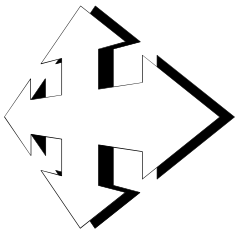

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Performance Measurement and Evaluation Framework for the Canada Research Chairs Program 2000—2004

Final Report

Prepared for

Chairs/NCE Evaluation Steering Committee
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Constitution Square
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December 13, 2001

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EXECUTIVE SUMMARY

The Canada Research Chairs Program (hereafter, the program) is a key piece in Canada's strategy to become a world leader in the knowledge-based economy. The program's contribution to the strategy is to enable Canadian universities to create research opportunities that will attract and retain the outstanding researchers. It is aimed at developing 2000 university chairs between years 2000 and 2005. The 2000 Budget provided $900 million over five years toward that objective — in addition to $250 million earmarked within the Canadian Foundation for Innovation (CFI) to support the program. The program is managed by the Social Science and Humanities Research Council on behalf of a management committee where the Natural Sciences and Engineering Research Council, the Canadian Institutes of Health Research, the Canada Foundation for Innovation as well as Industry Canada are also represented.

Program logic

The program is based on the pre-allocation of research chairs to universities and disciplines based on funds received from granting councils in the past. Universities present nominations which are assessed through a peer-review process. The review takes into consideration both the established excellence of the researchers (for Tier I chairs, valid for seven years and renewable without limit) or the potential for excellence (for Tier II chairs, valid for five years and renewable once) and the contribution that the nominee could make to the realization of the university strategic research plan.

The program aims at producing two critical short term impacts: retaining the best Canadian researchers as well as attracting excellent researchers from other countries (or Canadian expatriates). The program also pursues a peripheral objective of ensuring the effective use of research resources

through strategic planning by the institutions as well as the inter-institutional and inter-sectoral collaboration.

The establishment of a more productive research infrastructure environment is expected to contribute to offsetting "brain-drain" pressures. A series of impacts on the university research environment should flow from the reduction of pressures on key personnel: easing the construction of dynamic research teams; reinforcing the training of graduate students through inclusion in a world-class research environment; producing more and better graduate students and improving retention of highly qualified personnel in Canada.

In the long run, the goal of the program is to lead to a strengthened and more highly competitive research environment in Canada's universities as compared to our competitors in the world, and enhanced Canadian visibility in the global knowledge-based economy. Ultimately, the program should contribute to the overall government objectives of a strong economy and of a better quality of life

Evaluation issues

This evaluation framework paves the way for ongoing performance monitoring, the mid-term review and the evaluation planned in the fifth year of program implementation. It is based on a review of program documentation, interviews with 30 key informants and a literature scan.

Evaluation issues have been identified within three groups:

- process issues deal with: program take-up, the allocation formula, the peer review process, selection criteria, gender equity, the disposition of reserve chairs through an open competition and the efficiency of the CFI and CRC interface;

- short-term impact issues include: integration with other council programs and other chair programs, the appropriateness of the number of chairs, the retention and attraction effects, the excellence of the chair holders, the balance between Tier I and Tier II chairs, the displacement of personnel, the effects beyond the hiring of a researchers, university commitment to the chairs and the generation of additional research funds;

- longer-term impact issues comprise: risks taken by universities, the stability of chair holders, contribution to the training of highly qualified personnel, impacts on the capacity of the university research system's capacity to produce and apply new knowledge, contribution

to inter-institutional and inter-sectoral collaboration, distinctive effects on smaller universities, progress in the realisation of the strategic research plans and possible unintended effects, in particular, the possible impact on the equilibrium of the Canadian university system.

Evaluation methods

Priorities have been established within the set of issues and timing of the study of the issues has been laid out. Indicators and data sources have been associated with each issue. The following data sources have been identified as requirements for a full evaluation of the program:

- statistical reports using program data;
- annual chair and university reports;
- interviews with university representatives, key stakeholders and management committee members;
- special requests for information from universities;
- statistical reports using data from the three granting councils;
- selection committee reporting forms;
- survey of faculty members — chair holders and other faculty members;
- survey of selection committee members;
- case studies;
- a series of special studies: a gender equity study, an international peer review of chair holders, a comparison of selection criteria worldwide, a study on the open competition concept and an international comparison of the ratio of chairs to the number of faculty members.

Ongoing performance measurement was given particular attention. It includes program activity data drawn from statistical reports produced by the program as well as information on immediate impacts from special requests to universities and annual chair and university reports.

Evaluation options were developed. They correspond to a minimal but credible package which deals with highest priority issues; a more complete package which provides more qualitative information relative to the incrementality of the program and more complete data collection on the issue of excellence; and a comprehensive package including all indicators and data sources

INTRODUCTION

The Canada Research Chairs Program (hereafter, the program) is a key piece in Canada's strategy to become a world leader in the knowledge-based economy. It is aimed at developing 2000 university chairs between years 2000 and 2005. The 2000 Budget provided $900 million over five years toward that objective — in addition to $250 million earmarked within the Canadian Foundation for Innovation (CFI) to support the program.

The success of the program will be assessed in three ways. A summative evaluation is planned for the end of the five-year program planning period to assess the results of the program. An interim evaluation, or mid-term review, will be conducted part-way into the planning period to gauge progress to date and to increase probabilities of obtaining the desired outcomes. Ongoing monitoring will document whether or not the program has attained the short term targets it set for itself.

This evaluation framework paves the way for these three perspectives on program performance by providing a clear conceptual model of the program logic, by identifying key evaluation issues and questions and by proposing rigorous methods to document program progress.

Chapter 1 describes the process put in place to develop this framework while Chapter 1 presents a brief description of the program and its logic. Chapter 3 lists the evaluation issues, establishes priorities and stages the analysis of the issues over a two-step evaluation process. Chapter 4 builds a collection of indicators required to research the evaluation issues and

describes the research modules and information sources which will feed information into the evaluation.

Chapter 1

PROCESS

The content and structure of this evaluation framework is derived from four sources of information.

First, program documentation was reviewed. The documentation included the 2000 budget speech, the submission to Treasury Board Canada, the program guide, other sources of program description, program statistics and minutes of the management committee meetings. The list of documents reviewed is presented in Appendix A.

Second, some 30 informants were interviewed (more than half in person) to identify the issues raised by the program via expressions of concerns, analysis of risks and statements about accountability requirements. Priorities for assessment also emerged from these interviews. Appendix A contains the list of people interviewed.

Third, published literature was scanned in search of conceptual models and measurement models relevant to the issues at hand. A small number of particularly interesting documents were studied more carefully. They are identified in Appendix A.

Finally, the work performed in preparation for this evaluation framework conformed to the Treasury Board Canada policy on program evaluation.

Chapter 2

PROGRAM DESCRIPTION

"New ideas and the highly skilled people who can create them are increasingly crucial to Canada's efforts to develop a more innovative and knowledge-based economy."

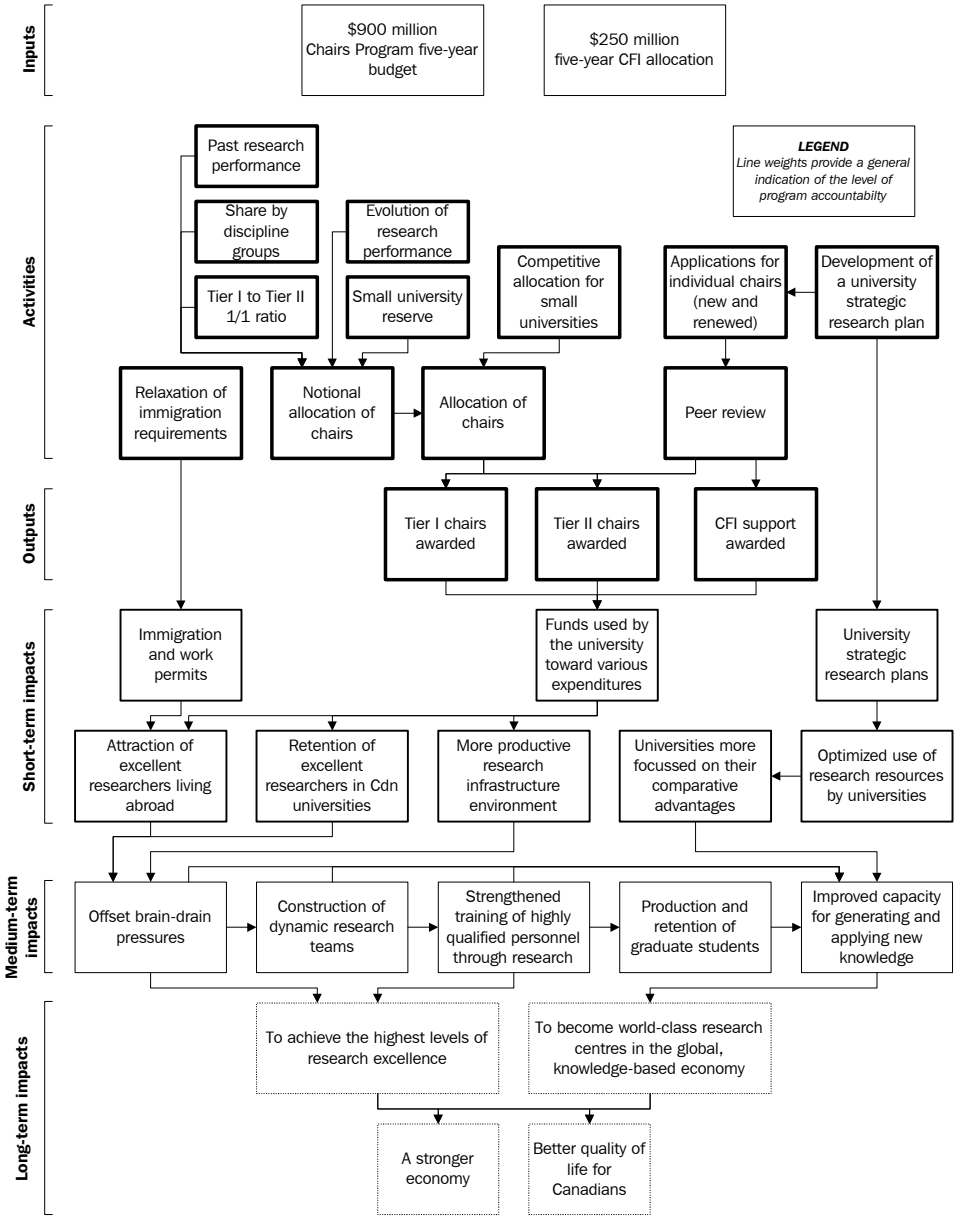
Better finances, better lives; The Budget Plan 2000

