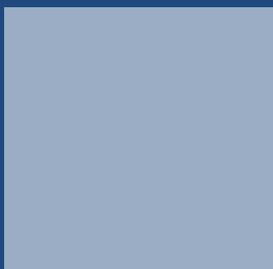
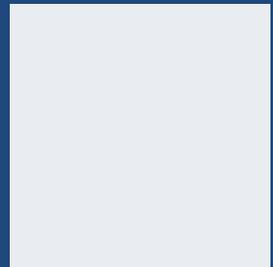
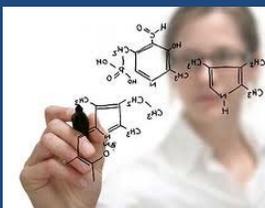
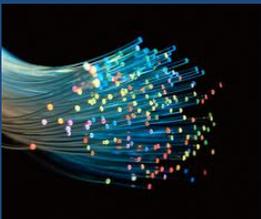


# Final Report

## Performance Audit of the Council of Canadian Academies

Prepared for:  
**Council of Canadian Academies**

28 May 2013



**HICKLING  
ARTHURS  
LOW**  
INNOVATION POLICY ECONOMICS

HAL Ref: 8133

# Executive Summary

## Background

The Council of Canadian Academies (the “Council”) is an independent, not-for-profit corporation that supports evidence based, expert assessments on the science underlying matters of significant public interest in Canada. The Council, supported by a 10 year, \$30-million grant from the Government of Canada under a Funding Agreement with Industry Canada, came into existence in 2005 and was fully operational by 2006.

The Council is required to have an independent performance (value-for-money) audit completed by March 31, 2015. The purpose of the audit is to assess the economy, efficiency and effectiveness with which the funds have been used. Hickling Arthurs Low (HAL) Corporation was engaged by the Council through a competitive process to undertake the audit.

The audit includes assessments of: (1) the governance and strategic planning processes and the corporate structure; (2) the plans practices and processes used in the management of the Council’s assessment projects; and, (3) corporate management. It covers the period of the current Funding Agreement, that is from the Council’s formation in 2005 to March 31, 2013 with an emphasis on the period from 2009.

## Council Profile

The Council consists of a Board of Governors, a Scientific Advisory Committee, and a Secretariat. The assessment process includes the establishment of panels of independent experts comprised of fellows of the founding Member Academies of the Council (the Royal Society of Canada; the Canadian Academy of Engineering; and the Canadian Academy of Health Sciences) and others largely drawn from Canadian and international academic institutions.

Under a Funding Agreement with Industry Canada, the federal government can refer up to five questions per year to the Council for assessment. The Council may also conduct assessments outside of its agreement with the government including assessments for foundations, nongovernmental organizations, the private sector or any level of government. All assessment questions, regardless of source, and the resulting reports must be approved by the Council’s Board of Governors and made publicly available.

Since the Council’s inception, twenty-eight assessments have been undertaken within the Funding Agreement, of which fifteen have been completed and thirteen are in progress; six assessments have been undertaken outside the Funding Agreement, of which four have been completed and two are in progress; and two Council initiated projects have been undertaken, of

which one has been completed and one is in progress. Of the 34 ongoing and completed assessments, 38 per cent have been in the natural sciences and engineering, 29 per cent in the social sciences, 24 per cent in health sciences, and 9 per cent have been of a general nature (e.g., The State of Science and Technology in Canada).

## Findings

### **Audit Objective 1: Plans, practices and processes**

The processes for selecting and reviewing questions for assessment as well as the conduct, peer review and distribution of the assessment report are well developed and documented in the Council's Assessment Lifecycle Methodology (CALM) and has been followed in all Council assessments. CALM is an excellent and detailed guide on implementation steps for assessments, methodologies and report distribution that is reviewed regularly, reflecting the organization's continuous learning philosophy. The case studies and other interviews with sponsors, Council staff and members of the Board and Scientific Advisory Committee indicate that Council staff are familiar with and do follow the processes outlined in CALM. The Council's process for monitoring an assessment's progress and for measuring the impact of assessment reports is well established and thorough. As well, the length of time to complete an assessment in terms of the average number of months and the average cost per assessment are reasonable and comparable to the U.S. National Academy of Sciences (NAS) and U.K. Royal Society.

### **Audit Objective 2: Communication planning and processes**

External communications of the Council's assessments are managed efficiently and effectively. Council practice is to prepare a separate communication and distribution plan for each assessment, and in some cases, the Council's communication plans are coordinated with the sponsor's plans. Summary documents are also prepared such as the "News Release & Backgrounder" and "Report in Focus" which can be used at media events and conferences. The Council pursues all distribution avenues including social media, videos, pod casts, making reports available on Scribd and Google books, as well as on relevant LISTSERVs. Panel members, peer reviewer monitors and sponsors noted that the Council's credibility is growing and although it does not yet have the same recognition of the U.S. National Academy of Sciences or the U.K. Royal Society, each of which has been in existence for over 100 years, the quality of the Council's reports are considered by them to be comparable.

### **Audit Objective 3: Corporate management structure of the Council is appropriate**

The corporate structure was created with an emphasis on the production of high-quality assessments, the core business of the Council, and has been appropriate for that purpose. As the number of assessments has increased, and the work expanded, the structure has been adjusted to create assessment teams led by a Program Director with full responsibility for each assessment assigned to them. The roles and responsibilities of Council management and staff are clearly set out in corporate documentation. The Council operates with a "flat" organizational structure that

has 10 of the 34 employees reporting to the President. This is a situation that needs to be reviewed given increased emphasis to the other goals of the Strategic Plan such as sustainable funding as the Council moves beyond its start-up phase.

#### **Audit Objective 4: Financial, administrative and risk management policies, processes and practices**

The Council's financial, investment and risk management policies processes and practices are in place and appropriately monitored to ensure the responsible investment, expenditure and accounting of public funds. An Investment Committee has been created with clear terms of reference in accordance with the Funding Agreement and meets regularly. An Investment Advisor has been appointed and provides expert advice to the Investment Committee and senior management. The Council's Strategic Plan, policies and processes allow for the diversification of the sources for assessment questions and funding as called for in the Funding Agreement. The Council has undertaken a number of pilot projects to study possible approaches to diversification. We conclude that the Council's administrative obligations are being undertaken in an efficient and effective manner.

#### **Audit Objective 5: Human resources planning, management, and policies**

A review of staffing policies and practices found that the Council's human resources policies and planning are compliant with the relevant laws, regulations, requirements and policies. The human resources policies are effective in ensuring that the Council can deliver on its core business of providing high-quality, evidence-based assessments. The skills of the staff are appropriately aligned to deliver on the core business of the Council. However, the Council could benefit from increasing staff skills in strategic planning and marketing through training or acquisition. The rate of staff turnover has been manageable but could be an issue for the Council in the future if the rate continues.

#### **Audit Objective 6: Performance measurement frameworks and processes**

The Council has a performance measurement framework in its annual Corporate Plan that is in accord with the Funding Agreement. Performance measurement and monitoring mechanisms are in place for all goals of the Strategic Plan. The process for monitoring the conduct of Council assessments is based on the achievement of nine milestones with regular progress meetings. Those mechanisms are reliable and effective. Milestone targets for assessments are detailed, well monitored and working as intended to ensure the production of timely, high-quality assessments. The key performance framework and processes are in place and working as intended.

#### **Audit Objective 7: Processes for governance of the Council's assessments and activities**

The processes for governance of the Council are based on best practice governance policies. These policies guide the Council's core operational activity of conducting assessments that have to meet the standards of excellence fundamental to accomplishing the Council's mandate. The

direction provided by the Board of Governors supported by five Board Committees and the Scientific Advisory Committee has effectively managed the business of the Council allowing it to proceed in a comprehensive and timely fashion. All orders and resolutions of the Board are carried into effect by senior managers of the Council in close cooperation with the Board Chair with effective feedback provided to the Board. While the Board manages well with its current nomination and appointment process for Board members, issues with the process have been identified which the audit finds to have had an impact on the efficiency of the Board operations. These issues will need to be addressed in the context of new legislative provisions on the governance of non-profit corporations which require compliance by October 2014. The impact of this legislation on the Council is currently being examined by a Board Committee.

## **Recommendations**

### **Recommendation 1**

The Council should continue with its current plans, practices and processes, and continue to update CALM, in managing the Council's assessment operations and related activities.

### **Recommendation 2**

- (a) The Council should consider consulting with Industry Canada and assessment sponsors to identify other federal and other levels of government that should be briefed in advance of an official release.
- (b) The Council should consider in its corporate planning the period of time between the release of assessment reports on similar subject matter.

### **Recommendation 3**

- (a) The Council should consider creating a management level position to take on full operational responsibility for the assessments.
- (b) The Council should create new staff roles to address the increased focus on strategic planning and marketing as the Council moves toward the next phase of its funding.

### **Recommendation 4**

The Council should increase its emphasis on the diversification of its sources of both questions and funding by assessing the lessons learned from its pilot projects and engaging in increased marketing activities.

### **Recommendation 5**

Council management should expand the internal human resources review, led by the Human Resources and Compensation Committee, to include an analysis of the turnover issue and work on retention strategies.

**Recommendation 6**

The Council should continue its performance measurement strategy that includes the current mechanisms for monitoring the performance of the assessment process.

**Recommendation 7**

The Board should consider making the required changes to the nomination and election process for Board members in conformity with the Non-Profit Corporations Act 2009 and have the changes reflected in the Council's By-Laws in the context of the Council's submission to the government for renewal of its mandate. These changes would be pursuant to the necessary amendments being made to the Funding Agreement by Industry Canada.

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# 1. Introduction

## 1.1 Background

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The Council of Canadian Academies (the “Council”) is an independent, not-for-profit corporation that supports evidence based, expert assessments on the science underlying matters of significant public interest in Canada. The Council, supported by a 10 year, \$30-million grant from the Government of Canada under a Funding Agreement with Industry Canada, came into existence in 2005 and was fully operational by 2006.

Under the Funding Agreement, the Council is required to have an independent performance (value-for-money) audit completed by March 31, 2015. Hickling Arthurs Low (HAL) Corporation was engaged by the Council through a competitive process to undertake this performance audit.

## 1.2 Council Profile

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The Council’s mission is to provide Canadians with:

- the best available scientific knowledge with the objective of informing debate and decision- making;
- independent, authoritative and evidence-based assessments on the science underlying current and future issues of public interest; and
- a science voice nationally and internationally.

The Council consists of a Board of Governors, a Scientific Advisory Committee, and a Secretariat. The assessment process includes the establishment of panels of independent experts comprised of fellows of the founding Member Academies of the Council (the Royal Society of Canada; the Canadian Academy of Engineering; and the Canadian Academy of Health Sciences) and others largely drawn from Canadian and international academic institutions.

Under the Funding Agreement, the federal government can refer up to five questions per year to the Council for assessment. The Council may also conduct assessments outside of the Agreement including assessments for foundations, non-governmental organizations, the private sector or any level of government. All assessment questions, regardless of source, and the resulting reports must be approved by the Council’s Board of Governors and made publicly available.

The Council’s Assessment Lifecycle Methodology (CALM) is a detailed and comprehensive framework that outlines the processes and underlying activities that should be followed in a Council assessment. CALM is broken down into different phases as follows:

- Phase 0: Pre-Assessment involves defining and selecting proposals;
- Phase 1: Planning consists of engaging the chair, panel members and planning the conduct of the assessment;
- Phase 2: Content Development and Review includes developing report content, selecting the report review monitor and reviewers, and reviewing the report;
- Phase 3: Report Publication consists of editing, translating, figure design, report layout and printing of the final report;
- Phase 4: Report Dissemination involves developing a communication plan that articulates plans for promoting the report prior to release, detailing launch day activities and identifying strategic post launch activities. This phase also includes the development of a targeted distribution list, and distributing the report in electronic and hard copy, and finally preparing an analysis document of how the report was received within the first two weeks of its release; and
- Phase 5: Close-Out documents lessons learned from the assessment and communication process.

The distribution of assessments completed and ongoing within and outside the Funding Agreement by fiscal year is provided below in Figure 1-1. Since the Council's inception: (i) twenty-eight assessments have been undertaken within the Funding Agreement, of which fifteen have been completed and thirteen are in progress; (ii) six assessments have been undertaken outside the Funding Agreement, of which four have been completed and two are in progress; and (iii) two Council initiated projects have been undertaken, of which one has been completed and one is in progress. A list of completed and ongoing assessments, within and outside the Agreement, and Council initiated projects is provided in Appendix A.

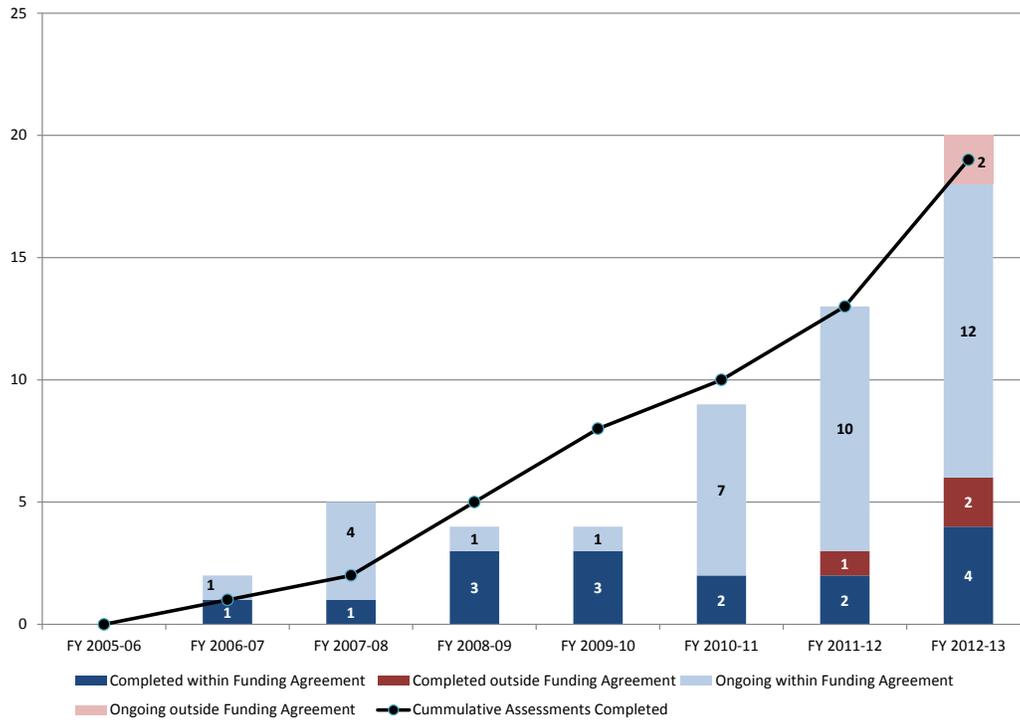
As shown below in Figure 1-2, of the 34 ongoing and completed assessments undertaken by the Council:

- Thirteen have been in the natural sciences and engineering,
- Ten in the social sciences,
- Eight in health sciences, and
- Three have been of a general nature (e.g., The State of Science and Technology in Canada).

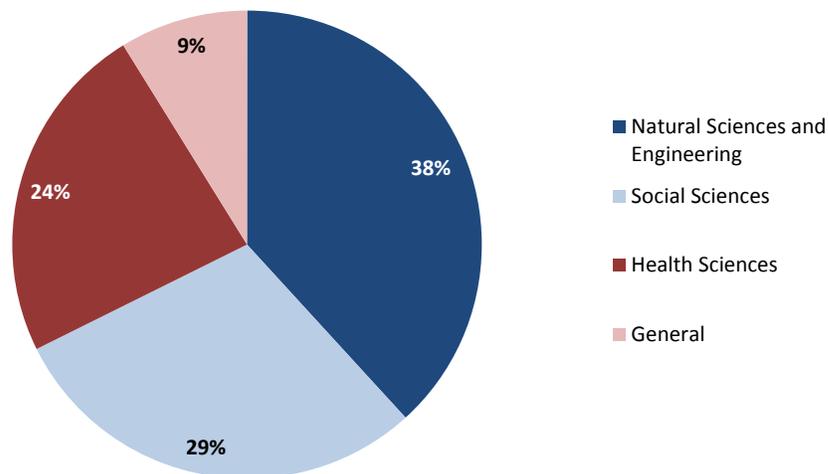
Of the 34 ongoing and completed assessments undertaken by the Council (Figure 1-3):

- Industry Canada has sponsored eight studies;
- Federal agencies, museums and councils have sponsored seven;
- Health Canada five;
- Natural Resources Canada four;
- Environment Canada two;
- Other federal ministries five; and
- Non-federal sponsors also at five.

