Major Science Initiatives

Oversight framework

February 2015

Canada Foundation for Innovation
230 Queen Street
Ottawa ON K1P 5E4
Innovation.ca

INNOVATION.CA
CANADA FOUNDATION FOR INNOVATION | FONDATION CANADIENNE POUR L'INNOVATION

TABLE OF CONTENTS

CONTEXT AND INTRODUCTION **2**

SCOPE **2**

OBJECTIVES OF THE CFI OVERSIGHT FRAMEWORK **3**

GUIDING PRINCIPLES OF THE OVERSIGHT FRAMEWORK: MANAGING FOR SUCCESS **3**

CFI'S OVERSIGHT ACTIVITIES: REPORTING, MONITORING AND REVIEWS **4**

Selection of indicators/metrics 5

Baseline data 6

Annual performance report 6

Financial reporting 6

Mid-term review 7

Monitoring visits 7

Annual workshop 8

End of funding period report 8

BEST PRACTICES IN THE GOVERNANCE AND MANAGEMENT OF UNIQUE NATIONAL RESEARCH FACILITIES **8**

Governance 8

Board committee structure and roles 9

Management 10

APPENDIX 1 – ELIGIBILITY **11**

CONTEXT AND INTRODUCTION

Over the last fifteen years the CFI has supported the creation of unique national research facilities that present particular challenges in terms of their operations and maintenance, as well as with their management and governance. These world-class facilities, owned by one or more institutions, are unique in Canada and serve communities of researchers from across the country and internationally. Such facilities are increasingly more complex and international in scope, ultimately requiring a greater focus on governance and management as well as stewardship mechanisms to ensure they are funded, managed and operated for success and ultimately contribute to the Canadian economy and society-at-large.

In 2010, the CFI was given the mandate to design a more systematic approach for evaluating and addressing their operating and maintenance (O & M) funding needs as well as their scientific performance, and for overseeing their management and governance policies and practices. The CFI created a funding mechanism for this purpose called the Major Science Initiatives (MSI) Fund. The MSI Fund has a dual objective:

- To enable the eligible facilities to fully exploit their capabilities by contributing to their O&M costs; and,
- To promote the adoption of best practices in governance and management, including long-term strategic and operational planning.

The ultimate objective of the MSI Fund is to stabilize these unique national research facilities through the development of robust business and operating plans tailored to the Canadian funding landscape and the adoption of state-of-the-art management and governance practices.

The Canadian funding system is such that these facilities typically have multiple funding partners and stakeholders from various sectors and academic institutions. The different mandates of the various funding partners — who support capital, O & M or direct costs of the research — make for a complex funding model. Until recently,, much of the funding for the O & M of these facilities was obtained through ad-hoc mechanisms and in the absence of general oversight and performance reviews.

In some international jurisdictions (the National Science Foundation (NSF) in the USA, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia and the Research Council in the UK), large-scale science facilities are typically assessed through comprehensive funding proposals that include: 1) the initial capital costs for construction, 2) the costs for commissioning, 3) the operating and maintenance costs, 4) the plan for capital upgrades, and 5) decommissioning plans. The funding for such proposals is often released in stages or phases upon successful achievement of milestones and deliverables. These are usually verified through additional peer review and focused assessments. In some cases, the operations of a facility are funded through a collaborative agreement between two or more organizations, for example the NSF and the Department of Energy in the US.

SCOPE

This framework is intended for unique national research facilities funded through the CFI's Major Science Initiatives Fund, including the 2014 special competition (see appendix 1). An MSI is defined as an initiative that addresses a set of leading-edge scientific problems or questions of such significance, scope and complexity that it requires unusually large-scale facilities and equipment, substantial human resources, and complex operating and maintenance activities to be carried out. These facilities usually have a lifecycle extending over many years, often involving multiple stakeholders and numerous funding partners. Their complexity calls for advanced management and governance structures, policies and practices, including the creation of separate entities to manage and govern them.

There is a dearth of expertise and experience in managing large-scale science facilities in this country. The CFI therefore consulted internationally to develop this framework and has created an advisory

committee to assist in devising and implementing this oversight framework. In order to implement a continuous improvement process, this framework is meant to be an evergreen document that will be periodically updated to reflect lessons learned and best practices in the management of large science facilities.