Based on the documentation reviewed, a program logic model was developed. It is presented in Exhibit 2.1 on the next page. Only official documentation fed into this model as the goal is to present a reflection of the official logic which guided the design of the program.

The Canada Research Chairs program (the program) was announced in the 2000 Government of Canada budget. It is an important component of a larger governmental strategy aimed at making Canada "a world-leading knowledge-based economy, capable of creating next-generation ideas and putting them to work to generate jobs, growth, wealth and improved quality of life" (March 2001 Program Guide, page 3).

The planned program's contribution to this overall strategy relates to the top-caliber human resources needed: the program is meant to "enable Canadian universities to create research opportunities that will attract and retain the outstanding researchers of today and the best researchers of tomorrow" (March 2001 Program Guide, page 3).

EXHIBIT 2.1 • Canada Research Chairs Program Logic Chart



This context provides the backdrop for the explanation of the program logic (Exhibit 2.1 presents this discussion in graphical form).

Inputs. The program was approved by Treasury Board Canada in April 2000, resourced with $900 million. This budget was split among the three granting councils; expenditures were planned to increase from year to year over the first five years of the program, as more and more chairs would be awarded (see Exhibit 2.2 for details).

EXHIBIT 2.2 • Program Budget
(millions of dollars)

Granting council	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
NSERC (vote 90)	27	54	81	108	135
MRC[1] (Vote 20)	21	42	63	84	105
SSHRC (Vote 100)	12	24	36	48	60
TOTAL	60	120	180	240	300

[1] Now the Canadian Institutes for Health Research
Source: Treasury Board submission

A one-time new allocation of $250 million was awarded to the Canadian Foundation for Innovation (CFI). The lump sum was earmarked to infrastructure support for the CRC beneficiaries.

Activities. Program process includes four activities, some carried out by the program itself, others by program clients — universities and degree granting colleges.

First, universities wanting to benefit from the program were required to produce a strategic research plan outlining their priorities, their strategies and their indicators of success. This document is to be used by all federal granting programs which require such a plan. The content of the strategic research plans was not assessed by the program; the program ensured that the form corresponded to expectations and posted the plans on its Web site.

Secondly, the 2000 planned research chairs were pre-allocated to universities and council-based disciplines. SSHRC disciplines received 20%

of the chairs; CIHR disciplines, 35%; and NSERC, 45%. Individual universities and degree-granting colleges were allocated chairs in proportion to the share of the funding received by their researchers from the three granting councils — based on a three-year average. Allocations are reviewed annually based on updated three-year averages. Chairs were also allocated in two equal groups between Tier I and Tier II chairs (described later). Six percent of chairs were set aside for smaller universities, i.e. those that received 1% or less of the total federal research granting agency funds over the period; it is planned that the leftover from this reserve at the end of fourth and fifth year of the program will be attributed via a competition open to smaller universities.

Thirdly, universities prepare nominations for chairs based on their strategic research plan and on their chair allocation. Nominations may be presented at different times during the year. Nominations are reviewed by a group of three peers chosen among a College of Reviewers. The review is based on the quality of the nominee and of the research program as well as on the integration of the chair with the university strategic research plan. Where there is disagreement within the peer committee, the nomination is reviewed by an Interdisciplinary Adjudication Committee.

Finally, the program had to make special arrangements with Citizenship and Immigration Canada and with Human Resources Development Canada to ease the immigration of foreign researchers. The need for case by case employment validations at the Human Resource Centres of Canada was eliminated for foreign researchers that obtained a Canada Research Chair. In addition, a fast foreign worker entry system was put in place to facilitate the foreign chairs' entry to Canada. However, health, criminal and security restrictions still apply.

Outputs. Nominations may be for Tier I or Tier II chairs. According to the Program Guide (p. 10), "Tier I nominees are expected to meet the following conditions:

- they should be outstanding and innovative researchers whose accomplishments have made a major impact on the field;
- they should have received international recognition as leaders in the field;

- their record in attracting and supervising graduate students and postdoctoral fellows should be superior, taking into account the practices of the field;
- their proposed research program should be innovative, original and of high quality;
- as chair holder they should attract excellent trainees, students and future researchers."

Tier I nominees should be mature, experienced researchers who define excellence in their discipline. Tier I chair awards are accompanied by $200,000 of annual funding for a seven-year period, renewable indefinitely — the renewal is subject to peer review.

In comparison, Tier II chairs are associated with $100,000 of annual funding for five years, renewable once. Tier II nominees should be emerging stars who present high potential to redefine their field. According to the Program Guide (p. 10), "Tier II nominees are expected to meet the following conditions:

- they should be excellent emerging researchers who have demonstrated particular research creativity;
- they should have the potential to achieve international recognition as a leader in the next five to ten years;
- their proposed research program should be innovative, original and of high quality;
- as chair holder they should have the potential to attract excellent trainees, students and future researchers."

In addition to the chairs themselves, the program can produce CFI funding support. CFI funding covers 40% of the eligible infrastructure costs for projects requiring more than $75,000 of funding — 100% for smaller projects. Institutions were allocated CFI envelopes valued at $125,000 per chair (without consideration for the type of chair). Individual CFI applications are not limited to $125,000, however.

Short-term impacts. The obvious first level of impacts of the program is that universities receive funding and make investment decisions. The program guidelines call for flexibility in the use of funds by universities "as

long as the funds are used in support of the chair holder and the Chair's research program" (Program Guide, p. 13). Eligible expenditures include (but are not limited to) the chair holder's salary and benefits, salary and benefits of members of the research team as well as administrative and other costs related to the research program. Eligible expenditures for CFI funds follow general CFI guidelines where eligible costs include all goods and services required to bring the new infrastructure into service, but exclude any part of the ongoing costs of operating a facility.

The program aims at producing two critical short term impacts: the program "will allow Canadian universities to retain the best Canadian researchers as well as attract some of the world's best minds from other countries" (Treasury Board submission, p. 3). ***Retention*** of excellent researchers should take place through the provision of significant and flexible funding for a prolonged period of time and via the acquisition of a notable chair holder status. The same dynamic should be at play in ensuring ***attraction*** of top researchers from abroad, be they Canadian expatriates brought back home or foreign researchers wanting to pursue their career in Canadian universities.

The provision of CFI funding is expected to translate into a more productive research infrastructure environment where top researchers can fully give way to their excellence.

While attraction and retention of key research personnel are the core short-term objectives of the program, the Chairs program also pursues a peripheral objective of ensuring "the effective use of research resources through strategic planning by the institutions as well as the inter-institutional and inter-sectoral collaboration" (Program Guide, p. 3). This should take place through the preparation of the university strategic research plans and their publication on the Internet. Based on their strategic planning, universities would optimize the use of their research resources and would be more focussed on their competitive advantages.

Medium-term impacts. According to the program logic, attraction and retention of key research personnel as well as the establishment of a more productive research infrastructure environment should contribute to

offsetting "brain-drain" pressures (Program Guide, p. 3; see Ross Finnie, 2001, listed in Appendix A).

A series of impacts on the university research environment should flow from the reduction of pressures on key personnel: this will ease the construction of dynamic research teams; it will reinforce the training of graduate students through inclusion in a world-class research environment; it will lead to the production of more and better graduate students and to the improved retention of highly qualified personnel in Canada — which, in turn, will assist the university system in facing the challenge presented by the forecasted high turn over rate in faculty ranks over the next ten years.

This stream of effects, coupled with the heightened focus of universities on their competitive advantages and optimized use of research resources, should "improve universities' capacity for generating and applying new knowledge" (Program Guide, p. 3).

