

Final Report

New Opportunities Fund Evaluation

Prepared for:

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Executive Summary

Study Objectives

The objective of the study is to evaluate the New Opportunities Fund (NOF). The study has assessed impacts of the program on research capability and productivity, retention and attraction of researchers, collaborations and partnerships, generation of economic and social benefits, and attraction of other sources of funding. The evaluation has also examined program design and delivery issues that affect the ability of the program to meet its objectives.

Under the terms of the funding agreement with the Government of Canada, the CFI is required to conduct independent evaluations of its programs making use of an evaluation framework approved by the CFI Board. A framework was developed in 1998 and has recently been updated¹ to take account of an extension to CFI's mandate and changes to the CFI range of programs. The framework is consistent with Treasury Board guidelines and principles for program evaluation, in particular the Results-based Management and Accountability Framework. This evaluation of the NOF is based on the updated framework.

Program Profile

The CFI launched the NOF in 1998 and eligible candidates for the first competition were those who took up their first faculty positions between July 1, 1995 and April 1, 1998. Through that competition which was open, 222 awards to 26 institutions were made involving 415 researchers for an amount of \$37.9 million. Following that competition, the NOF continued to accept applications on an ongoing basis for researchers hired after April 1, 1998, but within allocations set by CFI for institutions based on their level of sponsored research. Through this process, 390 awards were made to 41 institutions for 507 researchers for a total of \$61.2 million, bringing the total funds committed to \$99.1 million as of April 6, 2001. The CFI announced earlier in 2001 an extension to the NOF for the period 2002 to 2005, and provided an additional \$114 million.

¹ Evaluation Framework for the Canada Foundation for Innovation, Hickling Arthurs Low, December 19, 2001

Approach

The evaluation of the NOF was based on evaluation issues and questions relevant to the NOF taken from the revised CFI evaluation framework. The data collection phase was based on a variety of information sources making use of four lines of enquiry: document review, interviews, case studies, and a survey. The institutions for case studies were chosen to represent three different sizes in terms of level of sponsored research, and differing geographical regions. We undertook a survey of all participants in the NOF utilizing electronic web-based survey technology. The return rate on the survey was 42.1% of total NOF participants.

Recognizing that the NOF funds are invested in partnership with the institutions and their funding partners, the institutions serve an important role in ensuring that the NOF achieves its objectives. This report will, therefore, be of value to institutions as well as to the CFI in the continuing management and use of the NOF program.

Findings

Program Relevance

The NOF program has been a timely initiative that has enabled universities to hire some outstanding young researchers and has given those new investigators an opportunity to accelerate their careers through access to state-of-the-art equipment and other facilities. The NOF has been an even more significant factor in allowing universities to retain these top researchers. The demand for NOF funding is increasing as universities step up recruitment to replace the current high spate of retirements and university administrators are having to turn down more applications within their institutions. There is a need to continue infrastructure investments if Canada is to be able to attract the new talent and upgrade the scientific equipment needed to maintain and improve its research competitiveness.

Objectives Achievement

The objectives of the NOF are, through the provision of research infrastructure, to attract and retain able researchers in their first full time academic appointments, and to train researchers and other highly qualified individuals who will embark on research and other careers. Thereby researchers are enabled to move towards their full potential. The evidence from the study demonstrates that these objectives are reasonable and realistic and are being reached. At the institutional level, administrators stressed how integral the NOF program has become to their overall recruiting strategy and their ability to offer prospective candidates competitive start-up offers. In several instances cited in our case studies, the ability to put together a competitive start-up package involving NOF funds, provincial funds and the university's internal money was the critical factor in bringing a high calibre person to the university.

It is also clear, however, that the availability of advanced equipment is not a sufficient condition to attract and retain new researchers over the longer term. Several other factors, notably salary levels and research budgets, heavily impact on the objectives pursued by NOF. The low level of operating funds for research, including budgets for equipment operations and maintenance, weakens the capability of universities, in particular smaller universities, to increase the number of postgraduate and postdoctoral students, and to recruit and, thereafter, retain exceptional researchers.

Impacts and Effects

Research Capacity and Competitiveness

Not only has the NOF contributed to bringing first rate people into the universities but it has also enabled these new investigators to advance their careers rapidly because they have been able to work with state-of-the-art equipment that in times past would not have been accessible until much later in their university life. The question of whether the NOF has led to improvements in research competitiveness is difficult to assess in any absolute sense. A number of questions in the survey addressed the point to obtain a subjective assessment of competitiveness improvement.

From the survey, 89.5% of respondents believe that NOF investments have increased their research quality and productivity. The NOF related research is thought to have received international recognition by 15.1% of respondents. As a percentage of respondents whose work was sufficiently advanced to be recognized (that is excluding those whose results are not yet available – 100% for 2001 awards), this figure almost doubles providing further evidence of the quality of the NOF related research. Only a small number of researchers felt their research was pioneering. Further, respondents were very positive in indicating the level of recognition of the publications enabled by NOF infrastructure. Given that these researchers are at the early stages of their careers, these figures are impressive.

The responses from interviewees in the granting councils indicate that the NOF is placing increased demands on council funding. The general view is that “each research investment drives the need for other investments”. The hiring of more new faculty with a strong propensity for research, assisted through the NOF, will create pressure for more research operating funds; this is particularly so if the infrastructure allows researchers to do research in new breakthrough areas.

Infrastructure

The survey results demonstrated the high regard researchers have for their NOF supported infrastructure; 32.5% of respondents considered their equipment comparable to the best in the world while 35.9% said it was comparable to the best in Canada. The survey also made clear that the NOF has raised the level of research for many of those using the infrastructure to be world competitive; 38.1% responded “very much” and 44.9% said “considerably” to that survey question. Many of the researchers we interviewed identified the issue of maintenance and renewal of their equipment as a key issue.

Attraction and Retention

In cross tabulating the survey results with the year of the NOF award, we found differences in the perceived role of the NOF in attraction and retention. The open competition in 1998 was for researchers who had taken up their first faculty position between July 1, 1995 and April 1, 1998. A large percentage (79%) of respondents in this category said that the NOF was a factor in their staying at the institution and/or in Canada. Since 1999, the fund has been directed at ongoing new recruitment and for this group of researchers, the NOF was a factor in attracting them to the institution and/or to Canada, 46% of respondents who received awards in 1999, 53% with awards in 2000, and 64% with awards in 2001. For this same group, NOF was also a factor in their staying, 85% of respondents with awards in 1999, 92% with awards in 2000, and 89% with awards in 2001.

The majority of NOF recipients (58.9%) were located in Canada prior to accepting their first faculty appointment and of the remainder (41.1%), who were drawn from outside the country, 29.0% came from the US, 4.0% from the UK and 2.5% from Germany. A significant number of NOF recipients (55 out of the 326 survey respondents) obtained their PhD degree in Canada, left Canada for the US, and were attracted back by the NOF.

Training

From the survey we found that the NOF is considered to be a major factor (66.4%) in attracting more and better quality graduate students. Almost all respondents (97.6%) viewed the NOF as also having had a very positive effect on the quality of student training. The preponderance (94.1%) believes that the opportunity to work with the NOF infrastructure has improved the career prospects of their graduate students.

Research Collaboration and Multidisciplinarity

Our results indicate that 52.1% of respondents have shared the NOF infrastructure only with their co-applicants, while 47.5% have shared the infrastructure within their department, 26.4% within their faculty, and 19.3% broadly within their university. Relatively less sharing appears to take place with other institutions in Canada and abroad and with industry, government and non-profit organizations. Over half the respondents (61.9%) said the NOF infrastructure had or would strengthen the multidisciplinary nature of their research.

We found instances of partnerships being developed by NOF supported researchers with the private sector but also received many cautionary words that much of the research being conducted with NOF infrastructure was of a long-term fundamental nature and linkages with industry were unlikely. Nevertheless, some 20% of NOF respondents said they were receiving research funding from industry. Examples of NOF researchers who did form partnerships are given in the case studies and include the establishment of important relationships with leading pharmaceutical companies and to high-profile work for the National Cancer Institute and the BC Ministry of Health.

Benefits to Canada

The feeling of many researchers through the interview and survey responses was that, in most cases, it was too early yet to be able to evaluate the full scope of the impact and benefits of the NOF related research. Much of the research is basic in nature, its high quality is a very positive benefit in itself, and potential economic and social benefits, including spin-off companies, will take longer to materialize. There are exceptions to this as noted in the case studies. An outstanding example is provided by a University of Toronto researcher who helped found a proteomics start-up that was recently acquired by MDS Proteomics. The researcher felt very strongly that his NOF grant had laid the basis for this spin-off development.

Of the 326 projects that responded to the survey, 215 reported areas in which results are expected. It is evident from these results that more than half the respondents expect IP from their NOF related research, more than half expect health improvements, but a much smaller percentage (15.3%) expect social improvements. We analyzed these results further, together with data on the dates the NOF infrastructure became operational, to determine the estimated number of years for results to emerge. The number of years from the operational date is reported below; on average, for the 215 projects, the infrastructure has been operational for 1.1 years.

	IP	Products/ Services	Spin-off companies	Jobs	Improvements in			
					Public policy	Health	Environment	Social
Projects expecting results	124	127	72	135	46	115	63	32
% of projects (215)	58%	59%	33%	63%	21%	53%	29%	15%
Years to results	4.1	4.7	6.5	2.6	5.4	7.0	5.5	5.1

Program Design, Management and Delivery

The NOF program is well designed and is seen by many university administrators as a model program. In fact, only 5.3% of respondents from the 2000 and 2001 NOF award years said the NOF application and selection processes needed improvement. We also learned that the approach to allocating funds to institutions over several years has allowed for better planning and recruitment. The cost-sharing arrangements for the program have encouraged good management and accountability from the universities and ensured that the selected infrastructure corresponds to real requirements. Concerns were expressed, however, about the continuing capacity of institutions, provinces and the private sector to provide the matching funds. Smaller universities have particular worries in this regard.

In general, the existence of multiple and different funding sources required to develop a research program is a cause of contention because the preparation of applications places a major burden on the community of researchers and reviewers. “There is a need to rationalize the process.”

There is a wide-spread desire among NOF researchers for a greater standardization and integration of application procedures among the various federal granting agencies. Also evident is an interest on the part of institutions in reducing the complexity and time required to complete NOF applications. For some, this has been a disincentive to applying to the NOF.

Few applications to the NOF have been received in the area of the social sciences and humanities and it was noted that CFI staff have taken steps, together with SSHRC, to make this community more aware of the opportunities for enhancing critical infrastructure and of the openness of the CFI to receiving their applications.

In order that universities can better report on impacts of the NOF in future, they need clearer guidance on what factors to track. It was suggested, in this respect, that universities consider using as performance indicators the outcome factors in the revised progress reports included as part of the CFI Evaluation Framework referred to earlier, and integrating these into their institutional research plans. Developments arising out of the NOF and other CFI investments could then be followed on an ongoing basis by the institutions and be reported to the CFI, as required.

