



Canada Foundation for Innovation  
Fondation canadienne pour l'innovation

## **Outcome Measurement Study: Instructions for the Institution**

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# Instructions

## The Intent of the OMS

The Outcome Measurement Study (OMS) is designed to assess the degree to which the CFI's investment in research infrastructure is a critical contributing factor<sup>1</sup> in the realization of five outcomes:

- **strategic research planning**
- **research capacity**
- **highly qualified personnel**
- **research productivity**
- **innovation**

The OMS also asks institutions to discuss challenges in sustaining these outcomes.

The OMS helps demonstrate to the CFI Board, the Government of Canada, the Canadian public, and other key stakeholders the extent to which the CFI is achieving its mandate. It also provides information resources for evaluation and planning purposes, and features prominently in the evaluation framework.

The OMS is a learning exercise done in partnership with participating institutions and is not a typical merit-review process. No funding is contingent on the findings, nor are the findings used to rank research activities or institutions. The OMS methodology involves an in-depth questionnaire submitted by the institutions with a follow-up validation by a visiting expert panel whose report is the key output of the exercise. The scope is unique, looking across an institution and a specific **theme** rather than examining an individual project or program. The **theme** is selected following discussion with institutions and is based on several factors, including the degree of synergy between the institution's Strategic Research Plan and areas of major CFI investment. This approach captures with **quantitative** and **qualitative data** the outcomes of investments across the spectrum, from basic research to innovation and societal and economic benefits.

The OMS recognizes the CFI as one player in a large and complex system of research support. Careful discussion of the relative contributions of funding programs, organizations, and other factors external to CFI is coupled with longitudinal analysis in order to ensure issues of attribution are addressed accurately and in context. Other stakeholder funding agencies (e.g. provincial, federal) not only contributed to the design of the OMS tool, but also regularly send representatives to the visits as observers, maximizing the return on the resources invested by the institution and CFI for data collection.

Selected institutions are notified at least nine months in advance of the visit. Institutions wishing to participate in an OMS should contact the CFI evaluation team. In recognition that institutions

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<sup>1</sup> That is, the outcomes in question would likely not have occurred, or would not have occurred to anywhere near the same extent, in the absence of the CFI investments.

may need to invest additional resources in data collection and other related activities to support the OMS exercise, the CFI will make a one-time contribution of \$10,000 to participating institutions once the final OMS Expert Panel Report is completed.

## Institutional Deliverables

Deliverables	Format	Due date
<b>Institutional Data Document</b> - created by filling out the template attached. Document length will vary by number of projects etc. <ul style="list-style-type: none"> <li>a. <b>Draft report</b> for CFI's review and feedback to the institution</li> <li>b. <b>Final report</b> for the Expert Panel's assessment</li> </ul>	MS Word	<ul style="list-style-type: none"> <li>a. Six weeks prior to visit</li> <li>b. Three weeks prior to visit</li> </ul>
<b>List of the Project Leaders (PLs) and Principal Users (PUs)</b> – list the names, identify whether PL or PU, departmental affiliation, and sponsored research funding for the past year for each of the PLs and PUs.	MS Excel	Four weeks prior to the visit
<b>Recent CVs of all PLs and PUs.</b> It is recommended that a maximum of 25 CVs be submitted	PDF or MS Word, in zipped folder online or mailed CD, file names standardized by last name	Four weeks before the visit
<b>Six 15-minute presentations</b> – addressing each of the five outcome categories plus challenges	Handouts of presentations for the Expert Panel and electronic (PPT) version for the Chair and CFI	At the start of the OMS visit (Day 1)

## OMS Stages

### Timeline

Time (in months)									
-8	-7	-6	-5	-4	-3	-2	-1	0	1
A- Orientation (6-9 months prior to visit)									
	B- Data Preparation and report writing Draft report (due 6 weeks prior to visit), list of PLs/PUs, and CVs (due 4 weeks prior to visit), and final report (due 3 weeks prior to visit)								
		C- Expert Panel membership Propose potential Panel members (6 months prior to visit) and confirm suitability of panel (3 months prior to visit)							
								D- Visit (1.5 Days)	
									E- Reports
On-going communication with the CFI									

### A – Orientation (six to nine months in advance of visit)

1. Confirm a **theme** in consultation with the CFI. The **theme** should be an area of research in which there has been substantial CFI investment and that is linked to the institution's past or present strategic research planning. The **theme** should be broad enough to capture a portfolio of CFI projects, usually between 10-20 mature projects, and sufficiently coherent or integrative in content that a single Expert Panel can make an assessment of outcomes in each of the five defined areas with a reasonable degree of confidence.
2. Identify, with the CFI, the list of projects to be investigated based on scientific boundaries of the **theme**. To preserve the integrity of the thematic unit of analysis, other criteria such as PL availability or research successes must not drive the selection process. Undeveloped projects with less than one year since award finalization should appear on the list but should not be included in quantitative data for outcomes categories 2-5. The list should be decided as early as possible in the process as several subsequent steps depend on it.
3. In consultation with the CFI, host a pre-visit orientation presentation to be led by a senior CFI representative who will provide an overview of the OMS process and highlight some

of the effective practices and pitfalls that have been identified by institutions that have participated in past reviews.