Long-term impacts. In the long run, the goal of the program is to "lead to a strengthened and more highly competitive research environment in Canada's universities as compared to our competitors in the world, and enhanced Canadian visibility in the global knowledge-based economy" (Treasury Board submission, p. 10). Ultimately, the program should contribute to the overall government objectives of a strong economy and of a better quality of life: "As Canada enters the new millennium, it faces what is both a challenge and an opportunity: to become a world-leading, knowledge-based economy, capable of creating next-generation ideas and putting them to work to generate jobs, growth, wealth and improved quality of life" (Program Guide, p. 3).

Accountability. This description depicts the logic of the program — its theory as to how it should impact its target environment. It is built in isolation from any one of the many factors which are outside the control of the program and which could help or hinder its performance — and make it such that the program theory would not fully take shape in reality.

Exhibit 2.1 and the logic model recognize that the program constitutes one of several contributions to achieving the objectives set out by government.

They do that by reflecting — through the thickness of the shape lines in Exhibit 2.1 — the extent of accountability which rests with the program at each level of the program logic. The program is most fully accountable for activities carried out and outputs produced. It is less directly accountable for short-term impacts since other organizations feed into them and because other factors may influence their realization.

The challenge of fairly and realistically measuring program impact increases as we move from considering results that are influenced primarily by the program to results that are also influenced by a wide variety of factors external to the program. Case studies are recommended for revealing program impacts on strategically important results for which the program shares attribution with many other influencing variables.

Chapter 3

EVALUATION ISSUES

The review of the documentation, the construction of the logic model and the interviews led to the identification of a series of evaluation issues. Exhibit 3.1 presents the complete list of issues relevant to the program (leaving aside strictly management issues which are not within the realm of program assessment and evaluation). Issues are organized according to the logical sequencing of the program as depicted in the logic chart (Exhibit 2.1).

Priorities. Exhibit 3.1 also assigns priorities and timing to issues. These assignments were made according

- to the expression of interest of stakeholders,
- to program evaluation theory and federal practice (as cast in the Treasury Board Canada Evaluation policy) as well as
- to the expected sequencing of the impact chain.

The main criteria for determining the importance of an issue was the level of consensus observed among program managers and stakeholders regarding the necessity of raising the issue as well as the emphasis given to the issue by key informants.

Timing. Exhibits 3.2 and 3.3 distinguish the evaluation issues for the three-year and the five-year evaluations and sort them by level of priority. As expected, process issues will be the main topic of the mid-term evaluation and objectives achievement as well as other impacts will form the bulk of the five-year evaluation. Some issues warrant to be addressed at both time periods, however. Timing of the issues was determined by

- the need for the information from a management standpoint,
- the keenness of the interest of key informants and
- the reasonableness of the expectation that an impact could be assessed within the evaluation time frame.

Ongoing performance measurement. Ongoing performance measurement requirements are laid out in the next chapter. In the short term, the three-year review (January 2002) and the five-year evaluation (January 2004) will provide valuable information that can be used by management to monitor performance.

In addition to the 3-year review and 5-year evaluation, the performance of the program should be monitored annually. To avoid unnecessary demands for information from program participants, it will be important to coordinate the collection of data on ongoing measures with data collections related to specific evaluation issues. Section 4.3 of this report discusses ongoing performance indicators.

EXHIBIT 3.1 • Complete list of possible evaluation issues

		Priority			When	
		Low	Med-ium	High	3-year	5-year
Process						
What has been the ***take-up*** on the chairs program and of the CFI chairs component? What are the barriers to the creation of chairs (including the nomination process)? How could the chairs program and the CFI chairs component help alleviate them? (Special attention should be given to the constraint possibly imposed by the size of the grants and the relative size by tier level.) Did smaller universities encounter more/different barriers in the creation of chairs?	1			✖	✖	✖
What are the effects of the ***chair allocation formula***? Is the balance of chairs by discipline pool adequate considering the program objectives? Is an allocation by discipline appropriate considering that CIHR is issue based rather than discipline based? Did the allocation formula lead universities to redirect their hiring & research priorities? To what extent if at all does the allocation formula tend to reinforce past wealth structures ("the rich getting richer")? To what extent does the allocation formula help/hinder innovation? What would be the effects of alternative chair allocation formulas (e.g., open competition, proportional to the number of faculties, budget allocation instead of body allocation)? Is the "small university" threshold appropriate? Are growing universities at a disadvantage?	2			✖	✖	✖
What is the value added of the ***peer review process*** implemented by the chairs program and by the CFI chairs component considering that universities already implement a selection process?	3	✖			✖	
Are the chairs program ***selection criteria*** and the CFI chairs component selection criteria clear? Are they stringent enough to identify the truly excellent researchers? Are they appropriate for all categories of researchers, institutions and disciplines (e.g., clinical and applied research)? Is the operational definition of a Tier I and of a Tier II chair appropriate? Are Tier II chair holders junior researchers on the rise?	4		✖		✖	✖
Does the make-up of the pool of chairs holders reflect an effort to attribute chairs equitably between ***genders***?	5			✖	✖	✖
Has the planned ***open competition*** for the year 4&5 reserve had impacts on the behaviour of universities during the first years of the program? How viable is the planned open competition in view of the program context?	6	✖			✖	✖
Is the interface between ***CFI and CRC*** efficient? How could it be made more efficient?	7		✖		✖	✖
Short-term impacts						
How well do the chair program and the CFI chairs component integrate with ***other council programs and non-council chair programs***? Is there a risk of duplication?	8		✖		✖	
Is the ***number of chairs*** created appropriate in view of the university context?	9	✖				✖
Have ***retention and attraction*** taken place? Is the balance between retention and attraction adequate? What are the barriers to retention/attraction? How could the chairs program and the CFI chairs component help alleviate them?	10			✖	✖	✖

		Priority			When	
		Low	Med-ium	High	3-year	5-year
Has the program rewarded ***clearly leading*** or "excellent" researchers?	11			✖		✖
Does the ***balance achieved between the numbers of Tier 1 and Tier 2*** chairs conform to the original intent of the program and to program objectives?	12		✖		✖	✖
How much ***displacement of personnel*** has taken place from one institution to the next? Is there a notable flow of personnel between smaller and larger universities? Whom does it advantage?	13	✖				✖
What have been the ***effects of the creation of chairs and the associated CFI funding beyond the hiring*** of a researcher? For example, were new research teams created? Were existing teams reinforced? Was other professors' performance affected by the chairs?	14		✖			✖
To what extent are universities ***committed to supporting*** the chairs? Did they include funding on their own to create the chairs?	15			✖	✖	✖
Have the chairs grants and the CFI chairs component grants generated significant ***additional funds*** from other sources?	16		✖			✖

Medium-term impacts

Does the program create ***undue risks*** for universities? Where it happened, how have universities coped with decreasing allocations? Do chairs represent a long term financial burden on universities? How will universities handle the period where Tier II chairs cannot apply for a renewal? Have cultural difficulties been encountered within university departments?	17		✖			✖
Have chair holders ***remained*** in their chair positions? Have some chair holders been made more mobile (or emigrated) by the chair status?	18			✖		✖
What has been the chairs program and the CFI chairs component contribution to ***training*** of highly qualified personnel?	19		✖			✖
What has been the chair program's and CFI component's contribution to the university research system's ***capacity to produce*** and apply new knowledge?	20			✖		✖
What has been the program's contribution to inter-institutional and inter-sectoral ***collaboration***?	21	✖				✖
Have chairs created in ***smaller universities*** produced effects similar/larger/smaller than those created in larger universities?	22		✖			✖
Do universities show progress toward the realisation of their ***strategic plan***? Do the chair program and the CFI chairs component feature enough flexibility to maximize its contribution to the implementation of university strategic plans?	23	✖				✖
Have the chairs program and the CFI chairs component produced ***unintended effects*** in the Canadian university research system? Have the programs contributed to a two-speed university research system? What have been the effects of rejected applications? Have the programs contributed to the creation of two types of university professors (teachers and researchers)? Have council grant funds and CFI funds been more concentrated in the hands of fewer researchers as a consequence of the chair program?	24		✖			✖