The CFI will adopt a funding and oversight approach that balances general principles of scientific excellence, responsible stewardship and accountability tailored to the particular situation of each facility.

OBJECTIVES OF THE CFI OVERSIGHT FRAMEWORK

The purpose of this oversight framework is to promote the responsible stewardship of these facilities. Consequently this framework:

- Outlines the CFI policies, procedures and requirements for the oversight of the facility;
- Sets out CFI's expectations regarding the governance and management of the facility including performance measurements based on internationally recognized best practices;
- Promotes the sharing of good practices on governance and management to assist the facility in meeting their objectives against established milestones and indicators, aiming for the optimal performance of the facility; and,
- Ensures that realistic decommissioning plans are developed in the eventuality of a shut-down of the facility.

The framework will serve as a guide to funding partners on effective project management and oversight of large scientific facilities to ensure responsible stewardship of public investments. The framework is also intended to help multiple funding partners align oversight requirements to reduce both the duplication of efforts and the reporting burden on the facilities.

GUIDING PRINCIPLES OF THE OVERSIGHT FRAMEWORK: MANAGING FOR SUCCESS

One of the criteria that defines an MSI is its uniqueness. The framework therefore must accommodate this fact. Unique national research facilities come in varying shapes and sizes and differ in many ways such as mandate and mission, stakeholders, culture of the research community and the stage in the lifecycle of the facility. It is also important to recognize that a facility's governance and management approach will be different as it matures through the different stages of its lifecycle. These differences will be taken into consideration when developing the oversight plan for each one. Each plan will be customized within the structure of this framework through discussions to be held between the CFI, the facility, the recipient institution and other funding partners interested in a common oversight approach.

Through an ongoing, systematic process of collecting, analyzing and using performance metrics, the facility will assess and report on its use of resources and progress in meeting its management and operational objectives. The performance measurement process will guide decision making of the facility's internal governing bodies, allowing them to identify deviations from targets or risks and make, where needed, the necessary adjustments to ensure expected results are achieved. Further, performance monitoring and reporting will support accountability and transparency at the levels of both the facility, and the CFI and its other funding partners.

Performance measures provide useful information on the soundness and efficiency of the operational and functional components of an R&D organization including financial ratios, user base, and knowledge development and transfer. Measures — such as percentage of operational funds from particular funding partners, downtime, number of new users and access cycle time, user satisfaction, diversity of staff expertise and turnover rate, papers published, and strategic partnership and collaboration agreements —

when combined, can provide a useful and telling composite picture of the performance of a science facility.

CFI'S OVERSIGHT ACTIVITIES: REPORTING, MONITORING AND REVIEWS

It is expected that the facilities have established monitoring and reporting activities as part of their existing management plan. In order to reduce the burden on the facility and the institution, these activities will be reviewed by an integrated CFI team composed of representatives from programs, finance and evaluation and outcome assessment. This will serve as a basis to establish CFI's customized oversight plan for each one. Several factors will be taken into account to establish the nature and extent of these monitoring and reporting activities, namely the complexity of the operation, the "maturity" of the facility, the experience of its staff in managing a unique national research facility and the adequacy of the controls in place. A risk-based approach will be used to determine the appropriate monitoring and reporting activities.

All facilities will need a performance measurement (PM) strategy at the outset to assess progress toward achieving its mission and key goals and objectives. Key success indicators, also known as key performance indicators (KPI), help an organization define and measure progress toward organizational goals. Creating these measures is typically a crucial part of the strategic planning process. Although facility may have already developed its own PM strategy, it may need to be enhanced to allow a fulsome assessment of value for money including the achievements of CFI objectives and expected results.

With the diverse nature and functions of unique national research facilities it is expected that performance monitoring will include generic and organization-specific measures. The generic KPI will be of great utility to the CFI and other funding partners by capturing data needed for accountability purposes, while the specific measures will reflect the uniqueness and critical success factors of each one. By measuring indicators on a regular basis, and by comparing the results to expectations, the facility will be able to assess progress against objectives and actions/strategies, detect problems or deviations, and identify opportunities for continuous improvement. The CFI also expects performance measurement to be an additional tool for the long-term strategy of the facility in measuring its own accomplishments and managing for success.