4. Establish an academic champion (who will represent the institutional commitment and engagement in the review), a project lead person, a project plan, and an advisory group to undertake the OMS exercise. If a consultant is hired, ensure they maintain excellent communication with advisory group and project lead person.

## **B - Data and Institutional Report Preparation (final report due three weeks in advance of the visit)**

1. Draw up the complete list **PLs** and **PUs** within this **theme**. This includes all researchers who rely heavily on the infrastructure for their work.
2. Use the data template to identify which information sources at the institution are most appropriate to respond to each indicator. Having more than one source of information for an indicator is encouraged.

### **Possible information sources vary by institution but may include:**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>○ Research Office and office of the vice-president for research</li> <li>○ Provost</li> <li>○ Alumni office</li> <li>○ Grad studies</li> <li>○ Office of institutional analysis, statistics, reporting</li> <li>○ Office of Technology Transfer</li> <li>○ University/Industry Liaison Office</li> <li>○ Department records</li> </ul> | <ul style="list-style-type: none"> <li>○ Interview of key informants (dept. head, deans etc.)</li> <li>○ Scholarships, finance offices</li> <li>○ Annual Project Progress Reports</li> <li>○ Research Grants Office</li> <li>○ PL/PU CVs</li> <li>○ Online database (e.g. web of science, PubMed) for bibliometric analysis</li> <li>○ Researcher's websites</li> <li>○ Survey/interviews of <b>PLs</b> and <b>PUs</b></li> </ul> |
|---|---|

3. Begin data collection and start filling out the template (Institutional Data Document) attached. For each question, provide information on the data source. If the institution has information they feel would be valuable for the Expert Panel but it is not specifically requested in the template they are highly encouraged to include or append it. The use of figures and graphs can be effective in illustrating trends or complex connections (e.g., links among projects); such graphics are often included in the Expert Panel's report. Institutions are encouraged to contact the CFI throughout the data collection and report writing process whenever they have questions or require clarifications.
4. Develop a narrative on the evolution of the theme within the institution and the impact of the CFI investments, employing case histories of particularly interesting outcomes,

whether positive or negative, and making reference to the **quantitative data**. Where possible, describe the life cycle of innovations/benefits from the upstream research idea to the downstream user benefit, as well as the role of the infrastructure, graduate students, interactions with other researchers and/or users and other complementary funding sources. The narrative should also address the particular advantages accruing to the researchers and the institution.

5. Gather and submit up-to-date CVs for all PLs/PUs to the CFI four weeks before the visit.
6. Send the draft Institutional Data Document to the CFI six weeks before the visit.
7. Send the final Institutional Data Document to the CFI three weeks before the visit.

### **C – Expert Panel membership (3 to 6 months in advance of the visit)**

1. Send to the CFI names of suggested subject matter experts to participate on the expert panel about six months before the meeting. For each visit the CFI normally fills four positions on the panel while the panel Chair is selected separately. Suggestions from the institution are especially important for finding an expert familiar with knowledge translation, i.e. use of the research findings in areas such as industry, policy etc.
2. Review the list of final expert panel members selected by the CFI for issues such as conflict of interest or gaps in expertise. The CFI provides the list of panellists for the institution's approval approximately three months prior to the visit.

### **D - Visit**

The visit is structured around six 15-minute presentations, one on each of the outcomes areas and one focussing on institutional challenges, interspersed with Q&A sessions, breaks and *in-camera* sessions. During *in-camera* sessions institutional representatives leave the room and the Expert Panel works on their report. The purpose of the presentations is to provide additional **qualitative** detail on a few key examples from the data, presented in person by those most familiar with them. Presentations may include one slide showing the summary findings for the outcome category (e.g. HQP) but otherwise they should not repeat information from the Institutional Data Document as the Expert Panel will have read this document thoroughly. The presentation must focus at all times on the specific outcome being featured rather than on individual research projects.

It is a recommended practice for each presentation to be delivered by 1 or 2 speakers selected carefully by the institution for their expertise relevant to the given indicator. Other individuals with relevant expertise should also be present to participate in the Q&A. For example, for Strategic Research Planning, the presentation should be presented and attended by individuals who can discuss the role of the CFI investments, and the relationship to complementary investments in new hires and other funding sources, at a high (institutional) level, such as the V-P Research (or

representatives), Deans, Department Heads, the University Industry Liaison Office, etc. For **HQP**, excellent presenters in the past included local employers, students, co-op program managers etc. Innovation presentations might feature those who have used research results from the institutions such as local industry representatives or policy makers. It is recommended that all participants be familiar with the Institutional Data Document so that they could respond to requests for clarification on how the data were collected.

At the visit the panel Chair guides proceedings while the other members of the Expert Panel ask questions to explore and validate the existence and significance of outcomes. They also provide verbal and written comments that are summarized in the Expert Panel Report. Observers from the CFI, the province and other funding partners (e.g. CIHR, NSERC) are also invited.