EXHIBIT 3.2 • Third year review issues

		Priority		
		Low	Med-ium	High
Process				
What has been the ***take-up*** on the chairs program and of the CFI chairs component? What are the barriers to the creation of chairs (including the nomination process)? How could the chairs program and the CFI chairs component help alleviate them? (Special attention should be given to the constraint possibly imposed by the size of the grants and the relative size by tier level.) Did smaller universities encounter more/different barriers in the creation of chairs?	1			✖
What are the effects of the ***chair allocation formula***? Is the balance of chairs by discipline pool adequate considering the program objectives? Is an allocation by discipline appropriate considering that CIHR is issue based rather than discipline based? Did the allocation formula lead universities to redirect their hiring & research priorities? To what extent if at all does the allocation formula tend to reinforce past wealth structures ("the rich getting richer")? To what extent does the allocation formula help/hinder innovation? What would be the effects of alternative chair allocation formulas (e.g., open competition, proportional to the number of faculties, budget allocation instead of body allocation)? Is the "small university" threshold appropriate? Are growing universities at a disadvantage?	2			✖
Does the make-up of the pool of chairs holders reflect an effort to attribute chairs equitably between ***genders***?	5			✖
Are the chairs program ***selection criteria*** and the CFI chairs component selection criteria clear? Are they stringent enough to identify the truly excellent researchers? Are they appropriate for all categories of researchers, institutions and disciplines (e.g., clinical and applied research)? Is the operational definition of a Tier I and of a Tier II chair appropriate? Are Tier II chair holders junior researchers on the rise?	4		✖	
Is the interface between ***CFI and CRC*** efficient? How could it be made more efficient?	7		✖	
What is the value added of the ***peer review process*** implemented by the chairs program and by the CFI chairs component considering that universities already implement a selection process?	3	✖		
How viable is the planned ***open competition*** in view of the program context?	6	✖		
Short-term impacts				
Have ***retention and attraction*** taken place? Is the balance between retention and attraction adequate? What are the barriers to retention/attraction? How could the chairs program and the CFI chairs component help alleviate them?	10			✖
To what extent are universities ***committed to supporting*** the chairs? Did they include funding on their own to create the chairs?	15			✖
Does the ***balance achieved between the numbers of Tier 1 and Tier 2*** chairs conform to the original intent of the program and to program objectives?	12		✖	
How well do the chair program and the CFI chairs component integrate with ***other council programs and non-council chair programs***? Is there a risk of duplication?	8		✖	

EXHIBIT 3.3 • Fifth year evaluation issues

		Priority		
		Low	Med-ium	High
Process				
What has been the ***take-up*** on the chairs program and of the CFI chairs component? What are the barriers to the creation of chairs (including the nomination process)? How could the chairs program and the CFI chairs component help alleviate them? (Special attention should be given to the constraint possibly imposed by the size of the grants and the relative size by tier level.) Did smaller universities encounter more/different barriers in the creation of chairs?	1			✖
What are the effects of the ***chair allocation formula***? Is the balance of chairs by discipline pool adequate considering the program objectives? Is an allocation by discipline appropriate considering that CIHR is issue based rather than discipline based? Did the allocation formula lead universities to redirect their hiring & research priorities? To what extent if at all does the allocation formula tend to reinforce past wealth structures ("the rich getting richer")? To what extent does the allocation formula help/hinder innovation? What would be the effects of alternative chair allocation formulas (e.g., open competition, proportional to the number of faculties, budget allocation instead of body allocation)? Is the "small university" threshold appropriate? Are growing universities at a disadvantage?	2			✖
Does the make-up of the pool of chairs holders reflect an effort to attribute chairs equitably between ***genders***?	5			✖
Are the chairs program ***selection criteria*** and the CFI chairs component selection criteria clear? Are they stringent enough to identify the truly excellent researchers? Are they appropriate for all categories of researchers, institutions and disciplines (e.g., clinical and applied research)? Is the operational definition of a Tier I and of a Tier II chair appropriate? Are Tier II chair holders junior researchers on the rise?	4		✖	
Is the interface between ***CFI and CRC*** efficient? How could it be made more efficient?	7		✖	
Has the planned ***open competition*** for the year 4&5 reserve had impacts on the behaviour of universities during the first years of the program?	6	✖		
Short-term impacts				
Have ***retention and attraction*** taken place? Is the balance between retention and attraction adequate? What are the barriers to retention/attraction? How could the chairs program and the CFI chairs component help alleviate them?	10			✖
Has the program rewarded ***clearly leading*** or "excellent" researchers?	11			✖
To what extent are universities ***committed to supporting*** the chairs? Did they include funding on their own to create the chairs?	15			✖
Does the ***balance achieved between the numbers of Tier 1 and Tier 2*** chairs conform to the original intent of the program and to program objectives?	12		✖	
What have been the ***effects of the creation of chairs and the associated CFI funding beyond the hiring*** of a researcher? For example, were new research teams created? Were existing teams reinforced? Was other professors' performance affected by the chairs?	14		✖	
Have the chairs grants and the CFI chairs component grants generated significant ***additional funds*** from other sources?	16		✖	

		Priority		
		Low	Med-ium	High
Is the ***number of chairs*** created appropriate in view of the university context?	9	✖		
How much ***displacement of personnel*** has taken place from one institution to the next? Is there a notable flow of personnel between smaller and larger universities? Whom does it advantage?	13	✖		

Medium-term impacts

Have chair holders ***remained*** in their chair positions? Have some chair holders been made more mobile (or emigrated) by the chair status?	18			✖
What has been the chair program's and CFI component's contribution to the university research system's ***capacity to produce*** and apply new knowledge?	20			✖
Does the program create ***undue risks*** for universities? Where it happened, how have universities coped with decreasing allocations? Do chairs represent a long term financial burden on universities? How will universities handle the period where Tier II chairs cannot apply for a renewal? Have cultural difficulties been encountered within university departments?	17		✖	
What has been the chairs program and the CFI chairs component contribution to ***training*** of highly qualified personnel?	19		✖	
Have chairs created in ***smaller universities*** produced effects similar/larger/smaller than those created in larger universities?	22		✖	
Have the chairs program and the CFI chairs component produced ***unintended effects*** in the Canadian university research system? Have the programs contributed to a two-speed university research system? What have been the effects of rejected applications? Have the programs contributed to the creation of two types of university professors (teachers and researchers)? Have council grant funds and CFI funds been more concentrated in the hands of fewer researchers as a consequence of the chair program?	24		✖	
What has been the program's contribution to inter-institutional and inter-sectoral ***collaboration***?	21	✖		
Do universities show progress toward the realisation of their ***strategic plan***? Do the chair program and the CFI chairs component feature enough flexibility to maximize its contribution to the implementation of university strategic plans?	23	✖		

Chapter 4

INDICATORS AND METHODS

In this chapter, the information requirement of each issue is analysed to identify the empirical indicators that will be used in the evaluations. Sometimes, an issue requires a simple descriptive indicator using readily available information; other times, an issue demands a sophisticated *ad hoc* study; most of the issues have requirements which fall between these two extremes. A data source is listed for each indicator. The identification of indicators does not take into account the level of priority assigned to issues.

The next section reverses the indicator-to-data source relationship. It focusses on data sources, describing them and listing the indicators expected from each. Also, it brings back the level priority associated with issues in order to assist in determining the worth of investing in each data source.

4.1 Indicators

Exhibit 4.1 lists the proposed indicators (and associated data sources) for each evaluation issue. We don't intend to comment on each indicator — a tedious and less than useful exercise. Instead, this section offers additional information on the more complex indicators and describes the assumptions and hypotheses which tie the indicator to the issue when this link is not readily apparent.

Issue 1, take-up. One of the indicators is the number of "chairs awarded vs. allocated". The intent is to use the difference between these two numbers as an indicator of the difficulty in creating chairs: the larger the difference, the more difficult the process. The comparison will be most revealing once broken down by size of university — thereby verifying whether smaller universities encountered more difficulties than larger universities — and by discipline.

Issue 2, allocation formula. The indicator "number of faculties hired annually, by council discipline, starting in 1995" will allow the evaluation to document whether the patterns of hiring changed with the advent of the program. If an effect took place, it is expected that hiring increased in disciplines where chairs were allocated. Similarly, if the allocation formula reinforced past wealth structures, the "annual council grant funds by university, starting in 1995" will show a break in funding patterns favouring universities with the largest historical portion of the research funding.

Issue 3, peer review process. The indicator "proportion of rejections taking place at the first stage of review" reflects the hypothesis that the smaller the proportion of rejections at the first review stage, the less relevant the review process. Obviously, this is a very reductionist view of the peer review process in the context of this program (it is possible that, because of the peer review process, universities present better nominations than they would otherwise) but it will complement the qualitative evidence garnered through other methods.

Issue 4, selection criteria. The appropriateness of the selection criteria will be analysed, among other things, through the rate of rejection of nominations. The key information here will be whether there is a significant gap in the rejection rate by size of university and discipline (addressing the issue of possible ill-adapted criteria for smaller and regional universities and for some situations such as clinical researchers in health sciences or professional school researchers in social sciences).

The operational definition of the Tier II chairs will be challenged by the proportion of full professors selected for these chairs; the assumption is that Tier II chairs should be awarded to researchers early in their careers and that, in principle, full professors are not initiating their career.

Whether Tier II chair holders were indeed rising stars will be assessed through the comparison of their production as chair holders with the production of other professors/researchers hired at similar times and at similar levels. The hypothesis is that chair holders will display a significantly stronger production and a significantly higher acceleration of their production over the period of the chair.

Issue 5, representation of genders. Whether or not the program leads to a fair representation of women among chair holders is a complex issue. It has been addressed once through a special study (Bégin-Heck, 2001). It is proposed that such a study be endeavoured again in the third and fifth year of the program.

Issue 10, retention and attraction. Several indicators address the central issue of the impact of the program on the retention and attraction of top researchers — the core objectives of the program. Many are qualitative in nature since the numerical assessment of the incrementality of the program in this regard is difficult: it is easy to count the number of chair holders attracted to Canada via the program but it is more difficult to assess, on a quantitative basis, whether they would have come anyway. The effect of the program on retention is even more difficult to assess. Our quantitative indicator of this effect is based on the fact that, in principle, chair nominees were at risk of leaving Canada — this is the founding principle of the program. Therefore, there should be a sizeable out-

emigration movement among failed retention nominations. The indicator "rate at which rejected applicants left Canada" provides information to test that hypothesis, in support to other, qualitative evidence.

