewed believes that five years of funding will be insufficient and identified a potential need for a second round of funding for some centres. A minority of Expert Panel and PSAB members stated that financial resources are adequate.

Evaluation findings indicate that Program resources are generally adequate. However, the workload on Program managers and staff caused by very tight time lines is likely unsustainable. There is some evidence of a need for the Program to better define the types of centres it funds, with respect to their scale and focus on commercialization versus research.

2.4 SELECTION PROCESS

a) Selection Process and Changes Made

The selection process is a two-stage process involving a letters of intent stage followed by a full application stage. The NCE Secretariat consults with provinces and territories prior to issuing a call for LOIs to identify centres seeking support. Provincial and territorial representatives also review LOIs received from their provinces during stage one. In the second stage, FAs are sent to the Expert Panel who meets with the applicants (centres). Each review panel consists of five to seven individuals focused in a particular area. Their roles are to analyze the strengths and weaknesses of each application. The peer review does not make funding recommendations. Provincial and territorial representatives are consulted following receipt of completed full applications, to identify provincial priorities and obtain views on the project proposal(s) from the relevant provinces.

Senior Program management interviewed noted that tools were refined for the second funding competition but the process remained essentially unchanged. Changes to the selection process between the 2008 and 2009 CECR competitions were made to increase the emphasis on information and communication technologies, and environmental science and technologies. To increase the emphasis in these priority areas, two individuals with expertise in these areas were added to the PSAB, and rating questions were added to better assess alignment with the priority areas. As well, an evaluation grid was developed to augment the rating template to include a rationale or explanation for a given rating. This contributed towards an increased standardization of the process across Expert Panels.

The definition of commercialization used in the CECR Program's Funding Agreement changed between the 2008 competition and the 2009 competition. For the 2008 competition, the funding agreements defined commercialization as "the series of activities to manufacture, distribute and sell."¹⁴ For the 2009

¹⁴ CECR Funding Agreement 2008-2013, Version – March 2008, p. 4.

competition, the funding agreement defines commercialization as “the series of activities to transform knowledge and/or technology into new goods, processes or services to satisfy market demands.”¹⁵ Here, it should be noted that the 2009 definition aligns with the definition used by the Expert Panel on Commercialization.¹⁶

PSAB members interviewed noted that one change in the selection process from 2008 to 2009 simply involved an increased level of experience and comfort of members with the review process. As well, one PSAB member interviewed noted that proposals are now short-listed to manage volumes, and that members are trying to read more proposals to provide greater context for the rating of proposals specifically assigned to them. Another noted that formulas have been introduced or adjusted to increase consistency in scoring from one member to another. Expert Panel members interviewed were not aware of any changes to the selection process, or at least did not believe that any changes had been made which affect them.

Four provincial government representatives were interviewed as part of the evaluation. Provincial representatives were asked to describe how their government was consulted by the CECR Program during the selection process, to comment on their satisfaction with the process and to suggest any potential changes or improvements.

In terms of consultation, one provincial representative reported never having had an opportunity for any input during the first competition, and a second representative reported being given one week to provide feedback during the full application stage (well after the initial LOIs were submitted). In the second competition, provinces were invited to provide feedback at the LOI stage. All representatives were dissatisfied with the extent of provincial consultation during the selection process. In general, these representatives felt that the consultation occurred too late in the selection process (i.e., provinces were reviewing full applications) and that provinces were not given sufficient time for a thorough review of the applications. In the future, provincial representatives expressed an interest in seeing provinces engaged earlier in the process and in a more structured fashion. They expressed an interest in being involved during LOI preparation. For example, they suggested that provinces could support the development of the LOI, or that they be informed of the nature of the proposal to offer them a chance to put their own support behind the proposal if it matches one of their own strategic priority areas. One also suggested that there should be more feedback provided on decisions (to potentially assist projects in getting to the next level in subsequent competitions).

The evidence indicates that the Program continues to refine the selection process as required. However, there are strong indications that the Program has not adequately engaged the provinces.

¹⁵ CECR Funding Agreement 2009-2014, Version – December 2008.

¹⁶ People and Excellence: The Heart of Successful Commercialization, Volume 1: Final Report of the Expert Panel on Commercialization. Industry Canada. 2006, p.5 The report defines commercialization as “everything a firm does that transforms knowledge and technology into new goods, processes or services to satisfy market demands.”

b) Satisfaction with the Selection Process

PSAB and Expert Panel members interviewed expressed a high level of satisfaction with the selection process. Expert Panel members noted that the diversity of panellists is excellent, and that a good rating system is provided and explained. Panel members indicated that they have the information needed to produce assessments of proposals. Individual respondents described the process as “rigorous,” “fair,” “transparent” and as “exceeding expectations.” PSAB members noted that their recommendations are generally followed, and expressed an increasing level of comfort with the review process. The two-stage process, and the involvement of high calibre external expert reviewers, was cited as a best practice of the Program. Having an experienced chair was noted as a further benefit during the selection process.

NCE-CECR senior management, PSAB and Expert Panel members were all asked to suggest potential improvements to the selection process. A few interview respondents across the Expert Panel, PSAB and senior management categories suggested that applicants be given more time and/or greater clarification of selection criteria to assist in the development of quality proposals. A few Expert Panel members interviewed suggested providing some follow-up information to the panel on the recommendations made by PSAB and decisions made by the NCE Steering Committee (e.g., to let them know which centres were approved and why). One panel member suggested adding a category for individual analysis or opinion as to the potential success of a centre, and another suggested that more information on the government’s purpose and agenda for the CECR Program be provided. Furthermore, one PSAB member and a few senior management representatives suggested finding ways to lighten the work load for PSAB members, possibly by increasing the number of members. Finally, one senior management respondent suggested speeding up the announcement of funding to expedite the incorporation process, as this would facilitate quicker implementation of funded centres.

Most representatives from centre management interviewed generally expressed high overall satisfaction with the selection process, stating that it “worked well,” or was “fine.” The primary complaint of CECRs interviewed concerns the time lines surrounding the process. A minority found the time lines too short or tight. A few commented that it took time to put together a LOI or FA and, in the case of the LOI, a few stated that this was difficult to accomplish during the summer months. Not surprisingly, most suggestions for improvements to the selection process made by CECRs focus on extending time lines for the proposal process. One CECR staff member also suggested making the process completely electronic, while another staff member suggested increasing the focus on commercialization (as opposed to a shared focus on both commercialization and research).

Centre management also expressed satisfaction with the feedback received on proposals, describing the feedback as “good,” “accurate,” “focussed” and “useful.” A few also commented on the value of the in-person review meeting, finding this process to be useful and constructive.

65 Unfunded applicants interviewed expressed mixed views with respect to the selection process. A minority felt that the process was clear and were reasonably satisfied. A minority felt that there was some confusion as to whether they met the selection criteria for the Program or not (and whether they would in

fact be seriously considered as a potential centre). These applicants expressed a high level of frustration with the process upon the realization that they would never be funded under the existing process. In one respondent's words, "we didn't stand a chance." Two respondents in particular stated that their centre did not have sufficient ties to academia or research to be successful, and that this was not clear from the criteria (although it is not clear if they had been specifically told their ties to academia were insufficient, or if they formed this impression based on the outcome and their observations of which centres received funding). One further expressed the sense that the Expert Panel did not understand their sector (energy and the environment), and the other noted that "the Panel was heavily slanted towards researchers." One expressed dissatisfaction that the Program was focusing on approaches already funded in the past which have proven not to be successful in terms of commercialization (i.e., university research centres), and was unwilling to try new, untested or novel approaches. Finally, one respondent indicated that the timing of the LOI process was "tight" or "compressed" and occurred during the summer months, and too little time was given during the in-person presentation component of the FA process to respond to questions regarding their application.

Most unfunded applicants expressed satisfaction with the level of detail in the feedback received on their applications, although some were again frustrated that this was negative. Only one expressed strong dissatisfaction, although this was based on the fact that this feedback clearly indicated that the Program was supporting academic ventures rather than industrial commercialization.

Unfunded applicants provided some suggestions for improvement to the process, including a need to more clearly define what the Program means by commercialization (which is thought to be based on a pharmaceutical or health model). Two applicants suggested that the process needs to include more of an industry perspective rather than academic perspective, with measures more focused on commercialization rather than research. Another suggests that each S&T sector should be considered differently or separately, as a peer review panel will not feel confident in recommending something outside their spheres of experience.

Overall, there is a high level of satisfaction with the selection process. Although there were suggestions for improvements made, no one, with the exception of a minority of unsuccessful applicants, questioned the funding decisions made.

2.5 CHALLENGES TO IMPLEMENTATION

Senior CECR-NCE management interviewed were asked to identify challenges encountered with the implementation of the Program to date. Time lines are identified as the primary challenge to implementation. In particular, the challenges relating to time lines involved in the funding competition include:

- ***Difficulties coordinating experts:*** Each competition involves the mobilization of busy international experts who have demanding schedules which are difficult to coordinate, particularly given that the same individuals review proposals for more than one program.

- ***Pressure on applicants:*** Applicants have a relatively short time frame in which to complete a proposal.
- ***Pressure on staff:*** The short time frames also place pressure and stress on CECR Program staff.

Another challenge identified with respect to implementation of the Program by senior management involves the lack of permanency of the CECR Program. This lack of permanency is perceived to create instability and a concern that key CECR staff might leave prior to the completion of the five year funding window.

One senior manager also suggested that the time frame CECRs have been given to achieve sustainability may not be sufficient for all centres to succeed in becoming self-sufficient (particularly those which were not established prior to the Program).

3. EARLY PROGRESS TOWARD INTENDED OUTCOMES

This section presents the evaluation findings related to early progress toward intended Program outcomes. It should be reiterated that this is a formative evaluation of the Program, and thus a full assessment of outcomes is not feasible. Rather, this study examines available evidence of early progress toward the immediate outcomes of the Program. This section also examines the effectiveness of Program advice and direction provided to the centres, Expert Panels and PSAB, presents findings with respect to lessons learned and best practices, implementation challenges faced by centres, and identifies potential improvements for the Program.

3.1 EARLY PROGRESS OF THE CECR PROGRAM TOWARD INTENDED OUTCOMES

Almost all senior program management indicated that there has been progress toward intended outcomes such as having industry very involved and engaged in some centres. Centres are perceived to be working diligently in increasing their partnerships with industry and other organizations (e.g., research centres, academic institutions). Senior management perceived the centres to be moving forward in terms of processes and the Program has enhanced capacity in the sense that researchers and industry are now working together more collaboratively toward commercialization objectives. While partners have been identified, senior managers also cautioned that attracting investment may prove more challenging for some centres, given the current poor state of the economy. Additionally, time lines for health-focused centres were noted to be a potential challenge as research and commercialization in the health sector tends to have very long time horizons, extending beyond the five-year funding from the CECR Program.