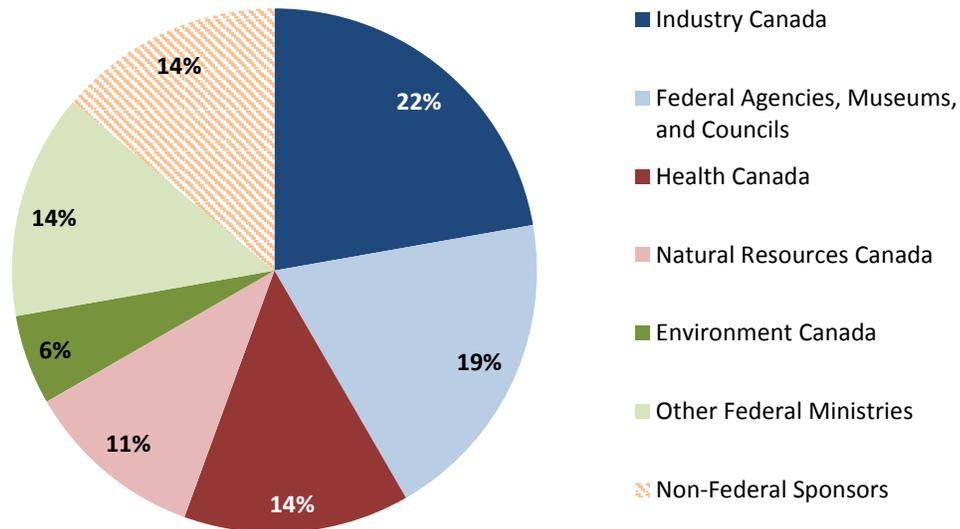
**Figure 1-1: Number of Completed and Ongoing Assessments, within and outside the Funding Agreement with Industry Canada, from fiscal year (FY) 2005-06 to 2012-13<sup>1</sup>**



**Figure 1-2: Distribution of Report Subjects, FY 2005-06 to 2012-13**



<sup>1</sup> One assessment undertaken outside the Funding Agreement was completed in April 2013 but has been included in the 2012-13 fiscal year.

**Figure 1-3: Distribution of Report Sponsorships, FY 2005-06 to 2012-13**

### 1.3 Audit Purpose and Scope

The purpose of the performance audit is to assess the economy, efficiency and effectiveness with which Council funds have been used. The audit includes assessments of: (1) the governance and strategic planning processes and the corporate structure; (2) the plans practices and processes used in the management of the Council's assessment projects; and, (3) corporate management, including the financial administration and risk management policies and processes, human resources management and policies, communications plans, projects and practices, and the framework and processes for performance measurement and monitoring. It covers the period of the current Funding Agreement, that is from the Council's formation in 2005 to March 31, 2013 with an emphasis on the period from 2009 when processes, plans and practices were governed by the Council's Assessment Methodology of 2009.

### 1.4 Audit Objectives and Criteria

The performance audit objectives proposed by Council Management and audit criteria proposed by HAL are set out in Figure 1-4 below. These audit objectives and criteria were explored and refined during the Survey Phase through the document review and preliminary interviews and discussion with the Council.

**Figure 1-4: Audit Objectives and Criteria**

Audit Objective	Audit Criteria
<b>Assessment Reports</b>	
<p>The plans, practices and processes that are in place are appropriate for the economical, efficient and effective<sup>2</sup> management of the Council's assessment operations and related activities.</p>	<ul style="list-style-type: none"> <li>– The Council's practices and processes in the management of its assessments are economical and efficient in responding to the needs of sponsors and addressing the question(s) that have been asked based on:               <ul style="list-style-type: none"> <li>• Understanding context of the assessment and sponsor needs</li> <li>• Defining the scope of assessments</li> <li>• Successful recruitment of experts as panel members</li> <li>• Timely conduct of assessments</li> </ul> </li> <li>– The Council's assessment methodologies are sound and comparable with what is being done by similar organizations in other countries</li> <li>– The Council makes effective and efficient use of its Board, Scientific Advisory Committee, Council staff, Member Academies, expert panels, and individual peer reviewers.</li> <li>– The cost of conducting Council's assessments is appropriate in the context of providing evidence-based, high quality, expert panel reports in both official languages and is comparable with other similar organizations.</li> <li>– Performance measurement and monitoring mechanisms are used to support efficient and effective corporate and assessment management.</li> </ul>
<p>Communication planning and processes are allowing for the economical, efficient and effective external communication to key audiences regarding Council assessments and the organization overall.</p>	<ul style="list-style-type: none"> <li>– Communication plans, process and programs are efficient and effective in creating awareness of the Council and its programs and activities among audiences in government, universities, private sector and the general public.</li> <li>– The Council is recognized nationally as a highly credible scientific organization providing independent, authoritative, expert advice in public policy making.</li> </ul>
<b>Corporate Management</b>	
<p>The corporate management structure of the Council is appropriate to meeting its mandate and reaching results in an economical, efficient and effective manner.</p>	<ul style="list-style-type: none"> <li>– The corporate structure is appropriate to meeting the Council's mandate.</li> <li>– The corporate structure is appropriate to the economical, efficient and effective operation of the Council; that is, Council operations are balanced and appropriate to providing high quality, bilingual products.</li> <li>– Any gaps in the corporate structure are identified and</li> </ul>

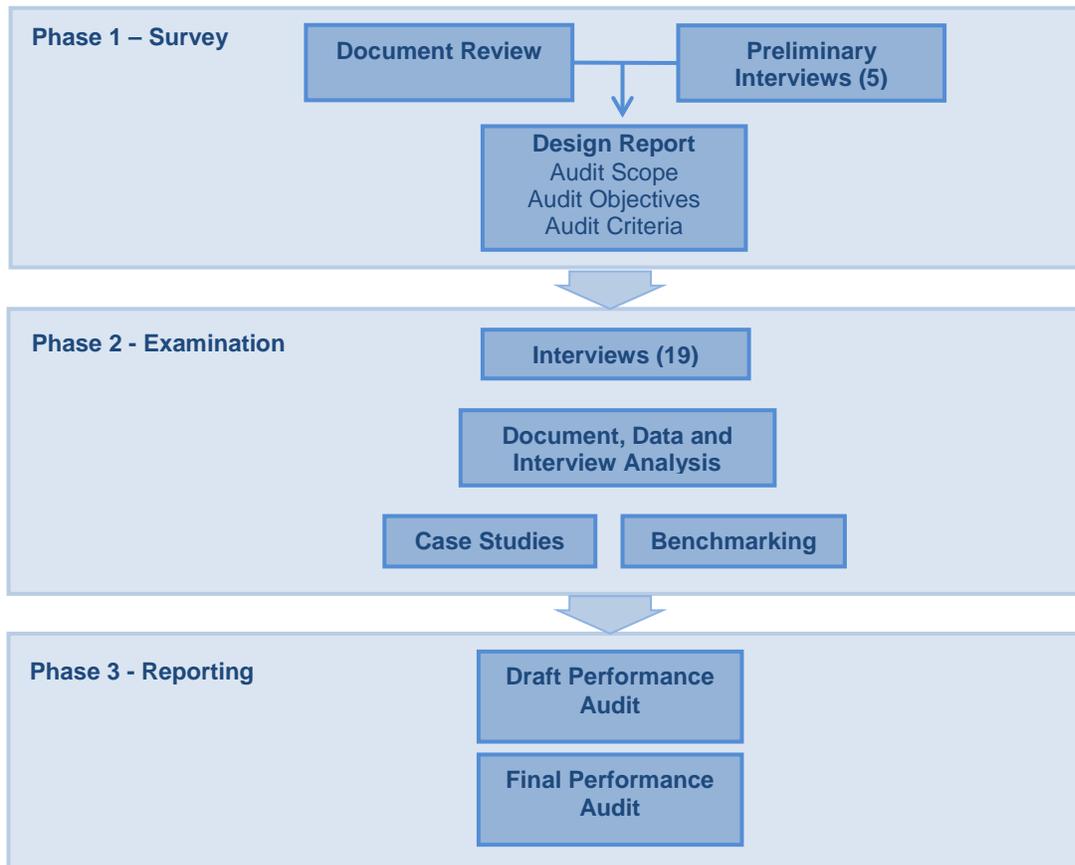
<sup>2</sup> The Treasury Board of Canada refers to effectiveness as “the extent to which an organization, policy, program or initiative is meeting its expected results”; operational efficiency as to “how inputs are being used and converted into outputs”; and “economy is said to have been achieved when the cost of resources used approximates the minimum amount of resources needed to achieve expected outcomes”. For purposes of the performance audit these definitions are used.

Audit Objective	Audit Criteria
	<p>acted upon.</p> <ul style="list-style-type: none"> <li>– Roles and responsibilities of Council management and staff are clearly set out in the corporate structure.</li> </ul>
<p>The financial, administrative and risk management policies, processes and practices support the economical, efficient and effective operation of the Council.</p>	<ul style="list-style-type: none"> <li>– Financial, investment and risk management policies processes and practices are in-place, appropriate and monitored by senior management and ensure the responsible investment, expenditure and accounting of public funds based on: <ul style="list-style-type: none"> <li>• The establishment of an Investment Committee with clear terms of reference that is used efficiently and effectively and the appointment of an Investment Advisor.</li> </ul> </li> <li>– The Council's policies and processes allow for the diversification of funding and sponsor sources and broadening the range of questions and federal sponsors.</li> <li>– The Council's administrative obligations are being undertaken in an efficient and effective manner.</li> </ul>
<p>Human resources planning, management, and policies are up-to-date and economical, efficient and effective in ensuring that the necessary human resources are available.</p>	<ul style="list-style-type: none"> <li>– The Council's human resources policies, planning and management ensure the Council is able to efficiently and effectively deliver on its core service, evidence-based assessments, based on planning and policies that are compliant with relevant employment laws, regulations, requirements and policies.</li> <li>– The skills of Council staff are appropriately aligned and adequate to address the requirements of the Council's Strategic Plan.</li> <li>– Staff performance is appropriately planned and managed.</li> </ul>
<p>Performance measurement frameworks and processes are in place and working as intended.</p>	<ul style="list-style-type: none"> <li>– Performance targets have been established against which the Council's programs, activities and management can be assessed.</li> <li>– Performance measurement and monitoring is reliable and consistent.</li> <li>– Performance measurement and monitoring mechanisms are used to support efficient and effective corporate management.</li> </ul>
<p><b>Governance</b></p>	
<p>Processes for governance of the Council's assessments and activities provide reasonable assurance that the assessments and associated activities are consistent with meeting the mandate of the Council.</p>	<ul style="list-style-type: none"> <li>– The direction provided by the Board of Governors ensures the Council's resources are well managed and allows for the long-term strategic positioning of the Council</li> <li>– The Board has the necessary plans and processes in place, including appropriate committees, to ensure that the Council's mandate is being met.</li> <li>– Board decisions are followed-up in an efficient and effective manner.</li> <li>– Selection of Board members operates in an efficient and effective manner.</li> </ul>

## 1.5 Audit Approach and Methodologies

The performance audit was carried out in accordance with the performance audit policies of the Office of the Auditor General of Canada (2004). As described schematically in Figure 1-5, the audit proceeded in three phases. Phase 1 was the Survey (Planning) Phase, which included a broad based appraisal of the Council's operations through document review and five preliminary interviews with selected senior managers of the Council and members of the Board of Governors to provide information to fine tune initial decisions with respect to scope, audit objectives, audit criteria and areas for more in-depth review.

**Figure 1-5: Audit Approach**



Phase 2 was the Examination (Data Collection) Phase which involved a thorough analysis of the Council's data and documents that served several purposes. In addition to helping understand the organization, the review, amplified through 19 in-depth interviews with selected stakeholder groups as shown in Figure 1-6, was critical to identifying the main management and assessment processes and structures that were in place and, drawing from best practices, to determining whether they were adequate and operational (effective), efficient and cost effective (economical).

**Figure 1-6: Distribution of Examination Phase Interviews by Stakeholder Group**

Stakeholder Group	Number of Interviews
Council Senior Managers	2
Council Staff: Program Directors, Coordinators	3 (4 people)
Council Board and Scientific Advisory Committee (SAC)	3
Expert Panel	2
Sponsors	3 (7 people)
Peer Review Monitors	2
Royal Society, United Kingdom	2
National Academy of Sciences, United States	2
<b>Total</b>	<b>19</b> (24 people)

This phase also included the benchmarking of the Council's performance against two<sup>3</sup> organizations with similar mandates to the Council as independent sources of expert scientific assessments, namely: (1) the Royal Society in the United Kingdom, and (2) The National Academy of Sciences in the United States. The results of the benchmarking exercise are provided in Appendix B.

The Examination Phase also included two case studies, selected in consultation with senior managers of the Council, that focused on the assessment process from the beginning of the assessment (the referral of the question), through the research, drafting and peer review to reporting and publication. The case studies provided valuable insight for the performance audit on the efficiency and effectiveness of the assessment process and were a preferred approach compared to a broad but more shallow sampling of the total 34 assessments. The two case studies, which are provided in Appendix C, included *State of Science and Technology in Canada, 2012* and *Informing Research Choices: Indicators and Judgment, 2012*.

Phase 3 was the Reporting Phase, which brought together the analysis, findings, and recommendations in a structure and style that conformed to audit standards, met the requirements of Industry Canada, and would be useful to Council management.

<sup>3</sup> A third proposed organization, the InterAcademy Council, was not included in the benchmarking exercise as we were unable to arrange an interview with a representative from the organization's secretariat, which is staffed by three people. Information on the InterAcademy Council is available at <http://www.interacademycouncil.net/>

## 2. Audit Findings

### 2.1 Assessments

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#### 2.1.1 Audit Objective 1:

**The plans, practices and processes that are in place are appropriate for the economical, efficient and effective management of the Council's assessment operations and related activities.**

**Summary Findings:** The processes for selecting and reviewing questions for assessment as well as the conduct, peer review and distribution of the assessment report are well developed and documented in the Council's Assessment Lifecycle Methodology (CALM) and has been followed in all Council assessments. CALM is an excellent and detailed guide on implementation steps for assessments, methodologies and report distribution that is reviewed regularly, reflecting the organization's continuous learning philosophy. The case studies and other interviews with sponsors, Council staff and members of the Board and Scientific Advisory Committee indicate that Council staff are familiar with and do follow the processes outlined in CALM.

As the quality of an assessment depends largely on a thorough understanding of the sponsor's needs, the proper scope of the assessment and recruitment of a high calibre expert panel appropriate to addressing the assessment question, the Council devotes considerable effort to this critical initial stage of an assessment. Although the process is well-developed, measures have already been implemented to streamline the selection process such as liaising with the Scientific Advisory Committee (SAC) in parallel with examination of the question by the Inter-Departmental Working Group of the Assistant Deputy Minister (ADM) Science and Technology Subcommittee (IDWG).

To ensure a quality assessment that meets the needs of the sponsor, the Board and SAC are consulted at key milestones of every assessment's lifecycle, Member Academies are consulted for potential panel members and peer reviewers, an initial meeting held between the expert panel and assessment sponsor to ensure a thorough understanding of the context and scope of the question, and peer reviewers comments are prioritized and all comments addressed. Council staff was noted by sponsors, panel members and peer review monitor interviewees as being professional and supportive throughout the assessment process.