Although oversight activities for each facility will be tailored to its specific situation, at a minimum, the CFI will require one annual performance report, including financials, and a final report at the end of the CFI funding. The CFI will conduct monitoring and audit activities throughout the funding period of the award. The minimal frequency and type of monitoring and reporting activities are summarized in table 1.

Table 1: Minimal MSI reporting, monitoring and review requirements during the course of funding

Minimal frequency	Monitoring & reporting requirements
Several times/year	Meetings, phone calls and information exchange between the CFI, the facility and the recipient institution
Annual	Performance report including the financial report, MSI workshop
End of funding period	End of funding period report
Ad hoc basis	Monitoring visits, contribution audits, on-site visits

Selection of indicators/metrics

The ongoing monitoring of indicators will be an essential part of the performance measurement under the MSI Fund. Although unique national research facilities are diverse and complex, the key indicators will need to include MSI-specific metrics as well as generic indicators of program results related to the objectives and accountability requirements of the CFI.

Among others, these common indicators should demonstrate how the MSI Fund ensures that facilities remain at the leading-edge, enables researchers to undertake world-class research and technology development, enhances training and job opportunities for highly qualified personnel, and creates the necessary conditions for innovation and long-term socio-economic benefits. Examples of the potential key indicators that may be used as part of the CFI's oversight are listed in Table 2.

Table 2: Potential common key indicators for performance measurement

Indicator category	Data requested
Access to the facility	Number of users of the facility per year by sector (academic, public, private) and research domains Were the facility's target numbers of users met in the past year?
Users' level of satisfaction	Of those using the facility in the past year, how many were very satisfied, satisfied, neutral, dissatisfied or very dissatisfied?
Promotion/outreach activities	Number and type of initiatives (e.g. workshops, presentations) to attract users to facilities Describe the nature of the initiatives and the number of participants from the academic, public or private sectors
Contributions to training of HQP	Number of HQP trained at the facility or who used data from the facility in the past year by type (e.g. undergraduates, graduate students, PDFs, research associates, technicians) and origin (Canadian and non-Canadian)
Technology transfer activities	List key technology transfer activities (e.g. patents licensed, spin off companies) that have taken place in the past year. Provide a brief description of each tech transfer activity and its value (e.g. jobs created, revenues) or significance to the user community
Knowledge transfer/advancement of research programs	List key knowledge transfer activities, including the dissemination of knowledge (e.g. publications, technical reports) that have taken place in the past year

Recognizing the importance of the input of the facilities and their stakeholder communities into the identification of appropriate indicators (and sub-indicators), the CFI will collaborate with each one to develop and select facility-specific metrics. The set of key indicators selected to form the performance

measurement strategy should be limited to mitigate the cost and burden associated with their capture and tracking.

MSI-funded facilities are required to modify their management plans to include the agreed-upon metrics once the identification process has been completed.

Baseline data

For each metric identified, each facility will be required to provide the CFI with baseline data. Depending on its operational status,, the baseline data for identified performance indicators could be either a historical number or set at zero (for those facilities that may not be fully operational at the time of application). The baseline data will be the starting point against which progress will be systematically tracked over time.

Annual performance report

On an annual basis, each facility must provide data and information on the status, progress, outcomes and upcoming activities including the latest performance measures for the selected metrics. This will allow the funding partners to annually review the progress and achievements of the facility and maintain accountability to all their stakeholders. The release of funds for a subsequent year will depend on the submission of a satisfactory annual performance report.

Annual performance reports must be presented to and approved by the facility's Board of Directors. A cover letter signed by the Chair of the Board will confirm approval of the report and attest that it has met the reporting requirements of the MSI Award Agreement.

The annual performance report will use a standard template developed in collaboration with the facility's funding partners. This well-defined format will outline key areas for inclusion such as:

- The implementation status of the facility;
- The achievements and progress against planned objectives and activities from the previous year's annual report and/or business plan;
- The achievements and progress against selected performance metrics/key indicators;
- The remaining challenges and mitigation strategies with reference to planned objectives and activities from the previous year's annual report and/or business plan;
- The planned scientific and operational activities for the upcoming year; and,
- Updates to the strategies or plans of the facility (e.g. risk assessment, performance monitoring strategies, decommissioning plans).