Most provincial government representatives generally agree that the CECR Program is enhancing research capacity by providing much-needed operational funding for centres; however, they note that commercialization capacity is more challenging to enhance and can depend on the project. For example, one provincial representative articulated that the CECR Program is strong in terms of potential to contribute to research capacity, but perhaps weaker in terms of potential contribution to commercialization, with the latter being extremely difficult to do. Here, the interviewee noted that “everyone is talking about this [commercialization], but no one is doing it really well.”

Available evidence indicates that provincial involvement in CECRs is mixed (as applications submitted from some provinces were not selected to receive Program funding). According to one provincial government representative, provincial funding has gone to some centres located in the province that are consistent with the province’s science and technology priorities, while other centres funded by the CECR

Program have not received any provincial funding. Another provincial representative, in a region with unsuccessful applicants, indicated that provincial funding was not made available to the applicants due to limited provincial funding.

The current status of investment attraction for unfunded applicants is mixed. A few indicate they have attracted sufficient investment to continue along the path to reach their objectives by either maintaining their current funding levels and attracting paying users to their centres, or having attracted other investments mainly through local and foreign synergistic relationships for partnership development, investment and talent sharing. The majority of unfunded applicants indicate that no additional investment has been attracted at this point, and that they are maintaining the project while they continue to attempt to secure funding.

3.2 PROGRAM ADVICE AND DIRECTION

a) Nature of Program Advice and Direction

A review of CECR Program documentation identified a selection of resources relating to the advice and direction provided by the CECR Program to applicants and funded centres, including:

- The CECR Program Guide provides background information for the CECR Program; application requirements and review process; selection criteria; administration; management; use of NCE funds; monitoring and guidance; the conflict of interest and policy framework; and the *Access to Information Act* and the *Privacy Act*.
- The NCE Secretariat has developed a section of its bilingual Web site with information on existing centres, competitions and the application process, including the results of that process, publications (i.e., annual reports, newsletters), backgrounders, questions and answers on the CECR Program, and event information.¹⁷
- Information is provided with regard to submitting LOIs and FAs for the CECR Program, including questions and answers on the selection process.
- A detailed LOI guide and a FA guide are made available to prospective applicants. The guides provide a summary of the CECR Program, the competition process including dates and milestones, guidelines for completing the submission (i.e., deadline, number of copies), and a checklist of all the materials required.
- Questions and Answers on eligibility, budget, eligible expenses and selection criteria, as well as additional information for prospective applicants on acquiring a personal identification number (PIN) number for the LOI application, letters of support and funding/budget requirement for the LOI submission.

¹⁷ http://www.nce.gc.ca/cecrs_e.htm

According to NCE-CECR senior management, the role of Program staff is largely to facilitate the success of the funded centres. Program staff administer the CECR Program grants and have observer status on the Board of Directors of centres to provide information and clarification to the Board regarding the Program. The nature of advice and direction provided by Program staff to the Boards and centre staff includes assistance in connecting individuals, aiding in the accountability of centres in terms of eligible expenditures and outcome achievement, and being available for questions when required. The Program has also implemented a system of annual reporting, as well as sessions at the NCE Program's Annual General Meeting to bring together centre management to share concerns and best practices.

Representatives from most centres indicate that the nature of advice and direction has been helpful and focused primarily on operational and accountability issues related to expenditures, reporting requirements and information sharing (such as clarifying aspects of the agreement or arranging CECR meetings). A few centres mention that the CECR staff are fairly "hands off," or that they have had minimal contact to date. One centre suggested that CECR Program staff appears to be busy or under resourced and, as a result, are delayed in answering questions at times. Conversely, a few other centres stated that they are very pleased with the availability of their CECR Program representative, and stressed the importance of the continuity of a single contact.

Almost all PSAB felt they were provided with abundant advice and direction from Program staff, primarily during the initial phase of the Program, regarding the objectives, guidelines, selection process and criteria of the Program. This direction was provided face-to-face, as well as through written material. After this orientation, the PSAB worked with Program staff to clarify interpretations of the objectives and application criteria, and were directed to consider the variety of industries under the scope of the Program while recommending those applicants who demonstrate "excellence" and may have the best chance of success in meeting the objectives of the Program. Other discussions between the PSAB and the Program included strategies to evaluate the large number (110) of LOIs as well as background material on the applicants provided by Program staff. Most Expert Panel members indicate that they were provided comprehensive written guidelines and information on the Program, along with the opportunity for further discussion among the panel the evening prior to a review.

Overall, evidence indicates that CECR Program staff are providing appropriate and effective advice and direction to most centres, PSAB and Expert Panels. Where centre management have expressed frustration or disappointment, it appears to be largely the result of staff turnover in the CECR Program. In addition, the speed with which the Program was developed and implemented has meant that Program staff have not always been able to respond to questions posed by centres quickly and consistently.

b) Satisfaction with Program Advice and Direction and Suggestions for Improvement

Of the centres that have had more experience and contact with Program staff, the relationship was described as good to excellent. A majority of centres indicate that the Program has provided helpful advice during the first year of implementation. Having a Program representative act as an observer on their centre's Board of Directors, along with the option of the centres to attend NCE annual general meetings was also reported to be beneficial. Other centres suggested problems such as confusion due to Program staff turnover or little engagement by Program staff to date as reasons for dissatisfaction with advice or direction provided by the Program. Representatives from a few centres noted that there were initially mixed messages from Program representatives about the meaning of the research and commercialization objectives of the Program (e.g., acceptable activities and expenditures for research and commercialization). Related to this, a few interviewees indicated that the Program should provide greater clarity and guidance on commercialization versus research goals of the Program, to better define and support the activities of the centres.

Senior NCE-CECR managers noted that improvements to the advice and direction provided to the centres are constrained by the limited availability of resources. Still, one notable area where the Program could enhance its contribution to the effectiveness of the centre would be to enhance the interaction among the centres to network, and share information, ideas and best practices.

Expert Panel members and the PSAB echo the general satisfaction with the advice and direction provided by the Program staff. Overall, PSAB members feel that the advice and direction is a two-way activity, especially during this relatively early stage of the Program. Members of PSAB indicate that they were both receiving instructions and clarifications regarding the Program's objectives and criteria, as well as having the opportunity to communicate methods to Program staff that would improve the process to evaluate and recommend full applications for funding (section 2.4). While most Expert Panel members were satisfied with the communication from the Program, this group had comparatively more suggestions for improvement, including a more thorough initial orientation process for Panel members to the Program, improved direction to the applicants regarding what is expected of them during the Expert Panel review, and ensure that panel chairs have more experience and understanding of the CECR Program's review process.

3.3 CENTRE CONTRIBUTIONS TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Research and commercialization outcomes of the CECR Program were discussed in a preliminary way for this formative evaluation. Although it is early in the implementation of most centres, there are some indications of progress being made. The annual reports to be submitted by the centres in August 2009 will likely provide a stronger indication of progress towards objectives for each centre. There

are, however, indications of ongoing confusion with respect to the emphasis of the Program on commercialization versus research.

Overall, the majority of key informants feel it is too early to measure many of the intended outcomes, given that the centres only received their funding in April 2008. While the initial focus of the centres has been on establishing the organization, there are some early indications of progress toward both research and commercialization outcomes. For example, most centres identify success in efforts made to enhance capacity by developing partnerships to bring together existing infrastructure. Results of these partnerships include examining research projects earlier during their development to assess commercialization potential and consider how research results can be taken to the market. Centres conclude that bringing together more relevant players creates more promising projects and aids capacity for investment and commercialization. As an interviewee from one centre identified, the Program helps to “move projects along the discovery chain, ultimately bringing discoveries to market.”

In addition to capacity, there are examples of centres enabling the attraction of research and commercialization talent to Canada. On this point, most centre managers believe the enhanced profile and success of their centre (and its projects and partner affiliations) will strengthen recruitment efforts. It is important to note that success in attracting commercialization and research talent will vary by centre type and priority areas. For example, a few interviewees indicated that their centres are focused primarily on commercialization with less need for attracting research talent at this point, while others state that their centres’ commercialization projects have not yet reached a stage of maturity to require top commercialization or business talent. With regard to providing high quality postgraduate and postdoctoral training opportunities, most centres reiterate that it is too early in the Program to provide much evidence of progress.

Evidence of the centres’ ability to attract investment is again varied. While interviewees from one centre indicate that by design they have no focus on venture capital, respondents from another indicate that they are attracting investment by leveraging CECR and partner funding dollars from foreign sources. Their focus is on attracting investors who are interested in helping to grow companies. Key informants from another centre stated that they are having discussions with venture capital companies, but that this type of investment is not a quick process as their research continues through various stages of development.

a) Centre Research Activities Contributing to Program Research Outcomes

While a few of the funded centres are focused strictly on commercialization objectives, other centres provided examples of activities and achievements that will contribute to the Program’s immediate outcomes related to research. Table 3.1 presents some selected examples of centre activities that are contributing, or will contribute to the Program’s immediate outcomes related to research.

Table 3.1: Centre Activities Contributing to CECR Program's Immediate Outcomes for Research

CECR Program Immediate Outcomes for Research	CECR Centre Activities
Enhance capacity by bringing together existing research strength, infrastructure, networks and funding	<p>CDRD: The Centre is a joint initiative among four universities and two health authorities (including two teaching hospitals). The Centre will validate therapeutic discoveries for commercial potential.</p> <p>PC-TRIADD: The Centre is a research group (UBC Centre of Excellence) comprised of well-known, internationally recognized researchers, which in the past year has had significant success in attracting research dollars (e.g., \$9 million commitment from Pfizer over three years and a new partnership with Astra Zeneca). The Centre is effectively networked with Academic Research and Development Centres, and U.S. National Institutes of Health prostate cancer research programs. The CECR will capitalize on the Prostate Centre's discovery pipeline and provide management of translational research from discovery to clinical research.</p> <p>PREVENT: This Centre has created an infrastructure of vaccine specialists across three organizations – VIDO/InterVac at the University of Saskatchewan, the BC Centre for Disease Control and the Canadian Centre for Vaccinology in Halifax. The pooled expertise of the Centre will address the CECR Program's research objectives through developmental research (preclinical and early clinical trials) of vaccine discoveries with a view to meeting public health priorities.</p> <p>PROOF: The Centre is building on the Genome Canada-funded Biomarkers in Transplantation (BiT) initiative. The CECR is undertaking pan-Canadian trials of the BiT. According to its business plan, this research will implement the discovery, validation and qualification of blood biomarkers for monitoring patients with a heart, kidney or liver transplant. The Centre has undertaken discussion with the Food and Drug Administration (FDA) in the United States to support this work.</p>
Attract top research talent (including postgraduate and postdoctoral students) from around the world	<p>BIC: The Centre has attracted top research talent, including internationally renowned scientists, to participate and/or partner with the work of the CECR.</p> <p>CDRD: The profile and reputation of the CDRD facilitated recruitment of extremely talented and well-regarded leaders and investigators. Six postdoctoral candidates have been hired, including three international candidates.</p> <p>CPDC: The Centre has attracted research talent, including two researchers from the U.S., and a number of new partnerships have been developed that have brought leading edge equipment and technology to Canada.</p>
Provide high quality postgraduate and postdoctoral training in innovative and internationally competitive research	<p>CDPC: There are six students (graduate and postdoctoral) being trained.</p> <p>CDRD: The (new) Pfizer Innovation Fund was established, and with leveraged funding from CIHR (training grant), the Centre has funded positions for 28 co-op students and is further developing a full-scale training program and seminar series.</p> <p>PREVENT: The Centre is developing an internship program for student trainees from the School of Public Health and Graduate Program in Vaccinology and Immunotherapeutics at the University of Saskatchewan.</p> <p>PROOF: The Centre has leveraged partner funding to hire two postdoctoral fellows and two graduate students in computational biology.</p>

b) Centre Activities Contributing to Program Commercialization Outcomes

As with research outcomes, some commercialization outcomes are expected to occur in the longer-term; however, there is some evidence of centre activities that will contribute to the Program's immediate outcomes related to commercialization. Table 3.2 provides some selected examples of centre activities that are contributing, or will contribute, to the Program's commercialization outcomes.