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1. Introduction

1.1 Background

The Canada Foundation for Innovation (CFI) is an independent corporation established by the Government of Canada to increase the capability of Canadian universities, colleges, hospitals and other eligible institutions to carry out world class research and technology development. To assist in carrying out its mandate, the CFI created the New Opportunities Fund (NOF) to attract and retain able researchers in Canada and to train future generations of researchers and other highly qualified individuals who will embark on research and related careers.

The CFI launched the NOF in 1998 and eligible candidates for the first competition were those who took up their first faculty positions between July 1, 1995 and April 1, 1998. Through that competition which was open, 222 awards were made to 26 institutions involving 415 researchers for an amount of \$37.9 million. Following that competition, the NOF continued to accept applications on an ongoing basis for researchers hired after April 1, 1998, but within allocations set by CFI for institutions based on their level of sponsored research. Through this process, 390 awards were made to 41 institutions for 507 researchers for a total of \$61.2 million, bringing the total funds committed to date to \$99.1 million. The CFI announced earlier in 2001 an extension to the NOF for the period 2002 to 2005, and provided an additional \$114 million.

Under the terms of the funding agreement with the Government of Canada, the CFI is required to conduct independent evaluations of its programs making use of an evaluation framework approved by the CFI Board. A framework was developed in 1998 and has recently been updated² to take account of an extension to CFI's mandate and changes to the CFI range of programs. The framework is consistent with Treasury Board guidelines and principles for program evaluation, in particular the Results-based Management and Accountability Framework. This evaluation of the NOF is based on the updated framework.

1.2 Study Objectives

The objective of the study is to evaluate the NOF. The study has assessed impacts of the program on research capability and productivity, retention and attraction of researchers, collaborations

² Evaluation Framework for the Canada Foundation for Innovation, Hickling Arthurs Low, December 19, 2001

and partnerships, generation of economic and social benefits, and attraction of other sources of funding. The evaluation has also examined program design and delivery issues that affect the ability of the program to meet its objectives.

1.3 Structure of Report

The report is laid out in a logical progression to provide the reader with a complete view of all aspects of the investigation. The report includes a statement of study objectives (Chapter 1), a description of the NOF program (Chapter 2), the approach and methodologies used to evaluate the NOF (Chapter 3), the findings we developed based on our data gathering through document review, interviews, case studies and a survey of all NOF supported researchers (Chapter 4 and 5), and the conclusions we arrived at based on the findings (Chapter 6). The appendices to the report includes our list of interviewees (Appendix A), the interview guides we developed (Appendix B), the protocol for case studies (Appendix C), the survey form (Appendix D), the evaluation issues and performance indicators (Appendix E), the case studies of eight universities (Appendix F), and the survey results (Appendix G).

2. *Program Profile*

2.1 *Overview*

Funding through the New Opportunities Fund (NOF) is designed to help institutions recruit first-time faculty members by providing research infrastructure. This new infrastructure will also assist institutions in recruiting and retaining other research staff in priority areas for research and training at the institution. The linkages between the NOF objectives, program management, and impacts, both short-term and longer-term are illustrated in the logic model given in Figure 2-1. This model is consistent with the logic model for CFI presented in the CFI evaluation framework. The application, approval and monitoring processes between institutions and the CFI and between institutions and projects are shown in Figure 2-2.

2.2 *Eligibility and Application*

NOF funding can be provided to individuals taking up their first full-time academic position in a Canadian degree granting institution, teaching hospital or affiliated institute. The project may involve more than one new researcher, including a group of researchers with complementary skills and expertise or researchers that share infrastructure or work in related fields of research that are a high priority for the university and which the university wants to develop to enhance its training and research mandates. Applications are assessed by CFI on the basis of three criteria:

- Quality of research and the need for the infrastructure,
- Contribution to strengthening the capacity for innovation, and
- Potential benefits of the research to Canada.

The case for receiving funding under the NOF has to rest on the quality of the NOF candidate and not on the other users of the proposed infrastructure. The research to be conducted, how the infrastructure will be used, and the necessity for carrying out the research have to be described in the application. The CFI Board of Directors make the final funding decision based on the assessments of appointed reviewers.

Figure 2-1: Logic Model

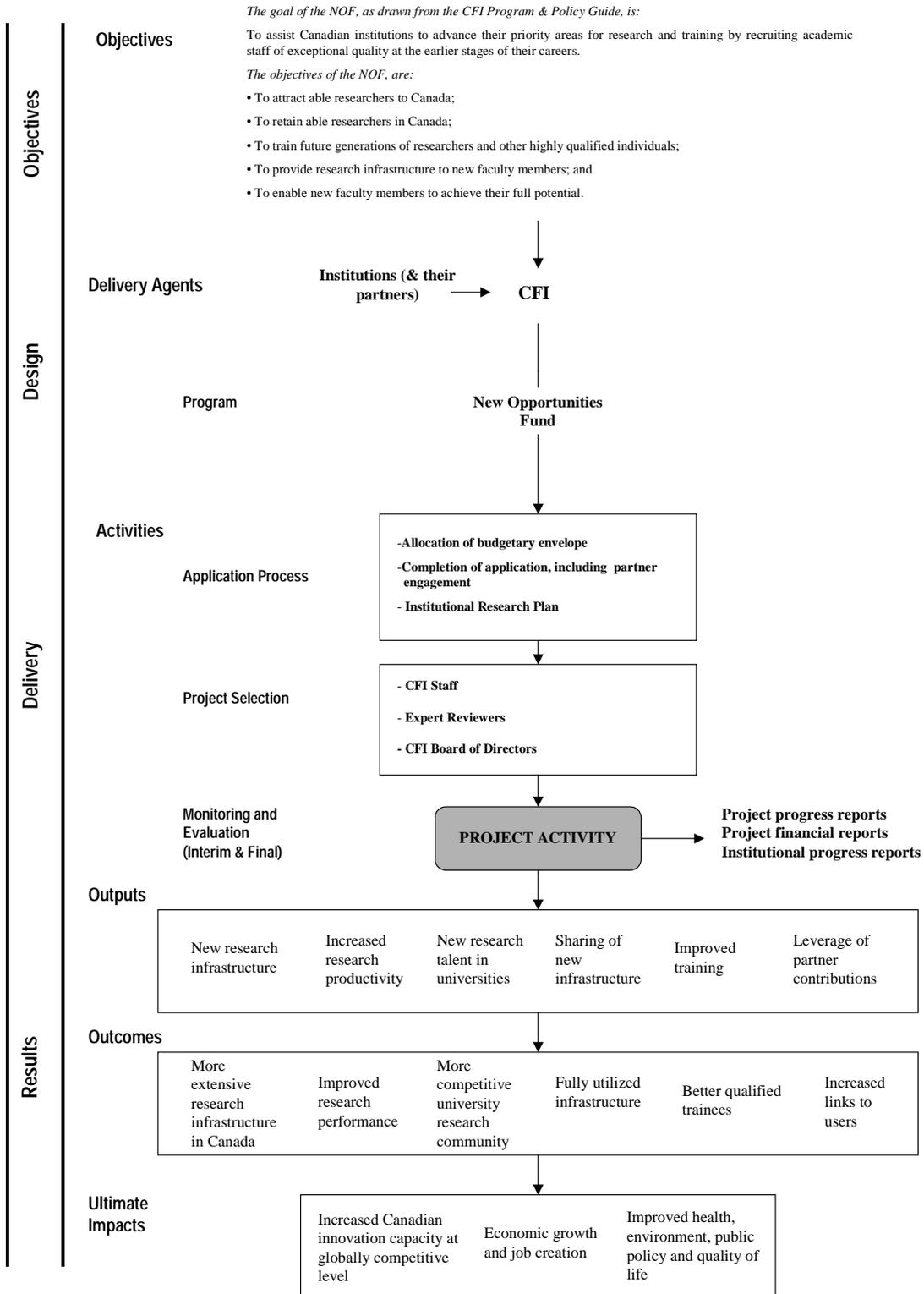
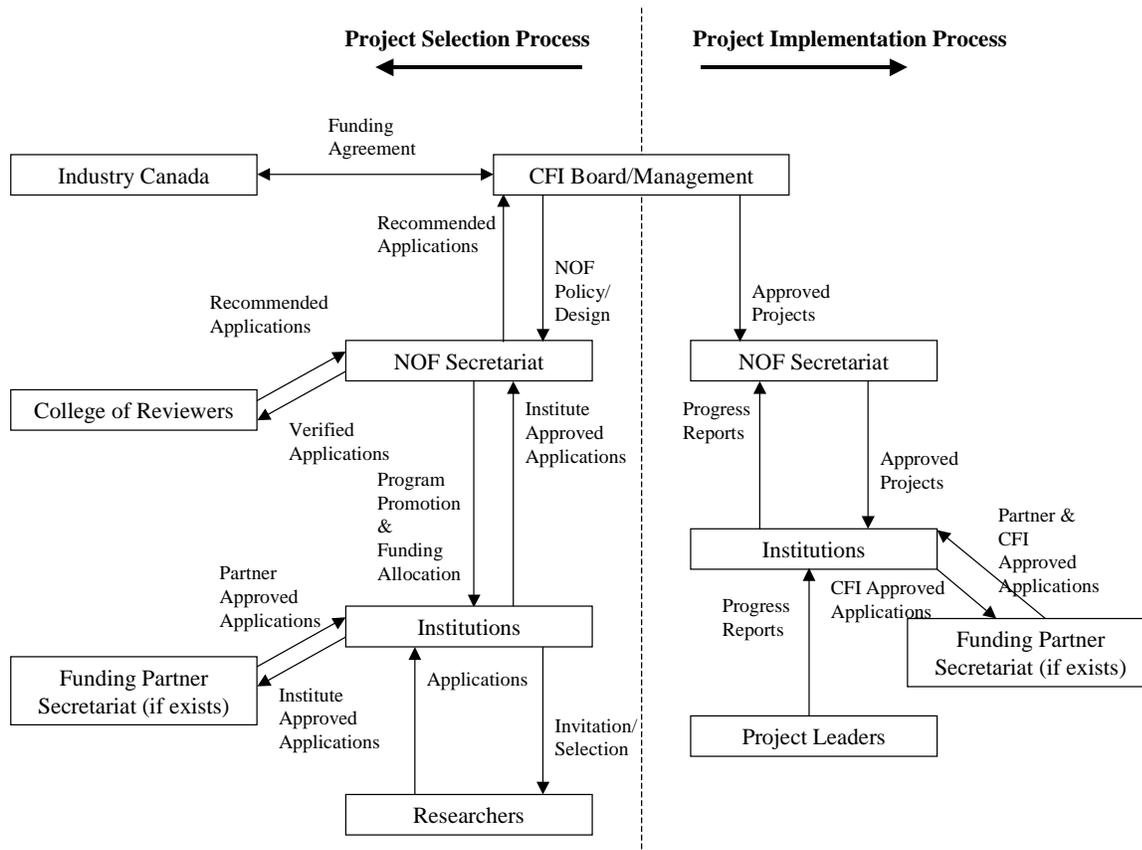


Figure 2-2: Activity-based Logic Model



2.3 *NOF Investments*

There were 612 NOF projects approved as of date April 6, 2001, the cut-off time for consideration within this study. Of these, 121 had not been finalized, meaning that the institutions had received approval of the CFI Board for the funds, however no agreement had been entered into with the CFI that would enable infrastructure to be purchased. Thus, 491 projects were considered to comprise the NOF population for the study.