The Council's process for monitoring an assessment's progress and for measuring the impact of assessment reports is well established and thorough. As well, the length of time to complete an assessment in terms of the average number of months and the average cost per assessment are

reasonable and comparable to the U.S. National Academy of Sciences (NAS) and U.K. Royal Society (the “Society”).

**Audit Criterion 1.1: The Council’s practices and processes in the management of its assessments are economical and efficient in responding to the needs of sponsors and addressing the question(s) that have been asked based on: (i) Understanding context of the assessment and sponsor needs; (ii) Defining the scope of assessments; (iii) Successful recruitment of experts as panel members; (iv) Timely conduct of assessments.**

Through the case studies we found that considerable effort is expended by Council staff to understanding the context of the assessment, the needs of the sponsor and to defining the scope of the assessment. Initially, this involves Council staff engaging with Industry Canada as the link to the sponsor and then meeting with the sponsor before Industry Canada submits the proposal to the Inter-Departmental Working Group of the Assistant Deputy Minister (ADM) Science and Technology Subcommittee (IDWG). It is through these informal discussions with the sponsor that Council staff are provided with a better understanding of the needs, context and scope of the assessment. Preliminary work by the Council, including the outcome of these informal discussions between the sponsor and Council staff, is often distributed to SAC and Industry Canada for initial reaction and feedback. By the time the proposal is formally submitted to the IDWG, there is greater assurance that the scope of the question meets the needs of the sponsor and that the Council’s process is appropriate and can adequately assess the topic.

While recognizing the issue is outside the control of the Council, some concern was noted by sponsors about the length of time the process takes and the timing of Ministerial approval. It is noted, however, that measures have already been implemented by Industry Canada to streamline the selection process. As is the case, the Council takes the draft selection to SAC in parallel to the IDWG process.

The recruitment of panel members begins with the process for selecting and reviewing questions for assessment. This includes an examination of background and grey literature, peer-reviewed literature, attendance at conferences, etc., which not only contributes to an understanding of the question but also helps to identify possible candidates and compositional guidelines. A letter is also sent by the Council President to Member Academies seeking suggestions for potential members.

Once compositional guidelines for panel membership are set and approved by SAC, the short list of panel members is approached by Council staff. The chair is appointed by the Board before the rest of the Panel, and can comment on the proposed slate. Panel membership including a short description of the strengths of each individual is presented to the Board for approval. A similar practice is followed for engaging reviewers and review monitors. Panel members and peer review monitors indicated that their roles, responsibilities and anticipated level of commitment were clearly outlined prior to their acceptance.

An initial meeting is held with the sponsor and the expert panel. This allows the sponsor to convey directly to the expert panel their needs and expectations of the assessment, and for the expert panel to ensure they have a thorough understanding of the context and scope of the assessment and how it will address the needs of the sponsor. Both the sponsor and expert panel interviewees were very complimentary of the support given by and calibre of Council staff.

A review by this study of a sample of completed assessments (seven)<sup>4</sup> over the past three years indicated that on average it takes about 25 months (the shortest being 16 months and the longest taking 34 months) to complete an assessment. This consists of an average six months from the time of receipt of the question to the first meeting with the expert panel and sponsor; an average of 14 months for content development and peer review; and an average of five months for translation, production and release.

The range of time for assessments (16 to 34 months) is comparable to the range of time taken by U.S. NAS which takes between four and 48 months to complete, and the U.K. Society which takes about six months for smaller studies and about 18 to 24 months for larger studies. Further details on the results of the benchmarking exercise are provided below under Audit Criterion 1.4.

**Audit Criterion 1.2: The Council’s assessment methodologies are sound and comparable with what is being done by similar organizations in other countries.**

CALM outlines the roles and responsibilities of different stakeholders in the assessment process from the sponsor and IDWG, Board and SAC, senior management and program director, panel chair and members, to the review monitor and reviewers and the Council’s communications. As well, CALM provides a detailed guide on implementation steps for assessments, report production and distribution.

The case studies, including interviews with Council staff and senior managers, sponsors, panel members, and peer review monitors indicates that Council staff are familiar with and do follow the processes outlined in CALM. At the end of each assessment, Council staff consult sponsors, panel members, peer reviewers and peer review monitors for lessons learned, and if necessary, adjustments or tweaks are made. We understand that a more formal review of CALM is being completed and a new version is expected to be released later this year.

The main features of CALM are very similar to methodologies employed by the U.S. NAS and U.K. Society, specifically:

- Overall guidance by an advisory group;

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<sup>4</sup> The seven completed assessments included: 1) Water and Agriculture in Canada: Towards Sustainable Management of Water Resources (February 2013); 2) The State of Science and Technology in Canada, 2012 (September 2012); 3) Informing Research Choices: Indicators and Judgment (July 2012); 4) Integrating Emerging Technologies into Chemical Safety Assessment (January 2012); 5) Healthy Animals, Healthy Canada (September 2011); 6) Canadian Taxonomy: Exploring Biodiversity, Creating Opportunity (November 2010); and 7) Honesty, Accountability and Trust: Fostering Research Integrity in Canada (October 2010).

- Development of the assessment report by a volunteer panel of experts;
- Review of the draft report by a group of peers; and
- Support to the panel and reviewers and the publication and distribution of the assessment report by staff.

To date, about 85 per cent of the assessments undertaken by the Council have been commissioned by the federal government, the remaining 15 per cent have been pilot projects (five). By comparison, 80 per cent of the assessments undertaken by the U.S. NAS are commissioned by government, while most of the assessments the U.K. Society undertakes are selected and funded by the Society; only occasionally does the Society carry out studies commissioned by government.

**Audit Criterion 1.3: The Council makes effective and efficient use of its Board, Scientific Advisory Committee, Council staff, Member Academies, expert panels, and individual peer reviewers.**

The *Board*, as outlined in CALM, is responsible for establishing policies to guide the assessment process, approving assessment proposals, approving the appointment of the panel chair and panel members, appointing the report review monitor and overseeing the report review phase through the Report Review Monitor, and approving the public release of the final report. A review of minutes of Board meetings over the past couple of years indicates that the Board is consulted at key milestones of assessments' lifecycle. Council staff, and in particular program directors, attend Board meetings as observers so that any questions or issues pertaining to a particular assessment can be readily addressed.

*The Scientific Advisory Committee (SAC)* is responsible for assisting the Board in these activities as well as in the development and approval of compositional guidelines for the panel. As illustrated in the two case studies and referenced above in Audit Criterion 1.1, in addition to these responsibilities, SAC is also consulted once or twice in the pre-assessment phase regarding the selection and review of questions for assessment.

*Member Academies*, as noted above and in the two case studies, are consulted by the Council regarding the identification of potential candidates for panel membership and reviewers. It should also be noted that many Council Board and SAC members are Fellows of Member Academies.

*Expert Panels* were noted by sponsors as being very high level and appropriately constituted that reflected all needed perspectives for successfully undertaking the assessment. In addition, panel members and sponsors appreciated having the opportunity to meet before work on the assessment begins to better understand and refine the context and scope of the question and how the assessment could best address the needs of the sponsor. A panel member summarized the sentiment very well by noting, "the Council kept us all organized, they were really interested in plumbing the depths of our knowledge, and the knowledge of all panel members."

*Peer Review Monitors* indicated that the Council’s process of categorizing comments along three priority areas (major, minor, and editorial) provided an efficient and effective framework for allocating proportionately more time and dealing with “real problem” issues first. One monitor, who had also participated as a reviewer for the U.S. NAS felt that the Council’s peer review process was better because of the Council’s practice of categorizing comments and because every single comment is addressed even those of a minor or editorial nature; and that both the U.S. NAS and U.K. Society could learn from the Council’s review process.

*Council Staff* was noted by peer review monitors, sponsors and in particular panel members as being extremely professional and supportive in identifying and selecting panel members, reviewers and peer review monitors, in the development of content and review of the assessment, as well as in the publication and distribution of the report.

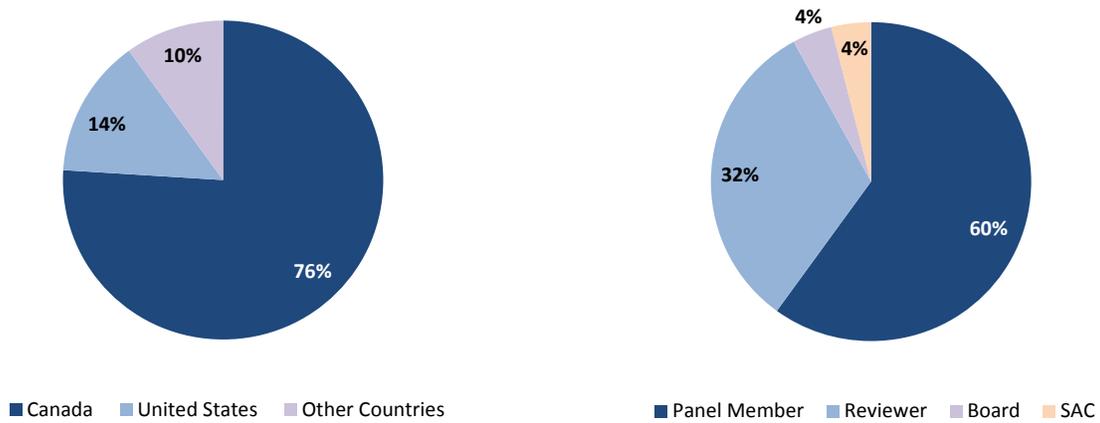
The contribution of voluntary support to the Council’s work (e.g. SAC, panel members, reviewers) is significant both in terms of its effectiveness and its efficiency. The value of the contribution has been estimated to be \$13.6 million since 2005. This figure is based on the amount of time spent on Council activities determined through a survey of volunteers and average per diem rate of the volunteers set at \$1,200.

The Council is well aware of the importance of this support and expends a great deal of effort on recognizing its value by: a) sending a letter to the volunteer’s organization, usually the president of a university, along with a copy of the assessment report thanking them for their contribution; b) acknowledging the volunteers’ contribution with a plaque to inform a wider audience of their contribution; c) providing each volunteer with a pin to show they are part of the “Council family”; and d) placing an advertisement in university papers during National Volunteer Week thanking volunteers by name.

The geographical composition of volunteers and the breakdown by Council activity is shown in Figure 2-1. As indicated in the figure, 76 per cent of the volunteers are from Canada, 14 per cent from the United States and ten percent from other countries. Most (60 per cent) of the volunteers support the Council as panel members, followed by 32 per cent who are reviewers, four per cent are Board members and four per cent are members of the SAC.

We find the Council to have achieved a successful balance between effective use of its corporate structure in focusing on the quality of its assessments as the Council’s core function and operating in an efficient manner in terms of time and resources.

**Figure 2-1: Geographical Composition of Volunteers and Breakdown by Council Activity of Volunteers**



**Audit Criterion 1.4: The cost of conducting Council’s assessments is appropriate in the context of providing evidence-based, high quality, expert panel reports in both official languages and is comparable with other similar organizations.**

The results of a benchmarking exercise comparing the Council’s assessment process to the processes of the U.S. NAS and the U.K. Society for their studies in terms of the number of panelists and staff, length of time to complete an assessment and the cost per assessment are shown in Table 2-1. As indicated in the table, these factors in the Council’s assessment process are comparable to both the U.S. NAS and U.K. Society.

The U.S. and U.K. can and do complete studies in fewer months and at a lower cost, but they also undertake studies that take longer and cost more than studies undertaken by the Council. This is because both the U.S. and U.K. undertake both smaller studies which take about four to six months and cost around \$250 thousand as well as larger studies which can take up to two to four years and can cost up to \$2.5 million. When the comparison is made against larger studies conducted by the Council, which constitute the majority of the Council’s assessments to date, the length of time to complete an assessment in terms of the average number of months and the average cost per assessment are comparable. This suggests that staff costs and panel costs of the NAS, Royal Society and Council which constitute the major factor in assessment costs in all three organizations are similar.

**Table 2-1: Comparison of Assessment Costs and Effort amongst the Council, U.S. NAS and U.K. Society**

Organization	Average Number of Panelists per Assessment	Average Number of Staff per Assessment	Average Number of Months to Complete an Assessment	Average Cost per Assessment (Canadian \$)
U.S. NAS	10 – 20	3 – 4	4 – 48	\$250K – \$2.5M
U.K. RS	12 – 15	3 – 4	6 – 24	\$250K – \$700K
Council	10 – 20	3 – 4	12 – 30	\$450K - \$850K

A review of a sample of seven recently completed assessments<sup>5</sup> on variance between planned and actual costs found average actual costs of \$649 thousand per assessment were \$16 thousand less than average planned costs per assessment of \$665 thousand (i.e., actual costs varied from planned costs by less than three per cent). This minor variance between planned and actual costs either positive or negative was due to differences in actual costs associated with operating the expert panels.

**Audit Criterion 1.5: Performance measurement and monitoring mechanisms are used to support efficient and effective corporate and assessment management.**

The case studies indicate the main monitoring mechanism used by the Council is milestone meetings, involving the Council’s Program Director, other staff associated with the assessment and senior management of the Council. While budget performance is a regular topic at milestone meetings, the Council also reviews the assessment’s progress (where the assessment is in the schedule, how the research and writing are coming and any issues that might cause delays), and if there are any significant problems options to address these problems are discussed. The milestones, as outlined in CALM, include: 1) proposal accepted; 2) panel engaged; 3) report plan complete; 4) content ready for review; 5) report content approved; 6) release to sponsor; 7) report release; 8) dissemination complete; and 9) project closed.

The project close-out reports document lessons learned from the assessment and communication processes; they outline what went well, what went wrong, and what should be done next time. In addition to the milestone meetings, program directors provide bi-weekly status updates to the President. The Program Director and other Council staff assigned to an assessment ask panel members and reviewers for feedback and for any suggestions on how the process could be improved. Both panel members and peer review monitors indicated that the Council is always operating in a “continuous learning and improvement” mode. We agree with this observation, finding that the post assessment review process enhances the learning culture of the Council.

The case studies indicate that the Council’s practice for measuring the performance of its assessment process is comparable to the practices of the U.S. NAS and U.K. Royal Society. Both

<sup>5</sup> The seven completed assessments are the same as mentioned in the previous footnote (#1)

have recognized in the case study interviews that measuring the impact of reports is an inexact methodology. On a formal basis, the Council: 1) monitors and collects information on the number of downloads from its web site for each assessment report, the number of downloads from Scribd and Google books; 2) surveys the sponsor a year after release to see if the assessment report met the needs of the sponsor, how the assessment report informed the work of the sponsor, and so forth; 3) panel members are asked to report to the Council any citation or use of the assessment report such as at an international conference; and 4) citation analysis<sup>6</sup> is planned to take place approximately two years after the release of the assessment report. On an informal basis, the Council gathers announcements and other communications by Ministers and senior officials, conducts scans (e.g., media, internet) for citation or use of Council assessment reports by provincial governments, and obtains additional information by “word of mouth” from other stakeholders.

### **2.1.2 Audit Objective 2:**

**Communication planning and processes are allowing for the economical, efficient and effective external communication to key audiences regarding Council assessments and the organization overall.**

**Summary Findings:** Our finding is that communication planning and practices by the Council are effective. The practices also appear to be efficient in terms of time and resources. Council practice is to prepare a separate communication and distribution plan for each assessment; the Council’s communication plans are sometimes coordinated with the sponsor’s plans. The case studies found that panel members are also consulted regarding the composition of the distribution list, with some being asked to participate in communication events. Summary documents are also prepared such as the “News Release & Backgrounder” and “Report in Focus” which can be used at media events, conferences, and so forth. The Council pursues all distribution avenues including social media, videos, pod casts, making the report available on Scribd and Google books, as well as on relevant LISTSERVs.

As noted in the case studies, sponsors appreciated being briefed on the report one week in advance of its official release. The briefing provides a detailed overview of key findings and helps the sponsor to understand the results and to prepare for any questions that the media may have. The Council currently consults with the sponsor on whether other departments should be briefed. By comparison, the U.K. Royal Society briefs all key government stakeholders on the major findings and recommendations a few days in advance of a report’s official release.