Table 3.2: Centre Activities Contributing to CECR Program's Immediate Outcomes for Commercialization

CECR Program Immediate Outcomes for Commercialization	CECR Centre Activities
<p>Enhance capacity by bringing together existing commercialization strength, infrastructure, networks and funding sources</p>	<p>BIC: The Centre has been involved in a number of large-scale projects (e.g., commercialization of biofuels) and small-scale projects (e.g., producing a plastic cup holder with a biological product-component).</p> <p>CDRD: The Centre has developed or expanded relationships with the business community, including large pharmaceutical companies such as Pfizer and Astra Zeneca.</p> <p>IRICoR: Four commercialization projects have been selected for development through the discovery chain. One project is a candidate for a preclinical trial; a second is moving towards clinical trial; and the remaining two are much earlier in the development/discovery chain.</p> <p>CEPMed: This Centre is coordinating several organizations within the University of Montreal for the purposes of partnership, investment and commercialization.</p> <p>CCR: Commercialization capacity is being enhanced through partnerships with: 1) University of Waterloo Accelerator Group to provide entrepreneurs with services and an assessment of their needs; 2) Queen's University, including programs such as First Job for new graduates; and 3) an Imbedded Coach program (where a seasoned entrepreneur is placed with a new venture); 4) partnership with OMERS (pension fund for municipal employees) to provide them with guidance on investment opportunities.</p> <p>PREVENT: A call for proposals to university investigators and biotechnology companies is yielding some promising potential vaccine candidates. The focus of the Centre is on "early wins" (e.g., animal vaccines that have a shorter commercialization process/regulatory pathway).</p> <p>PROOF: Following a call for proposals (as well as unsolicited opportunities), the Centre has identified three commercialization project proposals in the area of diagnostics that will move forward with support from the Centre.</p>

CECR Program Immediate Outcomes for Commercialization	CECR Centre Activities
Attract and retain top commercialization talent (including internationally recognized business leaders) to Canada	<p>CDRD: The Centre has hired qualified staff experienced in commercialization to mentor individual investigators.</p> <p>CPDC: The Centre has filled a commercialization position and is looking to recruit internationally for additional commercialization talent.</p> <p>PROOF: Commercialization experience (including venture capital) is represented on the Board of Directors and committees to inform and facilitate decisions about the development of diagnostic technologies.</p>
Attract investment (including foreign direct investment and venture capital)	<p>BIC: The Centre has secured \$10 million in matching funds from the Ontario government.</p> <p>CPDC: The CPDC has secured two commercial contracts from foreign companies to invest in the Centre. Investment contracts have also been signed and funding has begun.</p> <p>CEPMed: The Centre is working to attract pharmaceutical companies as partners and to co-fund projects. To date, two partners/companies have invested in research/commercialization projects.</p> <p>MI has acquired 38 disclosures to date and three commercialization agreements attributed to the CECR. Matching funds committed by the members are in place.</p> <p>PC-TRIADD: The Centre has established two significant investment partnerships with large pharmaceutical companies.</p>

3.4 LESSONS LEARNED AND BEST PRACTICES

Key informants from the CECRs and NCE-CECR senior managers were asked to identify best practices or lessons learned that have emerged from the implementation of the centres that have been funded to date and, related to this, factors that facilitate or hinder success. While early in the grant for the centres, there were a number of notable factors of success related to the start-up and initial operation of the centres. As the centres move forward with the implementation of their corporate plans, there will undoubtedly be additional lessons learned on the commercialization process.

The most commonly mentioned factors for success, according to NCE-CECR senior management and CECR interviewees, include:

- ***Strong Board of Directors, committee members, and staff.*** A majority of centres identified the leadership and staff within their organizations as a critical factor of success. Boards of Directors were variously described as “prestigious,” “passionate,” “senior, high level” and “having a track record.” The centres gain in terms of building visibility and support for the organization and leveraging the expertise and recognition of leaders to forge strategic partnerships. A few key informants noted that their Boards and committees feature multi-sectoral representation, including members with business investment/venture capital knowledge and experience. This is a benefit in enriching the expertise of the centre, particularly with respect to commercialization and outreach to various sectors.

- ***Sound administrative structure.*** Creating an effective core administrative structure (i.e., the management team and administrative and financial management processes) has been an important focus of centres during their first year of operation and was noted by about half of the centres as a foundation for future success. For example, strong governance practices and principles, financial controls and a human resources strategy were viewed as important requisites for smooth and effective operation of the centres. Supporting procedures (e.g., reporting to the Board, standardization of Board meetings, identifying economies of scale with CECRs linked to a common host) were also mentioned by a few respondents as helpful. Finally, for a few centres, establishing a commercialization advisory committee – a body responsible for reviewing and recommending which commercialization projects move forward – was viewed as a key milestone important to the future success of the centre.
- ***Partnerships.*** Partnerships were identified by a majority of centres as an important element of success for CECRs. The centres have established various partnerships with, for example, research centres, industry, the financial community, other CECRs and academia. Partner support and investments were noted as a likely determinant of the long-term sustainability of the CECRs.
- ***Existing team/infrastructure.*** A minority of the centres reportedly derived benefit from a team or infrastructure that was in place prior to the CECR funding, or having ready access to a host or partner organization with a related track record and expertise. Having a core team or some of the required administrative elements in place enabled these centres to move quickly from operational start-up to implementation.
- ***Communications/outreach.*** A few comments from CECR managers highlighted the importance of efforts in the area of communications and outreach – generating awareness of and support for the centre among various constituencies such as industry, government, academia and the broader community. Examples of initiatives include Town Hall meetings, Web sites, presentations at various forums and conferences, and formal and informal networking.

3.5 IMPLEMENTATION CHALLENGES

Overall, centre managers stated that the activities of their CECR during the first year have generally been implemented according to their full application and initial corporate plan. A minority noted that their progress has been somewhat slower initially than anticipated due to the intensity of work in defining their vision or mission, developing an effective business model to achieve intended results and establishing the administrative structure of the organization.

Key informants from the funded centres and NCE-CECR senior managers identified a number of specific implementation challenges encountered by centres during their first year of operation. A number of themes emerged, including:

- ***NCE funding agreement.*** Negotiating the funding agreement between the centre and the NCE was noted by about half of the centres as a challenge. At least some of the difficulties stemmed from the organizational complexity of the centres – involving the newly created incorporated non-profit, a host (academic) institution and (possibly) multiple partners to the agreement. A few interviewees noted that some aspects of the language of the agreement were problematic, specifically requiring modification to fit the more business-oriented model of the CECRs (examples include the language of the agreement with respect to definition of “members” of a corporation, requiring an identified Chair of the Board of Directors in the application [though in a corporation a chair cannot be named until after the board has had its first meeting] and the structure of committees specified in the funding agreement that does not translate well to a business environment). Thus, finalizing their agreement with the NCE has been a time-consuming process for some.
- ***Clarifying the centre’s role:*** With the compressed time line available to prepare a funding application, the first year of operation for the majority of centres involved work toward defining a vision or mission, and developing an effective business model to achieve intended results. For some CECRs, the process of clarifying the centre’s role was complicated by the need to reach a commonly defined and shared vision among multiple partners/organizations involved in the centre and the need to achieve a fit with the CECR Program objectives.
- ***Relationship with host institution.*** About half of the CECRs had experienced challenges in their relationship with their host institution. For most of these centres, these challenges were largely administrative difficulties that stemmed from establishing a funding arrangement that is both operationally workable and within the guidelines of the CECR funding agreement.
- ***Shifting to a commercialization focus.*** About half of the CECRs commented on the challenges of marrying the research/academic culture with the business objectives of the CECRs. According to these key informants, some academics with the CECR (host institution, leadership and staff) have found the business orientation to be somewhat foreign.
- ***Leadership/staffing.*** About half of the centres experienced a challenge in securing “transformative leadership” to steer a new and unique organization. The blending of research and commercialization objectives of the centres requires an unusual combination of entrepreneurial/business and science and technology skills and experience for their management. A small number noted that the five-year time frame of the Program creates an added barrier in staffing due to lack of stability of the organization and the positions. Populating CECR committees was similarly challenging for a minority of centres seeking busy experts from a limited pool in highly technical fields.

Key informants from the centres were asked about any issues they may have experienced related to securing matching funding from government and the private sector, or the implementation of intellectual property agreements. As mentioned, the majority of the CECRs did not view the matching funding criterion as problematic, and one centre is targeting to leverage these funds threefold. With respect

to IP, the situation is less clear. Of those who were probed specifically about the issue, a majority had not yet advanced to a stage where management of IP agreements is an issue. A prevailing view seemed to be a recognition that IP management will be complex and will require a high degree of flexibility on the part of the centre (i.e., negotiated on a case-by-case basis). The complexity of IP derives, at least in part, from the multiple players likely to be involved, including: centre, inventor, host institution, partner institutions and receptor(s). For some centres, the expertise of the host institution's University-Industry Liaison Office or similar has been useful in developing IP agreements with researchers at the host institution (though the expectation was that IP agreements will need to be negotiated with each university or other partner organization individually).