Facilities must submit their annual performance by June 15 of every year. The data and information included in the annual performance report may be made public, once combined with information from all MSI-funded facilities or from other project progress reports, through various publications and communications. This data will also be used for program evaluation.

Financial reporting

Annual financial reports of actual expenses and projections for the future period will be required of all facilities. Depending on the situation, more frequent financial reporting may also be required. The management body of each facility must have approved the reports prior to submission by the recipient institution.

The financial report is to be incorporated with the annual performance report and must include:

- Actual and forecasted eligible costs;

- Actual and forecasted contributions to eligible costs from eligible partners, including assurance that funds have been received and spent (or will be received during the forecast period); and,
- Indication of any actual or forecasted significant changes.

In the financial reports, institutions must disclose their various funding sources and the full actual eligible cost of all budget categories, even if the cost exceeds the estimated cost reported upon award finalization. In order to reduce the burden on the institution and the facility, where appropriate, the CFI will consult with other funding partners and attempt to establish a common financial report template.

Mid-term review

Facilities funded through the 2011 competition will undergo an external review at the midpoint of the award cycle. A mid-term review will not be required for facilities funded through the 2014 special competition.

The objectives of the mid-term review will be to assess organizational and operational excellence and effectiveness of the facility, evaluate the quality of the MSI Fund, monitor and measure progress, and provide feedback. The review will allow an independent and expert assessment of the facility's performance, identify and recommend best practices that should be implemented, and recommend the appropriate level of CFI funding for the last two years of the award.

The four key areas of focus of the mid-term review will be:

- Outputs and outcomes in relation to research capacity, research productivity and innovation;
- Scientific and technical quality;
- Governance and management practices; and,

  Financial efficiency and sustainability.

Facilities will be provided with a template in the preparation of the review document. This document, prepared by the facility and the institution, will be a key element of the review process as it will provide the expert panel with relevant data and information (quantitative and qualitative) to gain insights about the facility, to effectively address the areas of the review and afford a reasonable basis for conclusions or recommendations. The content, the preparation for and the conduct of, the mid-term review will be done in conjunction with other funding partners. Careful consideration will be given to the selection of independent reviewers. The review panels will generally have representation from the academic and broader national/international research community, as well as experts in governance and in the management and operational aspects of unique national research facilities.

Monitoring visits

Monitoring visits may be conducted to ensure that facilities and institutions have adequate and effective policies, processes and controls in place and that the funds are being used in accordance with CFI policies and guidelines. An initial visit may be performed at the start of the funding cycle to gain assurances that policies and guidelines are applied and appropriate financial structures and tools are in place.

Facilities may also be subject to contribution audits to ensure that the funding received has been used in accordance with agreed-upon terms and conditions of the Award agreement, and with applicable policies and guidelines.

If the CFI funds will be transferred to the recipient institution, a formal agreement between the institution and the facility must be in place to specify the roles and responsibilities of each party in the management of the funds. Good communication between the facility and the recipient institution is essential.

When appropriate, the CFI can request that the facility share relevant documentation approved by the facility's governing body and/or committees. The CFI also reserves the right, when necessary, to meet with the facility's Board of Directors and/or any committees of the Board.

The use of site visits, teleconferences and annual scientific workshops are other ways in which the CFI can provide advice and guidance to facilities..

Annual workshop

An annual workshop will provide a forum for discussion on achieving governance, management and operational excellence, identifying gaps or challenges, and sharing of best practices. In the first few years, the CFI will play a key role in organizing the workshop and identifying key topics to be addressed; planning and organizing of future workshops will be increasingly assumed by the facilities.

These workshops may be exclusive to MSI-funded facilities, be co-hosted with other national or international funders of major science facilities (e.g. NSF), or be opened to other unique national research facilities. Ultimately, it is expected that the group of MSI-funded facilities will nurture and strengthen linkages with other similar facilities in Canada and elsewhere..

End of funding period report

The final performance report will be in a slightly different format than the annual report to allow for the gathering of some data and information that will be cumulative over the entire project period.