The following tables (Tables 2-1, 2-2, and 2-3), derived from the NOF project application data supplied by CFI, set out the NOF investments by year for the 612 project awards and by province and application area for the 491 projects.

Table 2-1: NOF Total Investments by Year

NOF Investments	1998-1999	1999-2000	2000-2001	Cumulative
Number of projects	222	154	236	612
Number of institutions	26	32	38	41
Total Amount Awarded (millions)	\$37.9	\$23.7	\$37.5	\$99.1

Table 2-2: Cumulative NOF Investments by Province

Province	Amount	Percent	Awards	Percent
Alberta	\$7,995,929	10.1	46	9.4
British Columbia	\$5,363,152	6.8	38	7.7
Manitoba	\$5,024,026	6.3	29	5.9
New Brunswick	\$447,893	0.6	4	0.8
Newfoundland	\$1,127,092	1.4	9	1.8
Nova Scotia	\$1,923,612	2.4	16	3.3
Ontario	\$33,276,254	42.0	201	40.9
Québec	\$21,709,144	27.4	136	27.7
Saskatchewan	\$2,298,105	2.9	12	2.4
Total	\$79,165,207	100.0	491	100.0

Table 2-3: Cumulative NOF Awards by Application Area

Application Area³	Frequency	Percent
Health	230	46.8
Industrial production and technology	104	21.2
Pollution and protection of the environment	45	9.2
Other research	28	5.7
Exploration and exploitation of the Earth	28	5.7
Renewable resource production and technology	23	4.7
Infrastructure and general planning of land-use	20	4.1
Social structures and relationships	3	0.6
Production, distribution and rational utilization of energy	6	1.2
Exploration and exploitation of space	4	0.8
Total	491	100.0

³ This classification system for areas of application has been adapted by CFI from the system used for reporting federal science and technology expenditures in Canada.

3. Study Approach and Methodology

3.1 Study Approach

The evaluation of the NOF was based on evaluation issues and questions relevant to the NOF taken from the revised CFI evaluation framework. These are presented in Section 3.3. The overall study approach is shown in Figure 3-1 and consists of four phases: management, data collection, analysis and reporting.

3.1.1 Study Management

The management phase concerned the internal administration of the project and communications with the client. An important component of this phase was the initialization meeting where we obtained the client's input on the methods and directions proposed for the study.

3.1.2 Data Collection

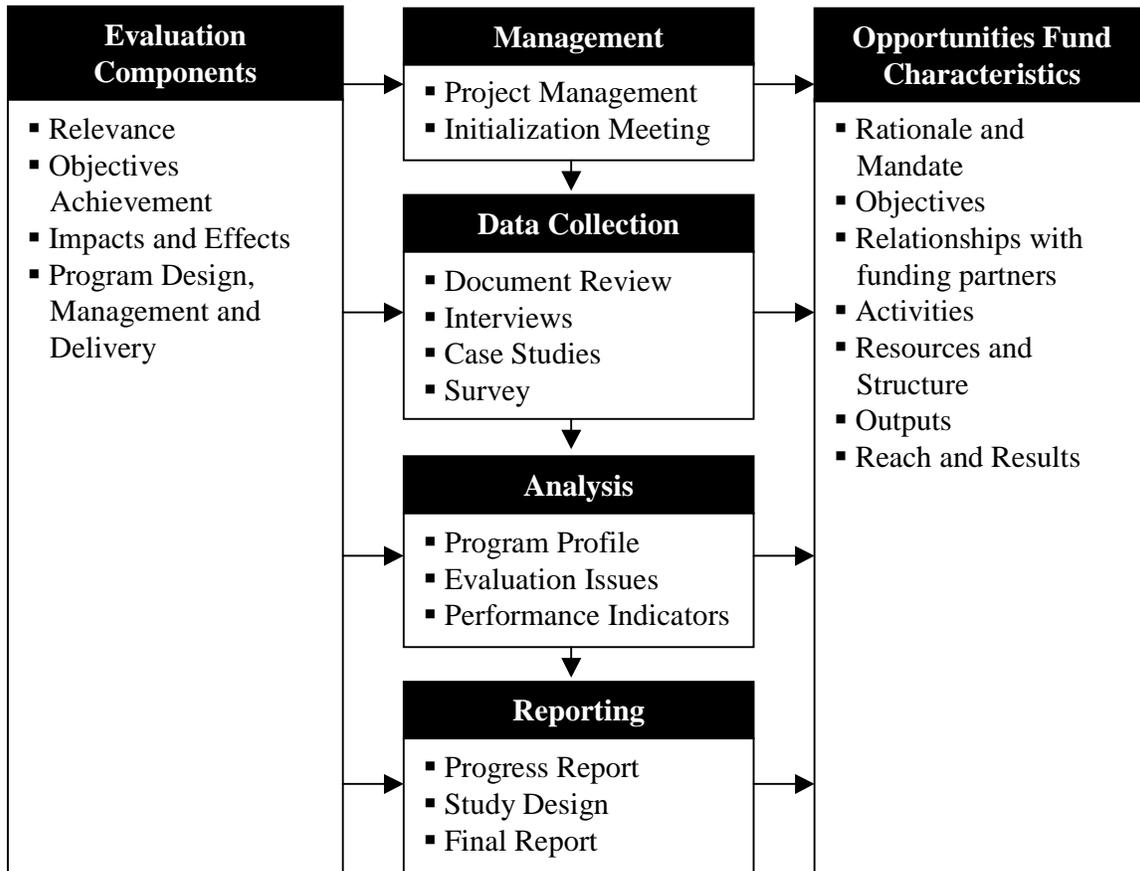
The data collection phase was based on a variety of information sources making use of four lines of enquiry: document review, interviews, case studies, and a survey.

3.1.2.1 Information Sources

There were four types of information sources for this study, as follows:

1) Representatives of program funding stakeholders

- CFI Board
- CFI Management
- Industry Canada
- Granting Councils (Natural Sciences and Engineering Research Council - NSERC, Social Sciences and Humanities Research Council - SSHRC, Canadian Institutes for Health Research - CIHR)

Figure 3-1 Study Approach

2) Representatives of NOF infrastructure project stakeholders

- Institutions (Universities - Vice Presidents (Research), Deans, Heads of Departments)
- Project Leaders for NOF infrastructure projects and NOF project participants
- Other infrastructure project stakeholders (industry, federal government departments and agencies)

3) Documents and files for institutions selected for case studies

- Institutional Strategic Research Plans
- Institutional Reports
- NOF Project Reports
- NOF Financial Reports

4) Other documents

These include such documents as the CFI funding agreement, CFI annual reports, reports related to CFI by the Office of the Auditor General, Treasury Board, Industry Canada, and the Royal Society of Canada.

3.2 Study Methodology

3.2.1 Interviews

Interviews were conducted with representatives of CFI, industry, Industry Canada and the federal granting agencies, and from each of eight selected institutions and projects (see Table 3-2) focusing on the impact of NOF. Interviews were held at both the institutional and project levels at each of the eight institutions as follows: six at each of three large institutions, four at each of two medium institutions and four at each of three small institutions. In total, there were 49 interviews with representatives of stakeholders as follows:

Table 3-1: Stakeholder Interviewees

Interview Source	Number of Interviews
CFI	5
Industry*	2
Industry Canada*	1
NSERC, SSHRC, CIHR	3
Institutions	19
Projects	19
Total Interviews	49

* Interviewees from these sources supported both the development of the CFI Evaluation Framework and the NOF Evaluation

The methodology that was used in determining appropriate interviewees from the various stakeholder groups is outlined in Appendix A. Selection factors applied to CFI's many stakeholders included ensuring representation of funding stakeholders who are senior and have expertise pertinent to the mandate of the CFI, or in program evaluation. Factors applied to the selection of institutions for the case studies, and NOF projects within the institutions, included geographic location, institution size, project budget, and research discipline.

Three interview guides were developed, each designed to capture information for the evaluation that would be analyzed and presented in the evaluation report. The guides, given in Appendix B, are for:

- a) **Program funding stakeholders:** Information gathered will largely focus on policy and program elements of the evaluation.

- b) ***Institutional stakeholders:*** The focus will be on the roles, responsibilities and perspectives of the eight institutions selected for case study in terms of program impacts, and program design and delivery.
- c) ***Infrastructure project stakeholders:*** Project Leaders from the 19 selected projects were interviewed (this included three projects from each of the large institutions, and two projects from each of the medium and small ones). The sample was designed to be representative of the total project population, according to such factors as geographic location, project budget, discipline, etc.

3.2.2 Case Studies

For each of the identified eight institutions, a case study was prepared that incorporated information obtained through document review and interviews. The case studies were designed to provide the context, and illustrate and highlight the findings of the evaluation. As noted above, the institutions were chosen to represent three different sizes in terms of level of sponsored research, and differing geographical regions. A list of the selected institutions, based on discussions with the client, is given in the following table.

Table 3-2: Institutions Selected for Case Study

Large	Medium	Small
University of British Columbia	University of Calgary	Nova Scotia Agricultural College
University of Toronto	University of Saskatchewan	University of New Brunswick
University of Montreal		University of Quebec at Trois-Rivières

The case studies were structured as indicated in Appendix C.

3.2.3 Survey

We undertook a survey of all participants in the NOF utilizing electronic web-based survey technology. The survey form is attached as Appendix D.

As noted in Section 2.3, 491 NOF projects were considered to comprise the project population. Of these projects, 332 listed one researcher, 96 listed two researchers, and 63 listed three or more researchers. All together, 775 researchers including project leaders were named in the NOF projects. The e-mail addresses of these researchers were provided by CFI staff and invitations to complete the survey were distributed to all members of this list. The number receiving the survey form was somewhat less (729) due to the fact that 46 researchers had invalid addresses and could not be reached. Responses were received from 326 researchers, representing 283 projects, which gives a response rate of 44.7% based on the survey population (729) and a rate of 42.1% based on the total number of researchers (775).