Panel members, review monitors and sponsors noted that the Council’s credibility is growing nationally and internationally. Although the Council does not yet have the same level of

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<sup>6</sup> It is noted that we did not review citation analysis as part of the two case studies as both assessments were completed in 2012; i.e., the citation analysis will take place in 2014.

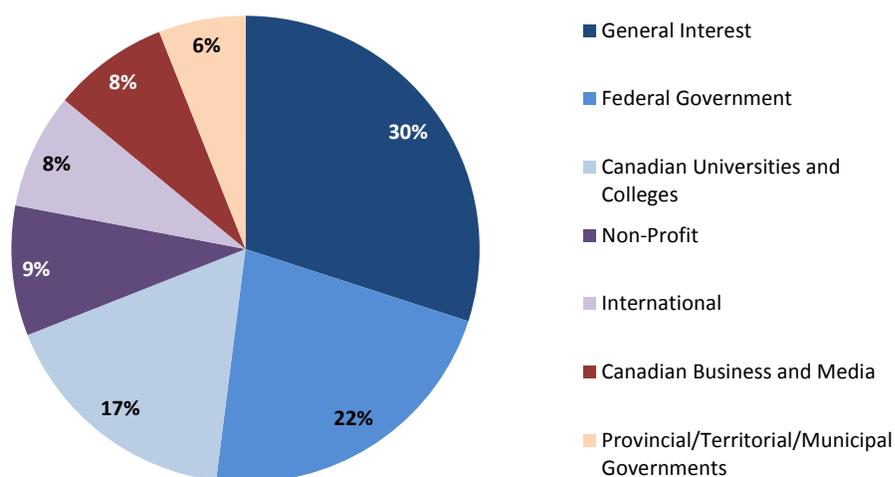
international recognition as the U.S. National Academy of Sciences or the U.K. Royal Society, each of which has been in existence for over 100 years, interviews with representatives of these two academies considered the quality of the Council’s reports to be comparable to their own.

**Audit Criterion 2.1: Communication plans, process and programs are efficient and effective in creating awareness of the Council and its programs and activities among audiences in government, universities, private sector and the general public.**

Council communication plans and practices for the release of assessments are effective in reaching a broad cross section of Canadians representing both specialized and general interests and building awareness of the Council. Communication plans identify the audience for each assessment, e.g., scientists, policy makers, stakeholders and national media, as well as the approach that will be used to release the report. Based on a distribution in March 2013, for example, for the assessment report on Innovation Impacts: Measurement and Assessment (see Figure 2-2), general interest accounted for 30 per cent of the list, followed by the federal government at 22 per cent, Canadian universities and colleges at 17 per cent, non-profit organizations for nine per cent, organizations outside Canada for eight per cent, Canadian business and media also for eight per cent, and provincial/territorial and municipal governments for six per cent. Distribution lists for hard and electronic copies of the report may differ to account for variations in the audiences for the two formats.

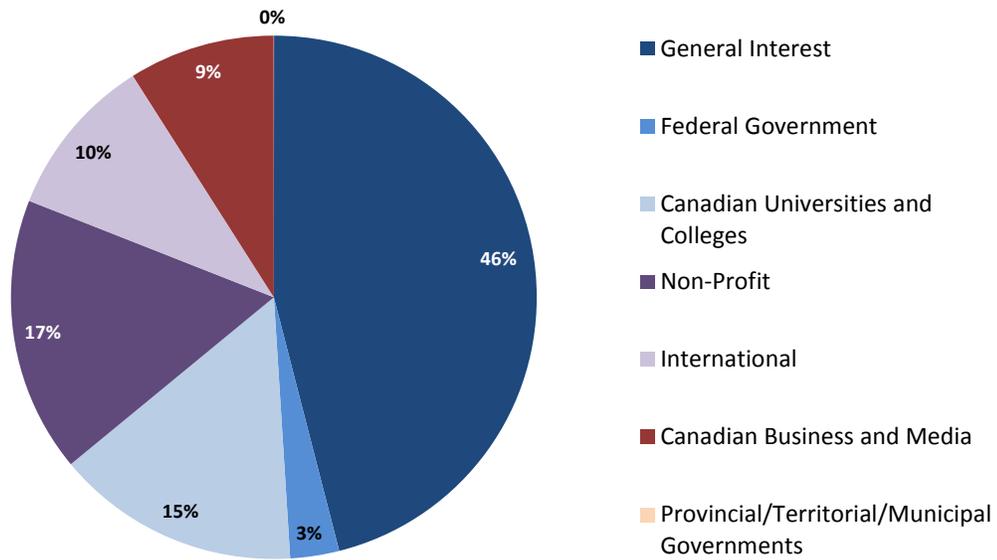
The Council’s practice is to prepare a separate communication and distribution plan for each assessment, and as noted in the case studies, the Council’s communication plans are sometimes coordinated with the sponsor’s plans, e.g., the sponsor posts the Council’s link for the assessment report on their web site at the time of release.

**Figure 2-2: Mailing List Composition to Approximately 1,200 People in March 2013**



Summary documents are also prepared such as the “News Release & Backgrounder” and “Report in Focus” which can be used at media events, conferences, and so forth. The Council pursues all distribution avenues including social media, videos, pod casts, making the report available on Scribd and Google books, as well as on relevant LISTSERVs.<sup>7</sup> The twitter composition of 450 accounts in January 2013 is shown below in Figure 2-3 as an example. We find that the communication process is efficient in creating awareness through this broad use of different mechanisms to distribute and make known the assessment reports.

**Figure 2-3: Twitter Composition of Approximately 450 Accounts in January 2013**



The case studies found that sponsors appreciated being briefed on the report a few days in advance of its official release. The briefing provides a detailed overview of key findings and allows them time to prepare media lines and brief their Ministers. A sponsor summarized the sentiment very well by noting that, “we have an interest in good communications as well because it is important to generate debate on the report and the issues that will influence public policy decisions that might emerge from that report.”

Panel members, as noted in the case studies, were equally impressed with the Council’s communication and distribution activities. Panel members were asked by Council staff for their advice regarding the composition of the distribution list, and they had the opportunity to review and comment on presentations and other material summarizing the assessment report in advance. A panel member described the communication process for one assessment as follows: “we had a

<sup>7</sup> LISTSERV refers to electronic mailing list software applications that allow a sender to send one email to the list, and then transparently send it on to the addresses of the subscribers to the list.

conference call media session across the country with 18 media types and we included two other members of the Panel from across the country to respond to questions.”

As noted in the benchmarking exercise, the U.K. Society briefs key government stakeholders in advance of a report’s official release. It is noted, however, that the Society selects and funds its own studies, there is no sponsor. As a courtesy, therefore, and to ensure wider discussion and impact of the report, a briefing is given to key government stakeholders on the major findings and recommendations a few days in advance of a report’s official release; such as briefing the Departments of Energy and Environment for a study by the U.K. Society on fracking. Currently, the Council consults with the sponsor on whether other departments should be briefed.

**Audit Criterion 2.2: The Council is recognized nationally as a highly credible scientific organization providing independent, authoritative, expert advice in public policy making.**

We find the Council to have developed a solid reputation in Canada for high quality reports. Sponsors interviewed by the study noted that the Council’s credibility is growing, reflecting an admirable performance for such a young organization. Panel members concurred and added as noted previously that while the Council does not yet have the same level of recognition as the U.S. NAS or the U.K. Society the quality of the Council’s reports are comparable. Peer Review Monitors noted that Council recognition is growing amongst the academic community in Canada but added that many of the Council’s reports are narrow and of interest to only a limited audience. Similarly, international recognition can be confined to communities with a particular interest in the topic of the report.

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## **2.2 Corporate Management**

### **2.2.1 Audit Objective 3:**

**The corporate management structure of the Council is appropriate to meeting its mandate and reaching results in an economical, efficient and effective manner.**

**Summary Findings:** The corporate structure has been appropriate to the emphasis placed by the Council on the production of high-quality assessments – the core business of the Council. As the number of assessments has increased, and the work expanded, the structure has been adjusted. For example, assessment teams led by a Program Director with full responsibility for each assessment assigned to them, have been created. The roles and responsibilities of management and staff in the corporate structure are clearly set out in the corporate documentation. We find, however, that one element of the structure needs to be reviewed that is the number of staff reporting directly to the President.

**Audit Criterion 3.1: The corporate structure is appropriate to meeting the Council's mandate.**

The principal mandate of the Council is to conduct assessments for the federal government and other sponsors. The Council has expressly planned to concentrate its efforts on ensuring the high quality of the assessments that it does produce. The corporate structure has been designed to provide those quality assessments. It has been tested in the last eight years and, while it has performed well, it has also evolved over that period as the Council has matured and grown. For example, assessments are now managed in a team approach with the Program Director supported by a Research Associate and Program Coordinator to ensure effective support to the expert panels.

Internal respondents and external commentators are of the view that the corporate structure and processes, as designed and implemented, ensure that the core business of assessments is accomplished effectively. As noted in the discussion of Audit Criterion 1.4, the length of time required to complete assessments ranges from 12 to 30 months, with an average of about 25 months. While these periods are consistent with the benchmarked international organizations, we were unable to assess the efficiency of the process. Based on our review of the Council's operations and the benchmarked organizations we find that the corporate structure is currently appropriate to meeting the Council's core mandate.

A positive working relationship between the Board and staff also contributes to the ability of the Council to meet its mandate. While the President remains responsible to the Board for all the work of Council staff, the President engages senior staff in meetings with the Board as necessary to ensure direct and constructive communication of the work.

The corporate structure includes the relationship between the Member Academies (the "members" of the corporation) and the Board of Governors. This relationship can have an effect on the ability of the Council to meet its mandate. Because this is also a governance matter, the issue is dealt with in Audit Objective 7.

**Audit Criterion 3.2: The corporate structure is appropriate to the economical, efficient and effective operation of the Council; that is, Council operations are balanced and appropriate to providing high quality, bilingual products.**

Generally speaking, the current corporate structure is appropriate to the economical, efficient and effective core operation of the Council; that is, the generation of high-quality, evidence-based assessments. However, there is an emerging need for further evolution of the structure to maintain the effectiveness of management given the increased numbers of assessments, the associated increase of staff, and the need to attain the other goals of the Strategic Plan. There are efficiencies to be gained in the appropriate delegation of emerging responsibilities to staff.

It was noted by respondents that during the early days of the Council, the President was in a position to be heavily engaged in the actual processes for all assessments. As the volume of work

associated with the assessments has increased, that arrangement is no longer possible and adjustments have been made to relieve the President of the need to be directly involved in every assessment. Currently, however, it remains that ten of the 34 staff report to the President, suggesting that further adjustment of the corporate structure may be necessary to allow the President to continue to expand the emphasis on other goals of the Strategic Plan.

The structure of the assessment team (Program Director, Research Associate and Program Coordinator) is effective in supporting the operations related to assessments. In addition, the Council introduced the Intern Program, which includes engaging two to four interns every six months. The program has worked well and has introduced new people to the Council who may become staff members. This has proven to be a cost effective way to add expertise to the staff assessment teams.

An analysis of the Council budgets indicates that about 67 per cent of expenditures are directly related to the conduct and production of assessments. The other expenditures (about 33 per cent) are related to administration and governance. This balance is within the limits of the Funding Agreement and has been consistent over the last three years.

The Council contracts out the translation of the assessment reports; however, internal staff includes a Senior Bilingual Publications Specialist to ensure the consistent, high-quality of the bilingual reporting across all of the assessment reports.

### **Audit Criterion 3.3: Any gaps in the corporate structure are identified and acted upon.**

As the number of assessments and the amount of work on assessments and on other priority areas increases, some gaps in the corporate structure are emerging. Other priority areas include the three goals of the Strategic Plan that are not directly related to the conduct of assessments: (1) establishing a long-term, sustainable and dependable funding stream, (2) strengthening collaborative alliances among the Members and the Council and with foreign national academies, and (3) increasing the visibility and awareness of the Council's work.

A large proportion of managers (including the seven Program Directors) currently report to the President. This has been alleviated, to some extent, by the appointment of a Senior Program Director in support of the President's role but further structural changes may be required to share the senior management oversight of the assessments and free up the President to respond to the other priorities. We understand that the Council plans to hire a Director of Assessments and Policy but it is not clear that this new position will reduce the number of people reporting directly to the President on matters related to the assessments.

In addition, especially with the recent growth of the Council and increased emphasis on the other strategic goals, there are potential structural gaps in relation to responsibility for human resources planning and management, strategic planning and marketing of Council services, and creating sustainable funding. Given budgetary constraints, it may be appropriate to assign these responsibilities to existing senior staff rather than create new positions.

**Audit Criterion 3.4: Roles and responsibilities of Council management and staff are clearly set out in the corporate structure.**

The roles and responsibilities of the Board, the Scientific Advisory Committee, other Board Committees and senior management and other components of the Council are well defined and described in the corporate By-Laws and the Funding Agreement. The role of the President is set out in the By-Laws and the role of the Vice-President, Corporate Services and Chief Financial Officer is defined by the President with input from the Human Resources and Compensation Committee of the Board. The Council has created an Employee Orientation Manual, which defines the desired attributes for Council employees and sets out the job profiles for the Program Directors, Research Associates and Program Coordinators.

**2.2.2 Audit Objective 4:****The financial, administrative and risk management policies, processes and practices support the economical, efficient and effective operation of the Council.**

**Summary Findings:** The Council's financial, investment and risk management policies processes and practices are in place and appropriately monitored to ensure the responsible investment, expenditure and accounting of public funds. An Investment Committee has been created with clear terms of reference in accordance with the Funding Agreement and meets regularly. An Investment Advisor has been appointed and provides expert advice to the Investment Committee and senior management. The Council's Strategic Plan supports and their policies and processes allow for the diversification of the sources for assessment questions and funding and the Council has undertaken a number of pilot projects to study the possible approaches. Generally speaking, the Council's administrative obligations are being undertaken in an efficient and effective manner.

**Audit Criterion 4.1: Financial, investment and risk management policies processes and practices are in-place, appropriate and monitored by senior management and ensure the responsible investment, expenditure and accounting of public funds based on: The establishment of an Investment Committee with clear terms of reference that is used efficiently and effectively and the appointment of an Investment Advisor.**

The Funding Agreement between Industry Canada and the Council is very precise as to the financial, investment and risk management policies that must be adopted by the Council in the management of the \$30 million contribution. The Board of Governors has implemented those policies and put in place the processes and practices to ensure that the policies are followed.

An Investment Committee was established by the Board and an Investment Advisor appointed, as required. A Fund Manager and Fund Custodian were engaged. The Investment Committee meets twice a year with the Investment Advisor to receive advice and to ensure that the Investment Advisor, the Fund Manager and the Fund Custodian are acting in accord with the

Board policies and the Funding Agreement. The Board receives regular financial and investment management reports from the Committee, which are well monitored by senior management. As an example of good, safe fund management, the Council's investments performed relatively well through the economic downturn.

At the operating level, senior management develops, monitors and adjusts all policies and processes as necessary and in consultation with the professional advisors and the Board. They are accountable to the Board to ensure that the necessary and appropriate policies, processes and practices are in place and being used effectively.

The Board has also created an Audit and Finance Committee, which meets quarterly to provide budget and financial management oversight. At the end of March 2012, a potential issue had arisen with respect to the ability of the Council to meet its expenditure management limits as set out in Section 4.3 of the Funding Agreement. Specifically, that section requires that the Council has expended at least 75 per cent of the Fund provided by Industry Canada by March 31, 2013. As of that date, the Council had only expended about 67 per cent of the fund. Senior Management is fully engaged with this issue and plans to meet the 75 per cent limit by October 31, 2013.