BEST PRACTICES IN THE GOVERNANCE AND MANAGEMENT OF UNIQUE NATIONAL RESEARCH FACILITIES

The purpose of this section is to outline some best practices in governance and management that will serve as guidance to as facilities mature and evolve over time. It is not meant to be prescriptive since much depends on the nature of each facility, its legal/administrative structures and the phase of its operational status (R&D design, construction, commissioning, utilization, decommissioning). While a "one-size-fits-all" approach is not appropriate in this context, governance and management structures that are flexible and adaptable will help ensure the facilities are governed, managed and operated for success throughout the lifetime of the facility.

The CFI's governance principles for large projects should be used as a starting point to help inform best practices in governance and management structures.

Governance

The governing body (herein Board) must be the principal decision-making body for the facility. Its mandate and its fundamental structure and procedures must be clearly identified within its legal, financial, and administrative structures (and recipient institution). Typically, the Board develops and implements policy and strategy and defines approaches for assessing Board and management performance including performance measures.

It is important that the facility clearly define, and elaborate on, the role of the Board with respect to:

- Accountability
- Legal duties and responsibilities
- Financial controls
- Relationship with management
- Policy formulation and strategic planning (including stakeholder communications)

- Management of organizational performance and risk

Best practices indicate that effective Boards include members who are knowledgeable, effective, and independent and who can act in the best interests of the facility. Avoiding conflict of interest or perceived conflict of interest is essential in choosing Board members. In addition to being familiar with the facility and its environment, they should be willing and able to commit the necessary time to engage in and contribute to its sound governance and management. Best practices suggest that developing a skills/competency matrix can help identify key competencies and potential gaps in Board membership experience and skills.

An experienced, knowledgeable and skilled Chair to both lead the Board and interface with management is critical to the long-term success of the facility. This is particularly critical during a transition phase, such as progressing from construction to operations, and every effort should be made to attract a Chair who has sufficient time to dedicate to this role.

It is also critical for the facility to develop a strategy and approach to ensure that representation on the Board continues to support the facility as it transitions from construction to commissioning to full operational status.

A number of key structures and processes are also essential to the effective operations of a Board. Consideration should be given to the following:

- An appropriate number of Board meetings each year with at least one to be attended in person;
- Agendas focused on finances, strategic issues and risks, and management plans to address them;
- Effective communications between management and Board members (e.g. orientation for new members, communication between meetings, meeting material provided sufficiently in advance);
- Regular in camera sessions without management in order to maintain Board independence; and,
- An effective Board Secretary to assist with agenda preparation, briefing material preparation and distribution, record of meetings, logistics etc.

Board committee structure and roles

Best practices suggest that effective governance often includes the delegation of some Board functions to a standing committee which acts in an advisory capacity to the Board. Appropriate standing committees of the Board with clear roles and skilled membership enhance good governance as well as augment key skills and expertise through the appointment of members who are independent of the Board and the facility's partners and collaborators.

Examples of such committees are:

- Audit Committee: typically responsible for oversight and stewardship of the facility's financial information, control systems and reporting, internal and external audit and risk management.
- Governance Committee: generally deals with governance and internal Board operations, such as Board and Committee structures and appointments and Board performance and processes.

Another key responsibility and best practice of this committee is to develop and implement a plan for the succession of the Chair and Board members.

Finally, best practices suggest that ethical responsibilities for code of conduct and conflict of interest for Board members be clearly identified and followed.

Management

In order to operate at an optimal level, facilites should implement the concept of simultaneous excellence. This includes: 1) scientific and technical excellence 2) operational excellence that includes cost controls, financial integrity, risk management, responsible stewardship of the resource, environmental impacts and health and safety issues, and 3) excellent community relations.

Best practices suggest that a project management framework be integrated into the planning processes. An annual work plan must be developed to help the facility attain the objectives of the strategic work plan. This plan should include activities around funded research projects but also the development of new areas that could create opportunities for the community of users.

Directly tied to this plan must be: definitions of results, impacts and outcomes for the facility as a whole; measures of performance and benchmarks for success in achieving goals and objectives; and, progress reporting.

The following are recognized as best practices in establishing effective performance measures:

- Indicators must define the keys to success. As such indicators should be defined following consultations with users, stakeholders, and staff to find out their needs, expectations, and requirements;
- Indicators must be specific, realistic, measurable and time-based;
- Indicators must allow adequate and timely assessment of the progress, performance and the results (e.g. outputs and outcomes) of the organization including its governance, operations and R&D activities; and,
- Indicators are not exclusively quantitative, they may include qualitative information.