While most CECRs indicate that implementation of their centres has generally unfolded as intended in the first year (albeit with some delays), a common concern for most centres is the ability to become self-sufficient by the end of the five-year funding period of the CECR Program grant. While the majority of the CECRs have secured, or will secure, funds to match CECR funding, the five-year CECR Program grant funding horizon and the prospect of achieving full sustainability at the end of the funding agreement remain a critical issue. It should be noted that none of the centres indicated that they would close down at the end of the five years; however, a minority specifically indicated that they would not be operating at the same level as they are currently. Thus they will continue to operate, but operations likely cannot be sustained at their current levels. While a few CECRs noted that they are focusing efforts on "early wins," the commercialization process can be lengthy. Further, informants' perceptions are that the current investment environment has become more challenging (due to the economic downturn among other factors, such as difficulty acquiring funding for therapeutic or translational research). Thus, there was some feeling that the time frame for funding CECRs could be extended, or that the centres could be eligible for subsequent funding based on results.

Also related to the issue of sustainability of centres over the long term is the question of what factors facilitate success with respect to sustainability. As noted in section 2.1, a few PSAB and Expert Panel members questioned whether it was reasonable to expect that all centres funded will be sustainable, let alone sustainable within five years. Finally, a minority of PSAB and Expert Panel members noted that a final evaluation will provide better insight into what factors facilitate the success and longer-term sustainability of CECRs.

3.6 CECR PROGRAM IMPROVEMENT

A number of suggested improvements have been noted previously in other sections (e.g., with respect to the selection process and the advice and guidance provided by the Program). This section summarizes key informants' (including NCE-CECR senior managers, centre management, provincial representatives, advisory panel members and unfunded applicants) suggested changes to the Program to improve progress toward expected outcomes.

In general, there were many comments from key informants across the different respondent groups about their general support for the Program. These interviewees noted that operational funding (as

opposed to infrastructure funding) had been a significant gap in the research and development funding landscape prior to the CECR Program. The CECR Program was described, for example, as a “necessary program” and “a complement to CFI funding.”

In terms of potential changes to the Program, there were few common themes in the respondent comments. Areas where there was some convergence of opinion included:

- ***Increase focus on commercialization.*** There were a few comments from centres themselves, as well as senior management and unfunded applicants to clarify and intensify the focus of the Program on commercialization. This includes clarifying the intentions of the Program and how resources are utilized with respect to commercialization, as well as ensuring that the commercialization focus is well captured in the metrics by which centres’ success is measured and in the composition of the Expert Panel.
- ***Extend time frame.*** Consistent with the challenges noted previously in implementation of the centres, several centres felt that the Program would benefit from extending the time frame beyond five years or, alternatively, allowing centres a period of time for start up, not counted within the five-year limit (e.g., a year zero).
- ***Outreach and communications.*** There were a number of suggestions falling under a more general category of outreach and communications. A few of the centres, as well as senior management felt the Program and the centres would benefit from increased communications among the CECRs to share objectives and activities, and find areas of complementarity. A related benefit of this would be sharing of best practices and lessons learned with new CECRs and possibly mentoring of new CECRs. A small number of interviewees requested clarification of the Program’s communications policy, including reconsideration of the requirement for the Annual Report to be in both official languages, and ensuring the language of the Program’s policies, agreements and communications reflect the business environment. Finally, there was a suggestion for the Program to promote the CECR Program and the centres more broadly to industry and other relevant federal departments and agencies to better facilitate partnership development.
- ***Flexibility/advice on incorporation/relationship with host.*** There were a few centres who felt the Program should review the current organizational requirements for funding (e.g., host institution, incorporated non-profit organization). These respondents felt there would be efficiency gains if these requirements were removed or made more flexible. Related to this, several suggested that the Program and the centres should both come to a clearer understanding of the legal ramifications of the CECR program’s policies on structuring the centres and the centre-host institution relationship.
- ***Ongoing Monitoring.*** Advisory board members indicate that incremental changes have been made as the Program has moved along, but look forward to reports on the progress and outcomes of the funded centres. Some members of both the PSAB and Expert Panel believe that this information can be used to determine if results are in line with expectations and to

consider what elements of applications are good indicators of the future success of a centre. Once centres are funded, a few Expert Panel members identified the need to affirm that centres are not hindered by administrative processes, such as that only a portion of the budget should be used to cover operating costs and that reporting requirements should be streamlined while still ensuring accountability.

- ***Address over-focus on health.*** A few interviewees from various respondent groups felt the Program has focused too heavily on funding centres operating in health and pharmaceuticals in the first competition. For example, some unfunded applicants believe the current program criteria support models used in the health sector along with re-enforcing “university technology transfer agendas.” Some unfunded applicants state that the interview panel should consist of more experts in their industry and technology because “based on one’s background, the Program can be interpreted differently.” Without these experts, applicants felt that they were being graded on structured criteria geared to other industries rather than an understanding of the commercial implications of their particular projects.

4. PERFORMANCE MEASUREMENT AND RISK MANAGEMENT

This chapter addresses evaluation issues related to the CECR Program's performance measurement strategy, the risk management plan and evidence of new, emerging or unforeseen risks.

4.1 PERFORMANCE MEASUREMENT

As one of the requirements of the CECR Program grant, each centre must provide to the NCE Secretariat an annual report of its operations during the previous fiscal year, which is approved by its Board, in both official languages, and submitted within four months of its financial year-end.¹⁸ All centres must submit an annual report discussing the accomplishments and planning that has taken place over the past year of the grant. The annual report is to include lists of centre participants, statement of expenditures, statistical tables, Financial Statements of Accounts (including partner contributions) and a conflict of interest report. The annual report is also expected to describe a centre's progress and provide evidence and results of activities proposed in each centre's corporate plan, as well as discuss issues and opportunities encountered while aiming to contribute to the expected commercialization and research outcomes of the CECR Program.

NCE-CECR senior managers and key informants from the CECRs were asked to comment on the nature and extent of ongoing performance measurement systems, performance reporting templates and data, and to suggest potential improvements. NCE-CECR senior managers explained that annual report templates have been developed to align with the reporting requirements already being used by the NCE and shared with centres, but have not yet been completed and submitted by the centres, making it difficult to comment on their overall effectiveness and efficiency. CECRs will submit their annual reports for the 2008-2009 fiscal year by August 2009.

NCE-CECR senior managers did explain, however, that the current performance measurement approach requires each funded CECR to submit an annual report with tables that track centre performance and use indicators that are linked to each corporate plan as a way to measure success. In particular, centres are required to report on common activities and outputs, describe centre contributions to the Program's expected outcomes, and may also report on unique activities and outputs. While different indicators by each centre will make it much more difficult to aggregate the Program's results, the performance measurement system reflects the uniqueness of each centre and also encourages the centres

¹⁸ CECR Funding Agreement, Version – December 2008.

to continue to measure their own accomplishments as they progress. NCE-CECR senior managers also explained that they expect the reporting process to be refined and adjusted as the centres advance in their mandate, and as the Program itself determines the best way to evaluate, analyse and assess performance. It should be noted that the centres selected for funding were selected, in part, because their objectives as described in their proposals align with the objectives of the Program. As such, one would anticipate that the achievement of centre objectives will directly contribute to the achievement of the Program objectives. However, the extent to which this is true will only become evident once centres provide reports. Given that centre staff interviewed had varied perspectives on how success should be measured, and the lack of clarity surrounding what is meant by “commercialization,” we anticipate that the linking of the achievement of centre objectives and Program objectives may be a challenge.

Most of the key informants from the CECRs had not yet completed the annual report performance templates at the time of the interviews, however, a majority of the respondents identified key types of information they felt would be relevant in demonstrating their CECRs performance or progress toward the achievement of centre objectives. A few interviewees also made suggestions on ways to improve the annual reporting guidelines and tables, and to make them more effective and efficient for monitoring performance. It should be noted that all of the reporting elements suggested by the interviewees are already included in the guidelines and templates. The centres are also provided with the opportunity to provide an annual report descriptive report in their submissions which would allow them to address all of the topics and reporting elements they suggest. Overall, the Program's performance measurement strategy and the existing templates align with the requirements in the RMAF, with the Program's logic model and with the key types of information suggested by the centres.

The most commonly mentioned key types of information to demonstrate centre performance, according to CECR interviewees include:

- **Commercialization success** – A majority of respondents explained that since the focus of the Program is supposed to be on the commercialization and monetization of research, the achievement of this goal should be paramount and emphasized in the data collected and in the assessment of performance. One CECR representative explained that the annual report performance template should collect information on how many opportunities for commercialization are disclosed to the centre, and how many projects are actually engaged. Another CECR interviewee also suggested that the assessment of commercialization success should include the impact of the deals made on the market place in terms of actual revenue generated, the number of new enterprises (i.e., start-ups) and the population that has benefited from the commercialization.
- **Impact on jobs and revenue generation** – One centre representative explained that the centre was developing screening mechanisms for projects which included the number of jobs created and an assessment of how a project helps to strengthen existing companies. Another CECR indicated that it was developing training models and standards regarding commercialization which identified the creation of jobs and revenue generation as a tool for the measurement of the centre's success.

- **Partnerships** – The number, type and dollar value of partnerships was identified as a key indicator of success by a majority of CECR interviewees. One CECR representative explained that the continued support of its organization members was a good measure of commitment to the work the centre undertakes. Another CECR interviewee added that the broadening of a centre's affiliates and partners would indicate that the centre is becoming an entity that others want to join. Other interviewees also indicated that strategic partnerships, which include contributions in the form of venture capital, are extremely important and critical for the overall performance and success of any CECR.
- **Ability to develop best practices** – According to a few interviewees, when measuring the performance of a CECR, an indicator should be included which helps to evaluate a centre's contribution toward improving commercialization practices in a broader context. As an example, one centre explained how it has helped the existing technology transfer community "up its game" by being more discerning about the projects they choose to undertake. As a result of the best practices they have established, other technology transfer offices (TTO), especially those found in smaller member organizations, are improving their own commercialization practices. Member TTO offices are receiving benefits from joint efforts and they are seeing value added, especially in terms of the good advice they receive on commercialization practices.
- **Attracting investment funding** - A few interviewees suggested that the amount of venture capital a centre has managed to attract should be included in the performance measurement templates; however, several interviewees also noted that while attracting venture capital is certainly a measure of success, some activities aimed at business development may only achieve fruition over a longer period of time (beyond the five-year time frame of Program funding), and the results should be viewed with that understanding.

A few CECR interviewees also indicated that retaining and recruiting top talent, advancing IP (the number of patents filed or issued), gaining international recognition for a centre's achievements, administrative efficiency (i.e., response time, program applications) and reducing a centre's risk profile should be included in the key types of information that would be relevant in demonstrating their centres' performance or progress toward the achievement of the centres' objectives.

While a majority of CECR interviewees indicated that they wanted to reserve judgment on the current annual reporting guidelines and tables established by the Program until they had an opportunity to review and complete the reporting, a few respondents did raise concerns and a few offered suggestions for improvements. A minority of interviewees also commented in support of the current guidelines and tables, or made reference to the previous year's annual reporting guidelines saying they were adequate and did not require any changes.