The Board itself is responsible for risk management and assesses the risk management plan and the status of any associated risks once per year. A number of respondents noted that the biggest risk of the Council is a "bad" assessment. It is also noteworthy that both the Royal Society of the United Kingdom and the National Academy of Sciences in the United States consider maintaining the quality of their reports as their major source of risk. In the words of one respondent, "Maintaining our reputation is what drives us." Or, from another, "Our main asset is our credibility; that could be easily squandered in one major misstep."

### **Audit Criterion 4.2: The Council's policies and processes allow for the diversification of funding and sponsor sources and broadening the range of questions and federal sponsors.**

The Funding Agreement, Article 2.1(b)(v), which sets out the agreed corporate objectives of the Council, expressly allows the Council "to solicit and receive gifts and grants" and "to establish and maintain permanent and other funds" beyond those provided by Industry Canada. The current Strategic Plan of the Council also calls for the diversification and expansion of sources of funding and sponsors. Industry Canada is also working with the Council to expand the range of federal sponsors and the questions for possible study.

By policy decision, the Council has chosen in its start-up phase to focus on its core business of providing excellent assessments to the government. In addition, there have been a few experiments with outside sponsors. So far the overhead costs of those pilot projects have been absorbed by the Council within their limited (by the Funding Agreement) overheads. If this external sponsor program were to become a business line in the next phase of the Council's work, then overheads should be built into the contracting model for external sponsors. As an example, for the contracts of the NAS in the United States, they include overhead rates: (i)

generally a 65 per cent overhead to salary costs and (ii) a 20 per cent G&A (general and administrative) overhead rate for all other costs (e.g. costs of the committees).

**Audit Criterion 4.3: The Council’s administrative obligations are being undertaken in an efficient and effective manner.**

Our review of Board and Committee reports and minutes finds that administrative details associated with the running of the Board and its committees are very well handled including all budgetary and accounting preparations and reports. The Funding Agreement and the Board established the policy base for the Council’s administrative obligations. On the planning side, the Council develops a Corporate Plan for the next fiscal year by January 31<sup>st</sup>; once approved, staff then develops an Operational Plan by March 31<sup>st</sup>; finally, staff prepares, for Board approval and adoption by Council Members, an Annual Report for the past fiscal year by July 1<sup>st</sup>.

In terms of operations, senior management and staff provide detailed, comprehensive briefing materials to the Board and its Committees in advance of their meetings. Board and Committee decisions are recorded and delegated to staff as required. Staff report back to the next meeting as to their actions in respect of any Board decision.

For every new assessment, the President creates an assessment team including the program director, research associates, researchers, interns and a program coordinator. Panel and milestone meetings are arranged and briefing books prepared. Program management involves tracking program progress according to a project plan. Documentary evidence and interviews with the program directors suggest that the processes used for the assessments match the CALM manual proscribed practices. Lessons learned from the actual assessment experiences are fed back into adjustments to those proscribed practices.

**2.2.3 Audit Objective 5:**

**Human resources planning, management, and policies are up-to-date and economical, efficient and effective in ensuring that the necessary human resources are available.**

**Summary Findings:** A review of staffing policies and practices found that the Council’s human resources policies and planning are compliant with the relevant laws, regulations, requirements and policies. The human resources policies are effective in ensuring that the Council can deliver on its core business of providing high-quality, evidence-based assessments. The skills of the staff are appropriately aligned to deliver on the core business of the Council. However, the Council could benefit from increasing staff skills in strategic planning and marketing through training or acquisition. The rate of staff turnover has been manageable but could be an issue for the Council in the future if the rate continues.

**Audit Criterion 5.1: The Council’s human resources policies, planning and management are efficient and effective for ensuring the Council is able to efficiently and effectively**

**deliver on its core service, evidence-based assessments based on: Planning and policies that are compliant with relevant employment laws, regulations, requirements and policies.**

The Council has in place an Employee Orientation Manual which sets out in detail the Council's human resources policies. The Manual was created by senior management with the advice and approval of the Board and legal counsel. The management of human resources is supported by the Human Resources Committee of the Board. The senior executive responsible for human resources management is the Vice-President Corporate Services who is a member of the Human Resources Professionals Association and has held a Certified Human Resources Professional designation since 1993. The Manual and the associated employment contract template (provided to new hires) have been vetted by the Council's legal counsel.

The Council has added the "researcher" category which has increased its capacity at lower unit cost. The internship program has been successful in attracting excellent people to the Council. These individuals have been taken on to work on assessment projects for six months and those with good appraisals have been hired as researchers. The promotional sequence is intern, researcher, research associate and program director. The ten year funding cycle has not so far been a hindrance to hiring – it may prove to create more difficulty next year unless there is early indication of the likelihood of funding renewal.

Two issues are noted. First, some respondents noted that there has been turnover in the staff. An analysis of staffing lists (not including contract or temporary workers) over the last three years yields the following numbers:

- In 2010-11, there were six Program Directors. During the year one left and one joined. Out of a total staff of 20 people, six were new hires and two left. During that year two assessments were completed and three were ongoing.
- In 2011-12, there were six Program Directors, of whom two left. For the total staff complement of 25, eight joined during the year and three left. In that year, three assessments were completed and seven were ongoing.
- In 2012-13, there were six Program Directors, of whom one had left and three were added. Of the total staff of 34 currently listed, four left and 13 were added during the year. Four assessments were completed and six are ongoing.

The above numbers indicate that the turnover of staff of about 14.5 per cent is above the 2012 Conference Board Study<sup>8</sup> average of 7.2 per cent for voluntary turnovers and 10 per cent for total turnovers. However, the perception that this "turnover" is excessive may be more directly related to the rapid growth of staff over the last three years (thus, many "new faces") and the fact that there have been eight cases of parental leave in the last two years which adds to the

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<sup>8</sup> Stewart, Nicole, "Compensation Planning Outlook, 2013", October 2012, Conference Board of Canada.

impression of turnover. If the rate of turnover continues, it will have a negative effect on the retention of the necessary skill sets and corporate memory.

Second, some respondents were unable to provide definitive responses to questions of human resources policy and planning relying, instead, on the fact that no adverse events were reported. This inability of members of the Board to comment conclusively as to the status of human resources policies and practices is a management issue that should be addressed by including a formal report on human resources statistics, policy and planning matters to the Board once per year.

**Audit Criterion 5.2: The skills of Council staff are appropriately aligned and adequate to address the requirements of the Council’s Strategic Plan.**

We find the skills of the staff appropriate to the requirements of the Council’s Strategic Plan in respect of its core business of producing high-quality assessments. They are well chosen to support the Council’s assessment process. Our finding is shared by external respondents who are impressed with the quality of the Council reports and the competence of the staff in research and writing. However, as noted in the discussion of Audit Criterion 3.3, we find that the resources aligned with the other goals of the Strategic Plan may not be adequate.

The skills of the staff are aligned with the work requirements through the use of a matrix that has been established to ensure that the right skills are available to meet the diversified needs of assessment projects.

In addition, the Council has a major internal human resources review underway and now has a better sense of the number of assessments it can handle in a “steady state” mode. It is expected that this process will be completed by the end of the fiscal year and that existing practices will be improved leading to structural change, including new job classifications and profiles. We believe that this review is timely given the recent growth of the Council and the need to prepare for funding renewal.

**Audit Criterion 5.3: Staff performance is appropriately planned and managed.**

It is challenging for a small organization to develop and follow succession plans. For the Council in particular, there is the added issue of the unpredictability of their workload; that is, the Council is not in complete control of when questions are referred to it. However, when senior positions do become vacant, it has become the practice to do an internal search for a successor before an external search is conducted. Should an emergency arise respecting a senior position, the practice would be to look to the Board for an interim in-fill while a formal process was undertaken to replace the person.

## 2.2.4 Audit Objective 6:

### **Performance measurement frameworks and processes are in place and working as intended.**

**Summary Findings:** The Council has a performance measurement framework in its annual Corporate Plan that is in accord with the Funding Agreement. Performance measurement and monitoring mechanisms are in place for all goals of the Strategic Plan. The process for monitoring the conduct of Council assessments is based on the achievement of nine milestones with regular progress meetings. Those mechanisms are reliable and effective in making adjustments to program planning and administration. Milestone targets for assessments are detailed, well monitored and working as intended to ensure the production of timely, high-quality assessments. The key performance framework and processes are in place and working as intended.

### **Audit Criterion 6.1: Performance targets have been established against which the Council's programs, activities and management can be assessed.**

The Council's corporate performance measurement framework is contained in the Annual Corporate Plan, which is prepared every year in January. While there is no formal "logic model", as that term is used by federal government departments, the plan sets out key planned activities and the key expected outcomes for the short and medium terms. The Corporate Plan reports on the successful (or otherwise) achievement of those outcomes for the previous year and presents a set of planned activities and expected outcomes for the next year.

At the corporate level, the Council sets general performance targets: the number of assessments started, number completed, and the number ongoing. However, because the process used to set the assessment questions is largely outside the direct control of the Council, measuring, for example, "the number of assessments completed during the year" is also an issue that in some cases is beyond the control of the Council.

At the operational level, the performance of staff is appropriately planned and managed. Salaries of staff are linked to performance objectives and there is performance pay. The President and senior staff have performance targets linked to the Council's Strategic Plan. There is an elaborate procedure for staff evaluation. The Human Resources Committee reviews the staff assessments and has expressed a high level of comfort at the Board with the assessments and the process. Each assessment has a project management plan, which contains up to nine milestone meetings where the Program Director meets with senior management to assess progress, exceptions, "work-arounds", and next steps.

### **Audit Criterion 6.2: Performance measurement and monitoring is reliable and consistent.**

Staff performance is monitored on a regular basis and reported to the Board of Governors on an annual basis. Based on our document review and interviews with staff and management, we find

that performance measurement and monitoring is reliable and consistent. In respect of the assessment process, performance measurement and monitoring is based on nine milestone progress meetings.

**Audit Criterion 6.3: Performance measurement and monitoring mechanisms are used to support efficient and effective corporate management.**

We reviewed the annual performance measurement planning and reporting processes and the results of that process and find that performance measurement and monitoring mechanisms are used effectively to support the management of the assessment process and other corporate activities.

## 2.3 Governance

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### 2.3.1 Audit Objective 7:

**Processes for governance of the Council’s assessments and activities provide reasonable assurance that the assessments and associated activities are consistent with meeting the mandate of the Council.**

**Summary Findings:** The processes for governance of the Council are based on best practice governance policies. These policies guide the Council’s core operational activity of conducting assessments that have to meet the standards of excellence fundamental to accomplishing the Council’s mandate. The direction provided by the Board of Governors supported by five Board Committees and the Scientific Advisory Committee has effectively managed the business of the Council allowing it to proceed in a comprehensive and timely fashion. All orders and resolutions of the Board are carried into effect by senior managers of the Council in close cooperation with the Board Chair with effective feedback provided to the Board. While the Board manages well with its current nomination and appointment process for Board members, issues with the process have been identified which the audit finds to have had an impact on the efficiency of the Board operations. These issues will need to be addressed in the context of new legislative provisions on the governance of non-profit corporations which require compliance by October 2014. The impact of this legislation on the Council is currently being examined by a Board Committee.

**Audit Criterion 7.1: The direction provided by the Board of Governors ensures the Council’s resources are well managed and allows for the long-term strategic positioning of the Council.**

The 12 member Board of Governors is responsible for setting the strategic direction of the organization and overseeing fulfillment of the Council’s mandate and operations. The direction provided by the Board ensures the Council’s resources are well managed.

The soundness of the governance is based on the Board structure and best practice governance policies as set out in the Funding Agreement, in the Council's by-laws, and in the Council's conflict of interest guidelines. The Funding Agreement also defines the financial, investment and risk management policies that must be approved by the Board in the management of the \$30 million contribution. The Board has put in place the processes and practices to ensure that the policies are followed. The Board meets three times per year but in between their meetings the Executive Committee which meets about four times per year ensures that the business of the Council proceeds in a timely fashion.

The Board provides direction to senior managers for the management of the Council through decision making processes established in the Council's by-laws. The overall effectiveness of the Board which is self-assessed is exemplified by the Board's achievement in its management of the Council's resources within a mandated ceiling for administrative expenses of the Council. All orders and resolutions of the Board are carried into effect by the President who maintains a close liaison with the Board Chair. For example, the Chair works with the President in the preparation of agenda for each Board meeting.

The Board has responsibility for strategic planning, resulting in the Council's first Strategic Plan for the period 2011-2014. At every Board meeting, there is a report on how the Council is doing in terms of the Plan's goals<sup>9</sup> at which issues and challenges are identified. Although concerned with reaching all goals, the Board regards undertaking quality assessments as the Council's core goal. We understand a second Strategic Plan for 2015-2020 will be developed by the Board in conjunction with the 2014 Budget Cycle when renewal of the Council's funding will be up for consideration. The importance of this Strategic Plan to the decision on renewal suggests that the Plan be a part, at least in outline, of the renewal proposal.

**Audit Criterion 7.2: The Board has the necessary plans and processes in place, including appropriate committees, to ensure that the Council's mandate is being met.**

Governance of the Council is supported by five committees of the Board: Executive Committee; Finance and Audit Committee; Investment Committee; Nominations, Selection and Governance Committee; and Human Resources and Compensation Committee. The work of the Board is also supported by the Board-appointed Scientific Advisory Committee that provides advice on the selection and conduct of assessments. The terms of reference for these Committees as set out in the Funding Agreement and the Council By-Laws are followed closely by the Committees in their operations. All Committee chairs report to the Board and the chair of the Scientific Advisory Committee attends all Board meetings.

The Council's Assessment Lifecycle Methodology (CALM), updated from time to time, instructs the Board's plans and processes for guiding the Council's core operational activity of conducting

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<sup>9</sup> 1. Improve responsiveness; 2. Achieve potential; 3. Maintain excellence; 4. Become sustainable; 5. Foster collaboration; 6. Increase visibility.

assessments meet the standards of excellence called for by the Council's mandate. CALM draws on the approaches of comparable organizations such as the U.S. National Research Council and the Royal Society of the U.K.

### **Audit Criterion 7.3: Board decisions are followed-up in an efficient and effective manner.**

There is regular and efficient follow-up of Board decisions as is evident from our review of Board Minutes. Minutes are circulated to Board members and senior managers within two weeks of each Board meeting and the executive then report back to the next meeting of the Board as to the progress made on Board decisions. For decisions that require more immediate action, the report of the executive is referred to the Executive Committee which is chaired by the Board Chair and where the matter can be taken up by the Committee and the President.

### **Audit Criterion 7.4: Selection of Board members operates in an efficient and effective manner.**

The current process of selection of Board members is not efficient and has affected the effectiveness of the Board's work as a result.

The selection of Board members is governed by a number of instruments:

1. Legislation related to the incorporation of corporations without share capital ("not-for-profits")
2. The Funding Agreement between Industry Canada and the Council
3. The By-Laws of the Council
4. The Council's Code of Conduct and Conflict of Interest Guidelines for the Board of Governors

### **Legislation**

The Council was established pursuant to Part II of the *Canada Corporations Act*, RSC 1970, c. C-32, which governs the creation and management of corporations without share capital (not-for-profit companies). However, that Act is being replaced by the *Canada Not-for-profit Corporations Act*, S.C. 2009, c. 23. The Council must make the transition to the new Act by October 2014 or it will be subject to automatic dissolution.

### **Funding Agreement**

The Funding Agreement defines the Board of Governors to be the Board as constituted under Article IV of By-Law No 1 of the Council and composed of no less (sic.) than twelve Governors as defined in that article.

## By-Laws

Article IV, Paragraph (a) establishes that the Board will consist of not fewer than twelve and not more than 20 Governors. Governors must be individuals, at least 18 years of age, and have the power to contract. Each Governor must be a Canadian citizen resident in Canada. They need not be a representative of a Member, but cannot be an employee of a Member or of the Council. These requirements are consistent with (but go beyond) the requirements of the legislation.

The current Board of Governors consists of twelve members. Six of them are nominated by the three member Academies (two each); two are nominated from the general public (Governors' Appointees) also by the Academies; and four are nominated by the Minister from the general public (Minister's Nominees) who are then appointed by the Board.