3.3 Evaluation Issues and Performance Indicators

The evaluation issues and questions underlying the NOF evaluation are based on those set out in the revised CFI evaluation framework. Similarly, the performance indicators for the NOF evaluation are drawn from the revised framework and are identified in Appendix E. There are six evaluation issues, with supporting questions, listed under four headings: relevance; objectives achievement; impacts and effects; and program design, management and delivery. Each issue was reviewed in terms of its associated performance indicators.

Assessment of the impact of the NOF investments requires a baseline of information against which the changes brought about as a result of the new infrastructure can be measured. For a number of the performance indicators, new types of information had to be sought. In these cases, measurement of incremental change was not possible because a baseline for comparison did not exist but the new information will become the baseline for further evaluations.

4. Evaluation Findings: Program Relevance and Objectives Achievement

4.1 Introduction

The findings from the various lines of enquiry (interviews, survey, and case studies) are summarized in this Chapter (relevance and objectives achievement) and Chapter 5 (impacts and program delivery) by evaluation issue. The case studies of eight universities are given in Appendix F (marked as confidential to protect the commentary of identified individuals in the universities) and the full results of the survey are included as Appendix G.

4.2 Evaluation Issues

4.2.1 Program Relevance

Issue: Is there a continuing need to invest in research infrastructure to recruit exceptional academic staff at the earlier stages of their career?

- To what extent is continuing investment in infrastructure needed for Canadian research to perform at world class level in the medium term?

The NOF is widely considered by senior administrators and researchers in Canadian universities and by the federal granting councils to have been an excellent initiative in allowing universities to recruit new researchers with outstanding credentials. In the first NOF competition (1998), most of the researchers receiving awards were already in the Canadian university system but after that date they were drawn from many other sources (see Chapter 5). Using the NOF, universities have been able to compete with institutions in the US for new talent. A number of examples were given to us of universities attracting very strong, new investigators who wanted to return to Canada but were being sought after in the US. The point is illustrated in this statement from our case study on the University of British Columbia:

“One of them had a Ph.D. from the University of Toronto and had done a postdoctorate fellowship at MIT. He had three competing offers from the US and UBC had to match the best of the US offers. They used the New Opportunities Fund plus some internal start-up money and funds from NSERC to put together a package to attract this candidate.”

The survey results confirm the importance of the NOF in attracting and retaining researchers (see Tables 5-6, and 5-7 for more details). The NOF was rated by 66.7% of respondents as a factor in being attracted to their university positions for the year 2001. For the same year, 86.7% of respondents claimed that the NOF was a factor in their retention at the university. For prior years, the percentage ranking the NOF as a factor in attraction was less whereas for retention, the percentage remained constant. We attribute the increasing importance of the NOF in attraction to be due to the fact that, since 1998, the researchers are coming from outside the Canadian university system.

Not only has the NOF brought first rate people into the universities but it has also enabled these new investigators to advance their careers rapidly because they have been able to work with state-of-the-art equipment that in times past would not have been accessible until much later in their university life. The pressure to have the latest equipment is enormous.

“In the field of bioinformatics the science is experiencing exponential growth in the amount of data collected, it is almost a caricature. The rate of growth of the data speaks to the need for new equipment. Every year scientists working in this field need twice as much disk capacity to store the data being collected. There are similar increases in the processing speeds required to undertake the calculations for their computations. The scientists working in this field can't keep up with the field without the equipment grants to keep them competitive.”

The survey results demonstrated the high regard researchers have for their NOF supported infrastructure; 32.5% of respondents considered their equipment comparable to the best in the world while 35.9% said it was comparable to the best in Canada. The survey also made clear that the NOF has raised the level of research for many of those using the infrastructure to be world competitive; 38.1% responded “very much” and 44.9% said “considerably” to that survey question.

It was impressed on us, however, that while Canada is making progress in competing for minds with the rest of the world, it is not there yet, particularly against the US. As evidence, a recent goal of the National Institutes for Health is to provide an infrastructure and operating budget for each new researcher of \$US500,000. In addition, leading US universities have endowment funds that are available to researchers. Canadian universities are making efforts towards providing this kind of start-up package. The situation in the Faculty of Medicine at the University of Toronto is as follows:

“The Vice-Dean works closely with the affiliated hospitals when they undertake their recruitment. They all have a start-up package to offer new hires -- most of which is made up of equipment costs. He works with the individual chairs of the campus departments, as well as with the directors of the affiliated hospitals to

guarantee new recruits a minimum start-up package. The average size is \$250,000, of which \$150,000 usually comes from the New Opportunities Fund. They ask the candidates to raise the other \$100,000 by applying to different funding sources such as CIHR, and The Heart And Stroke Foundation, the National Cancer Institute etc. If the researcher is not successful in their application for the additional funds, then the faculty comes up with the money as promised.”

The argument was also made by a senior administrator in the granting councils that the task of the CFI and therefore of the NOF in strengthening Canada’s research infrastructure has to be a long-term commitment.

“But the funding must be maintained, it can't just be a one shot deal. A long period of underfunding has put us away behind the US and the recent funding from CFI has just begun to compensate for that period of underfunding.”

We found this point substantiated by the survey results which showed only 10.7% of respondents feeling that the level of their research funding was comparable to the best in the world and 26.1% saying that it was comparable to the best in Canada. 29.2 % responded that it was above average.

We were made aware through our survey that the NOF supported infrastructure is being fully utilized with only 12.4% of survey respondents saying that their equipment was under-utilized. In addition, 10.5% of respondents said that the demand for their infrastructure was oversubscribed (see Chapter 5). Researchers included comments in their survey returns indicating that a major limitation on use of equipment is the lack of funding for and availability of graduate students and technicians.

- What are the implications for institutions and researchers of continuing investment in infrastructure?

Such ongoing investment has implications for funding agencies, institutions, and researchers. A key consequence of the NOF has been to create increased demands for operating funds from the federal granting councils. The average NSERC grant is \$31,000 which is only 60% of what most researchers are seeking. Our survey results indicate, in the commentary provided by respondents, that a common reason for infrastructure to be underutilized (recalling that only 12.4% of respondents said this was the case) was insufficient operating funds to cover the costs of graduate students and technical personnel to work on the equipment. A further concern involves the critical issues of maintaining the new infrastructure and upgrading existing infrastructure, in spite of the fact that institutions agree to cover operating costs of the infrastructure for a minimum of five years, and that NOF infrastructure is eligible for upgrading through the Innovation Fund. A new CFI fund to help institutions contribute to the operating costs of new CFI-funded research installations will go some way to alleviating the former problem.

The implications of the NOF for institutions and researchers are positive. The CFI and the NOF more particularly are credited with “breathing new life” into university research. Some

university departments and institutes have undergone significant expansion as a result of their NOF awards, and research has been jump-started, not only the research of those with the award but the work of other researchers who have made use of the equipment. A comment from a major university in Quebec illustrates the point:

“Le programme a permis d’effectuer un rattrapage absolument nécessaire pour doter le département d’un parc d’équipement moderne correspondant aux normes internationales. Le Programme a répondu à un besoin fondamental car le centre était nettement sous équipé. La plupart des équipements acquis sont des instruments communs que tout laboratoire de R&D doit posséder et qui n’existaient pas auparavant.”

Another implication of CFI for the research community has been an increasing emphasis on interdisciplinarity and on collaboration. The survey results showed that NOF infrastructure has, to a large extent, supported researchers’ objectives in these two areas (26% responded “very much”, and 36% responded “considerably” in both cases).

A very important consequence of the CFI and the Canada Research Chairs program has been the requirement for institutional research plans. These plans are having a growing influence in determining the NOF applications forwarded by a university to CFI for approval. In general, how researchers have responded has been influenced by how the institutions have managed the NOF program. Many institutions have established central offices to assist researchers in preparing their applications. We have seen a shift in the focus of critical decision making on NOF applications towards the institutions as the research plans become more dominant in setting research directions for institutions. This has also resulted in more internal lobbying by researchers for their proposals.

4.2.2 Objectives Achievement

Issue: Is the NOF achieving its objectives?

- Were the objectives reasonable and realistic?

The NOF objectives are broadly seen as reasonable and realistic. The NOF has strengthened the ability of universities to attract and retain promising researchers and provide enhanced research training through the availability of state-of-the-art equipment. A frequent comment we heard, further demonstrated by the survey results, was that the NOF has improved the attractiveness of a research career in Canada.

A number of senior university administrators stated, however, that the NOF alone is not sufficient to bring the best researchers into the universities; research funding available as part of a start-up package, salary levels, and coverage of operating costs and upgrading of equipment are also important factors. In some instances, as a result of severe budget reductions over the past few years, universities have been unable to offer permanent positions to new researchers and these researchers have left despite the availability of well-equipped laboratories. The problem was stated this way to us:

“Dans l’avenir, un tel Programme ne sera plus aussi efficace, car il faut s’attaquer aux autres contraintes, essentiellement les budgets de fonctionnement et les salaires, pour devenir plus compétitif au plan du recrutement comme à celui de la performance de la recherche.”

It was, in large part, this issue that prompted the federal government to establish the Canada Research Chairs (CRC) program.

A concern we received on the CFI objectives was the benefit to Canada clause and the emphasis on research projects broadly contributing to economic and social development. Some researchers felt this was out of line with the fundamental nature of the research they were undertaking. We present evidence from our survey in Chapter 5, however, that shows that many researchers expect economic and social impacts to arise from their research at some point. The issue seems to stem from differences in perception of the time frame within which the results can be realized. We were informed that some universities, particularly the smaller ones, were dissuaded from applying for NOF awards because they felt their researchers would be unable to produce benefits in the short term.

In the case of the social sciences, we learned that, although the CFI has defined the benefit to Canada clause broadly, it has tended to be interpreted more narrowly as implying commercialization of research results. This was a factor in discouraging applications to the NOF. We understand that CFI staff has taken steps together with SSHRC to make the universities and the social sciences and humanities community more aware of the openness of the CFI to their applications.

- What progress has been made in achieving the NOF objectives?

The NOF is definitely considered to be achieving its objectives. At the institutional level, administrators stressed how integral the NOF program has become to their overall recruiting strategy and their ability to offer prospective candidates competitive start-up offers. In several instances cited in our case studies, the ability to put together a competitive start-up package involving NOF funds, provincial funds and the university’s internal money was the critical factor in bringing a high calibre person to the university.

Among the cases cited to us was that of the Samuel Lunenfeld Research Institute which was able to construct a world-class research facility in Bioinformatics and Proteomics through the hiring of an outstanding young researcher; also that of a departmental chair in an engineering faculty who effectively brought six new faculty together in a collective application that allowed them to create a state-of-the-art research facility and to form a major new research cluster within the faculty.

