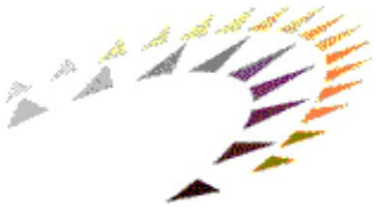
Brief to the

House of Commons

Standing Committee on Finance



Canada Foundation for Innovation

- Going for the Gold -
The Changing Research Scene

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President and CEO

May 28, 2002

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1. How was the CFI established?

- Created by an Act of Parliament in 1997.
- Established with a 2002 termination date.
- Initial Awards in 1998.
- Extended to 2005 and then to 2010 with some parliamentary amendments.
- Because of the limited life span, renewal and time extension only take place by government decision, and if the CFI is serving a need and serving it well.
- Having an explicit commitment for several years has allowed the institutions to conduct responsible planning.
- the CFI operates under the terms of a formal funding agreement.
- the CFI was established as an independent, non-governmental organization with a Board of Directors.
- In turn, the Board of Directors reports to the members (equivalent to shareholders) at the annual meeting and to the public through a public meeting.

2. Who are the CFI clients?

- The CFI clients are not-for-profit, non-government, research performing institutions.
- We make contributions to their research projects.
- We support equipment and facilities for research as one important element of Canada's commitment to become a knowledge-based economy and society.
- Maximum CFI contribution is 40%.
- 60% must be raised by the institutions themselves.
- the CFI clients are being empowered to take advantage of growth and replacement opportunities and to develop partnerships with industry, voluntary sector, federal, provincial and municipal governments, and internationally.
- There is no political influence in the selection of awardees, decisions are based on merit alone.
- the CFI is among the first agencies to recognize the research role of colleges.

3. What funding has the CFI received?

- To date the CFI has been awarded $3.15 billion by the federal government.
- Unexpended funds bear interest so the final total will be considerably more.
- This will leverage a total investment approaching $10B.

4. What are the CFI programs?

- All the CFI programs are competitions, based on merit.
- New Opportunities
  - These awards are to provide research tools to first-time university faculty appointments.
  - To date we have awarded $136.1M at 51 institutions to more than 1200 newly recruited faculty.
- Innovation Fund
  - These awards support needed research equipment and facilities.
  - To date we have awarded $1.37B to 110 institutions for 743 projects (this includes earlier funds earmarked for smaller institutions and colleges).
- Infrastructure Operating Funds
  - These funds ($400M) contribute to the operation of the facilities for projects funded under the New Opportunities Fund and the Innovation Fund.
  - We have funds to cover only the period 2001-2004/5.
- Canada Research Chairs
  - We make equipment available to the institutions that hire these researchers.
  - Funds ($250M) are available to cover the initial appointments to the chairs, we do not have funds to cover ongoing replacement appointments beyond 2005.
- International Funds
  - The CFI is completing the review of proposals to ensure that Canadian institutions can partner with the best from around the world. These are designed to link the best with the best.
  - The funds ($200M) are for a single competition ending in June 2002.

5. How have the CFI's institutional clients decided what to compete for?

- Each institution must develop its own research plan.
- The plan may be updated at intervals of their choosing.
- The plan is approved by their institutional governance structure.
- The plans are posted on the CFI web site.

- The plans demonstrate how they propose to build on their excellence or how they plan that the proposed investment will allow them to achieve excellence (i.e. capacity for excellence).

6. Have the CFI's clients been able to raise matching funds?

- To date, no project has failed for lack of matching funds.
- Since this is not a federal government run program, and decisions are based only on merit, institutions have largely been successful in convincing provincial governments to match their own priorities, dollar for dollar.
- Several provinces have created matching fund envelopes, in some cases, creating similar foundations.
- The remaining funds largely come from their private sector or voluntary sector partners.
- Institutions have been empowered in furthering Canada's research agenda and in many cases have raised substantial research funds far beyond those required for matching.

7. What is the CFI selection process?

- The CFI relies heavily on expert review processes and multi-disciplinary panels.
- Panel members and reviewers come from public institutions, governments and the private sector.
- The reviewers are selected from all parts of Canada and beyond.
- The CFI has an objective that 30% of the reviewers will come from outside Canada.
- We have used several thousand volunteer reviewers to date.
- Using many reviewers reduces the chance that any one person can influence the decision to a negligible level.
- The integrity of the selection process is key to the CFI's considerable success.
- This integrity is based upon the fact that there is neither political nor regional influence on the selection.
- The selection criteria are well established and widely available to institutions and their researchers.
- There is evidence from U.S. studies that merit-based selection leads to higher levels of excellence than politically based selection.
- Do we have an appeals process - no, but we do review requests where there may have been an administrative error.
- We have selected 1975 projects to date for a total of $1.75 billion (CFI share).

8. What is the distribution of the CFI awards in dollars and numbers?

- Attachment 1 shows the distribution of population, granting council awards, Canada Research Chairs, the CFI dollars and number of the CFI awards by province.
- This chart shows that there is excellence in all parts of the country.
- Attachment 2 shows the distribution of the CFI awards by institution.
- Institutions, large and small, colleges (recognized for research for the first time by the CFI) show peaks of excellence.
- Success rates are quite similar for all categories of institutions.
- Attachment 3 shows the distribution by type of recipient institution.