Paragraph IV (c) (iii) stipulates that no Governors' Appointee may be a director, officer, employee or agent of any Member, concurrent with their term as a Governor.

Paragraph IV (c) (iv) of the Council's By-Laws state that Board nominees shall possess one or more of the following qualifications:

- Recognized leadership within the Governor's community
- A demonstrated commitment to Canada and its citizens
- Qualifications relating to the Governor's area of expertise.

Paragraph IV (c) (vi) states that the Board "shall ensure, to the extent practicable, that the full Board reflects the breadth of sectors, fields of study, and social, economic and cultural communities appropriate for the effective pursuit of the objects of the Corporation. The Board shall, to the extent practicable, ensure a balance with respect to gender, language, age and geographic representation."

## Code of Conduct and Conflict of Interest Guidelines

The Board's Conflict of Interest Guidelines provide that a "conflict of interest" exists where the personal interests of a Governor or the Governor's relatives or close associates are in conflict with the Governor's fiduciary duty to act in the best interests of the Council. "A conflict of interest also exists where a competing fiduciary obligation of a Governor is in conflict with the Governor's duty to act in the best interests of the Council."

## Issues Raised by the Selection Process

These provisions for the selection, nomination and appointment of Board members have created a number of issues that directly impinge on the efficiency and effectiveness of the Board's operations:

- The Governors nominated by the Member Academies have tended to include their Presidents, which has given rise to two issues:
  - The Presidents tend to leave the Board at the end of their term of office of two years which is less than their obligation to the Council for a term of three years called for in the By-Laws and can have a disruptive effect on the work of the Board.
  - The Presidents appear to have a conflict of interest according to the Conflict of Interest Guidelines in that they have competing fiduciary obligations to the Council and to their Member Academy.
- Regular delays exist in receiving nominations from the government for the Minister's Nominees which has resulted in an additional load being placed on members in Board Committees, particularly in the Investment Committee, and, on occasion, difficulties in meeting quorum requirements for Committee meetings.
- Given the divided responsibilities for Board selection, nomination and appointment, there is no single oversight to ensure Board composition is in keeping with the Council's By-Laws with respect to having a balance of backgrounds and skill sets among members appropriate to the mandate of the Council as well as a balance of gender, language, age and geographic representation.

### **Impact of Canada Not-for-Profit Corporations Act 2009**

The current Board selection process has to be seen in the context of the new requirements for the nomination and election of Board members in the Canada Not-for-Profit Corporations Act 2009. The Council needs to be in conformity with this new legislation by October 2014 in order to receive a Certificate of Continuance. Most notably, Board members (or a subset of them where there are staggered terms) must be elected at the AGM by the Members. Best practice would be for the Nominations, Selection and Governance Committee of the Board to consider all vacancies and all nominations (e.g. from the Members and from the Minister) and ensure a balance of qualifications exists in the Board membership as noted in the By-Laws. The Committee would also monitor proposed nominees for conflicts of interest.

These changes would alter the current nomination and appointment process for Board members. Board members will be elected rather than appointed and officers of the Academies such as the Presidents who have fiduciary obligations to their Academies will no longer be able to be nominated by the Academies. This will remove the existing perception of a conflict of interest.

We commend the Board for asking the Nominations, Selection and Governance Committee to consider these matters and to look at the impact of the legislation on the Council's governance in order to prepare the Council for the necessary changes in the context of funding renewal for the Council.

# 3. Conclusions and Recommendations

## 3.1 Assessments

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**Audit Objective 1: The plans, practices and processes that are in place are appropriate for the economical, efficient and effective management of the Council’s assessment operations and related activities.**

### Conclusions

Although the Council devotes considerable effort to the initial phases of an assessment this is necessary in order to develop a thorough understanding of the context of the assessment, the needs of the sponsor, defining the scope of the assessment and in recruiting high calibre experts as panel members. The Council makes very effective use of its Board, Scientific Advisory Committee, Council staff, Member Academies, expert panels and individual peer reviewers. Its methodologies which are documented in the Council’s Assessment Lifecycle Methodology (CALM) are sound and comparable to the U.S. National Academy of Sciences and the U.K. Royal Society. As well, CALM is reviewed regularly reflecting the Council’s continuous learning mode of operation. The cost and timeliness of conducting Council assessments as well as its performance measurement and monitoring mechanisms are appropriate and comparable to the U.S. NAS and U.K. Society. We find, therefore, that the Council has reached the right balance between economy and effectiveness that makes for the efficient management of the Council’s assessment operations and related activities.

### Recommendation 1

The Council should continue with its current plans, practices and processes, and continue to update CALM, in managing the Council’s assessment operations and related activities.

**Audit Objective 2: Communication planning and processes are allowing for the economical, efficient and effective external communication to key audiences regarding Council assessments and the organization overall.**

### Conclusions

The Council’s approach of developing separate communication and distribution plans for each assessment, and where appropriate, coordinating plans with the sponsor are effective in creating awareness of the Council and its programs and activities. For a young organization it has done remarkably well in being recognized nationally as a highly credible scientific organization providing independent, authoritative, expert advice in public policy making. The requirement for secrecy until the release is sound practice to ensure independence of assessment reports.

However, as indicated by one of the case studies, the release of two similar assessments within a couple of months resulted in many people confusing the two studies.

The Council's practice of briefing the sponsor in advance of the report's official release is also sound but not as extensive as the U.K. Royal Society which briefs all key government stakeholders on the major findings and recommendations in advance. The Council's communication planning and processes are allowing for the efficient and effective external communication to key audiences of Council assessments. However, as indicated by the practice in the U.K. there is some room for improvement

### **Recommendation 2**

- (a) The Council should consider consulting with Industry Canada and assessment sponsors to identify other federal and other levels of government that should be briefed in advance of an official release.
- (b) The Council should consider in its corporate planning the period of time between the release of assessment reports on similar subject matter.

## **3.2 Corporate Management**

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**Audit Objective 3: The corporate management structure of the Council is appropriate to meeting its mandate and reaching results in an economical, efficient and effective manner.**

### **Conclusions**

The corporate structure was created with an emphasis on the production of high-quality assessments – the core business of the Council. It has been appropriate for that purpose. As the number of assessments has increased, and the work expanded, the structure has been adjusted to create “assessment teams” led by a Program Director with increased responsibility for each assessment assigned to them.

The roles and responsibilities of Council management and staff are clearly set out in the corporate documentation. The Council operates with a “flat” organizational structure that has 10 of the 34 employees reporting to the President. This is a situation that needs to be reviewed given increased emphasis of the Council on the other goals of the Strategic Plan, as the Council moves away from a concentration on producing high quality assessments in its “start-up” years.

The recent growth of the Council and the increased emphasis on the other strategic goals (for example, diversification of sources for funding and questions and increased collaboration), there are potential structural gaps in relation to responsibility for human resources planning and management, strategic planning and marketing of Council services, and creating sustainable

funding. The Council could benefit from having a focus on the staff on strategic planning and marketing.

### **Recommendation 3**

- (a) The Council should consider creating a management level position to take on full operational responsibility for the assessments.
- (b) The Council should create new staff roles to address the increased focus on strategic planning and marketing as the Council moves toward the next phase of its funding.

### **Audit Objective 4: The financial, administrative and risk management policies, processes and practices support the economical, efficient and effective operation of the Council.**

#### **Conclusions**

The Council's financial, investment and risk management policies processes and practices are in place and appropriately monitored to ensure the responsible investment, expenditure and accounting of public funds. An Investment Committee has been created with clear terms of reference in accordance with the Funding Agreement and meets regularly. An Investment Advisor has been appointed and provides expert advice to the Investment Committee and senior management. The Council's Strategic Plan supports and their policies and processes allow for the diversification of the sources for assessment questions and funding and the Council has undertaken a number of pilot projects to study the possible approaches. Generally speaking, the Council's administrative obligations are being undertaken in an efficient and effective manner.

### **Recommendation 4**

The Council should increase its emphasis on the diversification of its sources of both questions and funding by assessing the lessons learned from its pilot projects and engaging in increased marketing activities.

### **Audit Objective 5: Human resources planning, management, and policies are up-to-date and economical, efficient and effective in ensuring that the necessary human resources are available.**

#### **Conclusions**

The Council's human resources policies and planning are compliant with the relevant laws, regulations, requirements and policies. The human resources policies are effective in ensuring that the Council can deliver on its core business of providing high-quality, evidence-based assessments. The skills of the staff are appropriately aligned to deliver on the core business of the Council. There has been an above average level of staff turnover along with rapid growth over the last few years.

### **Recommendation 5**

Council management should expand the internal human resources review, led by the Human Resources and Compensation Committee, to include an analysis of the turnover issue and work on retention strategies.

**Audit Objective 6: Performance measurement frameworks and processes are in place and working as intended.**

### **Conclusions**

The Council has a performance measurement framework in accord with the Funding Agreement that is contained in its annual Corporate Plan. Performance measurement and monitoring mechanisms are in place for all goals of the Strategic Plan. The process for monitoring the conduct of Council assessments is based on the achievement of nine milestones with regular progress meetings. Those mechanisms are reliable and effective. Milestone targets for assessments are detailed, well monitored and working as intended to ensure the production of timely, high-quality assessments. The key performance framework and processes are in place and working as intended.

### **Recommendation 6**

The Council should continue its performance measurement strategy that includes the current mechanisms for monitoring the performance of the assessment process.

## **3.3 Governance**

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**Audit Objective 7: Processes for governance of the Council's assessments and activities provide reasonable assurance that the assessments and associated activities are consistent with meeting the mandate of the Council.**

### **Conclusions**

The processes for governance of the Council are based on best practice governance policies. These policies guide the Council's core operational activity of conducting assessments that have to meet the standards of excellence fundamental to accomplishing the Council's mandate. The direction provided by the Board of Governors supported by five Board Committees and the Scientific Advisory Committee has effectively managed the business of the Council allowing it to proceed in a comprehensive and timely fashion. All orders and resolutions of the Board are carried into effect by the senior managers in close cooperation with the Board Chair with effective feedback on decisions provided to the Board. While the Board manages well with its current nomination and appointment process for Board members, issues with the process have

been identified which the audit finds to have had an impact on the efficiency of the Board operations. These issues need to be resolved by October 2014 in the context of the governance requirements of the Non-Profit Corporations Act 2009.

### **Recommendation 7**

The Board should consider making the required changes to the nomination and election process for Board members in conformity with the Non-Profit Corporations Act 2009 and have the changes reflected in the Council's By-Laws in the context of the Council's submission to the government for renewal of its mandate. These changes would be pursuant to the necessary amendments being made to the Funding Agreement by Industry Canada.

# A. Council Assessments and Projects to April 2013

## A.1 Completed Assessments within the Funding Agreement

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1. Water and Agriculture in Canada: Towards Sustainable Management of Water Resources (February 2013) [Agriculture and Agri-Food Canada]
2. Strengthening Canada's Research Capacity: The Gender Dimension (November 2012) [Industry Canada]
3. The State of Science and Technology in Canada, 2012 (September 2012) [Industry Canada]
4. Informing Research Choices: Indicators and Judgment (July 2012) [Natural Sciences and Engineering Research Council of Canada (NSERC)]
5. Integrating Emerging Technologies into Chemical Safety Assessment (January 2012) [Pest Management Regulatory Agency]
6. Healthy Animals, Healthy Canada (September 2011) [Canadian Food Inspection Agency (CFIA)]
7. Canadian Taxonomy: Exploring Biodiversity, Creating Opportunity (November 2010) [Canadian Museum of Nature]
8. Honesty, Accountability and Trust: Fostering Research Integrity in Canada (October 2010) [Industry Canada]
9. Better Research for Better Business (May 2009) [Social Sciences and Humanities Research Council (SSHRC)]
10. The Sustainable Management of Groundwater in Canada (May 2009) [Natural Resources Canada]
11. Innovation and Business Strategy: Why Canada Falls Short (April 2009) [Industry Canada]
12. Energy from Gas Hydrates: Assessing the Opportunities and Challenges for Canada (July 2008) [Natural Resources Canada]
13. Small is Different: A Science Perspective on the Regulatory Challenges of the Nanoscale (July 2008) [Health Canada]

14. Influenza Transmission and the Role of Personal Protective Respiratory Equipment: An Assessment of the Evidence (December 2007) [Public Health Agency of Canada]
15. The State of Science and Technology in Canada (September 2006) [Industry Canada]

## **A.2 Assessments in Progress within the Funding Agreement**

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16. The State of Industrial Research and Development in Canada [Industry Canada]
17. Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction [Environment Canada]
18. The State of Knowledge of Food Security in Northern Canada [Health Canada]
19. The Potential for New and Innovative Uses of Information and Communications Technologies (ICTs) for Greening Canada [Environment Canada]
20. Canadian Industry's Competitiveness in Terms of Energy Use [Industry Canada]
21. Therapeutic Products for Children [Health Canada]
22. The State of Canada's Science Culture [Canada Science and Technology Museums Corporation (CSTMC), Natural Resources Canada, and Industry Canada]
23. RISK: Is the message getting through? [Health Canada]
24. Wind Turbine Noise and Human Health [Health Canada]
25. STEM Skills for the Future [Human Resources and Skills Development Canada]
26. The Future of Canadian Policing Models [Public Safety Canada]
27. Understanding the Potential Impacts of Energy Technologies on the Oil Sands Development [Natural Resources Canada]
28. Memory Institutions and the Digital Revolution [Library and Archives Canada]

## **A.3 Completed Assessments outside the Funding Agreement**

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29. Innovation Impacts: Measurement and Assessment (April 2013) [Ontario Ministry of Research and Innovation]
30. 40 Priority Research Questions for Ocean Science in Canada (July 2012) [Canadian Consortium of Ocean Research Universities (CCORU)]

31. Canadians Making a Difference (November 2011) [Canadian Academy of Health Sciences (CAHS)]
32. Vision for the Canadian Arctic Research Initiative: Assessing the Opportunities (November 2008) [Indian and Northern Affairs Canada (INAC)]

#### **A.4 Assessments in Progress outside the Funding Agreement**

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33. Canadian Ocean Science [Canadian Consortium of Ocean Research Universities (CCORU)]
34. Medical and physiological impacts of conducted energy weapons [Canadian Academy of Health Sciences (CAHS) at the request of the Defence Research and Development Canada. The Council of Canadian Academies is working collaboratively with CAHS]

#### **A.5 Completed Council Initiated Projects**

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35. Catalyzing Canada's Digital Economy (July 2010) [Council initiated]

#### **A.6 Council Initiated Projects in Progress**

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36. The Synthesis Report [Council initiated]

# B. Benchmarking

## B.1 National Academy of Sciences, United States

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### Introduction

The National Academy of Sciences (NAS) was established on March 3, 1863 by President Abraham Lincoln. It is a private, not-for-profit entity that has been advising the United States government on science and technology issues ever since. Beyond its role as an independent provider of advice, the Academy sponsors workshops and symposia, promotes public understanding of science, monitors human rights abuses against scientists, and publishes a respected research journal.

The National Academy of Engineering (NAE) is a subsidiary of the NAS and an association of outstanding engineers for the private and academic sectors. It is a separate agency in terms of its administration and the selection of its members. It shares responsibility with the NAS for advising the United States government but also conducts studies, encourages engineering education and makes awards to deserving engineers.

The Institute of Medicine (IOM), another subsidiary of the NAS, formed in 1970, is an association of eminent health care professionals and experts. Its responsibility relates to providing advice on issues related to the health of the United States population.

The National Research Council (NRC) was formed in 1916 and has become the major operating arm of the three above noted agencies. The staff conduct studies for the NAS and the NAE and these studies appear under the name of the NRC. The IOM conducts its own studies but uses the model and process developed by the NRC. The NRC also supports the professional development of scientists and engineers and works to improve science and mathematics education from kindergarten through doctoral programs.