The visit may include a brief tour (approximately 30 min) of nearby facilities; however, with time being limited, such a visit needs to be managed carefully so as not to run overtime. If a tour is to be provided, it should ideally take place at the end of Day One. Also, there should be people present during the tour who can respond to questions on outcomes of the research.

It is highly recommended to invite a group of students from the **theme** to join the lunch activities and to talk informally with the panel.

Please coordinate the logistics for the visit in close collaboration with the CFI, using the template agenda below.

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**Day One: [date] (8:30 AM – 5:30 PM)**

**Location: [address and room #, the room should not change over the course of the day]**

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8:30 AM	Initial Committee Meeting <i>In-Camera</i> (75 min.) Includes presentation by a provincial representative on the provincial S&T context
9:45 AM	<i>Break (10 min.)</i>
9:55 AM	Introductions (5 min.)
10:00 AM	<b>Theme Overview and Institutional Strategic Research Planning Presentation (15 min)</b>
10:15 AM	Q&A (25 min.)
10:40 AM	<i>Break (10 min.)</i>
10:50 AM	<b>Impacts on Research Capacity Panel Presentation (15 min.)</b>
11:05 AM	Q&A (25 min.)
11:30 AM	<i>Lunch (60 min.) – Meeting with Students and Key PLs/PUs</i>
12:30 PM	Committee Meeting <i>In-Camera</i> (30 min.)



1:00 PM      **Impact on Highly-Qualified Personnel (HQP) Panel Presentation (15 min.)**

1:15 PM      Q&A (30 min.)

1:45 PM      *Break (15 min)*

2:00 PM      **Impact on Research Productivity Panel Presentation (15 min.)**

2:15 PM      Q&A (30 min.)

2:45 PM      *Break (15 min)*

3:00 PM      Committee meeting In-Camera (105 min.)

4:45 PM      Possibility of tour

5:30 PM      Committee Adjourns

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**Day Two: [date] (8:30 AM – 12:30 PM)**

**Location: [address]**

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8:30 AM      Committee meeting In-Camera (30 min)

9:00 AM      **Impacts on Local, Regional, and National Innovation Presentation (15 min.)**

9:15 AM      Q&A (45 min.)

10:00 AM      *Break (15 min)*

10:15 AM      **Challenges Presentation & General Discussion (30 min.)**

10:45 AM      Committee meeting In-Camera (105 min.)

12:30 PM      Committee Adjourns (Lunch is served)

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## **E - Reports**

Once the Expert Panel Report is written based on the Institutional Data Document and the site visit, the institution is asked to review the Report for errors and omissions. This usually occurs within six weeks of the visit. The Chair of the Expert Panel is then responsible for giving final approval of the visit report before it is presented to the CFI Board with a copy forwarded to the institution. The Expert Panel Report is used by the CFI outcome assessment and evaluation team for evaluation purposes and will not be published. Aggregate reports of OMS findings from several visits may be published at a later date.

## Definitions

**Critical mass:** Critical mass is defined in relation to a specific research thrust and entails the existence of a well integrated group of researchers of suitable size and constitution, considering the diverse disciplinary and technical skill necessary to be able to make significant advances in the sub-field or issue areas at a level of national to international competitiveness.

**End users:** Individuals or organizations outside the academic community (typically in the private or public sector) who will use the research results to develop practical applications,

**Financial contributions** from end users. Amount of funding from end-users for research projects may include funding provided for: i) Fee-for-service activities (e.g., equipment or database access, testing, materials characterization, modeling, etc.); ii) Contract research projects; or iii) Collaborative research projects, consortia, etc. – where those activities use the CFI-funded infrastructure.

**HQP (also trainees):** Highly Qualified Personnel (HQP) are undergraduate students, Masters, and Ph.D. candidates, postdoctoral fellows and research technicians/technologists.

**Now:** The most recent year for which data is available (identify year used for response).

**Pre- CFI:** The year prior to the first CFI award in the theme

**Project Leader (PL):** PLs are designated by the institution as the leaders of the CFI-funded infrastructure project.

**Principal User (PU):** PUs are all researchers (i.e., not restricted to co-applicants on the CFI proposals) who have relied heavily upon the CFI-funded infrastructure for their work (includes adjunct appointments).

**Qualitative data:** Detailed qualitative commentary on indicators is critical to the exercise. Comments can also describe linkages among indicators; e.g., how better infrastructure attracts key scientists, which equipment affects training, which equipment affects linkages to local colleges, etc.

**Quantitative data:** Quantitative information for all indicators should be summed for the research theme overall. Where relevant, such as where findings vary dramatically across the theme, institutions may present data for individual sub-themes or facilities so long as the summary information is also available.

**Sponsored research funding:** All externally sponsored research funding, except for CFI infrastructure funding and industry-sponsored clinical trials for the purposes of regulatory approval.