Issue 11, excellence. Indicators of research excellence are not lacking; dozens, if not hundreds, of scholarly publications have proposed ways to measure this concept and peer committees routinely perform such assessments. Ideally, though, the evaluation of the Canada Research Chairs program requires a short set of significant indicators to depict research excellence. The indicators also have to apply generally to a large array of disciplines. The list offered in Exhibit 4.1 is a summary of suggestions found in a selection of published references (Gauthier, 1998; Godin, 1997; Observatoire des sciences et des technologies, 2000; Royal Academy of Engineering, 2000; Smith, 1998); they are adapted to social sciences and humanities as well as engineering and health sciences.

Excellence is largely a comparative concept — in fact, program managers and stakeholders often refer to "top" researchers rather than "excellent" researchers or define excellence as the trait which characterises the best 10% (or other such percentage) of the distribution of quality. Hence, the indicator of excellence will not be the absolute production of chair holders but rather the position where this production places them in the distribution of research production among all faculty members.

In theory, the best way to identify the top so-many in a group is to array all elements in the group and choose the required number. For example, to identify the five tallest pupils in a school, one would rank all pupils according to height and select the top five. What one would not do is select the tallest pupil in each class and array that group, since it is possible that the five tallest pupils all belong to the same class. Let's transpose this image to the program context: in theory, to identify the top researchers in a group of researchers, one would array them on some quality index and choose from the top down — without intervening factors such as disciplines or institutional base. To determine the extent to which the program diverges from this theoretical ideal, we propose to compare the distribution of CIHR awards — which are awarded through a national open competition — to that of the program CIHR-related awards A close match

between the two distributions would support the notion that the program selects top researchers.

Issue 16, additional funds. Similar to other demonstrations of the effect of the program on the university system, it is proposed that the effect on total research funding could be substantiated if the slope of the trend in funding changed with the advent of the program (interrupted time series).

Issue 22, smaller universities. Interrupted time series would again be the basis for assessing whether smaller universities have felt more or less impact from the program than larger universities. The dependent variables in this case will be the number of faculties hired and the total council grant funds.

Issue 24, unintended effects. One possible side effect of the program is that a larger proportion of the council grant resources be concentrated into the hands of fewer researchers. This will be analysed via a time series of the Gini coefficient applied to the distribution of grants by researchers and by university. A larger value of the Gini coefficient would indicate a higher concentration of research funds (see, for example, Alker, 1965).

EXHIBIT 4.1 • Issue-indicators matrix

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
Process			
What has been the ***take-up*** on the chairs program and of the CFI chairs component? What are the barriers to the creation of chairs (including the nomination process)? How could the chairs program and the CFI chairs component help alleviate them? (Special attention should be given to the constraint possibly imposed by the size of the grants and the relative size by tier level.) Did smaller universities encounter more/different barriers in the creation of chairs?	1	• number of chairs nominated, awarded, turned down* • chairs awarded vs. allocated (overall and broken down by size of university and by discipline)	• statistical reports
		• difficulties encountered	• case studies of failed nominations identified by universities • case studies of researchers who refused chairs
		• difficulties encountered • suggestions for program improvements	• interviews with university representatives
What are the effects of the ***chair allocation formula***? Is the balance of chairs by discipline pool adequate considering the program objectives? Is an allocation by discipline appropriate considering that CIHR is issue based rather than discipline based? Did the allocation formula lead universities to redirect their hiring & research priorities? To what extent if at all does the allocation formula tend to reinforce past wealth structures ("the rich getting richer")? To what extent does the allocation formula help/hinder innovation? What would be the effects of alternative chair allocation formulas (e.g., open competition, proportional to the number of faculties, budget allocation instead of body allocation)? Is the "small university" threshold appropriate? Are growing universities at a disadvantage?	2	• list of possible bases for allocating the chairs • arguments in favour and against each basis • qualitative assessment of the effect of the allocation formula on innovation	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members
		• number of faculties hired annually, by council discipline, starting in 1995	• special request to universities
		• total funding awarded by the program, by university and discipline sector	• statistical reports
		• annual council grant funds by university, starting in 1995 • segmentation analysis by university size and growth rate	• councils

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	**Data sources**
What is the value added of the ***peer review process*** implemented by the chairs program and by the CFI chairs component considering that universities already implement a selection process?	3	• proportion of nominations approved* • proportion of rejections taking place at the first stage of review*	• statistical reports
		• informed opinions	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members • survey of selection committee members
Are the chairs program ***selection criteria*** and the CFI chairs component selection criteria clear? Are they stringent enough to identify the truly excellent researchers? Are they appropriate for all categories of researchers, institutions and disciplines (e.g., clinical and applied research)? Is the operational definition of a Tier I and of a Tier II chair appropriate? Are Tier II chair holders junior researchers on the rise?	4	• comparison of selection criteria with those used in similar-caliber competitions worldwide	• special study

		• opinions on
		  • the adequacy/feasibility of selection criteria
		  • the fairness of the application of the criteria
		  • the definition of Tier II chairs
			• survey of selection committee members

		• nomination rejection rate by tier level, by type of university, by size of university, by discipline* • proportion of full professors among Tier II chairs*	• statistical reports
		• comparison of the production, during the chair period, of Tier II chairs vs. other hires of the same level at similar times	• analysis of indicators of research productivity (see below) over the chair period for a sample of new hires (subset of a survey of faculty members)
Does the make-up of the pool of chairs holders reflect an effort to attribute chairs equitably between ***genders***?	5	• proportion of women among chair nominations and awards compared to the proportion of women among feeder groups • reasons for lack of female nominations	• special study
Has the planned ***open competition*** for the year 4&5 reserve had impacts on the behaviour of universities during the first years of the program? How viable is the planned open competition in view of the program context?	6	• informed opinions	• interviews with university representatives
		• informed opinions	• special study on the open competition concept

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
Is the interface between ***CFI and CRC*** efficient? How could it be made more efficient?	7	• proportion of nominations applying for CFI funds*	• statistical reports
		• proportion of chairs whose CFI application was rejected*	• statistical reports
		• informed opinions	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members

Short-term impacts

How well do the chair program and the CFI chairs component integrate with ***other council programs and non-council chair programs***? Is there a risk of duplication?	8	• informed opinions	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members
Is the ***number of chairs*** created appropriate in view of the university context?	9	• informed opinions	• interviews with university representatives • interviews with key stakeholders
		• international comparison of the ratio of chairs to the number of faculty members	• special study

Have ***retention and attraction*** taken place? Is the balance between retention and attraction adequate? What are the barriers to retention/attraction? How could the chairs program and the CFI chairs component help alleviate them?	10	• number of chairs awarded to*
		  • Canadian expatriates
		  • foreign researchers
			• statistical reports

		• importance of the chair award in the decision to accept a position in Canada	• survey of chair holders (subset of a survey of faculty members) • qualitative case studies of chair holders
		• rate at which rejected applicants left Canada	• special request to universities
		• opinion on the balance between retention and attraction	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
		• existence of formal processes to select researchers likely to depart and to identify researchers to attract • difficulties encountered • suggestions for program improvements	• interviews with university representatives

Has the program rewarded ***clearly leading*** or "excellent" researchers?	11	• research production indicators:
		  • # of publications
		  • # of conferences and technical papers
		  • # of graduate students supervised
		  • # of (Cdn and foreign) post doctoral fellows
		  • # of articles cosigned with foreign researchers
		  • value of grants/funding received
		  • # of patent applications
		  • # of citations (biblio- and patent-metrics)
		  • # and nature of awards and prizes held
		• membership on boards of peer-reviewed journals
		• location of chairs on the distribution of research productivity
			• survey of faculty members

		• opinions of peers	• survey of faculty members • international peer review
		• opinions of selection committee members	• survey of selection committee members
		• statements made on selection reporting foms	• selection committee reporting forms
		• comparison of the distribution of CIHR chairs with the distribution of CIHR awards which are attributed on a basis of a national competition	• CIHR
Does the ***balance achieved between the numbers of Tier 1 and Tier 2*** chairs conform to the original intent of the program and to program objectives?	12	• number of Tier I and Tier II chairs*	• statistical reports
		• opinion on the balance achieved between Tier I and Tier II	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
How much ***displacement of personnel*** has taken place from one institution to the next? Is there a notable flow of personnel between smaller and larger universities? Whom does it advantage?	13	• chairs attributed to researchers from another Canadian university, broken down by origin and destination university size*	• statistical reports
What have been the ***effects of the creation of chairs and the associated CFI funding beyond the hiring*** of a researcher? For example, were new research teams created? Were existing teams reinforced? Was other professors' performance affected by the chairs?	14	• department-wide research productivity correlated with the presence (and number) of chairs (aggregation of individual-level indicators listed above)	• survey of faculty members
		• lists of achievements	• annual chair reports
		• qualitative assessment of (positive and negative) effects on other professors	• survey of faculty members
To what extent are universities ***committed to supporting*** the chairs? Did they include funding on their own to create the chairs?	15	• funding extended by universities to chairs • teaching load of chairs • number of (associate) professors hired parallel to setting up the chair	• special request to universities
Have the chairs grants and the CFI chairs component grants generated significant ***additional funds*** from other sources?	16	• annual value of grants/funding received from all sources, starting in 1995	• survey of chairs (subset of a survey of faculty members) • special request to universities • file review of research grant applications to the three councils (?)