A few interviewees indicated that they would like to see a process which incorporates some proportionality between the time it takes to prepare the report and the amount of time it takes to review it

(i.e., the report takes a much longer time to prepare when compared to the actual review of the findings when it is submitted). A few interviewees noted that there may be a need for the Program to explain to centres how the data will be used to report to Parliament and decision makers. It should be noted, however, that the CECR Program held a session at the NCE Annual Meeting in February 2009 to explain the importance of the annual report and how the Program would use the data to report to Industry Canada and Parliament. One respondent also explained that the reporting requirements (i.e., the revised corporate plan) are laborious and costly in terms of the time and dollars it took to prepare them, and suggested that the translation requirements were excessively onerous (i.e., it was difficult to find translators with understanding of scientific terminology). Another respondent suggested that the government would have a better evaluation tool if it paid attention to the timing of the reports in relation to the CECRs business cycle. Another interviewee also added that they would like to see more flexibility in the reporting which would enable them to prepare just one report (i.e., the same report) for all funders and partners.

A few CECR representatives raised specific concerns with the reporting guidelines and tables and questioned whether the Program had adopted the right criteria to measure performance. One CECR interviewee explained that the metrics being used were based on the old NCE model which was research focused and, as a result, the current indicators did not place enough emphasis on commercialization. According to the interviewee, the Program needs to focus on measuring the economic outcomes of the CECRs more effectively by gauging success in the number of start-up companies created, sales, exports and reinvestment in research. Another CECR respondent suggested that the current reporting templates rely too heavily on measuring success in terms of attracting or retaining commercialization or venture capital. The interviewee prefers more focus on measures that include the extent to which a centre has succeeded in increasing the revenues of the research partners they are affiliated with; whether they have been able to create new services; and whether they have expanded their partnership base, especially with the private sector.

Overall, the Program's performance measurement strategy and the existing reporting templates align with the requirements in the RMAF, with the Program's logic model, and with the key types of performance information suggested by the centres. The current performance measurement approach uses both common and specific indicators for each CECR (i.e., based on their corporate/strategic plans) and reflects the uniqueness of each CECR, while also encouraging the centres to continue to measure their own accomplishments with respect to research and commercialization as they progress. The centres are also provided with the opportunity to provide a descriptive report in their submissions which would allow them to address all of the topics and reporting elements they suggest. However, until the reports are received from the centres it will not be possible to definitively state whether performance measurement is sufficient for measuring outcomes. Without reviewing completed reports one cannot know whether there is a common understanding or interpretation of data items, nor whether Centres are consistently collecting all the necessary data items. The evaluation was unable to confirm these details with the centres, since centres had not yet completed their reports at the time of the interviews.

The key challenge with respect to performance measurement will likely relate to measurement of success in commercialization. There are strong indications of an inconsistent interpretation of how commercialization is defined and measured.

4.2 RISK MANAGEMENT

The integrated Results-based Management and Accountability Framework and Risk-Based Audit Framework provides results based management and accountability information for all the CECR Program's activities. It also provides an assessment of risk and mitigation strategies for managing key risk areas. The RMAF and RBAF are highly integrated. The results logic and risk assessment were coordinated to enable results and risk to be managed as one process. For example, results measurement and risk management strategies have been synchronized to draw on, where possible, common measures and review processes. The key risk areas identified in the joint RMAF and RBAF for the CECR Program are peer review, matching funds and intellectual property, and potential conflict of interest.

NCE-CECR senior managers were asked to comment on the implementation of the CECR Program's risk management plan to date, and provided evidence that indicates the risk management plan in the RMAF is in fact being implemented (i.e., program monitoring, financial monitoring). According to the NCE-CECR interviewees, all the Boards of the 11 CECRs include a senior program representative (i.e. senior program manager or Deputy Director), and all the centres meet the eligibility requirements. CECRs are due to report on their progress in August 2009, which includes the submission of an updated corporate plan, and there has been continuous and ongoing communication between the Program and the centres.

NCE-CECR senior managers were also asked to explain how the following four key risk areas for the Program are being managed.

- Real or perceived reductions in the effectiveness or quality of the peer review process due to time lines or workload.

According to NCE-CECR senior management, the Program called upon individuals who know and are aware of the CECR Program to participate in the process. All of the chairs are Canadian and understand the Canadian research environment. It should be noted that a few PSAB interviewees raised a concern about the peer review process, indicating that the workload is heavy and that a potential "burnout" of members is possible due to the large time commitment required (i.e., volume and comprehensiveness of reviewing applications). One PSAB interviewee suggested the Program should increase the number of PSAB members to lighten the burden.

- The achievement of required matching funds by centres from governments and the private sector.

NCE-CECR senior management explained that the Program staff perform ongoing monitoring and provide guidance with regard to eligibility of matching funds. The centres also have investment committees that seek out venture capital, with the goal of attracting 50 percent matching funds for commercialization projects.

- Intellectual property risks relating to the implementation of IP agreement endorsed by all involved parties.

NCE-CECR senior management explained that the CECRs must adopt the IP approach of the university or business they are associated with. The NCE policy, which is being used for the CECR Program and has been the standard for the past 20 years in dealing with IP issues, essentially leaves it up to the CECRs to work through IP issues with their partners. It should be noted that a few CECR interviewees mentioned the risks associated with patent ownership, and commented on the uncertainty of handling IP issues. For example, one interviewee explained that it would be extremely difficult for a centre to pursue a costly legal battle over IP ownership. Nevertheless, the majority of centres either have not encountered challenges associated with IP or have resolved any issues that did arise. There is evidence that centres that existed prior to the CECR Program resolved any IP issues prior to receiving CECR funds, or very soon thereafter. This provides more evidence of a need to encourage information sharing (lessons learned/best practices) amongst the centres, as well as amongst CECR Program staff administering Program grants.

- Real or perceived conflict of interest resulting from the involvement of private sector stakeholders in Program decision-making.

The Funding Agreement requests that the centre develops a process “no less stringent than that set out in the COI [conflict of interest] policy framework.” According to NCE-CECR senior management, each Board of Directors for the CECRs is structured in a way that mitigates a Board being dominated by a single entity. All the CECRs are also required to have a conflict of interest policy at the Board level. Almost all centres indicated that their Boards have been set up and implemented as required and as planned. One CECR, however, explained that they were still in the process of establishing their Board and were finding the process difficult due to the complicated nature of their particular industry and the organizational structures of the participating partners (i.e., complicated and slow decision making processes).

The Program also aims to have six members on each Expert Panel, and if a conflict of interest issue arises with a panel member, the individual is excused from the process and the occurrence is documented. Conflict of interest with the PSAB is managed in the same way as the expert panel.

When asked to comment on improvements to the way that risk is managed by the Program, an NCE-CECR senior manager suggested that the time line (i.e., five-year funding commitment) needed to be more realistic and that it was the cause of most of the risk associated with the success of the Program; namely, the Program's time frame is too short to achieve its intended outcomes.

Overall, available evidence indicates that the Program has appropriately managed the key risks identified in the RMAF-RBAF.

4.3 NEW OR EMERGING RISKS

NCC-CECR senior management, centre management, Expert Panel members, provincial government representatives, and key informants from the Private Sector Advisory Board were asked whether they were aware of any new, emerging or unforeseen risks that could impact the success of a centre or the Program. It is too early to assess whether these emerging risks are being managed appropriately; however, the continuous and ongoing communication between the Program and the centres, and the implementation of the Program's reporting templates and monitoring guidelines, suggests that the tools are in place to help address and sufficiently mitigate these risks.

The most commonly mentioned risks, according to CECR key informant interviewees, include:

- **Increased Economic Uncertainty:** Most interviewees indicated that the current Canadian economic downturn and the global crisis are making it increasingly difficult for the CECRs, which are focused on commercialization, to attract investment and venture capital. One Expert Panel member suggested that "it has always been difficult for Canada to attract venture capital, and it is doubly so now." A few CECR interviewees explained that the economic climate has had a negative effect on potential partnerships, resulting in fewer sources of research funding (e.g., through endowments, government programs) as well as a decreased willingness to contribute funding for inherently risky commercialization projects. A few CECR interviewees explained that some of their expected partners or funders are no longer in a position to participate in their planned projects. As a result, some centres are struggling with making a choice about which projects to undertake, and are worried about the impact their inability to fund worthy endeavours will have on researchers and their centres' overall performance. A few CECR interviewees also raised specific industry related issues and suggested that changes in their particular sectors have made commercialization much more risky and difficult to accomplish. For example, one interviewee explained how the nature of healthcare and the model for drug development is changing. Healthcare is becoming much more personalized and, as a result, it is more expensive to develop and commercialize drugs. Another interviewee explained how the biotechnology industry is in turmoil, and many companies are undergoing restructuring, thus changing the operating environment for the centre in a dramatic way. A few interviewees also explained that there is a risk of losing some of the funding they receive from provincial government sources, because some of the programs they rely on are under review.

- **Design Risk** – A majority of interviewees indicated that the centres will most likely require more than the Program's five-year funding period to become self sufficient and to achieve their goals. As such, there is a need for recognition by government stakeholders that the Program's success hinges on sustained funding, and may require the extension of funding beyond the current five-year commitment. One Private Sector Advisory Board interviewee suggested that "the Program's success will depend on the long-term stability of government funding, especially since the current economic downturn has reduced the availability of venture capital, which will make it more difficult for a centre to transition out of being a centre of excellence during its later stages of development." Another interviewee also pointed out that the risk for the Program extends to the views of Canadians, especially since achieving "excellence" will be difficult to do and may lead to criticism of the Program. Politicians will undoubtedly be looking for justifications to continue the Program, and communicating positive messages about the centres' objectives and achievements to Canadians is an important part of providing the necessary justification. Another CECR management interviewee added that without proper communication and promotion, a centre could also lose potential or existing partners that would otherwise be attracted by positive and high profile projects.

- **Human Resources Risk** – A few key informants from the CECRs explained that recruiting top talent has proved more difficult than originally thought, and some believe that there is a serious risk of losing research scientists if funding sources "dry up." One interviewee explained that while the science funding in the recent federal budget did not have a direct effect on the centres, it did "cloud" the overall environment, and left many scientists concerned about the government's commitment to the centres (i.e., regarding long-term commitment after the five-year funding period and the resulting impact on job security). Another interviewee raised the human resource issue with regard to the staffing levels at the NCE Secretariat. The interviewee explained that as the CECR Program grows, more staff will be required to sit on CECR Boards of Directors, and this may prove to be a strain on the Program's ability to provide the qualified staff necessary to perform the tasks that are required.