The performance indicators must be included in the facility's management/business plan which describes how it will operationalize its strategic objectives over the next one- to three-year period.

A key component of the planning process described above is identifying and addressing all aspects of risk, immediate and long-term as well as financial and non-financial. The Board must be provided with regular reports by management on risks and actions taken (or to be taken) to mitigate them.

The planning around the facility's operations must reflect its entire life cycle.. In essence, it must not only plan for the implementation and the operations but also for the decommissioning of the facility. Determining the process to identify the time and the manner in which a facility ends its operations must be considered in advance and should be accompanied by a clear decision matrix.. This includes on-going planning for the costs of decommissioning;.robust estimates are essential even if the sources of funding have not yet been identified.

Regular reports must be provided to the Board on the facility's performance relative to the annual operations plan and budget, as well as the strategic and business plans, along with Management's response to address any variances or issues in performance. Reports typically sent to the Board include financial updates, operational updates, and risk issues. The format of this reporting can take various forms (e.g. dashboards or scorecards). A benchmark against other similar facilities can be established.

Appendix 1 – Eligibility

Major Science Initiatives Fund eligibility criteria:

Facility

1. Large-scale: The facility has received a one-time contribution of at least $25 million in capital funding from the CFI. It houses specific and substantial equipment and has significant human and operational resources needs beyond what is standard in Canadian research institutions.
2. World-class: The facility compares with the best in the world and provides an environment to conduct leading-edge research.
3. Unique: The MSI is a purpose-built national facility created to offer a unique capability to all Canadian researchers. It is not standard in a discipline or research area and not available elsewhere in Canada.

Governance

4. Established governance structure: The MSI has a formal governance structure, including a Board of Directors that is responsible for such matters as long-term strategic and multi-year business planning, and risk management at both strategic and operational levels.
5. Ownership: The facility is owned by one or more eligible institutions.
6. Access: The facility is operational and accessible to a broad range of researchers from across Canada. It also has an established merit-based access policy.

Major Science Initiatives Fund 2014 special competition eligibility criteria:

Facility

1. The MSI is a unique national research facility offering to all Canadian and international researchers highly specialized capabilities that are not standard in a discipline or research area and are not readily available elsewhere in Canada.
2. The MSI has demonstrated annual eligible operating and maintenance (O & M) costs exceeding $500,000 to support significant human and operational resources beyond what is standard in Canadian research institutions. In the case of facilities that are part of a pre-existing integrated network, the O & M threshold applies to the network as a whole.

Governance and management

3. The MSI has an established governance and management structure appropriate to the size and complexity of the facility. For larger or more complex facilities, this may include a Board of Directors responsible for such activities as long-term strategic and multi-year business planning and risk management at both strategic and operational levels.
4. The MSI is owned by one or more CFI-eligible institutions.
5. The MSI is fully operational and accessed by a broad range of users from across Canada and internationally, the majority of whom (more than 50 percent) are from outside the host or local institutions and beyond its regional and provincial borders. It also has an established user access policy.

Major Science Initiatives

Major Science Initiative	Lead Institution
Advanced Laser Light Source	Université du Québec - INRS
Biodiversity Institute of Ontario	University of Guelph
The Canadian Centre for Electron Microscopy	McMaster University
Canadian Light Source	University of Saskatchewan
Canadian Research Icebreaker Amundsen	Université Laval
The Canadian Scientific Submersible Facility	University of Alberta
Compute Canada	University of Western Ontario
National Cancer Institute of Canada Clinical Trials Group Central Operations and Statistics Office	Queen's University
Ocean Networks Canada	University of Victoria
Plateforme de recherche en sciences humaines et sociales – ERUDIT.ORG	Université de Montréal
SNOLAB	Queen’s University
SuperDARN Canada: The Canadian Component of the Super Dual Auroral Radar Network, A Global Space Weather Collaboration	University of Saskatchewan
Toronto Centre for Phenogenomics	Mount Sinai Hospital

Research builds communities
La recherche au service des collectivités

450-230 Queen St.
Ottawa ON K1P 5E4
Tel 613.947.6496
Fax 613.943.0227

450-230 rue Queen
Ottawa ON K1P 5E4
Tél 613.947.6496
Téléc 613.943.0227