### Corporate Structure and Governance

The NAS was established by the Act to Incorporate the National Academy of Sciences in 1863. Pursuant to Section 2 of the Act, the organization created its Constitution and By-Laws. Article 9 of the Constitution establishes the National Academy of Engineering as a separate entity under the NAS. Article 10 establishes the Institute of Medicine. The National Research Council was established by law in 1916 and Article 11 of the NAS Constitution obligates the NAS to “perpetuate” the NRC. Each Academy has its own Articles of Incorporation which are approved by the Council of the NAS.

Each Academy is governed by a Council comprised of the Officers of that Academy and elected members. The NAS Council has 17 members; the NAE has 19, and the IOM has 21. The NAS Council has the overall lead role and the councils, broadly speaking, are concerned mostly with membership issues and high-level policy matters. The NRC has a “Governing Board” which is made up of members appointed by the three academies, including the three Presidents.

### **Corporate Management**

The three Academies each have a President and an Executive Officer as the principal managers of the day-to-day activities of the organization. The President of the NAS is also President of the NRC and, likewise, the Executive Officer of the NAS is also Executive Officer of the NRC.

The NRC (with most of the operating staff of the Academies) has about 1,100 employees. The work of the NRC is conducted by a series of 80 domain-specific Standing Committees.

The NAS manages an annual budget of about \$350M per year. It is described as a “soft money” organization in that most of its funding (over 80 per cent) comes from contracts. Of this, about \$290M is for overall programming with the rest for administration. The NAS generates its operating funds by charging overheads on the costs of the studies; 65 per cent overhead on salary related costs and 20 per cent G&A (general and administrative) overheads on all other costs (e.g. the costs of the committees).

The fact that it is a “soft money” organization creates a strong need for efficiencies in administrative and program delivery given that if costs rise too much, federal agencies may decide to do these types of studies in-house, even with some loss of the credibility conferred by the independence of the NAS.

The NRC, besides hosting the program offices for the NAS, also has the Press Office, the Office of Congressional Affairs, Communications Office, and the Chief Financial Officer.

### **Assessment (Study) Process**

United States federal agencies are the primary financial sponsors of the work of the National Academies; they sponsor about 80 per cent of the studies. Additional studies are funded by state agencies, foundations, other private sponsors (about 15 per cent), and the National Academies endowment (about 5 per cent). The Academies provide independent advice; external sponsors have no control over the conduct of a study once the statement of task and budget are finalized.

The Academies produce 200–300 reports each year. Recent reports cover such topics as the obesity epidemic, forensics, invasive plants, underage drinking, the Hubble Telescope, vaccine safety, the nation's energy future, transportation safety, climate change, and homeland security. Many reports influence policy decisions; some are instrumental in enabling new research programs; others provide program reviews. The study process has four stages:

**Stage 1: Defining the Study**

Staff of the Academies and members of their boards work with sponsors to determine the specific set of questions to be addressed by the study in a formal "statement of task". They also provide initial estimates of the duration and cost of the study. The statement of task defines and bounds the scope of the study, and it serves as the basis for determining the expertise and the balance of perspectives needed on the study committee.

The statement of task, work plan, and budget are then approved by the Executive Committee of the NRC Governing Board. The Executive Committee meets once a month for reviews and new approvals. This review often results in changes to the proposed task and work plan. On occasion, it results in turning down studies that the institution believes are inappropriately framed or not within its purview. Study budgets range from \$250K to \$2.5M.

**Stage 2: Committee Selection and Approval**

Selection of appropriate committee members, individually and collectively, is essential for the success of a study. All committee members serve as individual experts, not as representatives of organizations or interest groups. Each member is expected to contribute to the project on the basis of his or her own expertise and good judgment.

There are between 10 and 20 members on each study committee. The number depends on the complexity of the issues being addressed and staff look at the following factors when defining the proposed membership: (1) an appropriate range of expertise and diversity of backgrounds for the task; (2) a balance of perspectives to ensure that the relevant points of view are reasonably balanced so that the committee can carry out its charge objectively and credibly; and (3) the avoidance or elimination of possible conflicts of interest (note: having a different "point of view" does not represent a conflict of interest). Other considerations include membership in the Academies and previous involvement in studies, and the inclusion of women, minorities, and young professionals.

A committee is not finally approved until a thorough balance and conflict-of-interest discussion is held at the first meeting, and any issues raised in that discussion or by the public are investigated and addressed.

**Stage 3: Committee Meetings, Information Gathering, Deliberations, and Drafting the Report**

Study committees typically gather information through: 1) meetings that are open to the public and that are announced in advance through the National Academies Web site; 2) the submission of information by outside parties; 3) reviews of the scientific literature; and 4) the investigations of the committee members and staff. In all cases, efforts are made to solicit input from individuals who have been directly involved in, or who have special knowledge of, the problem under consideration.

In accordance with United States law and with few exceptions, information-gathering meetings of the committee are open to the public, and any written materials provided to the committee by individuals who are not officials, agents, or employees of the academies are maintained in a public access file that is available for examination.

The committee deliberates in meetings closed to the public in order to develop draft findings and recommendations free from outside influences. The public is provided with brief summaries of these meetings that include the list of committee members present. All analyses and drafts of the report remain confidential. Generally, the committee creates a subcommittee called the “Authoring Committee” which works with staff to prepare the draft of the report. The work of the committee is overseen by the responsible Standing Committee and the NRC Board.

Each committee member has the right to issue a dissenting opinion to the report if he or she disagrees with the consensus of the other members.

#### **Stage 4: Report Review**

All study reports must undergo a rigorous, independent external review by experts whose comments are provided anonymously to the committee members. The academies recruit independent experts with a range of views and perspectives to review and comment on the draft report prepared by the committee.

The review process is structured to ensure that each report addresses its approved study charge and does not go beyond it, that the findings are supported by the scientific evidence and arguments presented, that the exposition and organization are effective, and that the report is impartial and objective.

Each committee must respond to, but need not agree with, reviewer comments in a detailed “response to review” that is examined by one or two independent report review “monitors” responsible for ensuring that the report review criteria have been satisfied. After all committee members and appropriate National Academies officials have signed off on the final report, it is transmitted to the sponsor of the study and is released to the public. Sponsors are not given an opportunity to suggest changes in reports. The names and affiliations of the report reviewers are made public when the report is released.

#### **Measuring Impacts and Efficiency**

The NAS has struggled with the issue of measuring impacts of its work. First, it is a large and diverse organization with a wide range of studies. In addition, because of the nature of the questions that are studied, the impacts can be a few years in the future and changing government policy can take many years, if that is one of the implications of the study. They have not done a systematic study of impacts, relying mostly on the collection of anecdotal evidence of the use and impacts of individual studies. The six NRC divisions are now taking a slightly more systematic approach in that they collect information immediately after the release of a study as

baseline information and then follow-up one year later. The process involves interviews with staff and committee members and web-based searches for results and impacts.

In 2000, the NRC Board established a committee of 12 senior people to examine the overall effectiveness of their processes. The committee recommended (1) reducing the number of NRC divisions for 12 to 6 (which was done), (2) a number of incremental improvements to get reports out in a more timely manner, and (3) suggestions for improving quality and cost effectiveness of reports. The work of the committee appeared to have a positive impact on the processes.

### Conclusions

The National Academy of Sciences is a large organization with a long history of providing science-based, independent advice to the United States government. The NAS, through the NRC, conducts about 300 studies per year. It has a solid reputation and a very well developed set of policies and processes used in the conduct of those studies. It has provided its model, lessons learned and periodic training to the Council of Canadian Academies for use in the development of its practices.

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## B.2 The Royal Society, United Kingdom<sup>10</sup>

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### Introduction

The Royal Society is a self-governing Fellowship of many of the world's most distinguished scientists and is the oldest scientific academy in continuous existence. It is the national academy of science in the United Kingdom, and its core is its Fellowship which comprises the most eminent scientists in the UK, Ireland and the Commonwealth. The Society's fundamental purpose, reflected in its founding Charter of the 1660s, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity. A major activity of the Society is identifying and supporting the work of outstanding scientists. The Society supports researchers through its early and senior career schemes, innovation and industry schemes, and other schemes.

The Society also engages beyond the research community, through its Science Policy Centre which provides independent, timely and authoritative scientific advice to UK, European and international decision makers. Each year, the Centre publishes several reports (or assessments), produced by working groups (or panels) of Royal Society Fellows and other experts, who analyze the scientific evidence related to a topical issue. In addition to assessments, the Centre also supports conferences and seminars, short statements, media work, consultation responses and briefings for policy makers.

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<sup>10</sup> Since the Royal Society refers to their board as the "council", for the purposes of this description of the Royal Society the Council of Canadian Academies is referred to as CCA.

The Royal Society is supported by approximately 140 staff, of which 20-25 are with the Science Policy Centre.

### **Corporate Structure and Governance**

The Royal Society is governed by a Council of 21 Fellows, who are elected by the Fellowship. The Council manages all the Society's business and its members are Trustees of the Society under U.K. charity legislation. They have the power to make, appeal or amend the Standing Orders for the regulation of the Society's affairs in accordance with its Statutes.

The President, who sits for a five-year term, presides at meetings of the Council and is Chair of the Trustees. The President is supported by four other Officers, who are elected members of the Council. The Treasurer is responsible for keeping the accounts and administering the Society's finances. The Biological Sciences Secretary and the Physical Sciences Secretary are responsible for overseeing the Society's scientific business. The Foreign Secretary is responsible for overseeing the Society's international business.

The Council and Officers are supported by a permanent staff of around 140. The Executive Director heads the Society's staff. The Officers and Executive Director sit on the Society's Board, which meets before each Council meeting. The Board discusses the Society's strategy and makes recommendations on papers to be considered by the Council. Following a period of consultation with Fellows, Foreign Members and others the Society is committed to delivering on its Strategic Plan, currently for the period from 2012 to 2017.

The Science Policy Centre is guided by a Science Policy Advisory Group (similar to the CCA's Scientific Advisory Committee) comprised of 12-15 people. The Centre's Director heads a permanent staff of around 20-25. Thus, in terms of the number of staff the Centre is equivalent in size to the CCA.

### **Corporate Management**

The Royal Society receives funds from the following sources<sup>11</sup>:

- 68.2 per cent from Parliamentary Grant;
- 13.1 per cent from companies and trusts;
- 9.5 per cent from trading (e.g. journal sales, venue hire);
- 8.1 per cent from investments and endowments;
- 0.8 per cent from other public bodies; and
- 0.3 per cent from membership contributions from Fellows.

The Parliamentary Grant is negotiated with the Department for Business, Innovation and Skills (BIS) and is used by the Society for a variety of agreed purposes. The Parliamentary Grant

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<sup>11</sup> <http://royalsociety.org/about-us/reporting/parliamentary-grant/>

represents that share in the Science budget - voted annually since 1849 by Parliament - which is administered by the Society. Expenditure is subject to review and examination by BIS and the National Audit Office.

A major activity of the Society is identifying and supporting the work of outstanding scientists through a range of grant schemes to support the U.K. scientific community and to foster collaboration between U.K. based and overseas scientists. In the 2011-2012 fiscal year, the Society expended 72 per cent of its budget (£49M) to “supporting the scientific community”, eleven per cent (£7.7M) to “collaborating with the international community”, 8 per cent (£5.5M) to “inspiring the wider community”; three per cent to “advising the policy community”, 3 per cent to “engaging the education community”, and three per cent to governance and fundraising.

To maintain the Society’s reputation as an independent and self-governing body that recognizes, promotes, and supports excellence in science, rigorous financial controls are applied to the Science Policy Centre. Even though it is the Society’s own money, the Centre is required to submit its budget to the Board for approval each year. The annual budget of the Science Policy Centre is approximately £3M (equivalent to approximately CAD \$4.5M) which is equivalent to the CCA’s annual operating budget.

### **Assessment (Study) Process**

The Centre conducts two types of studies: those identified and funded by the Royal Society, and those commissioned by the government. The vast majority of studies are selected and funded by the Society. The few studies commissioned by the government must be also be approved by the Council, and are funded separately from the Parliamentary Grant. Examples of studies commissioned by the government over the past decade include: foot and mouth disease in 2002, nanotechnology in 2004, and one on shale gas extraction (or fracking) in 2012.

The identification of policy studies (assessments) is conducted by the Centre’s Policy Advisory Group which does a horizontal scan of possible topics. There are approximately 50 topics at any one time, of which 4-5 are selected for major study each year. The Policy Advisory Group meets every six months to recommend topics for study. Following formal approval of a topic by the Society’s Council, a Working Group (similar to the CCA’s panel) of 12-15 people is formed for each study. Generally, half the Working Group is comprised of Fellows and half by other experts. Working Groups are always chaired by a Fellow.

The Centre has about ten major studies ongoing, of which they aim to publish about half or 4-5 each year. In addition, the Centre conducts another 6-8 smaller studies each year. Typically, 3-4 staff is assigned to each major study to support the Working Group (or panel). Major studies generally take about 18 months from the time they are approved by the Council to their release, while smaller studies generally take about six months to complete. More staff (e.g., 6-8) is assigned for major studies that need to be conducted over a shorter time frame. Average cost per study is estimated at between £150-200K (CAD \$250K) and £400-450K (CAD \$700K) for

smaller and major studies respectively. In the past, staff focused on a particular area but this was changed to allow staff to work across different areas.

Similar to the CCA, a review panel of 5-6 individuals comprised of both Fellows and other experts, reviews the final draft. It is then submitted to the Council for final review and endorsement. Once endorsed by the Council, it is released as the policy statement of the Royal Society; however, not all members may agree with a particular report particularly on controversial topics such as climate change. The Society aims to achieve a consensus and the last time there was a minority report was over twenty years ago. Unlike CCA's reports, however, reports of the Society do include recommendations.

Both Working Group and Review Panel members volunteer their time. Serving the Society is considered part of being a Fellow, while non-Fellows consider it an honour to participate. The Society has not experienced any difficulties in attracting individuals to serve on either the Working Group or Review Panel.

A report is often released by a Nobel Laureate, with media and television present, and carried out in conjunction with an event such as a conference. If international partners are involved, the release may occur at an international meeting or event. In the past several years, the Society has increasingly briefed key government stakeholders and/or distributed the report to selected people a few days in advance of a report's official launch. The purpose of these briefing meetings is to give the government a "heads up" particularly if the topic is controversial and to ensure wider discussion and impact of the report.

## **Conclusions**

In terms of the annual budget and number of staff, the Science Policy Centre is equivalent in size to the CCA but unlike the CCA the Centre is not a separate body but part of the Royal Society and relies on them for financial and administrative support.

While the Centre's assessment (or study) process is similar to the CCA in terms of its conduct and use of volunteers, staff support, and peer review, the Centre selects most of its studies while most of CCA's assessments are commissioned by government.

# C. Case Studies

## C.1 Informing Research Choices: Indicators and Judgement

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### Introduction

The Council of Canadian Academies received the following question from the Natural Sciences and Engineering Research Council of Canada (NSERC) in June 2010:

*What do the scientific evidence and the approaches used by other funding agencies globally have to offer, in terms of performance indicators and related best practices in the context of research in the natural sciences and engineering, carried out at universities, colleges and polytechnics?*

Total time for the assessment from receipt of the question to the release of the report took twenty-five months, from June 2010 to July 2012. This consisted of: seven months from receipt of the question to the first meeting in January 2011; fourteen months for content development to the completion of the peer review in March 2012; and four months for production to the launch of the report in July 2012.

### Deciding on the Question

NSERC spends approximately one billion dollars a year on scientific research, with over one-third of this supporting discovery research through its flagship Discovery Grants Program (DGP). As NSERC strives to be at the leading edge for research funding practices, it was interested to see if improvements could be made regarding future funding decisions. It asked the Council to assemble an expert panel that would look at global practices that inform funding allocation and to assemble a library of indicators that could be used when assessing funding decisions.

Several preliminary meetings took place between the Council and NSERC before receipt of the official question, which allowed both parties to examine the feasibility of addressing the proposed question (which focused on metrics as compared to the usual public policy oriented question), formulating and defining the scope of the question, and refining the proposal to the ADM Science and Technology Committee.