5. CONCLUSIONS AND RECOMMENDATIONS

The following are the key conclusions and resulting recommendations stemming from the formative evaluation of the CECR Program. Here, it is important to restate that this evaluation was formative in nature and focused on implementation and early indications of progress towards results rather than the achievement of outcomes by the Program. It was also implemented very early in the life cycle of the Program; the scope of the evaluation was limited to the first two years of the Program.

a) Implementation

The findings of the evaluation indicate that the CECR Program has been implemented to date in a manner that will likely achieve its intended objectives. There has been significant interest in the CECR Program. The first competition, held in 2008, received 110 LOIs, from which 25 FAs were invited and 11 centres were funded. For the second competition, held in 2009, 34 LOIs were received, from which 15 FAs were invited and six centres were funded. The peer review and excellence-based approach of the CECR Program's selection process was widely praised as a key mechanism to ensure that funded centres will achieve the Program's intended research and commercialization outcomes.

To date, the Program has funded centres that address all four strategic priority areas. In the first competition, the majority of centres funded focused on the S&T priority of health and related life sciences and technologies. The majority of the centres funded by the second competition addressed the information and communication technologies, and environmental sciences and technologies priorities areas. Of the 17 centres funded to date, 11 address the health and related life sciences and technologies priority area; seven address the information and communication technologies; six address the natural resources and energy priority area; and five address the environmental science and technologies priority area.

Based on the results of the 2008 and 2009 competitions, the Program has funded centres that represent research fields from the three granting agencies. The majority of the research fields represented by the 17 funded centres to date are from NSERC and CIHR; research fields from NSERC and CIHR are present in 11 funded centres each and SSHRC research fields are present in two funded centres. Based on the results of the first competition, interviewees reported that SSHRC research fields were under-represented in comparison to CIHR and NSERC research fields. A few interviewees perceived this to be a reflection of reality due to fewer opportunities for commercialization in these research fields. A few other interviewees, representing SSHRC and Program management, perceived that the lack of representation of SSHRC research fields represents a need to change how research and commercialization is viewed by researchers across all research fields given the importance of SSHRC research fields, such as ethics and business law, for the Program's goal to deliver economic, social and environmental benefits. It is important

that the Program track the research focus and commercialization expertise of both applicants and funded centres to better assess progress towards its objective to create internationally recognized centres of commercialization and research in the four priority areas.

Recommendation 1: The Program should monitor the representation of the four strategic priority areas, as well as the research fields of the three granting agencies in both applications to, and centres funded by, the Program. The Program should work to improve awareness of the Program across all research fields to ensure that centres possess the appropriate knowledge and expertise to deliver economic, social and environmental benefits in the four strategic priority areas.

Overall, the majority of interviewees regard Program resources to be adequate. A few interviewees suggested that the timing or length of the competition places too great a burden on staff, and some managers suggest that financial resources will be insufficient long-term, particularly to support large-scale proposals that have been received by the program to date.

Some changes were made to the selection process between 2008 and 2009 to increase the emphasis on information and communication technologies, and environmental science and technologies, and to increase standardization across expert panels. The Program clarified the requirement for funding, indicating that the four priority areas were to be emphasized, including information and communication technologies, and environmental science and technologies priority areas. As well, the definition of commercialization used in the Program's Funding Agreement changed between the 2008 and 2009 competitions from a focus on manufacturing to one of transforming knowledge and technology. There is generally a high level of satisfaction with the current selection process among most interview respondents. Suggestions for change or improvement largely focus on extending the process to provide more time to prepare a proposal and to ease the burden on staff, and possibly to clarify the selection criteria.

While most interviewees were satisfied with the selection process and regard it as appropriate, the evaluation found a need for improvement in how provincial representatives are consulted. The NCE Secretariat is expected to consult with the provinces and territories prior to the call for LOI and, after receipt of FAs, to identify potential centres seeking support as well as provincial and territorial priorities. All provincial representatives interviewed were dissatisfied with the nature and extent of the consultations by the Program during the 2008 and 2009 competitions. Provincial representatives would prefer to be involved earlier in the process (e.g., at the LOI stage) and in a more structured fashion (e.g., to have the opportunity to express their support for projects that match their own provincial priorities and to obtain feedback on unsuccessful applications to support a second application in a later competition).

Recommendation 2: The Program should review the process used to consult provincial government officials to determine how to more appropriately obtain provincial input during the selection process.

b) Early Progress on Intended Outcomes

At this early stage in the implementation of the Program, sources of evidence that the CECR Program has made definitive progress towards intended outcomes are somewhat limited. The centres have been funded for one year and thus have focused on implementation activities such as establishing the structure of the organization, hiring and governance. Annual reports that are expected to provide details on centre activities and outputs are not yet available.

The full applications and corporate plans of the CECRs demonstrate a high degree of partnership and support for the centres among their constituents. The lead applicants for many of the centres are consortia that feature partnerships among academic and research organizations, university centres of excellence/research and development facilities, health institutions, business and industry associations. Many centres have secured provincial support, and the centres are also often networked with international research institutions.

The observations of Program stakeholders and the activities of the centres themselves indicate that the Program is making progress toward intended outcomes in both the research and commercialization areas. The 11 centres funded in 2008 are generally seen by centre management to have been implemented in a manner consistent with their full applications and the corporate plans. While implementation has been slower than anticipated for some centres (due to, for example, hiring processes, negotiation of funding and other agreements, and incorporation of the organization that proved to be more protracted), early operational milestones for virtually all centres have been achieved.

In general, Program stakeholders are satisfied with the advice and assistance provided by the Program to facilitate success. The Program has developed a series of tools and resources to assist applicants in developing their submissions for funding, and ongoing operational guidance is provided to centres by the program officers. Expert and Private Sector Advisory Board members are generally pleased with the advice and guidance they received with respect to the proposal review process. CECR Program officials are available to centres to provide guidance on administrative issues. Early inconsistencies in guidance provided to centres seem to have been clarified as experience with Program implementation increased.

The perceptions of stakeholders and the experience of the centres provide a number of early signs that the CECRs are making progress in contributing to the intended research and commercialization outcomes of the CECR Program. It is important to note that it is early in the implementation of centre research and commercialization activities, with some centres involved in developmental and translational research rather than discovery research and a few centres strictly focused on commercialization. The centres are making progress in the types of research and commercialization activities they have undertaken. Examples include:

- Development of innovative and unique partnerships, including multi-sectoral partners, both as the foundation of the centres and on a project-by-project basis. Industry is represented in management and in an advisory capacity within the centres;
- Leveraged investment from public and private sector organizations;
- Robust processes in place to solicit, evaluate and advance research and commercialization projects. The capacity and expertise of the centres contributes to earlier identification of research projects with commercialization potential and acceleration of the commercialization process;
- Generation of IP;
- Hiring of high calibre and often international talent to manage the CECRs and mentor investigators, or to play a partnership or advisory role in prioritizing and developing commercialization projects; and
- Recruitment of student trainees/interns and use of mentorship/coaching programs.

A series of lessons learned and best practices were noted by key informants from the centres, based on their initial experiences with implementation. These factors of success often related to the fundamentals of the organization itself – strong leadership and sound underlying administrative and management processes. Partnerships and outreach to constituents were also mentioned as important factors of success. Several CECRs benefited from building their centres on the success of a pre-existing team or infrastructure, which supported a more rapid start-up of the centres.

Implementation challenges included a variety of operational issues (e.g., negotiating the NCE funding agreement, arrangements with the host institution), as well as the significant degree of work undertaken by centres during this first year in defining their business model. Other notable issues were securing the right leadership for the centres and shifting the cultural focus among investigators and some centre stakeholders to a model emphasizing commercialization. IP management may pose a challenge for some centres as they move further toward implementation. While securing matching funds for the centres is not predicted to be a problem for most, an overarching issue for the CECRs will be achieving self-sufficiency within the five-year time frame.

Suggestions for Program improvements were varied. Centre management perceive a need for the Program to enhance the value of advice and guidance provided in order to better facilitate success. Specifically, centre staff should provide assistance and guidance (i.e., identify best or suggested practices) in operational areas common to most or all centres, and help to facilitate networking among centres to share knowledge, best practices and tools which would benefit both existing centres, as well as centres funded in future competitions. Examples include assistance or support in structuring the centres and negotiating the host-centre relationship, enhancing the profile of the Program and the centres, and facilitating linkages with potential partners and funding sources.

Recommendation 3: The Program should take steps to foster better communication and sharing of ideas and information among Program staff and stakeholders, and across centres. Specifically, the Program should identify and develop lessons learned and best practices for centre operations, and support centres' interests in increased opportunities to network with each other.

Despite the early signs of progress, findings from the evaluation indicate that there is a risk that funded centres may not be able to achieve all of the Program's commercialization outcomes, particularly becoming self-sufficient, within the current funding period. There is a common concern among centre management that their centres are unlikely to be financially sustainable within the five-year time frame of the CECR Program grant. On this point, Program documentation indicates that centres with a strong commercialization focus are expected to be self-sufficient by the end of the funding period, while centres with a strong research focus may be eligible for subsequent support (if the Program is extended). On this point, it is important to note that none of the 17 centres funded to date are focused solely on research, with 14 centres focused on research and commercialization, and three focused solely on commercialization. There is evidence that the five-year time frame is having an impact on centre decisions regarding which commercialization projects to select, and a few centres are focussing on "early wins," but the commercialization cycle is generally very lengthy. This was identified by senior Program management as a particular challenge for centres focused on health and related life sciences and technologies priority area (a focus area for 10 of the 11 centres funded in 2008). On this point, interviewees from centre management suggest adjusting the time frame of the funding agreement or providing an option to extend funding based on performance as possible means to address the expected challenges of the five-year funding time frame.

Recommendation 4: The Program should assess the feasibility of the five-year time frame for Program grants, centre type (commercialization, research, or research and commercialization), strategic priority area(s) addressed and centre performance, especially the extent of leveraged funding and the potential value of commercialization projects.

c) Performance Measurement and Risk Management

While the reporting template has been developed and shared with the CECRs, the templates have not yet been completed and submitted, making it difficult to comment on their overall effectiveness and efficiency. However, a majority of the respondents identified key types of information they felt would be relevant in demonstrating their CECRs performance or progress toward the achievement of centre objectives. The most commonly mentioned key types of information to demonstrate centre performance, according to CECR interviewees include commercialization success, impact on jobs and revenue generation, partnerships, ability to develop best practices and attracting investment funding. A few CECR interviewees also indicated that retaining and recruiting top talent, advancing IP (e.g., number of patents), gaining international recognition for a centre's achievements, administrative efficiency (i.e., response time, program applications) and reducing a centre's risk profile should be included in the key types of information that would be relevant in demonstrating their CECRs performance or progress toward the achievement of

centre objectives. Overall, the Program's performance measurement strategy and the current reporting templates align with the requirements in the RMAF, with the Program's logic model and with the key types of information suggested by the centres. The current performance measurement approach uses different indicators for each CECR (i.e., based on their corporate/strategic plan) and reflects the uniqueness of each CECR, while also encouraging the centres to continue to measure their own accomplishments as they progress. The centres are also provided with the opportunity to provide a descriptive report in their submissions which would allow them to address all of the topics and reporting elements they suggest.