**Theme:** In all OMS documentation, the theme is defined by the list of selected projects and the associated PLs and PUs. In some cases there may be researchers who are in the theme in terms of the nature of their research but are not users of CFI-funded infrastructure. If this discrepancy exists, please discuss as part of the introductory section titled “How are the projects in the theme linked?” and note there the number of PLs, PUs, and researchers who do not use CFI-funded infrastructure but might be considered in the theme. Ensure that the document specifies clearly which group of individuals is captured in each data table. As the number of PLs and PUs associated with the theme may change each year with new hires and retirements or departures, a table listing the names of PLs and PUs by year is a useful appendix to the document.

**Visiting researchers:** Researchers (from any sector) external to the institution who are spending a week or more in these facilities.

## Institutional Data Document

N.B. Please complete all tables provided. The headings and sub-headings should be maintained; however, please remove all CFI instructions and do not repeat the question in your response.

### Overview of Institution

[Please provide some basic overview information for the institution as it would appear on the institution's website. This might include brief information on the history of the institution, the number of faculty and students, the names of key senior staff, the distinctive characteristics of the institution, etc. (up to 1.5 pages)]

### Overall Description of the Theme

- What is the history of your institution's strategic interest in this **theme**?

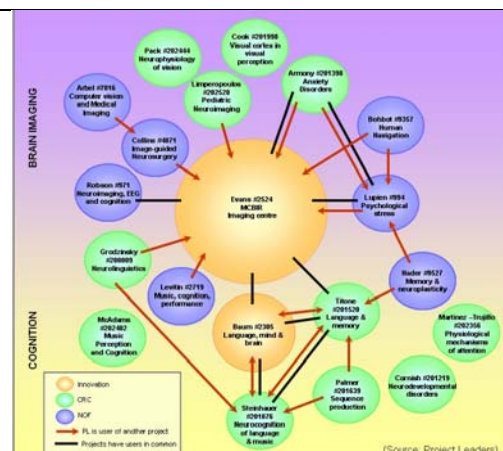
[Please describe the evolution of research in this theme at the institution, starting with when the theme first appeared through to the present. Outline the research vision underlying the OMS theme, the major lines of research in the theme and how the CFI-funded infrastructure underpins those lines of activity. Include discussions on how it became an institutional priority and major events such as when important facilities were built, critical faculty appointments made, major discoveries made etc. (1-2 pages)]

- How are the projects in the **theme** linked?

Specify the dimensions of the theme of this OMS visit (what is and is not included) and describe how the portfolio of projects provides a coherent or integrative theme for an assessment of outcomes and impacts. Describe the major elements of the CFI-funded infrastructure and any other complementary investments by the province or other funders, including expansions to other facilities that were not funded by the CFI, etc.

Describe how the theme is linked to other related domains of research within the institution and to the institution's participation in regional/national networks.

[The explanation can also discuss collaborations inside and outside the theme, as well as prospects for future projects. Please provide a detailed diagram that illustrates the links among individual projects. The above figure is provided as an example (up to 3 pages including diagram).]



## 1. Institutional Strategic Research Planning

The CFI requires institutions to have a Strategic Research Plan (SRP) which sets priorities based on their strategic vision for the future. Institutions are encouraged to set priorities in areas that integrate ideas and knowledge from many disciplines and sectors, and that build on their distinct advantages.

### 1.1 SRP Process

- Did an SRP process exist prior to the CFI? Describe the nature of the SRP process (e.g., timing, responsibilities, who participated).

- How has the SRP process evolved and what has been the influence of the CFI, if any?

- What changes have occurred in terms of the realization of the objectives of strategic research planning (e.g., integration, scope, speed of implementation), and what has been the impact of the CFI?

### 1.2 External influences on the SRP

- What has been the impact of external factors and programs on strategic research planning at the institution and on the realization of those plans (e.g. regional and provincial needs and priorities, federal S&T priorities, the CRC program)? How have these external factors impacted the SRP? How has the institution adapted the SRP to respond to changing needs?

### 1.3 External effects of the SRP

- What impacts has the institutional SRP made on planning and action at other institutions (e.g., at other universities, non-affiliated research hospitals, government labs, etc.)?

- What impacts has the institutional SRP made on planning and action at municipal, provincial, or national levels?

[Is there alignment between the federal government's S&T strategy, or that of the province, and the research strategy at the institution in this area and how did it come about?]

## 1.4 Complementary investments by institution

- Human resources
  - How many Canada Research Chairs (CRC) are there currently in this **theme** vs. in the institution as a whole?
  - How many new Industrial Research Chairs (IRC; if any) have there been in this **theme** since the first CFI award, vs. in the institution as a whole?
  - How many new faculty member hires have there been in this **theme** since the first CFI award, vs. new faculty hires in the institution as a whole in the same period?

Human Resources	# in the Theme	# at Institution	$\frac{[\# \text{ in the Theme}]}{[\# \text{ at Institution}]} \times 100\%$
CRCs	(e.g.) 3	5	$[3/5] \times 100 = 60\%$
IRCs (if any)			
New Faculty Hires			
CFI Investment (as a comparator)			

- Financial and other investments
  - What is the cumulative dollar value of other institutional research funding provided in the **theme** (e.g., from deans' budgets, foundation, etc., excluding O&M)?