The evidence presented in this report shows that the NOF has changed the research culture at universities and enabled new faculty to move towards their full research potential. Researchers we interviewed said the NOF had allowed them to jump-start their research careers and perform at a level that they would not have anticipated being able to do until much later.

- Are there other objectives that are served by the NOF?

In its objective of attracting and retaining able researchers, the NOF is seen to be serving the broader objective of expanding Canada's research capacity. High quality students are being attracted into pursuing their postgraduate degrees in Canada as opposed to going to the US. The new infrastructure being installed is also generating increased collaboration across disciplinary boundaries and across institutions. This is illustrated by the following commentary:

“The program also helps to build collaboration among researchers. The university has one very expensive piece of equipment available to conduct this kind of research. There was none available in the city before the New Opportunities Fund enabled its purchase. A number of researchers come from different departments within the institution to use the machine. I have been able to talk to them about the kind of research they are doing and as a consequence have started to collaborate with them on joint research. This involves people across different campuses at the university and it helps to link people together more effectively in research.”

5. Evaluation Findings: Program Impacts and Delivery

5.1 Evaluation Issues

5.1.1 Program Impacts and Effects

Issue: What have been the impacts to date and what impacts are likely in the future related to the NOF's goal and objectives?

Innovation Capacity

- Has infrastructure led to improvements in Canadian research competitiveness and innovation capacity? How?

In addressing this issue, we have looked at a number of aspects of research competitiveness, namely the quality of research proposals, the role of the NOF in supporting career plans, training, and innovation. There was a universal feeling among researchers and administrators that the NOF grants have significantly improved the quality of the research infrastructure at universities and the competitiveness of the research being undertaken (see survey results presented later in this chapter). However, there was concern on the extent to which the NOF, and the Innovation Fund for that matter, had brought the current state of research infrastructure up to the necessary level to be truly competitive with the US and other major research nations.

Many researchers felt that they were, indeed, operating with world-class facilities and were competitive with their peers south of the border. This positive response was confirmed in the survey results that showed 32.5% of respondents considering their NOF infrastructure to be comparable to the best in the world, and 35.9% saying the infrastructure was comparable to the best in Canada. Others, however, felt that international research competitiveness was a moving target that Canada still falls short on. These researchers were concerned about their ongoing ability to obtain the necessary operating funds to support the staff in their laboratories and to maintain and upgrade their equipment. Some administrators were concerned with the need to

upgrade and replace existing equipment; they seemed unaware that NOF researchers were eligible to apply to the Innovation Fund for this purpose.

In general, the NOF is seen as having created a greater research capacity in the universities, especially among young faculty. This boost, in turn, is raising the level of research output and improving the quality of the applications going forward to the granting councils. In fact, CIHR is seeing “a ratings creep” in their assessments of the quality of proposals. In the operating grant competition, ratings increased from a median of 2.7 in 1987 to 3.6 in 2000. In 1992, about 48% of grants were rated 3.0 and above. By 2000, 75% were rated above 3.0, and 56% received a rating of 3.5 or above. CIHR believe that CFI investments in infrastructure are contributing to this steady improvement in quality.

Further substantiation of this is the fact that many new recruits to medical positions with an NOF award have received CIHR grants on their first attempt or equivalent funding from some other agency. Given that acceptance rates for CIHR grants are about 30%, this is an encouraging observation. The amounts requested from CIHR have also increased over time which again may be related to the CFI investments. In order to see what impact, if any, the NOF was having on NSERC awards, we compared the new investigators success rates and award levels to those of the new investigators who were holding NOF awards as well. The NOF researchers had a somewhat higher success rate and about a 20% higher award.

The question of whether the NOF has led to improvements in research competitiveness is difficult to assess in any absolute sense. Bibliometric analysis would indicate trends in the publication record of Canadian researchers but this information for NOF researchers is, unfortunately, not available to us at present. NSERC is currently conducting such an analysis for researchers supported by the Research Grants Program (many NOF recipients are included) and this database will be helpful to later evaluations of the NOF and the CFI more generally.

The survey, however, does provide a subjective assessment of competitiveness improvement. In answer to the question, “Is there increased research quality and productivity as a result of NOF investments?”, 48.9% of respondents said “very much”, and 40.6% said “considerably”. Further, respondents were very positive in indicating the level of recognition of their publications, enabled by NOF infrastructure, that were regarded by the department of the respondents: 53.5% of the publications were reported as “very well regarded”, and 37.9% as “well regarded”. Given that NOF researchers are at the early stages of their careers, these figures are impressive.

The Chair of an engineering department at a large university noted that the new facilities are also having an important effect on graduate student careers. The laboratories are enabling new professors to obtain top-of-the-line research equipment and have their graduate students work on very challenging problems.

“If the facilities are not there, you can't really test a problem, you end up skirting around it. The experience of working with this kind of equipment is making a big difference in how quickly students are snapped up by industry. They get a salary premium to go into industry on graduation.”

This commentary is supported by the survey results indicating that 48.6% saw considerable improvement in the career prospects of trainees and 45.5% saw some improvement (see tables below).

- Have investments in infrastructure changed the nature and kinds of research performed in Canada? How?

In terms of the impact of infrastructure on the nature of research, the NOF has encouraged collaboration which has had a positive benefit for researchers and for institutions. The survey data below show that 47.5% of respondents have collaborated within their department, 26.4% within their faculty, 19.3% within the university, and 12.6% and 8.6% with other domestic and foreign institutions respectively. About 10% have collaborated with industry.

In the case of health research, the stimulus to collaboration introduced by the NOF has been complementary to the objectives of CIHR in addressing health issues. CIHR supports a range of research categories – basic, clinical, health services, and determinants of health - and infrastructure plays an important role in advancing all four areas. In the last three categories, which do not require laboratory-based infrastructure, infrastructure in areas such as information databanks is required.

In the case of basic research, medical researchers are directing their efforts towards those lines of investigation that they think will prove most important. The point was made to us by a senior grants administrator that the best researchers are those who can anticipate where the next line of research is going to occur within their discipline or sub-area of the discipline. An example was the question of research directions when the current sequencing of the human genome is completed. We were told that a great virtue of the quality of the equipment possible through NOF is that it allows researchers to pursue unconventional ideas at the early and often highly creative stages of their research careers. A number of examples of this in a variety of fields are given in the case studies.

The NOF and the CFI more broadly have enabled universities to better focus their research efforts, creating major centres of excellence or nodes within the universities. This trend is influenced by the institutional research plans on which are based decisions on appointments to Canada Research Chairs and, increasingly, decisions on new researchers being hired under the NOF, often in the same areas as the Chairs. The impact of the NOF on the universities has been considerable in terms of upgrading infrastructure, the attraction and retention of researchers, training of graduate students, research collaboration and multidisciplinarity, and broader benefits to Canada. A quantitative summary of our findings on these impacts, drawn from the survey results, is provided in the following tables (the questions posed in the survey are given under the evaluation questions).

Infrastructure

- How does the infrastructure in your institution compare with the best facilities in the world?

Table 5-1: Comparison of NOF infrastructure with similar infrastructure around the world

Survey Question 17: How does the NOF infrastructure, acquired or planned to be acquired, compare to similar infrastructure of other laboratories around the world?

	Frequency	Percent	Valid Percent	Cumulative Percent
Best in the world	105	32.2	32.5	32.5
Best in Canada	116	35.6	35.9	68.4
Above average	68	20.9	21.1	89.5
Average	22	6.7	6.8	96.3
Other	12	3.7	3.7	100.0
Total	323	99.1	100.0	
Missing	3	.9		
Total	326	100.0		

Respondents were clearly pleased with the quality of the infrastructure supported by NOF, given that 89.5% said it was considered to be above average compared to similar infrastructure elsewhere in the world.

- Is the infrastructure being optimally used? If not, what are the barriers preventing the infrastructure from being used to its full potential?

Table 5-2: Utilization of the infrastructure

Survey Question 21: Which of the following best characterizes the utilization of the infrastructure?

	Frequency	Percent	Valid Percent	Cumulative Percent
Under-utilized	32	9.8	12.4	12.4
Utilized appropriately	199	61.0	77.1	89.5
Cannot satisfy demand	27	8.3	10.5	100.0
Total	258	79.1	100.0	
Missing	68	20.9		
Total	326	100.0		

We see from the survey results that the infrastructure is to a large degree being fully used with only a small percentage (12.4%) indicating that the infrastructure is underutilized. Some of the reasons given for this underutilization (survey question 22) are as follows:

- Infrastructure not yet operational or not yet integrated into a research program

- Insufficient funds to cover operating costs of the infrastructure or lack of technical personnel to operate and maintain infrastructure (in spite of assurances of the institutions that this would not occur)
- Lack of research personnel such as post doctoral fellows to work on the infrastructure

Many of the researchers we interviewed identified the issue of maintenance and renewal of their equipment as a key issue.

Attraction and Retention

- Has the infrastructure had an impact on the attraction and retention of researchers including university staff, post doctoral fellows, and graduate students, and, in particular, have researchers been attracted from the US and other countries?

Table 5-3: Location prior to accepting first faculty position (in Canada)

Survey Question 3: Where were you working/located prior to accepting your first faculty position in Canada?

	Frequency	Percent	Valid Percent	Cumulative Percent
Argentina	1	.3	.3	.3
Australia	2	.6	.6	.9
Belgium	1	.3	.3	1.2
Canada	189	58.0	58.9	60.1
Finland	1	.3	.3	60.4
France	2	.6	.6	61.1
Germany	8	2.5	2.5	63.6
Greece	1	.3	.3	63.9
Netherlands	2	.6	.6	64.5
New Zealand	1	.3	.3	64.8
Russian Federation	1	.3	.3	65.1
Spain	1	.3	.3	65.4
Sweden	1	.3	.3	65.7
Switzerland	4	1.2	1.2	67.0
UK	13	4.0	4.0	71.0
USA	93	28.5	29.0	100.0
Total	321	98.5	100.0	
Missing	5	1.5		
Total	326	100.0		

The majority of NOF recipients (58.9%) were located in Canada prior to accepting their first faculty appointment but the remainder (41.1%) were drawn from outside the country, 29.0% came from the US, 4.0% from the UK and 2.5% from Germany.