Medium-term impacts

Does the program create ***undue risks*** for universities? Where it happened, how have universities coped with decreasing allocations? Do chairs represent a long term financial burden on universities? How will universities handle the period where Tier II chairs cannot apply for a renewal? Have cultural difficulties been encountered within university departments?	17	• informed opinions	• interviews with university representatives • interviews with key stakeholders
		• qualitative assessment of impacts on the research culture within universities	• survey of faculty members

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
Have chair holders ***remained*** in their chair positions? Have some chair holders been made more mobile (or emigrated) by the chair status?	18	• chair holder continued admissibility to the program*	• statistical reports
		• qualitative assessment of professional mobility	• survey of chairs (subset of a survey of faculty members)

What has been the chairs program and the CFI chairs component contribution to ***training*** of highly qualified personnel?	19	• comparison of CRC chairs, other chairs and other faculty on:
		  • # of graduate students supervised
		  • # of (Cdn and foreign) post doctoral fellows
			• survey of faculty members

What has been the chair program's and CFI component's contribution to the university research system's ***capacity to produce*** and apply new knowledge?	20	• informed opinions	• interviews with university representatives • interviews with key stakeholders
		• anecdotes	• qualitative case studies of chair holders
What has been the program's contribution to inter-institutional and inter-sectoral ***collaboration***?	21	• incidences of collaboration traceable to the program*	• annual university reports
Have chairs created in ***smaller universities*** produced effects similar/larger/smaller than those created in larger universities?	22	• number of new faculty members hired annually as a proportion of existing faculty, starting in 1995, correlated with the number of chairs awarded	• special request to universities • statistical reports
		• annual council grant funds by university, starting in 1995, correlated with the number of chairs awarded	• councils • statistical reports
Do universities show progress toward the realisation of their ***strategic plan***? Do the chair program and the CFI chairs component feature enough flexibility to maximize its contribution to the implementation of university strategic plans?	23	• progress realized* • contribution of the chairs to the realization of the strategic research plan*	• annual university reports

		Indicators * *Indicators marked with an asterisk require ongoing data collection*	Data sources
Have the chairs program and the CFI chairs component produced ***unintended effects*** in the Canadian university research system? Have the programs contributed to a two-speed university research system? What have been the effects of rejected applications? Have the programs contributed to the creation of two types of university professors (teachers and researchers)? Have council grant funds and CFI funds been more concentrated in the hands of fewer researchers as a consequence of the chair program?	24	• informed opinions	• interviews with university representatives • interviews with key stakeholders • interviews with management committee members
		• annual council grant funds by university, starting in 1995, segmented by university size • index of concentration /dispersion of grants by researcher/university	• councils
		• perceptions on the segmentation of the faculty corps	• survey of faculty members
		• teaching load of chairs relative to average teaching loads	• special request to universities
		• qualitative assessments	• survey of rejected applicants (subset of a survey of faculty members)

4.2 Data Sources and Methods

The previous exhibit associated indicators to issues. Exhibit 4.2 relates indicators to data sources thereby providing a list of data elements expected from each source. Within data sources, indicators are sorted in decreasing order of importance, based on the priority attributed to the issue to which they are associated. Finally, the timing of the analysis of the issues is lifted from Exhibit 4.1 and attached to the indicator.

The following paragraphs describe the nature of each data source and assess their feasibility and expected reliability.

Statistical reports

feasibility high
reliability high
necessity high at all stages

Statistical reports. Statistical reports are data extractions from the information available on chair nominations and chair awards. While the production of some indicators may require a small investment from the part of the program, the majority are already generated on a regular basis. Information from this source is reliable.

Interviews with university representatives

feasibility high
reliability high
necessity high at years 3&5

Interviews with university representatives. It is a given that university representatives will have to be consulted in the context of the evaluation of the program — a number of key issues require their input. It is also a given that their cooperation will be guaranteed — they are eager to make this program work and to see it continue. Because of the diversity of situations, a significant number of university representatives will need to be approached; thirty such interviews would not be excessive. As for the reliability of the information collected through this means, since "informed opinions" is the key type of data required from these informants and that they have not shown a tendency to constrain their comments, the reliability can be rated high.

Interviews with key stakeholders

feasibility high
reliability high
necessity high at years 3&5

Interviews with key stakeholders. Key stakeholders are organizations representing particular segments of the university system and other interested parties. They include, but are not limited to, the Association of Universities and Colleges of Canada, the Canadian Association of University

Teachers, the Humanities and Social Sciences Federation of Canada and the Canadian Association of Graduate Studies. They are not shy at expressing their points of view; their cooperation will be easily enlisted. Some ten such interviews should be planned for the year 3 and year 5 evaluations. As with university representatives, key stakeholders will be asked to express "informed opinions" on issues that they master; these qualitative data will therefore be reliable, as such.

Interviews with management committee members

feasibility high
reliability high
necessity high at years 3&5

Interviews with management committee members. The management of the program is supervised by a group of senior managers from the three councils, Industry Canada and the CFI. Since these individuals are representatives of government, their views will be important to gauge the reasonableness of proposals put forth by university representatives and key stakeholders. The evaluation will also collect their perspective on the strengths and weaknesses of the program. Five to ten high-caliber interviews will be required.

Special request to universities

feasibility high
reliability high
necessity high at years 3&5

Special request to universities. Universities hold key information for the assessment of the performance of the program. Some of the information describe their university environment in aggregate form, over several years; other information relate to individual nominations or chairs. In all cases, contrary to other information grouped under the "university annual report" data source, the information does not need to be collected every year, although it could — the program could decide to request the information listed under this data source as part of the annual report. The information needed is factual and readily available to universities.

Councils

feasibility high
reliability high
necessity high at years 3&5

Councils. The three councils will be called upon to provide information which exists in their information systems and goes beyond this particular program. The information is factual; there is no reason to doubt the reliability of the data. These data are associated with high priority issues for the three-year and, particularly, the five-year evaluations.

Selection committee reporting forms

feasibility high
reliability low
necessity medium at y 3&5

Selection committee reporting forms. Selection committee members produce assessments of nominees in a formal fashion. Statements made in these forms can be analysed to measure the level of excellence presented by researchers. Since these qualitative data are readily available,

such an analysis is very feasible. However, the logic of proof is weak since an element of the program process — the judgment of the selection committee members — is used to assess a short term impact, a slightly tautological approach. Other approaches are available to address the same issue; this method is, therefore, of low necessity.

Survey of faculty members

feasibility medium
reliability medium
necessity high at years 3&5

Survey of faculty members. The evaluation plan includes several issues which rely on data collected through a survey of faculty members. Some indicators involve the comparison of chairs to all faculty; others, the comparison of chairs to other award winners; yet others, the comparison of Tier II chairs to other recently hired professors; etc.. The survey of faculty members is also the key tool to assess excellence.

As far as chairs are concerned, the information could be collected as part of annual reports. However, most of the evaluation issues are comparative in nature (to address the incrementality question and also because excellence has been defined in comparative terms) and require similar information about other groups of professors and researchers. It is preferable to use the same method of data collection for all of these groups.

A survey of this nature faces challenges related to cost and to the expected level of participation of the target group. Considering the group under study, it will be possible to reduce the data collection costs through a Web-based survey (rather than a paper-and-pencil mailed questionnaire). The participation challenge will require early notification of the survey and support at the highest level of granting council management.

As with any survey, the results will be proportional to the level of attention given to it by respondents. This could affect the reliability of the data negatively. However, as most of the indicators are comparative, intrinsic biases in the data collected will be of concern only if they differ according to the groups compared — which should not be the case.

The sample should be stratified — according to several subgroups identified in the description of the indicators — and of significant size. All

chair holders could be contacted to participate; a similar-size group of other faculty could be included.

Case studies

feasibility medium
reliability low
necessity medium at year 3, high at year 5

Case studies. Some issues are better dealt with in a qualitative manner, looking for patterns in specific stories or anecdotes. This is the case here for the impact of failed applications, the refusal of chair awards, the attraction power of the chairs and the contribution of the program to the depth of the university research system. Case studies are relatively costly and they require time consuming input from busy individuals — a fact that reduces their feasibility. By definition, they will not be statistically representative of the variety of circumstances encountered under the program — they inform about the shape of the landscape but they do not provide a precise road map; they are useful for theory building, but they don't provide measurement open to generalization. While they have drawbacks, case studies may provide evidence of program incrementality which may escape other methodologies. Because incrementality should be a focus of the fifth-year evaluation, case studies are assigned a high necessity rating for that time period.