Source	Amount
Department budget	\$X,XXX
University Foundations, trust funds	\$X,XXX
Other sources (etc.)	\$X,XXX
Total	\$X,XXX

[Please report the cumulative total for the entire period subject to OMS analysis. Include a narrative discussing the data, highlighting key points and noting key investments. Do not include investments made by various granting agencies or O&M contributions. An annual breakdown is not required.]

- What is the **annual** dollar value of the O&M resources allocated by the institution to operate and maintain the CFI-funded infrastructure within the theme. This amount should exclude funding from the CFI's IOF.

[year] [amount]
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- What is the cumulative dollar value of IOF actually allocated to this **theme** vs. the dollar value originally generated based on the value of eligible projects in the **theme**?

	O&M spent over 5 years	Total eligible IOF	IOF actually allocated	Net O&M costs covered by other sources
Total	(e.g.) \$75k	\$50k	\$20k	\$75k-\$20k = \$55k

[Please indicate whether IOF amounts generated by eligible projects were distributed to those same projects.]
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- What is the cumulative dollar value of any other investments in the **theme** (e.g., other infrastructure initiatives, new graduate programs)?

[description – amount]
[description – amount]...
[total]

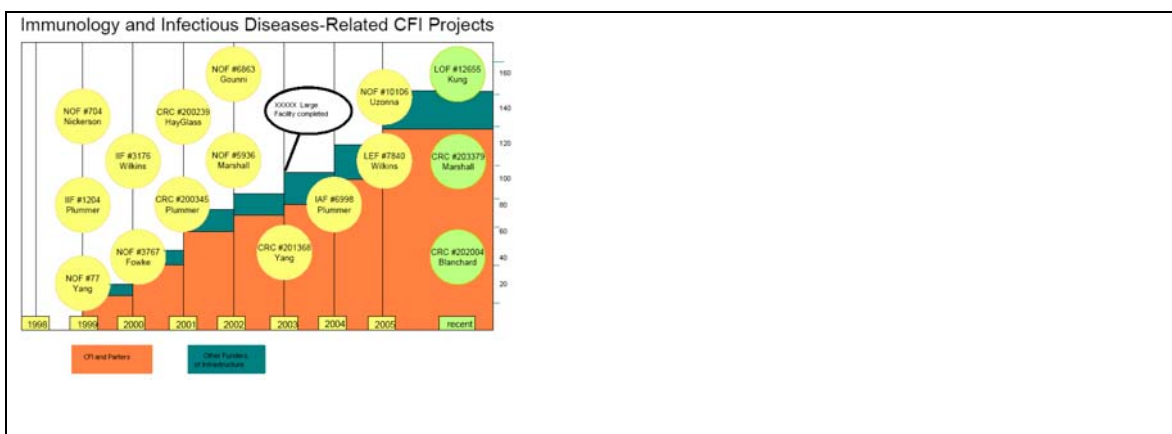
## 2. Research Capacity

Research Capacity focuses on the quantity and quality of CFI-funded infrastructure available, whether this infrastructure has in turn helped attract more research funding, and the overall impact on **critical mass**. *All questions in this section refer to the theme.*

### 2.1 Infrastructure Investment value

- What is the dollar value of infrastructure investment from the CFI and partners?

[Please provide a table and graph of the cumulative dollar value of investments over time by the CFI and partners, with flags showing the timing of major awards (see example below). Please also include reference to any significant infrastructure investment in the theme that is not partner funding linked with the CFI awards (e.g., by the granting councils, or by the province).]
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- How does the current amount of research infrastructure compare with the amount pre-CFI?

[Please provide a qualitative discussion about the evolution of the research infrastructure. The institution need not put a dollar value on the infrastructure in the theme prior to the CFI investment.]

## 2.2 Capabilities

- How does the infrastructure rate in technical capability pre-CFI and now, taking into account what might be expected for an institution of your size and type?

Technical Capability (e.g., accuracy, range/resolution, throughput, etc.)	Pre-CFI, % of theme infrastructure (by dollar value)	Now, % of theme infrastructure (by dollar value)
State-of-the-art	[e.g. if 4 projects worth 6 million are ranked state-of-the-art, while the total value of all projects is 10 million, then 60% of infrastructure by dollar-value is state-of-the-art.]	
Still highly useful for research, but no longer state-of-the-art		
Useful for supporting research and teaching		
Obsolete and no longer useful		



[Please complete the table provided. For each category, provide a short commentary in the table, or below it. Indicate how the CFI contributed to this capability. In addition, for one or two of the state-of-the-art infrastructures, justify your evaluation with more details.]

- How does the infrastructure rate in operational capability **pre-CFI** and **now**, taking into account what might be expected for an institution of your size and type?

Operational Capability (e.g., facility space, user capacity, computing, technical & professional support, etc.)	Pre-CFI, % of theme infrastructure (by dollar value)	Now, % of theme infrastructure (by dollar value)
State-of-the-art		
Still highly useful for research, but no longer state-of-the-art		
Useful for supporting research and teaching		
Obsolete and no longer useful		

[Please complete the table provided. For each category, provide a short commentary in the table, or below it. Indicate how the CFI contributed to this capability. In addition, for one or two of the state-of-the-art infrastructures, justify your evaluation with more details.]