*Finding:* The interaction between the Council and NSERC was an effective process for obtaining NSERC's input, and for ensuring the scope of the question was appropriate and adequate.

## Selecting the Panel and the Chair

The Council conducted a world-wide search for individuals to serve on the expert panel on science performance and research funding. The search included the three founding Member Academies, NSERC and the SAC. Of the fourteen panel members: six were from Canadian institutions; five from American institutions; two from European institutions; and one was from an Australian institution.

The roles and responsibilities of the chair and panel members were clearly communicated to prospective members. The number of meetings and the commitment in terms of time was also known to prospective members prior to their acceptance.

The expert panel on science performance and research funding was noted as being at a very high level and appropriately constituted to reflect all needed perspectives including performance measurement and different international contexts. The Council's ability to hone NSERC's question into something that prospective panel members could readily understand and contribute was cited as the main reason the process for selecting the panel and chair was effective and efficient.

The presentation to the Council Board, which outlined the strengths of each prospective panel member, was described as being very professional. Once the panel had been constituted, an initial meeting was held with the panel, NSERC, and Council staff to ensure panel members had an understanding of the context and scope of the question.

*Finding:* The process for selecting the panel and chair was efficient and effectively used the refined question to attract high calibre experts which resulted in an appropriately constituted panel.

## Research and Drafting

No major performance issues were found regarding the researching and drafting of the *Informing Research Choices* assessment. It was noted that, as there was very little in the way of right answers, a central aspect of panel discussions was on understanding the appropriateness of methods, the indicators and the data. Sub-committees were, therefore, formed to help flesh out approaches, indicators and data which in turn informed the research and drafting process. Support to the expert panel provided by Council staff was noted as being of high quality, appropriate and effective.

A couple of issues were, however, noted by NSERC. First, NSERC's normal practice with advisory groups is to allow certain groups such as the sponsor to have observer status, in this case, on the expert panel. This request was considered by the expert panel but declined on the grounds of maintaining the independence of the panel and to follow the normal research and drafting process of other assessments. Second, NSERC had included in the original scope of the assessment consultations with the Canadian community on possible indicators and their pros and

cons, so that the assessment would not have strictly been a report of the fourteen member panel. This was also considered by the panel but declined, given the focus of the question on practices of funding agencies in other jurisdictions. In light of the high level of satisfaction with the assessment report by NSERC, it is difficult to determine if granting observer status to the sponsor or including consultations with the Canadian community would have had any impact on the efficiency and effectiveness of the research and drafting process. It is possible, however, that granting observer status to the sponsor and/or including consultations with the Canadian community would have lengthened the time.

*Finding:* The process for considering the sponsor's request to deviate from normal practice was handled efficiently.

*Finding:* The process for researching and drafting the assessment report, supported by the formation of sub-committees, was appropriate and effective.

### **Peer Review**

The selection of peer reviewers and monitor was similar to the process of selecting members for the expert panel. This involved a world-wide search for prospective reviewers, and asking reviewers for suggestions of other reviewers. It was noted that the materials the Council had assembled for reviewers including a primer on issues and questions in a non-judgemental manner was extremely useful allowing reviewers to fulfill their remit efficiently and effectively. There were nine reviewers: four were from Canadian institutions; three from European institutions; and two from American institutions.

Council staff categorized reviewers' comments into: "this is a real problem", "minor problem" and "typos". While everything a reviewer said was addressed, categorizing comments along these three priority areas provided an efficient and effective framework for devoting proportionately more time to "real problem" issues first. The Council's ability to hone the question was also cited as making the peer review process more efficient and effective.

One respondent, who participated in U.S. NAS peer reviews felt that the Council's peer review process was better and that both the NAS and Royal Society could learn from the Council.

*Finding:* The categorization of reviewer comments into three priority areas provided for an efficient and thorough peer review process.

### **Report Publication, Release and Promotion**

The Council and NSERC coordinated the development of communication plans for the *Informing Research Choices* assessment. When the assessment report was posted on the Council's web site, a message was sent by NSERC to its community with a link to the Council web site at the same time. There were also joint briefing sessions that involved the vice-chair and other members of the expert panel.

The only issue was with the timing of the release of the assessment report. The *Informing Research Choices* assessment was released in July 2012, and a couple of months later in September 2012, the *State of Science and Technology in Canada, 2012* assessment was released. Even though the NSERC assessment dealt with indicators of research and the Science and Technology (S&T) assessment dealt with the state of Canada's S&T, and even though the Council communicated and promoted the two assessments separately, many people got the two assessments confused. This was, according to NSERC, unfortunate timing regarding the release of these two assessments. NSERC believed a greater separation of the two report releases would have improved the effectiveness of the communication of the two reports.

*Finding:* The collaboration between the Council and NSERC led to an efficient process of coordinated communication, release and promotion of the assessment report but with some reservations by NSERC on the timing of the report's release.

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## C.2 The State of Science and Technology in Canada, 2012

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### Introduction

In 2010, the Minister of Industry asked the Council of Canadian Academies to assess the following question:

*What is the current state of science and technology in Canada?*

In 2006, the Council published its first report, *The State of Science and Technology in Canada*, providing a solid evidence base for policy decisions. The Council's 2012 report builds upon, updates, and expands on the previous report. It is also one in a new series of assessments by the Council that addresses various aspects of Canadian science, technology, and innovation. In particular, research in the private sector, is assessed in depth by another Council panel, the Expert Panel on the State of Industrial Research and Development. The mandates of the two panels are complementary and taken together assess the entire research enterprise in Canada.

The S&T assessment was 22 months in total (from the selection of the question to the result). The first meeting of the Panel was April, 2011 and the last meeting was April, 2012. The further ten months involved the original decision and approval of the question and the publication of the report. The sponsor was satisfied with the timing.

The Panel developed a comprehensive assessment of the state of S&T in Canada, with a focus on research performed in the higher education sector, as well as in the not-for-profit and government sectors. Their report assesses Canada's overall S&T strengths, compared with international peers, and its strengths at the provincial and territorial level. The collective findings are comprehensive and represent one of the most in-depth examinations of Canadian S&T ever undertaken.

## Deciding on the Question

The establishing of the question for the S&T was relatively straightforward; Industry Canada was looking for an update of the previous S&T review in 2006. The intent was to ensure that the new report be comparable, but to expand on, the old one. But, science and technology is a broad topic, including academic, government and industry research, and the 2006 report covered all three areas. After much discussion, Industry Canada and the Council decided to divide the assessments into two parts: (1) academic and government, and (2) industry.

The sense was that if the question was too broadly scoped then the Council felt that they would not be able to provide the high-quality answer that is at the core of the Council's value added. It would be inefficient. The question was then referred to the Scientific Advisory Committee for review and comment, and as the last step, proposed to the Board of Governors for final approval.

The Panel itself contributed to the “scoping” at its first meeting. As is normal practice, Industry Canada, the sponsor, met with the Panel at its first meeting to parse out the question. This process was seen by the Panel to generate higher quality results and greater subtlety in the Panel's understanding of the question. By the end of that first meeting there was consensus among the Panel, the Sponsor and the Council on the scope of the question. After that first meeting, the sponsor had no further contact with the Panel until just before the release of the final report.

*Finding:* The Council and Industry Canada worked effectively to define the scope of the question including dividing the original question into two for reasons of quality and efficiency.

*Finding:* Having the sponsor meet with the Panel at its first meeting is an effective method to ensure a common understanding of the question before the Panel begins its work.

## Selecting the Panel and the Chair

In response to the charge, the Council assembled a multidisciplinary panel (the Panel) of 18 experts from Canada, the United States, and Europe, with backgrounds spanning numerous fields, because of the breadth of the question. The Panel was chaired by Dr. Eliot A. Phillipson, Emeritus Professor of Medicine at the University of Toronto and Former President and CEO of the Canada Foundation for Innovation. Originally, there was a feeling among staff and the Chair that this Panel was too large; however, the nature and breadth of the question required that many disciplines be represented.

The Council started with the assigned internal Assessment Team (4 or so people) who examined the background research, peer literature, grey research, conference documentation, etc. This process had two purposes: (1) to begin to understand the question and the available information

in more detail, and (2) to generate possible names for the Panel. In addition, Council staff consulted the relevant Academies.

The process yielded a set of criteria for the composition of the Panel. Those criteria were then approved by the Scientific Advisory Committee and names were generated and approved. It was noted that the effectiveness or efficiency of this process could be questioned but that it has worked well for the Council to date.

The selection of the Chair was a separate but parallel process with its own set of criteria. The Chair was appointed before the rest of the Panel and commented on the proposed slate, but did not suggest any changes. For the S&T Review Panel, it was clear that the Chair could not be an expert in every aspect of the report, but needed to have at least a broad understanding of the major issues. It was also acknowledged that it was advantageous to appoint a Chair who was not too immersed in the subject matter in order that they be objective about the study. In addition, the Chair needed to have the qualities required to manage a group of 18 people in a meeting setting.

The general assessment for the S&T review was that this was a very high quality set of Panel members, with good diversity in background and geography and, individually they were “incredible people”.

*Finding:* The processes used to select the Chair and the Panel were effective in selecting a suitable Chair and in creating a diverse expert Panel for the broad, complex question from the sponsor.

### **Research and Drafting**

The Panel was asked to consider the full range of disciplines in which research is conducted, including the humanities, arts, and social sciences. The Panel undertook an expansive analysis that included a penetrating look at the output and impact of Canadian publications and patents, a survey of over 5,000 top-cited international researchers, a survey of Canadian S&T experts, and an analysis of highly qualified and skilled personnel. After examining the available evidence, the Panel developed a number of key findings.

For the S&T report, the Panel went a little beyond their “integrative” role and did some original work on the methods of analysis – the Panel felt it was necessary to bolster the work they were doing. This could provide new methodologies for this type of work. This is atypical; most Council Assessments do not include any aspect of original research. Generally, the Panel’s role is to bring together the best and latest research relevant to the topic at hand.

As a matter of process, staff would draft sections of the report and then the Panel would review and refine the result. In addition, the Chair asked groups of two or three Panel members to take the lead on certain sections of the report.

In the final stages, the report was reviewed and approved by the Scientific Advisory Committee and the Board of Governors.

*Finding:* The Panel had the flexibility and the staff support to conduct some original work on methods of analysis that was not a usual part of the assessment process but proved effective in supporting the creation of a quality report.

### **Peer Review**

For the S&T review there were 8 to 10 reviewers asked to provide comments. Two of them sent back very detailed comments; two or three others sent more general comments and noted a few specific matters; and the four others had minor input. While the review process was seen by Panel members as an essential part of finalizing the report, there was disappointment that only about half of the reviewers did detailed, thoughtful work yet time was taken up going through all the comments. Despite these reservations, on balance, respondents felt that the peer review had been effective in obtaining different perspectives, leading to the completion of a better report.

*Finding:* The peer review process was seen as time consuming but necessary and effective to ensure the high quality of the final report.

### **Report Publication, Release and Promotion**

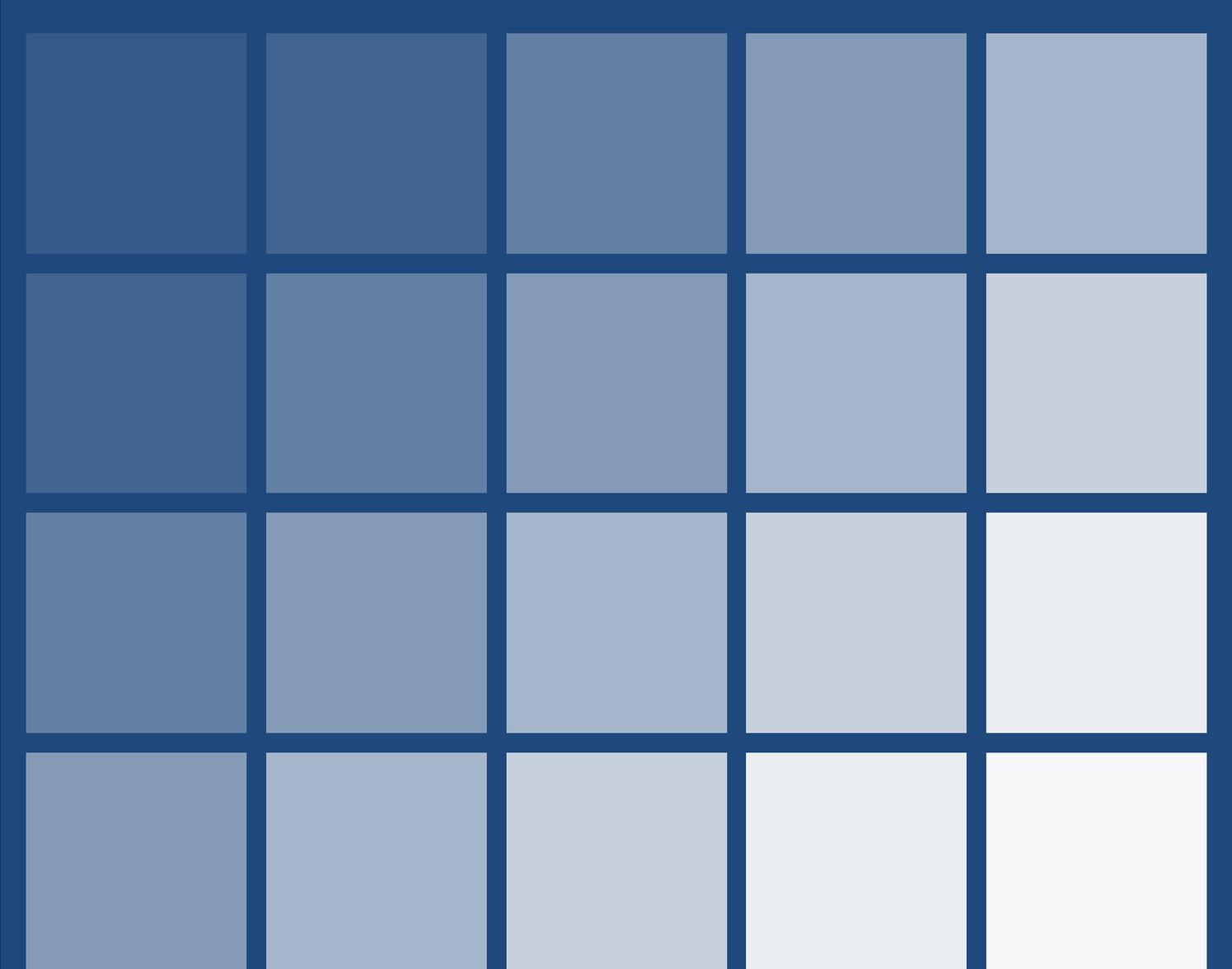
The original S&T Study was the first assessment of the Council and it had a very large impact right away; content from it went into the federal government's 2007 S&T Strategy. This latest one is even larger in scope and seems to have been well received, well regarded and influential.

Consistent with current practice, the Council invited the sponsor in for a briefing on the content of the report just before publication. This gave Industry Canada a detailed overview of their findings that helped them to understand the results and provide a "heads up" on possible media questions.

All respondents felt that the release of the State of S&T report was well handled. There was a high profile speech by the Panel Chair in Toronto and an editorial in a major newspaper that same day. There were also parallel sessions across the country; this was somewhat unusual but planned because of the broad application of the report. The original S&T Study was the first assessment of the Council and it had a very large impact right away; content from it went into the federal government's 2007 S&T Strategy. This latest one was larger in scope and seen to have been well received, well regarded and influential.

In addition to the publication of the report, the press release and the press events, the Council used a variety of other products and mechanisms as well: summary reports; web-based items; social media, follow on press conferences, etc. In addition, for the S&T report, the Chair was asked to provide a full briefing to a larger group of Industry Canada managers after the release and was also asked to speak at a number of universities across Canada about the report.

*Finding:* The comprehensive communications planning led to the efficient and effective release of the report across Canada simultaneously reaching a wide audience.



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