Table 5-4: Country in which last degree was received*Survey Question 5: Where did you receive that degree?*

	Frequency	Percent	Valid Percent	Cumulative Percent
Argentina	2	.6	.6	.6
Australia	1	.3	.3	.9
Canada	218	66.9	67.1	68.0
France	6	1.8	1.8	69.8
Germany	9	2.8	2.8	72.6
Greece	1	.3	.3	72.9
Netherlands	1	.3	.3	73.2
Russian Federation	4	1.2	1.2	74.5
Switzerland	3	.9	.9	75.4
UK	18	5.5	5.5	80.9
USA	46	14.1	14.2	95.1
India	5	1.5	1.5	96.6
P.R. China	2	.6	.6	97.2
Bulgaria	1	.3	.3	97.5
Japan	3	.9	.9	98.5
Poland	2	.6	.6	99.1
Hungary	1	.3	.3	99.4
Czech Republic	1	.3	.3	99.7
Denmark	1	.3	.3	100.0
Total	325	99.7	100.0	
Missing	1	.3		
Total	326	100.0		

We analyzed the above survey data on attraction to determine the background (location of PhD, and birthplace) of the NOF respondents who had moved from the US. The analysis showed that a significant number of NOF recipients (55 out of the 326 survey respondents) obtained their PhD degree in Canada, left Canada for the US, and were attracted back by the NOF. This data is given in Table 5-5 below.

Table 5-5: NOF researchers who moved from the United States

Degree Source	Birthplace	Count
PhD elsewhere*		8
	Born elsewhere	7
	Born in Canada	1
PhD in Canada		55
	Born elsewhere	12
	Born in Canada	43
PhD in US		30
	Born elsewhere	19
	Born in Canada	11
Total		93

* Not in Canada or the US.

Table 5-6: Attraction of new researchers and year of award cross tabulation

Survey Question 14: To what extent has the availability of the NOF infrastructure attracted you to your faculty position?

Award Year	1998	1999	2000	2001	Total
No effect	75%	54%	47%	35%	185
Minor factor	13%	22%	25%	35%	65
Major factor	13%	24%	28%	29%	68
Missing					8
Total	(26%)	(46%)	(53%)	(64%)	326

Table 5-7: Retention of new researchers and year of award cross tabulation

Survey Question 15: To what extent is the availability of the NOF infrastructure resulting in your staying, or your plans to stay, at your institution and/or in Canada?

Award Year	1998	1999	2000	2001	Total
No effect	21%	15%	8%	12%	47
Minor factor	36%	32%	34%	24%	108
Major factor	43%	53%	58%	65%	166
Missing					5
Total	(79%)	(85%)	(92%)	(89%)	326

In cross tabulating the survey results with the year of the NOF award (Tables 5-6, and 5-7 above), we found differences in the perceived role of the NOF in attraction and retention. The open competition in 1998 was for researchers who had taken up their first faculty position between July 1, 1995 and April 1, 1998. A large percentage (79%) of respondents in this

category said that the NOF was a factor in their staying at the institution and/or in Canada. Since 1999, the fund has been directed at ongoing new recruitment and for this group of researchers, the NOF was a factor in attracting them to the institution and/or to Canada, 46% of respondents who received awards in 1999, 53% with awards in 2000, and 64% with awards in 2001. For this same group, NOF was also a factor in their staying, 85% of respondents with awards in 1999, 92% with awards in 2000, and 89% with awards in 2001.

Training

- How much additional training has been made possible by having new infrastructure?

Table 5-8: Attraction of new and/or better quality trainees

Survey Question 16: To what extent is the availability of the NOF infrastructure attracting more and/or better quality trainees?

	Frequency	Percent	Valid Percent
No effect	16	4.9	5.0
Minor factor	92	28.2	28.7
Major factor	213	65.3	66.4
Total	321	98.5	100.0
Missing	5	1.5	
Total	326	100.0	

The NOF is a major factor (66.4%) in attracting more and better quality graduate students.

- Has infrastructure had an impact on the quality and nature of training for research and other careers?

Table 5-9: Level of improvement of the quality of training available to trainees

Survey Question 26: To what extent has the experience gained on the NOF infrastructure by trainees improved the quality of their training?

	Frequency	Percent	Valid Percent
No training	2	.6	.8
Little improvement	4	1.2	1.6
Some improvement	82	25.2	32.5
Considerable improvement	164	50.3	65.1
Total	252	77.3	100.0
Missing	74	22.7	
Total	326	100.0	

Almost all respondents (97.6%) viewed the NOF as having had a positive effect on the quality of student training.

Table 5-10: Level of improvement of the career prospects of trainees

Survey Question 25: To what extent has the experience gained on the NOF infrastructure by trainees improved their career prospects?

	Frequency	Percent	Valid Percent
No training	2	.6	.8
Little improvement	13	4.0	5.1
Some improvement	116	35.6	45.5
Considerable improvement	124	38.0	48.6
Total	255	78.2	100.0
Missing	71	21.8	
Total	326	100.0	

The preponderance of survey respondents (94.1%) believes that the opportunity to work with the NOF infrastructure has improved the career prospects of their graduate students.

Research Collaboration and Multidisciplinarity

- Has institutional sharing of infrastructure happened and, if so, has the sharing been implemented efficiently?

Table 5-11: Sharing of NOF infrastructure

Survey Question 23: Which of the following characterize the extent to which your NOF infrastructure is shared?

	Total Count	Number Responding	Valid Percent
Those on application	326	170	52.1
Within department	326	155	47.5
Within faculty	326	86	26.4
Within university	326	63	19.3
Within domestic institutions	326	41	12.6
Within foreign institutions	326	28	8.6
Within industry	326	34	10.4
Within government	326	16	4.9
Within not-for-profit sector	326	4	1.2
Within other	326	3	0.9

These results indicate that 52.1% of respondents have shared the NOF infrastructure only with their co-applicants, 47.5% have shared the infrastructure within their department, 26.4% within their faculty, and 19.3% broadly within their university. Relatively less sharing appears to take place with other institutions in Canada and abroad and with industry, government and non-profit organizations.

Table 5-12: Level of support of multidisciplinary research by NOF infrastructure

Survey Question 19: To what extent will/has the NOF infrastructure supported the following career and research objectives?

	Not an objective	Not at all	Somewhat	Considerably	Very much
Strengthened multidisciplinary research	1.9%	5.0%	31.3%	35.6%	26.3%

Over half the respondents (61.9%) said the NOF infrastructure had or would strengthen the multidisciplinary nature of their research.

Benefits to Canada

- What is the range and magnitude of socio-economic impacts that have occurred that are attributed to the infrastructure?

The feeling of many researchers through the interview and survey responses (see below) was that, in most cases, it was too early yet to be able to evaluate the full scope of the impact and benefits of the NOF related research. Much of the research is basic in nature, its high quality as evidenced earlier is a very positive benefit in itself, and potential economic and social benefits, including spin-off companies, will take longer to materialize. There are exceptions to this as noted in the case studies. An outstanding example is provided by a University of Toronto researcher who helped found a proteomics start-up that was recently acquired by MDS Proteomics. The researcher felt very strongly that his NOF grant had laid the basis for this spin-off development.

Table 5-13: Level of recognition of research making use of NOF infrastructure

Survey Question 30: Please select which on of the following statements best characterizes the research benefiting from the NOF infrastructure.

	Frequency	Percent	Valid Percent
Results not yet available	111	34.0	44.2
Recognized in specific field	62	19.0	24.7
Recognized in Canada	33	10.1	13.1
Recognized internationally	38	11.7	15.1
Recognized as pioneering research	7	2.1	2.8
Total	251	77.0	100.0
Missing	75	23.0	
Total	326	100.0	

The research arising from the NOF infrastructure is thought to have received international recognition by 15.1% of respondents. As a percentage of respondents whose work was sufficiently advanced to be recognized (that is excluding those whose results are not yet available – 100% for 2001 awards), this figure almost doubles providing further evidence of the quality of the NOF related research. Only a small number of researchers felt their research was pioneering. There is some variation in these percentages by year of award, as shown in Table 5-15.

Table 5-14: Level of recognition of research and year of award cross tabulation

	1998	1999	2000	2001	Total
Results not yet available	26%	39%	76%	100%	44%
Recognized in specific field	37%	15%	14%	0%	25%
Recognized in Canada	15%	20%	4%	0%	13%
Recognized internationally	17%	24%	6%	0%	15%
Recognized as pioneering research	5%	2%	0%	0%	3%

Table 5-15: Impacts time frame

Survey Question 31: Please indicate the anticipated time frame for achieving the impacts below that are expected from the research which has benefited, or is expected to benefit, from the NOF infrastructure.

	N/A	Less than one year	2-3 years	4-5 years	6-9 years	10 or more years
Intellectual property (IP)	42.4%	7.0%	19.2%	22.7%	4.8%	3.9%
Products	41.9%	6.1%	19.7%	18.3%	7.0%	7.0%
Spin-off companies	66.4%	0%	4.4%	12.7%	9.2%	7.3%
Jobs	36.2%	27.1%	19.2%	11.8%	3.9%	1.7%
Public policy improvements	79.0%	.9%	5.2%	8.3%	3.9%	2.6%
Health improvements	45.9%	3.1%	7.4%	14.8%	13.1%	15.7%
Environmental improvements	71.6%	1.7%	6.1%	10.9%	4.8%	4.8%
Social improvements	84.7%	3.9%	2.6%	2.6%	2.2%	3.9%

Of the 326 researchers who responded to the survey, 215 reported areas in which results are expected. No definitions of the areas beyond their titles were provided in the survey so there may be some variability in the assignment of impacts by respondents. It is evident from these results that more than half the respondents expect IP from their NOF related research, more than half expect health improvements, but a much smaller percentage (15.3%) expect social improvements. We analyzed these results further, together with data on the dates the NOF infrastructure became operational, to determine the estimated number of years for results to emerge. The estimated number of years from the operational date is reported below; on average, for the 215 projects, the infrastructure has been operational for 1.1 years.

Table 5-16: Expected results from NOF supported researchers

	IP	Products/ Services	Spin-off companies	Jobs	Improvements in			
					Public policy	Health	Environment	Social
Projects expecting results	124	127	72	135	46	115	63	32
% of projects (215)	58%	59%	33%	63%	21%	53%	29%	15%
Years to results	4.1	4.7	6.5	2.6	5.4	7.0	5.5	5.1

From this table, we see that, on average, IP results are expected in 2.7 years from the infrastructure being operational, spin-off companies in 4.5 years, and health improvements in 4.6 years. Jobs are expected to be created in less time (2.0 years); the jobs are in advance of companies being created so we assume respondents are referring to jobs in existing organizations including the researchers' laboratories or with collaborators.

Issue: What impacts have NOF investments had on institutions, partners, granting councils, and other agencies?

- What has been the effect of the NOF on institutional research planning activities and recruitment strategies?

The opinions on the effectiveness of a university's strategic research plan differ markedly between projects leaders and institutional authorities and across the universities we examined. Project leaders interviewed were often not aware of their university's research plan and some of them perceived such a plan to be an attempt by the university hierarchy to control research taking place in laboratories, "the effectiveness of research depends on a high level of motivation from those doing the research and cannot result from a top-down process". We also found though that more recent NOF researchers were more likely to be hired and to be doing research in accordance with the plan.