### 2.3 Sponsored research funding and number of PLs and PUs

- For each year, how much **sponsored research funding** was obtained by the institution from all sources?
- For each year, how many **PLs** and **PUs** were conducting research?

Year	1999 Year One = year of first major CFI award	2000...	...	...2010 [last year]
Research Funding in Theme				
- Tri-Council				
- Other funding sources				
Total				

Total # of PLs and PUs in theme				
Average funding per researcher				

## 2.4 Critical mass

- Do the **PLs** and **PU**s constitute a **critical mass** of faculty members?

[Please discuss reasons why there is, or is not, a critical mass. Refer back to the presentation of the theme to present what is considered to be the core areas of the research theme. Mention key research components, briefly summarize the expertise and disciplines of key PL/PUs, and give concrete examples of the ways they collaborate to achieve their research goals which are at the core of the research theme.]

## 2.5 Recruitment and retention of faculty members

- What is the total number of faculty members who were attracted to the institution since the first CFI award, and indicate from where they were recruited?

Name	Origin (institution or country)		Repatriated Canadian (y/n)
	Canada	outside Canada	
-			
...			
[total]			[total]

- How has the CFI funded -affected recruitment (refer back to **PL** and **PU** totals from table from 2.3)?

[Please include comments on individuals who were recruited to Canada because of the quality of the theme and the CFI-funded infrastructure within it, and individuals who left]

- How has the CFI-funded infrastructure affected retention?

## 2.6 Visiting researchers

- How many **visiting researchers** are attracted to these facilities annually **pre-CFI** and **now**?

Pre-CFI			Now		
Number	Affiliation	Host PL/PU	Number	Affiliation	Host PL/PU
-	[institution/ organization, province, country]				
-					
[total]			[total]		

[Please describe the impact of the CFI-funded infrastructure on attraction of visiting researchers, for example, indicate a piece of infrastructure that was particularly attractive to visitors, or identify visiting researchers whose interest in the facilities was/is significant as demonstrated by a longer stay at the institution or repeated visits at the facility.]

## 2.7 Multidisciplinarity

- How much is the CFI-funded infrastructure used by researchers from different disciplines?

[Please list disciplines involved, it may be a summary of the list of faculty affiliations from the list of PLs and PUs]

- Has the institution deliberately fostered multidisciplinarity? If so, describe how this was done.

[E.g. how does the institution encourage researchers from different disciplines to collaborate on common research problems?]

- Have there been changes in the degree of multidisciplinarity since **pre-CFI**?
- If so, did these changes add value to the conduct of the research? How?

### 3. Highly-qualified Personnel (HQP)

In this review, **HQP** is considered separately from research capacity because of its particular importance as a predictor of future capacity. Indicators cover issues such as how many **HQP** are trained, the quality and relevance of this training, the quality of the trainees, and the impact of **HQP** who go on to other job positions. **All questions in this section refer to the theme.**

#### 3.1 Number of research trainees

- How many students and fellows have been trained annually by **PLs** and **PU**s?

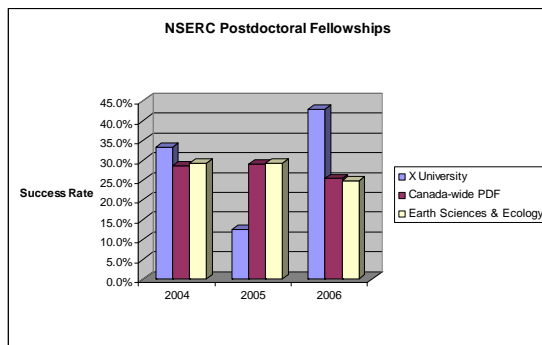
Trainees	Annually Pre-CFI		Now	
	Total number of students	Total number of PLs and PUs in theme	Total number of students	Total number of PLs and PUs in theme
Masters students				
PhD students				
Postdoctoral Fellows				
Total				

[Please use a diagram (e.g. bar chart) to show the evolution of HQP over time]

#### 3.2 Quality of training and trainees

- What has been the impact of the CFI (if any) on the quality of the trainees?

[e.g. changes in numbers of students or fellows with competitive external funding (scholarships), etc. See example below.]

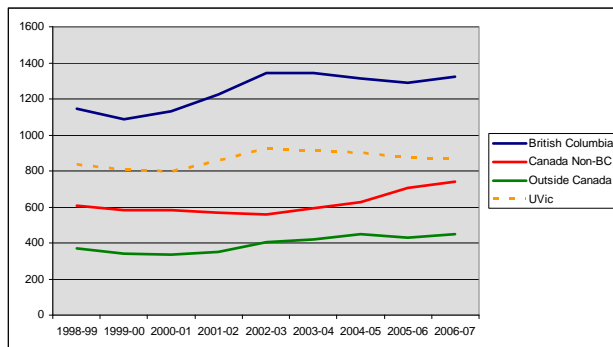


- What has been the impact of the CFI (if any) on the quality of the training?