Special studies

feasibility medium to high
reliability medium to high
necessity low to high at years 3&5

Special studies. Under this heading, we have grouped a series of particular studies dealing with specific aspects of the program. The priority of the underlying issues varies from low to high. The feasibility and reliability varies from medium to high. The "gender" study is a requirement; it is feasible and it provides reliable data. The "international peer review" is relatively difficult to implement, considering the variety of disciplines represented under the program; it is also of low necessity since other indicators exist to document the issues to which this study is attached. The other special studies are associated with medium and low priority issues.

EXHIBIT 4.2 • Data sources and associated indicators sorted by issue priority

Data sources	Indicators	Associated Issue Priority				
		Evaluation Issue Id	Priority L Low M Medium H High	Timing (1=ongoing)		
				1	y3	y5
Statistical reports	• number of chairs nominated, awarded, turned down	1	H	✖	✖	✖
	• chairs awarded vs. allocated (overall and broken down by size of university and by discipline)	1	H		✖	✖
	• total funding awarded by the program, by university and discipline sector	2	H		✖	✖

	• number of chairs awarded to
	  • Canadian expatriates
	  • foreign researchers
		10	H	✖	✖	✖

	• chair holder continued admissibility to the program	18	H	✖		✖
	• nomination rejection rate by tier level, by type of university, by size of university, by discipline • proportion of full professors among Tier II chairs	4	M	✖	✖	✖
	• proportion of nominations applying for CFI funds • proportion of chairs whose CFI application was rejected	7	M	✖	✖	✖
	• number of Tier I and Tier II chairs	12	M	✖	✖	✖
	• number of chairs awarded, by university	22	M	✖		✖
	• proportion of rejections taking place at the first stage of review	3	L	✖	✖	
	• chairs attributed to researchers from another Canadian university, broken down by origin and destination university size	13	L	✖		✖
Interviews with university representatives	• difficulties encountered in the creation of chairs • suggestions for program improvements in this regard	1	H		✖	✖
	• list of possible bases for allocating the chairs • arguments in favour and against each basis • qualitative assessment of the effect of the allocation formula on innovation	2	H		✖	✖
	• opinion on the balance between retention and attraction • existence of formal processes to select researchers likely to depart and to identify researchers to attract • difficulties encountered in balancing attraction and retention • suggestions for program improvements in this regard	10	H		✖	✖
	• informed opinions on the impact of the program on universities' capacity to produce and apply new knowledge	20	H			✖
	• informed opinions on the interface between CRC and CFI	7	M		✖	✖
	• informed opinions on the integration of the program with other council programs and non-council chair programs	8	M		✖	
	• opinion on the balance achieved between Tier I and Tier II	12	M		✖	✖
	• informed opinions on the risks taken by universities	17	M			✖

Data sources	Indicators	Associated Issue Priority				
		Evaluation Issue Id	Priority L Low M Medium H High	Timing (1=ongoing)		
				1	y3	y5
	• informed opinions on unintended program effects	24	M			✖
	• informed opinions on the value added of the peer review process	3	L		✖	
	• informed opinions on the impact of the year 4 and 5 open competition on the behaviour of universities in early years	6	L			✖
	• informed opinions on the appropriateness of the number of chairs created	9	L			✖
Interviews with key stakeholders	• list of possible bases for allocating the chairs • arguments in favour and against each basis • qualitative assessment of the effect of the allocation formula on innovation	2	H		✖	✖
	• opinion on the balance between retention and attraction	10	H		✖	✖
	• informed opinions on the impact of the program on universities' capacity to produce and apply new knowledge	20	H			✖
	• informed opinions on the interface between CRC and CFI	7	M		✖	✖
	• informed opinions on the integration of the program with other council programs and non-council chair programs	8	M		✖	
	• opinion on the balance achieved between Tier I and Tier II	12	M		✖	✖
	• informed opinions on the risks taken by universities	17	M			✖
	• informed opinions on unintended program effects	24	M			✖
	• informed opinions on the value added of the peer review process	3	L		✖	
	• informed opinions on the appropriateness of the number of chairs created	9	L			✖
Interviews with management committee members	• list of possible bases for allocating the chairs • arguments in favour and against each basis • qualitative assessment of the effect of the allocation formula on innovation	2	H		✖	✖
	• opinion on the balance between retention and attraction	10	H		✖	✖
	• informed opinions on the interface between CRC and CFI	7	M		✖	✖
	• informed opinions on the integration of the program with other council programs and non-council chair programs	8	M		✖	
	• opinion on the balance achieved between Tier I and Tier II	12	M		✖	✖
	• informed opinions on the value added of the peer review process	3	L		✖	
	• informed opinions on unintended program effects	24	M			✖
Special request to universities	• number of faculties hired annually, by council discipline, starting in 1995	2	H		✖	✖

Data sources	Indicators	Associated Issue Priority				
		Evaluation Issue Id	Priority L Low M Medium H High	Timing (1=ongoing)		
				1	y3	y5
	• rate at which rejected applicants left Canada (i.e., current location of rejected applicants)	10	H		✖	✖
	• funding extended by universities to chairs • teaching load of chairs • number of (associate) professors hired parallel to setting up the chair	15	H	✖	✖	✖
	• annual value of grants/funding received from all sources, starting in 1995	16	M			✖
	• number of faculties hired annually as a proportion of existing faculty, starting in 1995	22	M			✖
Councils	• annual council grant funds by university, starting in 1995	2	H		✖	✖
	• comparison of the distribution of CIHR chairs with the distribution of CIHR awards which are attributed on a basis of a national competition	11	H			✖
	• annual council grant funds by researcher, starting in 1995	24	M			✖
Selection committee reporting forms	• statements made on selection committee reporting forms regarding the excellence of the nominees	11	H		✖	✖

Survey of faculty members	• research production indicators:
	  • # of publications
	  • # of conferences and technical papers
	  • # of graduate students supervised
	  • # of (Cdn and foreign) post doctoral fellows
	  • # of articles cosigned with foreign researchers
	  • value of grants/funding received
	  • # of patent applications
	  • # of citations (biblio- and patent-metrics)
	  • # and nature of awards and prizes held
	• membership on boards of peer-reviewed journals
		4, 11, 14, 19	H[11]
			M[4]
			M[14]
			M[19]
					✖[4]	✖[11]
						✖[4]
						✖[14]
						✖[19]

	• importance of the chair award in the decision to accept a position in Canada	10	H		✖	✖
	• opinion of peers on the excellence of chair holders	11	H			✖
	• chairs: qualitative assessment of professional mobility	18	H		✖	✖
	• qualitative assessment of (positive and negative) effects on other professors	14	M			✖
	• annual value of grants/funding received, starting in 1995	16	M			✖
	• qualitative assessment of impacts on the research culture within universities	17	M			✖
	• perceptions on the segmentation of the faculty corps	24	M			✖
	• rejected applicants: qualitative assessment of the impact of the rejection	24	M			✖

Data sources	Indicators	Associated Issue Priority				
		Evaluation Issue Id	**Priority** L Low M Medium H High	**Timing** (1=ongoing)		
				1	y3	y5
Case studies	• failed nominations: difficulties encountered in creating the chairs • researchers who refused chairs: difficulties encountered in creating the chairs	1	H		✖	✖
	• "attraction" chair holders: importance of the chair award in the decision to accept the position in Canada	10	H		✖	✖
	• chair holders: anecdotes suggesting the program's contribution to the university research system's capacity to produce and apply new knowledge	20	H			✖
Special studies	• proportion of women among chair nominations and awards compared to the proportion of women among feeder groups • reasons for lack of female nominations	5	H		✖	✖
	• international peer review of the excellence of chair holders	11	H			✖
	• comparison of selection criteria with those used in similar-caliber competitions worldwide	4	M		✖	✖
	• viability of the the planned open competition in view of the program context	6	L		✖	
	• international comparison of the ratio of chairs to the number of faculty members	9	L			✖
Annual chair reports	• list of achievements	14	M	✖		✖

Survey of selection committee members	• opinions on
	  • the adequacy/feasibility of selection criteria
	  • the fairness of the application of the criteria
	  • the definition of Tier II chairs
	  • the excellence of the chairs
		4, 11	M[4]
			H[11]
					✖	✖

	• informed opinions on the value added of the peer review process	3	L		✖	
Annual university reports	• contribution of the chairs to the realization of the strategic research plan • progress realized toward the realization of the strategic research plan	23	M	✖	✖	✖
	• incidences of collaboration traceable to the program	21	L	✖		✖

Annual chair reports

feasibility high
reliability medium
necessity high, every year

Annual chair reports. As part of program conditions, chairs will issue an annual report of their progress. Tagging along with additional information from this report is, therefore, a reasonable way to collect information from chairs. "Excellence" data could be collected from chairs this way but they will also have to be obtained through a more general survey of faculty members members for comparative purposes.

Within this evaluation plan, annual chair reports will be used to collect information on annual achievements. This related to the issue of the effects of the creation of chairs beyond the hiring of a researcher which has been assigned a medium level priority; other data sources also address this issue.