On the other hand, institutional authorities indicated that NOF has had a significant impact on research planning by facilitating, for instance, the amalgamation of research projects and the elimination of projects in disciplines where the university does not have the necessary critical expertise. One department also reported that the NOF has helped to build an equipment base in targeted areas, such as bioinformatics and medical imaging, to attract further investment from industry players, and to broaden the disciplinary and multidisciplinary research interests of the department. The role of the strategic research plan in departmental planning is illustrated in this excerpt from one of our case studies.

"In support of the university's research plan, the Department of Physiology and Biophysics has contributed to the preparation of a research plan for the faculty of medicine. This plan is expected to be available in the early part of 2003, and interviewees from the department report that it is attributable to the CFI that this plan is being put in place. Also worthy of mention is the decision of the university to include "integration of research" as one of seven features in a new curriculum template at the undergraduate level, emphasizing the importance of multidisciplinary training, and of direct relevance to the objectives of the CFI."

In a medium sized university with a "top-down" approach, an internal prescreening step for CFI applications, including the NOF, has been introduced. Factors considered include the issue of infrastructure operating costs that would be incurred if the project were approved. These costs are playing a role in determining which proposals are pre-selected, those with lower operating costs and consequently a greater likelihood of doing excellent research given limited resources, all other things being equal, having a better chance of passing the prescreening. These considerations would be expected given the commitment institutions have to take care of the operating costs for NOF infrastructure. Also, with fixed budgets available for matching funds

from the institution and the provincial government, those applications with greater support from other sources are also more likely to be received favourably.

There are, not unexpectedly, differences of view on the selection of appropriate research priorities within an institution. As one researcher, again from a medium sized university stated: “In spite of the research plan, everyone has an agenda. The higher-ups each have one, the deans each have one, the department heads each have one, and the researchers each have one.” While it is unclear to what extent institutional research plans consolidate these agenda, some we interviewed felt that lobbying for NOF applications is a common occurrence and has resulted in favouring those who are more prone to promoting their project. This is to be anticipated given the central role of institutions in the CFI’s program design and application process.

Many endorsements were received on the key role played by the NOF in the recruitment strategies of universities. A frequently expressed view was that without the NOF, universities would not be able to put together competitive offers to attract outstanding international candidates. The point was also made, as noted earlier, that Canadian universities still face a considerable challenge when seeking to attract faculty from the US, given the start-up packages that are offered there. We were also informed that, at least for one major university, the strategic research plan has become an important factor in university-wide hiring priorities and has been exerting more influence on NOF selections by the university.

While the NOF has enabled recruitment, the lack of permanent positions in some universities, particularly in Faculties of Medicine and affiliated hospitals, has worked against retaining these researchers. The Tier II Canada Research Chairs program is now helping to fill that gap.

- Has the infrastructure led to increased partnerships, collaborations or linkages with the private sector? With other sectors?

We found instances of partnerships being developed by NOF supported researchers with the private sector but also received many cautionary words that much of the research being conducted with NOF infrastructure was of a long-term fundamental nature and linkages with industry were unlikely. Nevertheless, some 20% of NOF recipients are receiving research funding from industry (see table below). Examples of NOF researchers who did form partnerships are given in the case studies and include the establishment of important relationships with leading pharmaceutical companies and to high-profile work for the National Cancer Institute and the BC Ministry of Health.

“For a relatively modest investment in computing equipment and support material, group has been able to carry out a number of far-reaching studies on the factors associated with young smokers developing into regular smokers. This has led to several grants and ongoing proposals, some high-profile work for the National Cancer Institute and recently to the award from the BC Ministry of Health of funding to develop a Tobacco Research Unit for the province. This activity alone is being funded at the level of \$350,000 a year and support from NCIC, BCHRF, BCMSF, SSHRC, BC & Yukon Heart and Stroke Foundation, Canadian Cancer Society and the Cancer Centre for the Southern Interior has brought their funding to over \$600,000, excellent for a non lab-based group.”

In other cases, collaboration with industry has been more difficult because of lack of interest by industry.

“In project proposal there are three avenues of planned toxicity research: 1) environmental contaminants; 2) nutraceuticals; and 3) agricultural biotechnology products. In the first area, activity is proceeding as planned, with support from industry and other partners resulting in work related to oil sands, pesticides and heavy metals. In the other two areas, has been surprised by the relatively low level of interest of the biotechnology and related firms. It was reported that European countries have taken a much more proactive approach to assessing potential toxicity of such substances as genetically modified foods and alternative medicines. Until such time as this becomes a higher priority area in Canada, collaborative research with affected companies will not be continuing at the level anticipated by the researchers.”

The survey showed the range of funding sources, private and other sectors, being accessed by NOF supported researchers.

Table 5-17: Funding sources being accessed by NOF supported researchers

Survey Question 28: To which of the following organizations have you submitted funding proposals and from which have you received funding for research that is enabled by the NOF infrastructure?

	Not of interest		Plan to apply		Applied Unsuccessfully		Applied Successfully	
	Count	%	Count	%	Count	%	Count	%
SSHRC	113	92.6%	3	2.5%	1	.8%	5	4.1%
NSERC	17	8.0%	39	18.3%	10	4.7%	147	69.0%
CIHR	36	21.6%	34	20.4%	15	9.0%	82	49.1%
Federal	25	19.4%	23	17.8%	5	3.9%	76	58.9%
Provincial	7	3.8%	19	10.3%	11	5.9%	148	80.0%
Industry	24	18.0%	35	26.3%	5	3.8%	69	51.9%
Not-for-profit	34	31.5%	13	12.0%	3	2.8%	58	53.7%
Your institution	13	7.3%	6	3.4%	2	1.1%	156	88.1%
Domestic institutions	42	62.7%	10	14.9%	1	1.5%	14	20.9%
International public	30	34.9%	24	27.9%	5	5.8%	27	31.4%
International private	33	38.8%	18	21.2%	4	4.7%	30	35.3%

- Have investments in research infrastructure led to increased needs in research funding?

The responses from interviewees in the granting councils indicate that the NOF is placing increased demands on council funding. The general view is that “each research investment drives the need for other investments”. The hiring of more new faculty through the NOF with a

strong propensity for research will create pressure for more research operating funds; this is particularly so if the infrastructure allows researchers to do research not done before. CIHR say that, in fact, grant requests have been increasing over time which they see as being related to CFI investments (both NOF and Innovation Fund). The amounts awarded have also increased but, because of budget hikes for CIHR, the acceptance rate has remained constant (30%). The Canada Research Chairs is another example of an initiative that will have a consequent impact on demand for further investment in infrastructure and operating funds.

“A positive aspect of the current situation is that the leverage drives the wheel of research activity. The present lack of balance is being used creatively to seek increased funding.”

The councils believe that funding to upgrade or replace facilities financed by CFI will be needed and, in the case of NSERC, funding for equipment or “tools and instruments” is being included in the agency’s budget submissions. For SSHRC, it is not known whether NOF has created new demands. SSHRC reports that the number of new applicants to SSHRC has gone up by 30% in the last three years and 16% this year but the linkage to NOF is slight given the few NOF applications from the social sciences. The linkage to CFI awards more broadly may be there but has not been established.

- At the institutional level, are institutions able to take advantage, in a synergistic way, of the federal programs covering infrastructure, operating and research costs in support of institutional research plans?

The need for multiple and different research applications is a source of contention because it places a major burden on the community of researchers and reviewers. “There is a need to rationalize the process.” There is a wide-spread desire among NOF researchers for a greater standardization and integration of application procedures among the various granting agencies in Ottawa.

A number of researchers as well as some administrators also expressed concern about the lack of fit between infrastructure and research operating support. It was felt that this is particularly the case for NOF where better linkages could be made between infrastructure support through CFI, and research support through the granting councils to create “one-stop shopping”. This would mean that new investigators would be provided a package that included faculty position, infrastructure, and research operating grants. The CRC program provides this packaging of support but there is interest in seeing the linkage made more generally.

5.1.2 *Program Design, Management and Delivery*

Issue: Is the NOF program well-designed and well-delivered?

- Is the design of the NOF program appropriate?

The program design factors⁴ were generally considered appropriate given the objectives of the NOF. Administrators like the allocation design as opposed to open competition as it has allowed them to plan for recruitment with a known amount of funding over several years. Concern was raised by two smaller institutions included in our case studies about the approach to setting the allocations to universities. The CFI distribution of funds in accordance with levels of sponsored research was viewed as discriminating against smaller institutions and further unbalancing research capacities across the country. This was resulting “in the big universities getting richer and the smaller ones getting poorer”. Providing start-up packages of infrastructure and research support was suggested as a means of helping to alleviate this trend.

We were exposed to some criticisms by the university community that the NOF selection criteria gave insufficient emphasis to scientific excellence. At the same time, we heard contrary views to the effect that scientific excellence is only one of the criteria to be concerned about especially with new investigators. To these administrators, the emphasis given by CFI to the quality of the academic record and research potential, in reviewing new investigator proposals, was preferable to the peer review processes of the granting councils which may be biased in favour of experienced researchers who had had an opportunity to develop a publication record.

The reservation about the NOF design most frequently mentioned related to the requirement for matching funding. The issues on matching funding are covered below. A further concern was the capacity of institutions to cover the operating costs that the institutions are committed to providing in applying for NOF awards. It is expected that the new operating fund established by CFI will assist them in supplying adequate levels of operational support.

⁴ NOF program design factors include:

- 1) Funding of up to 40% of project budgets for eligible infrastructure costs is available;
- 2) Eligible applicants are taking up their first full-time academic position in a Canadian degree granting institution. Candidates either:
 - a. have yet to be recruited;
 - b. have been recruited but have not yet taken up their positions; or
 - c. have taken up their positions 18 months or less before the application date.
- 3) Projects may involve more than one new researcher, through:
 - a. a group or team of researchers with complementary skills and expertise; or
 - b. researchers that share infrastructure or work in related fields of research.
- 4) Teaching hospitals and affiliated institutes may apply through the university through which they are associated; and
- 5) Applications are assessed against the following criteria:
 - a. Quality of the research and the need for the infrastructure;
 - b. Contribution to strengthening the capacity for innovation; and
 - c. Potential benefits of the research to Canada.
- 6) Two rounds of funding were offered. The first was an open competition, the second allocated a budget to each institution proportional to the amount of sponsored research funding each received.
- 7) Institutions are required to cover operating costs of the infrastructure for a minimum of 5 years.

A senior administrator raised with us difficulties institutions have in including social scientists in their applications to the NOF, some of which relate to program design. For example the outside limit of 18 months at a university to qualify is seen as too short a time for a social scientist to develop a research project and prepare a proposal. Other concerns in the SS&H community which are outside CFI's mandate were that heavy teaching commitments can limit time for research; research support is not at the same level for social sciences; and that a lack of experience and, therefore, a lack of institutional advice exists on how to make successful applications.

- Is the service delivery of the NOF program of high quality?