[e.g. new curricula and courses, new technical skills taught, workshops, seminar series, co-op programs, colloquia, fostering inter-disciplinarity, preparation for careers in or outside academe, etc.]

- What has been the impact of the CFI (if any) on the training programs' reputation or competitiveness?

[e.g. describe changes in application/rejection rates, the proportion of students attracted from, and outside, the institution, etc. You may also describe changes in student origin such as in the example provided.]



### 3.3 KT through HQP

- What is the nature of the knowledge and capacity transfer through trainees, as measured by the number of graduates and PDFs (since the first CFI award) and their initial career destinations?

HQP	Number	Known Employers	% this category / those with known destination
Jobs in Canadian academia or research hospitals			
Jobs in Canadian private sector			
Jobs in Canadian public sector			
Jobs in Canadian not-for-profit sector			
Jobs abroad			
Further academic training in Canada			

Further academic training abroad			
Unknown destination			
Total PDFs and Graduates			

- Where it has occurred, how have partner organizations benefited from hiring these **HQP**?

[please provide detailed examples]

## 4. Research Productivity

This component of the review focuses on the CFI's impact on the overall competitiveness of the institution in the **theme**, the changes in the nature of research, the ability to produce ground-breaking findings and publications, the participation in important research initiatives and networks, and the sharing of the CFI-funded infrastructure. **All questions in this section refer to the theme.**

### 4.1 Competitiveness

- Which institutions are the main competitors and collaborators?
- Are they at the provincial scale? National scale? International scale?

	Provincial Scale	National Scale	International Scale
Main Competitors	- -		
Main Collaborators	- -		

- What was the impact of the CFI on overall competitiveness?

[Please provide examples of key projects and how they impacted competitiveness. Indicate what you deem indicators of changes in competitiveness. For example, consider discussing key accomplishments, key research contracts, new or increased infrastructure or analysis capabilities, or whether the institution is hosting, or will host or lead national research programs.]

### 4.2 Research productivity

- What are the key research problems and scientific issues that could not have been addressed without the CFI-funded infrastructure?

- What are the 10 most significant scientific publications by the **PLs** and **PUs** that relied directly on the CFI-funded infrastructure? Provide complete citation information (number of citations per publication and how they were compiled) and a brief explanation of their importance.

Citation information	Importance
	[e.g. world first analysis of x process]

- What are the important national and international research programs in which **PLs** and **PUs** are leaders or co-leaders as a result of working with the CFI-funded infrastructure?

- What is the impact of CFI funding on the quantity and quality of research of publications?

[Bibliometric analysis of publications/citations from your institution in the theme as a result of CFI funding. Please verify your proposed approach with the CFI; this can vary by theme. For example, methods such as a Web of Science search or the h-index have been used in the past. Additionally, if desired, show from independent sources where the institution stands relative to other Canadian and international institutions. A diagram can be helpful.]

- Please provide a list of excellence awards received by **PLs** and **PUs** such as CRCs; other endowed Chairs, memberships in prestigious societies, prestigious provincial, national, or international awards, etc.

[may be appended if too large]

- Where applicable, please provide a list of other modes of knowledge production & dissemination that are particularly important (e.g. for some **themes**, books or conference presentations are more important than journal publications, etc).

### 4.3 External research linkages

- What have been the changes (if any) in the level of external networking and collaboration, both formal and informal?

[If possible, please include a map illustrating links to the private sector and to the government. You may use different lines of evidence of collaborations, including co-publications with external collaborators.]

- If there are changes, did the changes add value to the conduct of the research, or to developing user applications? How?

[ Provide examples of key benefits]

- In the table below, please list all formal research networks (i.e. codified by MOU or other formal arrangements) that the institution participates in.

List of Formal Research Networks	
Pre-CFI	Now
[name1]	[name1]
[name2]	[name2]
[total]	[total]

[In the table, or below it, please identify the PLs involved with each formal network, and briefly discuss the nature of each network.]

#### 4.4 Sharing of infrastructure

- What are the planning processes and methods used by the institution to ensure effective and efficient sharing of CFI-funded infrastructure among researchers within the institution and with institutions, industry, and other organizations outside the institution?

Methods of Planning and Sharing	
<u>Within</u> the institution	<u>Outside</u> the institution
[e.g., access rights, scheduling, user fees, science/user committees, etc.]	

- How much is the CFI-funded infrastructure shared by researchers within the institution and with institutions, industry, and other organizations outside the institution?

Amount of sharing	
<u>Within</u> the institution	<u>Outside</u> the institution
[Describe approximate % time devoted to this type of sharing. Provide statistics– e.g., from user access records, etc.]	