Survey of selection committee members

feasibility high
reliability low to high
necessity medium to high at years 3&5

All in all, in particular because of ongoing performance reporting requirements, annual chair reports will be of high use to the evaluation as well as to regular management accountability. ***Survey of selection committee members***. The adequacy and fairness of selection criteria, a medium priority issue, and the value added of peer review, a low priority issue, could be informed by a survey of selection committee members. The issue of excellence could also be raised in such a survey. Handling these processes first hand, these informants could provide an informed opinion — they have no personal stakes in the information supplied at least in the cases of the first two issues; in the case of the issue of excellence, their own judgment is at stake. Considering the low priority of the underlying issues and the low reliability in one instance, however, a lower-cost evaluation could probably dispense with this method and its indicators.

Annual university reports

feasibility high
reliability low to medium
necessity medium, all years

Annual university reports. The primary purpose of the annual university reports is to support the demonstration of the contribution of the chairs to the realization of the strategic research plan, to document the progress toward the realization of the strategic research plan (a process that is outside the control of the program) and to provide information of incidences of inter-institutional and inter-sectoral collaboration. The latter two issues were considered low priorities but the former is a medium priority issue. Consequently, the use of annual university reports will be included in all evaluation options but the least involved.

4.3 Ongoing Performance Measurement

Program management requires regular feedback on the performance of the program. Also the evaluation requires that some data be collected continuously (or, at least, regularly) so that it be available for the year 3 review and year 5 evaluation. Exhibit 4.3 lists the elements of information which should be collected for ongoing performance reporting and the indicators which should be measured regularly but may not be required for ongoing reporting.

Note that the list of ongoing performance reporting indicators has been kept to a minimum considering the frequent pace of evaluations requested of this program (year 3 and year 5). Past year 5, if the program is maintained, the pace of evaluation will probably slow down and ongoing performance reporting will acquire more profile. The list of required indicators may need to be revisited at that time.

EXHIBIT 4.3 • Ongoing Performance Reporting Indicators and Ongoing Measurement

Data sources	Indicators	Associated Issue Priority	
		Id	**Priority** L Low M Medium H High
Ongoing Performance Reporting Indicators			
Statistical reports	• number of chairs nominated, awarded, turned down	1	H

	• number of chairs awarded to
	  • Canadian expatriates
	  • foreign researchers
		10	H

	• chair holder continued admissibility to the program	18	H
	• proportion of full professors among Tier II chairs	4	M
	• proportion of nominations applying for CFI funds	7	M
	• number of Tier I and Tier II chairs	12	M
	• number of chairs awarded, by university	22	M
	• chairs attributed to researchers from another Canadian university, broken down by origin and destination university size	13	L
Special request to universities	• funding extended by universities to chairs • teaching load of chairs • number of (associate) professors hired parallel to setting up the chair	15	H
Annual chair reports	• list of achievements	14	M
Annual university reports	• contribution of the chairs to the realization of the strategic research plan	23	M
Ongoing Measurement			
Statistical reports	• nomination rejection rate by tier level, by type of university, by size of university, by discipline	4	M
	• proportion of nominations applying for CFI funds	7	M
	• proportion of rejections taking place at the first stage of review	3	L
Annual chair reports	• list of achievements	14	M
Annual university reports	• incidences of collaboration traceable to the program	21	L
	• progress realized toward the realization of the strategic research plan	23	L

Chapter 5

EVALUATION OPTIONS

The evaluation program presented in the previous chapter does not take into consideration the resources required to conduct the work. In real life, such considerations are important. Based on the evaluation priorities as well as the feasibility and the reliability of the information derived from each data source, we have packaged three evaluation options: a minimal evaluation program, a fuller program and a comprehensive evaluation option.

Minimal package. The smallest possible credible evaluation must address the highest priority evaluation issues. In the year 3 evaluation, these are:

- an analysis of the program take-up (issue 1);
- an assessment of the allocation formula (issue 2);
- an analysis of the gender issue (issue 5);
- analysis of the open competition concept (issue 6);
- a study of the retention and attraction effects of the program (issue 10); and,
- an evaluation of the commitment demonstrated by universities (issue 15).

In the year 5 evaluation, these issues remain top priorities, in addition to the following:

- a substantiation of the excellence of chair holders (issue 11);
- the determination of the stability of the chairs (issue 18);
- an analysis of the impact of the program on the university research system's capacity to produce and apply new knowledge (issue 20).

These issues require the following research modules:

- statistical reports;
- interviews (about 50) with university representatives, key stakeholders and management committee members;
- special requests to universities;
- council inputs;
- gender study;
- annual chair reports;
- survey of faculty members (in year 5 only, limited size and scope); and,
- international peer review (in year 5 only, limited size and scope).

This evaluation option would offer limited qualitative input and anecdotal evidence to illustrate the dryer conclusions from quantitative analyses. With a scaled-down survey of faculty members, some segment-specific analyses (such as issue 4 dealing with the nature of Tier II chair holders) may not be feasible.

It may be possible to obtain this package for approximately $60,000 in year 3 and approximately $90,000 in year 5.

Fuller package. A more complete evaluation could be performed by adding one research module and expanding two other modules:

- case studies added in;
- annual university reports;
- full size survey of faculty members (in year 5 only); and,
- full size international peer review (in year 5 only).

This option packages more qualitative information relative to the incrementality of the program (issues 1, 10 and 20) and more complete

data collection on the issue of excellence (issue 11). It still fails to collect detailed excellence data from faculty in year 3, however.

It may be possible to obtain this package for approximately $90,000 in year 3 and approximately $120,000 in year 5.

Comprehensive package. The comprehensive package would include all indicators and data sources described in Chapter 5. The following research modules would be added to the second option:

- year 3 survey of faculty members;
- special studies: international comparison of selection criteria, viability of the open competition and international comparison of the ratio of chairs to faculty;
- survey of selection committee members.

This package addresses all evaluation issues (of low, medium and high priority) as well as possible considering the strengths and limitations of the indicators, of the demonstration logic on which they are based and of the methodologies proposed. Compared to the second option, the treatment of the following issues would be added:

- year 3 analysis (and more in-depth treatment) of some selection criteria questions (issue 4), of the value added of the peer review process (issue 3), of excellence (issue 11), of the effect of chairs beyond hiring (issue 14) and of the effect on the training of highly qualified personnel (issue 19);
- more in-depth analysis of the appropriateness of the number of chairs (issue 9);
- analysis of the program's contribution to inter-institutional and inter-sectoral collaboration issue 21); and,
- analysis of progress toward the realisation of the university strategic plans (issue 23).

This option would obviously be the most costly, possibly exceeding $150,000 for each of the year 3 and year 5 evaluation studies.

APPENDIX A Sources

Program documentation

- *Better finances, better lives; The Budget Plan 2000*
- Treasury Board submission
- program terms and conditions
- Canada Research Chairs Program Guide
- The Chairs Web site
- Fact sheet on the Canada Research Chairs
- Nicole Bégin-Heck, *Preliminary Gender-based Analysis of the Canada Research Chairs Program*, 2001
- Minutes of the Steering Committee (incomplete)

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- Hayward R. Alker. *Mathematics and Politics*. New York, MacMillan,1965
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- Élaine Gauthier. *L'analyse bibliométrique de la recherche scientifique et technologique : guide méthodologique d'utilisation et d'interprétation*. Statistics Canada publication number 88F0006XPB No. 8, 1998
- Benoit Godin. *Les indicateurs de la recherche universitaire*. Rapport présenté à l' ADARUQ et à la CREPUQ, mai 1997.
- Observatoire des sciences et des technologies. *La performance des universités canadiennes en recherche. Édition 2000*.
- Royal Academy of Engineering. *Measuring Excellence in Engineering Research*. January 2000.
- Keith Smith. *Science, Technology and Innovation Indicators, a guide for policy-makers*. Norway, Indicators and Data for European Analysis

Project, paper no. 5, STEP (Studies in technology, innovation and economic policy) Group, 1998.

Key informants

- Howard Alper, Partnership Group for Science and Engineering
- Peter Anderson, Canadian Foundation of Biological Societies
- Robert Best, Association of Universities and Colleges of Canada
- Mark Bisby, CIHR
- Bernie Bressler, University of British Columbia
- Mireille Brochu, consultant
- Tom Brzustowski, NSERC
- Alain Caillé, Université de Montréal
- Carmen Charette, Canada Foundation for Innovation
- Patricia Clements, Humanities and Social Sciences Federation of Canada
- JoAnn J. Crichlow, Canada Foundation for Innovation
- Denis Croux, SSHRC
- Julie Dompierre, SSHRC
- Patricia Dunne, SSHRC
- Louis-Gilles Durand, Institut de recherche clinique de Montréal
- René Durocher, SSHRC
- Peter Ennals, Mount Allison University
- Michelle Gauthier, Association of Universities and Colleges of Canada
- Kathleen Hollington, Canada Foundation for Innovation
- Lorrie Hubbert, SSHRC
- Joanne Keselman, University of Manitoba
- Louis Maheu, Association canadienne pour les études supérieures
- Jean-François Moreau, UQAC
- Martha Piper, University of British Columbia
- Marc Renaud, SSHRC
- Stan Shapson, York University
- David Strangway, Canada Foundation for Innovation
- Christian Sylvain, Association of Universities and Colleges of Canada
- Marie Tobin, Industry Canada
- James Turk, Canadian Association of University Teachers