A recurring theme throughout this evaluation relates to the lack of clarity surrounding what is meant by commercialization. Specifically, clarifying and enhancing the focus of the objectives of the Program on commercialization was recommended by a few members of centre management. This lack of clarity surrounding a key objective of the Program has strong implication for performance measurement since the term "commercialization" is interpreted differently by the Program, centres and other key stakeholders, such as PSAB and Expert Panel members. For example, the definition of commercialization used in the Program's Funding Agreement was changed between the 2008 and 2009 competitions from a focus on manufacturing to one of transforming knowledge and technology.

Interviewees representing management from a few centres indicate that there is a need to clarify and focus Program objectives relating to commercialization and research. On this point, interviewees noted that there were initially mixed messages from Program representatives about the meaning of the research and commercialization objectives of the Program and Program implementation, and reporting guidelines, with respect to these two objectives (e.g., acceptable activities and expenditures for research and commercialization). Related to this, a few interviewees indicate that the Program should provide greater clarity and guidance on commercialization versus research goals of the Program, to better define and support the activities of the centres.

The key challenge, with respect to performance measurement, will likely relate to measurement of success in commercialization given the lack of a common understanding of how commercialization is defined by the Program.

Recommendation 5: The Program should, in close consultation with the three funding agencies and Industry Canada, define what is meant by commercialization in the context of this Program in a way that is measurable and consistent with the Program's Terms and Conditions. Furthermore, the Program should ensure its research and commercialization objectives are clearly and consistently presented in Program documentation and communicated to all Program stakeholders.

NCE-CECR senior managers were asked to comment on the implementation of the CECR Program's risk management plan to date, and they provided evidence that indicates the risk management plan in the RMAF is in fact being implemented and managed appropriately (i.e., program monitoring, financial monitoring). According to NCE-CECR senior management, the results logic and risk assessment have been successfully coordinated to enable results and risk to be managed as one process. For example,

results measurement and risk management strategies have been synchronized to draw on, where possible, common measures and review processes.

The key risk areas identified in the joint RMAF and RBAF for the CECR Program relate to peer review, matching funds and intellectual property, and potential conflict of interest. In general, the evidence indicates that these risks are being appropriately managed. The possible exception may be IP risk, which will likely evolve or emerge as more centres progress towards commercialization of IP. The most commonly mentioned new or emerging risks, according to CECR key informant interviewees, include the difficulty in attracting investment and venture capital amidst the current economic downturn, design risks, human resources risks and provincial funding risks. It is too early to assess whether these emerging risks are being managed appropriately; however, the continuous and ongoing communication between the Program and the centres, and the implementation of the Program's reporting templates and monitoring guidelines, suggests that the tools are in place to help address and sufficiently mitigate these risks as well as other risks as they emerge.

Recommendation 6: Based on the annual reports to be submitted by centres for the 2008-2009 fiscal year, the Program should review its performance measurement and risk management system to ensure it is effectively and efficiently capturing the required information from centres to appropriately monitor and manage Program performance and risk.

APPENDIX A EVALUATION MATRIX

Evaluation Matrix

Evaluation Issue/Question	Indicator	Data Collection Method
Implementation		
1. To what extent has the CECR Program been implemented in a manner to achieve intended objectives?	<ul style="list-style-type: none"> › 1a Alignment of Program activities with Program objectives › Extent the Program has funded centres to address the four priority areas of the S&T strategy › Extent of alignment of funded centres with STIC sub-priority areas and Strategic Plans of CIHR, NSERC and SSHRC 	<ul style="list-style-type: none"> › Review of LOI and FA (NSERC)¹⁹ › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Private Sector Advisory Board ▫ Expert Panel
	› 1b Views of Program stakeholders regarding Program design and implementation	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Private Sector Advisory Board ▫ Expert Panel
	› 1c Views of Program stakeholders on the adequacy of resources (financial and human) relative to the objectives of the Program	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Private Sector Advisory Board ▫ Expert Panel
1.1 What is the representation in the Program of the research fields of the three granting agencies?	› 1.1a - Representation of the research fields of the three agencies in letters of intent and full applications submitted for the 2008 CECR competition	› Review of LOI and FA (NSERC)
	› 1.1b - Views of Program stakeholders on: <ul style="list-style-type: none"> ▫ the inclusiveness and representation of the research fields of the three federal granting agencies in the Program; and ▫ conditions which might explain any differences in representation of research fields in the program 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Private Sector Advisory Board ▫ Expert Panel

¹⁹ We note that a file review of letters of intent (n=110) and full applications submitted (n=25) will be undertaken internally by NSERC evaluation staff in collaboration with SSHRC and CIHR evaluation staff.

Evaluation Issue/Question	Indicator	Data Collection Method
1.2 What improvements, if any, can be made to the selection process for subsequent competition cycles?	<ul style="list-style-type: none"> › 1.2a Evidence of potential improvements that could be made to the selection process 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ✦ NCE-CECR Senior Management ✦ Private Sector Advisory Board ✦ Expert Panel ✦ Provincial Government Representatives ✦ Centre Management ✦ Unfunded Applicants
	<ul style="list-style-type: none"> › 1.2b Evidence of improvements to the selection process made between the first and second Program competitions 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ✦ NCE-CECR Senior Management ✦ Private Sector Advisory Board ✦ Expert Panel ✦ Provincial Government Representatives
	<ul style="list-style-type: none"> › 1.2c Satisfaction of Program stakeholders with selection process (including funded and unfunded applicants) 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ✦ Private Sector Advisory Board ✦ Expert Panel ✦ Provincial Government Representatives ✦ Centre Management ✦ Unfunded Applicants
Early Progress Toward Intended Outcomes		
2. What progress has the CECR Program made toward intended outcomes?	<ul style="list-style-type: none"> › 2a Number of applications received, number of applications funded (by S&T priority area) 	<ul style="list-style-type: none"> › Review of LOI and FA (NSERC)
	<ul style="list-style-type: none"> › 2b Number of agreements with funded centres 	<ul style="list-style-type: none"> › Document review (NSERC)
	<ul style="list-style-type: none"> › 2c Nature of advice and direction to centres, PSAB and Expert Panels provided by the Program 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ✦ NCE-CECR Senior Management ✦ Centre Management ✦ Expert Panel ✦ Private Sector Advisory Board

Evaluation Issue/Question	Indicator	Data Collection Method
	<ul style="list-style-type: none"> › 2d Satisfaction of Program stakeholders with advice and direction provided by the Program 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ☒ Centre Management ☒ Private Sector Advisory Board ☒ Expert Panel ☒ NCE-CECR Senior Management
	<ul style="list-style-type: none"> › 2e Evidence that existing research strength, infrastructure, networks and funding sources have been brought together to enhance research capacity 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ☒ NCE-CECR Senior Management ☒ Centre Management ☒ Provincial Government Representatives
	<ul style="list-style-type: none"> › 2f Evidence that existing commercialization strength, infrastructure, networks and funding sources has been brought together to enhance commercialization capacity 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ☒ NCE-CECR Senior Management ☒ Centre Management ☒ Provincial Government Representatives
	<ul style="list-style-type: none"> › 2g Number and type of partnerships and collaborations 	<ul style="list-style-type: none"> › Document review › Centre documentation
	<ul style="list-style-type: none"> › 2h Evidence top research talent (including postgraduate and postdoctoral students) is being attracted to Canada 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ☒ NCE-CECR Senior Management ☒ Centre Management ☒ Unfunded applicants
	<ul style="list-style-type: none"> › 2i Evidence top commercialization talent (including internationally recognized business leaders) is being attracted to, and retained in, Canada 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ☒ NCE-CECR Senior Management ☒ Centre Management ☒ Unfunded applicants

Evaluation Issue/Question	Indicator	Data Collection Method
	<ul style="list-style-type: none"> › 2j Evidence high quality postgraduate and postdoctoral training opportunities in innovative and internationally competitive research are being provided 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management
	<ul style="list-style-type: none"> › 2k Evidence that investment (including foreign direct investment and venture capital) is being attracted 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management ▫ Unfunded Applicants ▫ Provincial Government Representatives
	<ul style="list-style-type: none"> › 2l Amount and sources of financial and in-kind contributions 	<ul style="list-style-type: none"> › Document review
	<ul style="list-style-type: none"> › 2m Amount of national and foreign investment in centres 	<ul style="list-style-type: none"> › Document review
<p>2.1 What changes to the implementation of the CECR Program could be made to improve progress toward expected outcomes?</p>	<ul style="list-style-type: none"> › 2.1a Views of Program stakeholders regarding the need for changes to the implementation of the Program 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Private Sector Advisory Board ▫ Expert Panel ▫ Centre Management ▫ Unfunded Applicants
<p>3. How are centres' contributing to the achievement of the Program's research and commercialization outcomes?</p>	<ul style="list-style-type: none"> › 3a Extent to which centres have implemented activities as planned 	<ul style="list-style-type: none"> › Document review › Centre documentation (full application, corporate plan) › Key informant interviews › NCE-CECR Senior Management › Centre Management
	<ul style="list-style-type: none"> › 3b Evidence that centres are contributing to the intended research outcomes of the Program 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management

Evaluation Issue/Question	Indicator	Data Collection Method
	<ul style="list-style-type: none"> › 3c Evidence that centres are contributing to the intended commercialization outcomes of the Program 	<ul style="list-style-type: none"> › Document review › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management
<p>3.1 Are there features of the centres' structure and operations that facilitate or hinder success?</p>	<ul style="list-style-type: none"> › 3.1a Views of Program stakeholders regarding factors that facilitate or hinder the success of funded centres 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Expert Panel ▫ Centre Management ▫ Private Sector Advisory Board
<p>3.2 What lessons have been learned from the 11 CECR centres funded in 2007-2008?</p>	<ul style="list-style-type: none"> › 3.2a Evidence of lessons learned, best practices and challenges 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Expert Panel ▫ Centre Management ▫ Private Sector Advisory Board ▫ Unfunded Applicants
Performance Measurement and Risk Management		
<p>4. How adequate is the performance measurement strategy to monitor progress toward Program outcomes? What improvements, if any, can be made to the performance measurement strategy?</p>	<ul style="list-style-type: none"> › 4a Nature and extent of ongoing performance measurement systems, performance reporting templates and data 	<ul style="list-style-type: none"> › Document review › Program documentation › Key informant interviews <ul style="list-style-type: none"> ▫ Centre Management ▫ NCE-CECR Senior Management
	<ul style="list-style-type: none"> › 4b Assessment of Program performance measurement system and performance reporting templates 	<ul style="list-style-type: none"> › Document review › Performance measurement strategy and templates
	<ul style="list-style-type: none"> › 4c Potential improvements to the Program's performance measurement system 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management