## 5. Extrinsic Benefits - Impact on Local, Regional, and National Innovation

For the OMS, the term “innovation” is not restricted to technology transfer activities such as patenting, licensing, and spin-offs. Other types and routes of innovation and knowledge transfer are equally important in achieving socio-economic benefits. See the list below for examples. Include impacts of this research outside the **theme** (e.g., innovations in entirely different fields), but which arose from the **theme** under investigation and used the CFI-funded infrastructure. **All questions in this section refer to the theme.**

### 5.1 Partnerships

- What is the number and nature of formal partnerships (e.g., collaborative, joint research projects) with **end users**?
- What amount (\$) of **financial contributions** have **end users** made (e.g., joint and collaborative research projects, contract research, user fees for services)?

Partnership description	Importance	Financial Contribution (where applicable)
[Total]		

- What has been the impact of the CFI-funded infrastructure on these partnerships and contributions?

- What role, if any, do industrial partners play in the reported partnerships?

[e.g., have you had the opportunity to expand your partnerships with equipment vendors? If so, please explain how these partnerships have had an impact on the outcomes of the research.]

- Are there indications of an evolving industrial cluster?

[Describe and discuss any impacts of this research theme on the evolution, implementation and realization of local, regional, or national industrial clusters.]

## 5.2 Technology transfer

- What kinds of technology transfer have taken place in the following categories (if technology transfer is generally important in this **theme**)?

Indicator	Number	Key examples with brief description	Significance and value to users
Number of invention disclosures			
Number of patents filed			
Number of patents awarded			
Number of licenses granted			
Amount of royalties or other licensing revenue, equity returns, etc., if any			
Number of material transfer agreements			
Number of start-ups or spin-offs			

[When reporting spin-offs or start-ups, please expand the discussion in a short narrative following the table. Include details such as when they were established, number of employees, revenues, and founders, or participation/links to HQP from your institution. If the above modes of technology transfer are not applicable to the theme, please explain why.]

- In what ways (if any) has your group worked with the university tech transfer offices in transferring knowledge gained through CFI investments to the marketplace?

## 5.3 Knowledge transfer of other types

- What other kinds of knowledge transfer have taken place in the following areas (note that knowledge transfer through **HQP** is captured under section 3)?

<b>Indicator</b> (this is not an exhaustive list, if there are other important mechanisms for KT please add.)	<b>Number</b>	<b>Key examples with brief description</b>	<b>Significance and value to users of these key examples</b>
Contract research			
Direct participation in major end user R&D projects			
Provision of data or services (e.g., test facilities, analytic services, unique instrumentation) to users			
Consultation, “first point of contact” service, etc.			
Input into models (e.g., financial markets, weather systems, ecosystems)			
Invited presentations at the user organizations, participation in working groups, etc.			
Forming new research consortia, networks, etc.			
Contributing to new product/process development			
Contributing to new standards, policies, guidelines, regulations, codes of practice			
Improvements in and dissemination of best practices (e.g., in health care, education, environment, manufacturing strategies, organizational structure, marketing, decision-making tools, etc.)			
Improvements in professional practice (e.g. better teaching methods)			

Public information and interaction (e.g. interactions with various Media, collaborations with museums, on-line resources for public and educational use etc.)			
Formal collaborations with, and presentations to, community and professional organizations			
Other (please specify KT mechanism)			

#### 5.4 Socio-economic benefits

- What are the most important socio-economic benefits of research in this area?

[This component of the review focuses on the most important socio-economic benefits arising from the above listings of technology transfer and knowledge transfer activities in the theme (you may draw on and expand from the key examples named in 5.2 and 5.3). Identify key innovations and provide a sufficient description of the examples to demonstrate the link from the research to the downstream outcomes. Examples of social or economic outcomes include reduced health care costs, reduced morbidity and mortality, environmental impacts, new policies or guidelines, industrial sales revenues, cost savings, etc. Where possible provide statistics (e.g., numbers of linkages, type of organizations, etc., as available). Focus on discussion of the impact of the innovations derived from the research, rather than detailing the nature of the research. Help the reviewers get a sense of the social and economic value of work resulting from the CFI investments. Each example (2 - 4 examples) should be one or more paragraphs.]

#### Challenges

- What are some of the challenges faced in sustaining these outcomes?

[While “challenges” is not an outcome of research per se, the institution is encouraged to discuss the factors that it faces in optimizing and sustaining the achievements that have been possible as a result of CFI funding. Of particular interest are the challenges (internal, external, financial, human resources, policy, etc.) that may impact on future CFI policies and planning. Describe up to five important challenges. Include reflections on possible paths to solutions]

## Appendix A

### Project and Infrastructure Descriptions

Please complete the following table for each project in the thematic area.

<b>####: Project title</b>				
<b>Name of Project Leader Department</b>	<b>CFI Award: \$\$\$\$</b>	<b>Project Cost: \$\$\$\$</b>	<b>Approved: DATE</b>	<b>Finalized: DATE</b>
Project Description	Provide a short overview of the research program/projects			
Key Infrastructure	<ul style="list-style-type: none"> <li>• Key infrastructure &amp; equipment</li> <li>• Key infrastructure &amp; equipment</li> <li>• Key infrastructure &amp; equipment</li> </ul>			
Principal Users	Lastname, Firstname..... Affiliation/Department Lastname, Firstname..... Affiliation/Department Lastname, Firstname..... Affiliation/Department			