Interviewees at the institutional level praised the CFI secretariat services, considering them to be excellent and a model to be adopted by other government programs. In fact, only 5.3% of respondents from the 2000 and 2001 NOF award years said the NOF application and selection processes needed improvement. Project leaders normally had little direct contact with the CFI. The "regional desk system" was particularly appreciated because it established a personalized and stable relationship with CFI. We heard that CFI quickly answered questions, listened to problems, took prompt follow-up actions, and really tried to find solutions. Some concerns were raised about the lack of direct contact of researchers with CFI staff but, given that the institutions are the applicants to the NOF program, this was not an unexpected reaction.

The application system to CFI appears to work well. Most large and medium sized universities have created a central coordinating office responsible for preparing the NOF proposals. Some adverse comment on the application side was directed at the complexity of the application process and how this was discouraging some researchers at smaller institutions from accepting to be nominated. Several such researchers estimated that at least 20 days effort was needed to mount an NOF project, particularly to access matching funding. Another concern of these researchers with the application form was the apparent relative weight placed on socio-economic impact as opposed to the scientific value of projects. The need for having a central coordinating office at smaller institutions became apparent.

- What have been the implications, at the program delivery level, of the cost-shared approach on infrastructure investments?

Many issues were raised with us on the question of the cost sharing approach. For those universities whose provincial governments have established dedicated funds to match CFI awards, few problems were encountered. Ontario's Research and Development Challenge Fund and Ontario Innovation Trust, the Heritage Funds for health, natural sciences and engineering, and social sciences (forecast) in Alberta, and the Innovation and Science Fund in Saskatchewan were specifically cited in our case studies as working well. Some administrators pointed out the need for better public recognition of provincial contributions to the program and the desirability for CFI and the institutions to undertake joint publicity with the provinces.

Universities in all provinces experienced delays, of varying lengths, in their infrastructure becoming operational following project approval for a number of reasons including space availability, changes in suppliers, technical upgrades in equipment, and changing exchange rates.

Table 5-18: Average delay between project approval and infrastructure becoming operational. Based on projects approved in 1998 that provided this information.

Province	Average Delay (Years)	Number of Projects
Alberta	1.4	18
British Columbia	1.1	12
Manitoba	0.7	2
Newfoundland	0.5	2
Nova Scotia	2.9	1
Ontario	0.9	43
Québec	1.3	28
Saskatchewan	2.2	1
National Average	1.1	107

It was argued that the matching fund approach was presenting severe problems for smaller universities with limited resourcing potential and became quite a challenge in certain disciplines where industry partnership is often not a realistic option (e.g., ecology). The Atlantic Canada Opportunities Agency has recently launched the \$300 million Atlantic Innovation Fund (AIF) to support economic development and also to be a source of matching funds for universities applying to the CFI in the Atlantic region. While a welcome initiative, it was reported to us that the AIF has been the subject of considerable concern to institutions in the region. Senior representatives from Atlantic institutions are in discussions to attempt to make the selection criteria for the AIF⁵, whose focus is on economic development and commercialization objectives, more compatible with those of the CFI. This issue is particularly relevant to the NOF due to the lower level of experience of the researchers in working with industry and the frequent absence of industrial relevance in their applications.

Interviewees in general support the cost-shared approach but would prefer that it be adaptable to the capacity of institutions to access the matching share. Our analysis of matching funding data developed through the CFI financial reporting system showed a wide variation across the country in the share of non-CFI funding supplied by other sources.

⁵ Terms and Conditions: Atlantic Innovation Fund Program, Atlantic Opportunities Agency (www.acoa.ca)

6. *Conclusions*

6.1 *Introduction*

This Chapter summarizes the conclusions we reached in this study on the evaluation issues. They reflect the results presented in the previous chapters of our interviews, case studies and survey of the recipients of NOF funding.

6.2 *Evaluation Issues*

6.2.1 *Program Relevance*

Issue: Is there a continuing need to invest in research infrastructure to recruit exceptional academic staff at the earlier stages of their career?

The NOF program has been a timely initiative that has enabled universities to hire some outstanding new researchers and has given those investigators an opportunity to accelerate their careers through access to state-of-the-art equipment and other facilities. The NOF has been an even more significant factor in allowing universities to retain these top researchers. The demand for NOF funding is increasing as universities step up recruitment to replace the current high spate of retirements and university administrators are having to turn down more applications within their institutions. There is a need to continue infrastructure investments if Canada is to be able to attract the new talent and upgrade the scientific equipment needed to maintain and improve its research competitiveness.

6.2.2 *Objectives Achievement*

Issue: Is the NOF achieving its objectives?

The objectives of the NOF are, through the provision of research infrastructure, to attract and retain able researchers in their first full time academic appointments, and to train researchers and other highly qualified individuals who will embark on research and other careers. Thereby researchers are enabled to move towards their full potential. The evidence demonstrates that these objectives are reasonable and realistic and are being reached. In the first rounds of the

NOF competition, awards tended to be made to researchers already in the Canadian university system but this is no longer the case, new talent is being attracted to Canadian institutions because of the NOF. The NOF is also credited with playing an important role in keeping a majority of the researchers we surveyed at their institutions and/or in Canada.

It is also clear, however, that the availability of advanced equipment is not a sufficient condition to attract and retain new researchers over the longer term. Several other factors, notably salary levels and research budgets, heavily impact on the objectives pursued by NOF. The low level of operating funds for research, including budgets for equipment operations and maintenance, weakens the capability of universities, in particular smaller universities, to increase the number of postgraduate and postdoctoral students, and to recruit and, thereafter, retain exceptional researchers.

6.2.3 Program Impacts and Effects

Issue: What have been the impacts to date and what impacts are likely in the future related to the NOF's goal and objectives?

The NOF has contributed to the success of institutions in attracting new researchers into university positions with some 30% of these being drawn from positions in the US. In terms of training, the availability of the NOF infrastructure has been instrumental in attracting more and better qualified students. Furthermore, the quality of training and the career prospects of the trainees have been substantially improved. Other impacts of the NOF that we have observed have been a considerable sharing of NOF infrastructure mainly within the institution where the equipment is located but also with individuals and groups in other organizations in Canada and abroad. The presence of the new equipment and its sharing has led to the development of collaborative teams at institutions, and improved linkages with outstanding researchers in Canada and internationally.

The evidence from our interviews and the survey and the steady rise reported to us by the granting councils in the quality of research proposals coming from new investigators indicate that research performance is being enhanced by the NOF. Without the benefit of a bibliometric analysis of Canadian research publications, we were not, however, able to fully answer the question whether the NOF had brought about improvements in research competitiveness and innovation capacity. Our survey provided a subjective assessment by researchers indicating that research quality and productivity have increased as a result of NOF investments. This positive picture is also reflected in the high level of recognition accorded to the publications flowing from this research. Subsequent evaluations of the NOF may be able to draw on bibliometric analyses being sponsored by NSERC.

Innovation capacity in the country is being improved through the higher quality of research training resulting from the NOF investments and the number of linkages being formed by researchers with the private sector, other institutions and government research. About 20% of NOF researchers have received funding from industry for their research.

Of the 326 researchers that responded to the survey, 215 reported socio-economic impact areas in which results are expected. More than half the respondents expect IP from their NOF related research, more than half expect health improvements, but a much smaller percentage (15.3%) expect social improvements. On average, IP results are expected in 2.7 years from the infrastructure being operational, spin-off companies in 4.5 years, and health improvements in 4.6 years. In terms of academic achievement, a majority of NOF recipients feel their research is being recognized in Canada and internationally.

Issue: What impacts have NOF investments had on institutions, partners, granting councils, and other agencies?

Research plans are becoming more influential in determining priorities within an institution for NOF support. The NOF has had a significant impact on the research planning of institutions by facilitating, for instance, the amalgamation of research projects and the elimination of projects in disciplines where the university does not have the necessary critical expertise. The impact of the NOF on collaborations at the institutional, regional, national and international levels have been significant. Partnerships with industry are being formed but much of the research being conducted with NOF infrastructure is considered by the researchers to be long term and the researchers currently have little active industrial collaboration.

The NOF has created increased demands on NSERC and CIHR for research funding and at the same time increased the quality of applications. The number of research applications to SSHRC has been going up but the influence of NOF is slight because few NOF awards have been applied for in the social sciences.

6.2.4 Program Design, Management and Delivery

Issue: Is the NOF program well-designed and well-delivered?

Program Design

The NOF program is well designed and is seen by many university administrators as a model program. The cost-sharing arrangements for the program encourage good management and accountability from the universities and ensure that the selected infrastructure corresponds to real requirements. Institutions have been successful to date in securing matching funding for the NOF awards but concerns were expressed, however, about their continuing capacity to obtain the necessary shared support from provincial, private sector and internal sources. Smaller universities have particular worries in this regard.

We conclude that while the level of funding available through NOF is allowing new researchers to have access to research infrastructure that is competitive with the best in the world, continuing investment is required. Increasing demands through plans for accelerated hiring at universities will place more pressure on the NOF program. We also conclude that achievement of the goal of the NOF to attract outstanding researchers would be enhanced by a better integration of research support programs of the federal granting councils with the NOF to create competitive start-up packages in addition to those offered through the CRC program.

Program Management and Delivery

The NOF program has been well managed (a 95% approval rating by respondents for the 2000 and 2001 award years). However, some aspects of the application, administrative and reporting processes could continue to be improved. In general, researchers see the potential for their research to produce long-term socioeconomic benefits to Canada in keeping with NOF objectives, but both the application form and the reporting requirements appear to be biased against projects conducting basic research where benefits will tend to be longer term. The delays in the implementation of NOF projects (on average 1.1 years) need attention. These are not due to the CFI but to administrative processes at institutions and to installing the infrastructure and are affecting the competitive advantage of the institutions.

The institutional research plans are beginning to exert an influence on project selection at the institutional level and on ensuring NOF hiring supports the research agenda of the institution. Coordination of research plans on a regional and even a national basis could assist institutions in supporting multi-institutional projects and, more broadly, the innovation agenda of the federal government.

A major concern of university administrators and researchers is the lack of fit between the CFI infrastructure grants and the complementary equipment maintenance and operating funds required to ensure that the equipment is used to optimal advantage. The new Infrastructure Operating Fund will assist in correcting this problem in the future.

In order that universities can better report on impacts of the NOF in future, they need clearer guidance on what factors to track. Institutions might consider using as performance indicators the outcome factors in the revised progress reports included as part of the CFI Evaluation Framework, and integrating these into their institutional research plans. Developments arising out of the NOF and other CFI investments could then be followed on an ongoing basis by the institutions and be reported to the CFI as required.

The NOF was created in 1998. For institutions to benefit from the experience of managing and delivering the NOF since then, we conclude that the sharing of “best practices” among the institutions would improve the overall management of NOF resources.