Evaluation Issue/Question	Indicator	Data Collection Method
5. Are key risks areas being managed appropriately?	<ul style="list-style-type: none"> › 5a Evidence that the risk management plan has been implemented 	<ul style="list-style-type: none"> › Document review › Review of risk management plan › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management
	<ul style="list-style-type: none"> › 5b Evidence of new, emerging or unforeseen Program risks 	<ul style="list-style-type: none"> › Key informant interviews <ul style="list-style-type: none"> ▫ NCE-CECR Senior Management ▫ Centre Management ▫ Expert Panel ▫ Private Sector Advisory Board ▫ Provincial Government Representatives

APPENDIX B
BRIEF DESCRIPTION OF CENTRES
FUNDED IN 2008 AND 2009

1. Advanced Applied Physics Solutions Inc. (AAPS), Vancouver, B.C.

Advanced Applied Physics Solutions Inc. is a wholly owned, not-for-profit subsidiary of TRIUMF, Canada's National Laboratory for Particle and Nuclear Physics, that aims to improve quality of life by developing technologies emerging from international subatomic physics research. The work of AAPS involves collaborations with academic, government, and industry stakeholders with the objective of researching and developing promising technologies to a commercially viable stage, while increasing domestic industrial capacity to ensure long-term social and economic benefits to Canada. During its initial five years, AAPS plans to form at least six joint ventures, including ventures to design a new underground imaging system to improve productivity in the natural resource sector, and develop technologies with applications such as medical isotope production and pollution mitigation.

2. Bioindustrial Innovation Centre (BIC), Sarnia, Ont.

The Bioindustrial Innovation Centre's vision is to position Canada as a leader in taking sustainable feedstock, such as agricultural and forestry by-products and wastes, and turning these renewable resources into energy and value-added chemicals for use in applications ranging from construction to automotive parts. In partnership with industry, BIC will provide programs and facilities to develop, demonstrate and test these sustainable technologies with a view to accelerating their commercialization.

3. Centre for the Commercialization of Research (CCR), Ottawa, Ont.

Building on the work of the Ontario Centres of Excellence (OCE), the Centre for the Commercialization of Research is intended to: help ensure that new technologies developed in Canada's research universities reach the global marketplace; contribute to an innovative, competitive and environmentally responsible economy; and support the next generation of Canadian innovators, entrepreneurs and business leaders. Another objective of the Centre is to play an important role in areas such as development of complex and convergent technologies that require the alignment of various disciplines and national and international collaborations. The initial focus of the Centre will be on commercializing new technology discoveries related to the environment, natural resources and energy; health and related life sciences; and digital media.

4. Centre for Drug Research and Development (CDRD), Vancouver, B.C.

The Centre for Drug Research and Development proposes to increase the probability that discoveries made by Canadian researchers become medicines that improve health and well-being. The CDRD will provide an infrastructure in which the therapeutic potential of medical discoveries can be better validated in the academic environment, reducing the risk of failure in subsequent development. The CDRD intends to mobilize the scientific disciplines from academia to conduct drug discovery in an integrated, collaborative manner. The Centre is combining this with a commercial arm to encourage investment in promising discoveries. In addition, the CDRD training model has the objective of producing highly-skilled workers to

drive the therapeutic innovation pipeline, attract international talent to Canada and spur growth in knowledge-based jobs and companies.

- 5. Centre of Excellence in Personalized Medicine (CEPM), Montreal, Que.**
The objective of the Centre of Excellence in Personalized Medicine is to optimize drug therapies by capitalizing on recent discoveries in genomics. The CEPM draws on existing talent and infrastructure available in health and teaching institutions throughout Canada and works in partnership with the pharmaceutical and the biotechnological industries. The intention is for researchers to benefit from knowledge acquired by companies at the product development stage and by practitioners in an institutional setting. Clinical trials are a major focus of activity and the development of safe, effective drugs, with as few side effects as possible, is a key objective.
- 6. Centre for Probe Development and Commercialization (CPDC), Hamilton, Ont.**
The Centre for Probe Development and Commercialization was established to build on existing research in new molecular probes and special chemical compounds for early diagnosis and monitoring. The CPDC will create the capacity to convert methods used to produce promising probes in the lab into methods suitable for commercial and clinical use. The Centre will validate the safety and efficacy of promising probes, leading to human use in clinical trials. Finally, for those probes that have proven to be both safe and effective, the CPDC will play a role in managing the intellectual property to attract investment to Canada.
- 7. Institute for Research in Immunology and Cancer (IRIC)/CECR in Therapeutics Discovery (IRICoR), Montreal, Que.**
The objective of the Institute for Research in Immunology and Cancer / CECR in Therapeutics Discovery is to accelerate the development of new targeted cancer therapies by supporting the discovery portfolio and technological platforms developed at the Unit for the Discovery of Medicines at Université de Montréal (UDM2). The IRICoR will link the UDM2 with new partners, including the biopharmaceutical industry.
- 8. MaRS Innovation (MI), Toronto, Ont.**
MaRS Innovation is a joint venture of MaRS (which houses technology start-up companies, academic health researchers and a wide range of business services) and Toronto academic institutions. With a single integrated organization, the intent is to recruit personnel working at the crossroad of science and business and, through joint teams, work with researchers to identify discoveries that can be used by existing companies, or to launch new businesses that can grow into globally-recognized firms.
- 9. The Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development (PC-TRIADD), Vancouver, B.C.**
Located within the Prostate Centre at Vancouver General Hospital, the Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development integrates critical

components of translational research under one organization. This model is intended to enhance management of the complex processes involved in discovery, preclinical development and clinical research. Close partnerships with national clinical trials and research networks, as well as industry, will be a feature of the approach. While PC-TRIADD focuses on prostate cancer, many of its services and discoveries are intended to be applied to other cancers.

10. Pan-Provincial Vaccine Enterprise (PREVENT), Saskatoon, Sask.

By partnering with Canadian stakeholders and shouldering the risk of early-stage vaccine development, the Pan-Provincial Vaccine Enterprise is intended to strengthen Canada's vaccine industry, by promoting growth, investment and improved global competitiveness. By keeping manufacturing and clinical trials in Canada, PREVENT has the objective of accelerating the rate at which essential vaccines reach the Canadian marketplace, resulting in earlier access. The Vaccine and Infectious Disease Organization at the University of Saskatchewan, the Canadian Centre for Vaccinology in Halifax and the BC Centre for Disease Control have pooled their expertise to create PREVENT. The Centre will conduct animal studies and proof-of-concept clinical trials for promising early-stage vaccine candidates.

11. CECR in the Prevention of Epidemic Organ Failure (PROOF), Vancouver, B.C.

The Prevention of Epidemic Organ Failure will work to find practical solutions to vital organ failure and its impact on Canadians and our health care system. The work of PROOF's team of researchers, scientists and clinicians is intended to improve the standard of care and quality of life for patients faced with heart, lung or kidney failure. PROOF will focus on biomarker-guided prevention and effective early detection of primary diseases to diminish the epidemic of vital organ failure and its socio-economic impact.

12. Centre of Excellence in Energy Efficiency (C3E), Shawinigan, Que.

The vision of the Centre of Excellence in Energy Efficiency is to create an integrated vehicle for economic development in energy efficiency and new energy technologies. The C3E will unite and leverage critical partners to improve our environment while creating economic value. The Centre establishing a world-class facility in Shawinigan, Quebec, to support technology transfer and commercialization in the growing area of new energy technologies

13. Tecterra (formerly known as Centre of Excellence for Integrated Resource Management - CEIRM), Calgary, Alta.

Tecterra's vision is to develop intelligent, integrated resource management tools to observe, monitor, forecast and manage Alberta's land and natural resources. The Centre will build a substantial, sustainable geomatics-based ICT capability in Alberta and Canada. The CEIRM will be involved in four activities critical to the advancement of integrated resource management: education and training; R&D; pre-commercialization of R&D, and partnering with and providing services to industry. The Centre will go well beyond traditional R&D, ensuring

real potential for geomatics commercialization by confirming industry needs up front, taking a collaborative approach and clearing paths toward deployment

14. Centre for Surgical Invention and Innovation (CSII), Hamilton, Ont.

The Centre for Surgical Invention and Innovation will develop and commercialize a new class of robotic platforms for targeted, less invasive surgical and medical interventions. These innovations will dramatically improve patient outcomes, reduce the length of hospital stays and recovery periods, and allow patients to return to full activity following major procedures far more quickly than conventional procedures. The Centre will combine Canada's leadership in the field of robotics (developed by MDA for space exploration) with McMaster's University's expertise in minimally invasive surgery and surgical robotic interventions to develop a viable new biotech industry.

15. Canadian Digital Media Network (CDMN), Waterloo, Ont.

The Canadian Digital Media Network is a joint initiative of Communitech and the Stratford Institute. It will link Canada's digital media clusters from coast to coast, creating a digital convergence corridor and enabling collaboration between researchers, implementers and entrepreneurs. Two complementary digital media hubs – the Stratford Institute and Waterloo Region's Digital Media Convergence Centre (DMCC) – will provide the facilities for sustainable digital media activity. The Stratford Institute will offer global business-centred research activities for graduate students, commercialization support for industry, and the tools and environment necessary to foster commercially viable content creation. The DMCC will offer the latest visualization hardware and software, business start-up services and office space for innovators in their start-up or pre-start-up phase.

16. Green Centre Canada (GCC), Kingston, Ont.

Green Centre Canada's vision is to transform green chemistry research breakthroughs into clean, sustainable products and processes that will benefit Canada and the world. The GCC will develop innovative green chemistry solutions to meet growing global demand for engineering and construction materials, energy production, fine chemical and therapeutic manufacturing, and transportation and communication systems. It will re-invigorate the Canadian chemical and manufacturing sectors, create jobs, stimulate economic development, train highly qualified personnel, establish new Canadian chemical and manufacturing companies, and build an internationally recognized critical mass of expertise in green chemistry innovation.

17. Ocean Networks Canada Centre for Enterprise and Engagement (ONCCEE), Victoria, B.C.

Ocean Networks Canada Centre for Enterprise and Engagement was created by the University of Victoria to build and sustain Canada's world leadership in ocean science and technology through the NEPTUNE Canada and VENUS cabled ocean observatories. These two internationally renowned observatories support transformative research on our oceans

and create unprecedented economic and outreach opportunities. **ONCCEE's** vision is to position Canada as an international leader in the S&T of ocean observation systems and to maximize the associated economic and social benefits through innovative commercialization and outreach programs.