9. What have the client institutions been able to achieve with the CFI assistance?

- We receive annual reports from each institution and from each project.
- These reports are summarized by an independent consultant and her report is attached (# 4) and will be published on the web.
- The institutional reports are also published on the web.
- With few exception, they document significant improvement in their ability to perform leading edge research:
  - they are attracting and retaining better faculty;
  - the faculty are frequently able to perform at international level;
  - they are competing successfully for significantly increased levels of research funding;
  - graduate students are being recruited to come to Canada or to stay here;
  - much of the new research involves partners from other institutions, from the private sector, from government agencies, from volunteer associations and internationally;
  - many networks and consortia are being established;
  - patenting, licensing and spin-off company creation are increasing substantially;
  - most of all, through the CFI together with the Canada Research Chairs and the start of support for indirect costs, there is substantial improvement to the morale of researchers and the level and quality of research being carried out;
  - the CFI has had a remarkable impact on establishing Canada's new research agenda in the context of benefits to Canada and Canadians;
  - this program has hit a profound nerve of need and has empowered the institutions and their researchers to go for the gold in the international race.

- In addition to the research infrastructure, there has been significant job creation in all parts of the country both in construction and in the development and operation of the tools.
- Because the client institutions are situated in communities, large and small, and in all parts of Canada, this support has contributed strongly to community economic development plans (several municipalities are funding partners).
- Institutions have developed research plans - many for the first time - that has them setting priorities for recruiting, fund raising and facilities - in this context, they are deciding what they will do, but also what they will not, and prescreening project proposals.

10. What is the role of the CFI client institutions in commercialization and in clusters development?

- The universities, hospitals and colleges are extremely effective in commercialization and are fully competitive with their U.S. counterparts according to most indicators, i.e. commercialization productivity is high.
- The University of Sherbrooke has by far the highest licensing income/research dollar of any institution in North America.
- The attached table (# 5) from a larger report demonstrates this.
- Most institutions are deeply engaged in commercialization activities, some more recently than others.
- It appears that an overall national strategy will not be needed, since there are already significant incentives for the institutions. Unlike the case in the U.S., before the Bayh-Dole Act, the government funder held the patents.
- A recent study concludes that success in commercialization is directly related to institutional aggressiveness.
- Institutions across Canada have a variety of intellectual property policies but in most cases these are in place, or are being developed to maximize the return to the institutions.
- Canadian universities create twice as many spin-off companies per research investment as their American counterparts, but somewhat less licensing income per research dollar.
- These results are probably best explained by a lesser receptor capacity in Canada.
- There are many clusters, large and small, (even micro clusters) already in existence or developing in Canada.
- Key to all successful clusters is the presence of an excellent post secondary institution(s) performing outstanding research.
- The research must be of such a standard of excellence that the private sector cannot afford not to be present.

- Clusters are local phenomena and the CFI client institutions, which are in the communities, are best placed to work with their local, municipal or regional government. There are already many examples of clusters in Canada, some documented in the progress reports/research plans/proposals.
- The best clusters grow spontaneously, says a recent study.

11. Does the CFI need to identify discipline priorities?

- It is instructive to review the approximately 100 institutional research plans. These plans cover the topics that are of significant interest to Canada and for which there is sufficient depth of excellence for Canada to be competitive internationally.
- The attached table (# 6) shows the priority topics identified by a very extensive consultation within the EU in preparation for the 6th framework. All of these topics are included in the institutional research plans.
- A review of the CFI progress reports demonstrates that the CFI has made substantial investments in each of these fields.
- There are centres and facilities for:
  - nanotechnology and materials;
  - genomics, bioinformatics and proteomics;
  - water and water quality;
  - high performance computing and the new grid technology;
  - aeronautics and space;
  - social science and humanities;
  - information and communication technology;
  - Canada wide digital library network;
  - food and agriculture.
- A series of thematic reports is being prepared that demonstrates that the institutions themselves have chosen to compete in the key fields.
- They are increasingly taking the initiative to form consortia among institutions, with the private sector and with government laboratories.
- Increasingly, the CFI clients' plans reflect these partnerships and demonstrate that they are planning with others to meet Canada's needs and their common objectives.

12. How do we monitor the impact of the CFI, document the outcomes and demonstrate value for money?

- the CFI requires and publishes client institutions' research plans.
- the CFI requires annual progress reports on each project.

- the CFI commissions an analysis of these reports, publishes it and submits it to the Minister of Industry.
- the CFI conducts third party triennial reviews under the aegis of the Royal Society of Canada and submits these to the Minister:
  - the first of these was in 2001 and is on our web site.
- the CFI conducts third party evaluations of its various programs triennially and publishes them as well as submitting them to the Minister.
  - New Opportunities in 2001
  - Innovation Fund (and URDF & CRDF) in 2002
- Timetables for these activities have been published (see attachment 7) and an annual review and evaluation report on this is made to the Minister.
- the CFI itself is fully audited by a private sector firm.
- the CFI publishes an annual report - tabled in parliament by the Minister of Industry. This report incorporates the formal audit of the CFI itself, by an independent firm of auditors appointed by the members.
- the CFI has initiated a series of contribution audits at our client institutions. It should be noted that these institutions are themselves subject to their own audits.
- the CFI conducts surveys of panel members and reviewers always seeking ways to improve our processes.
- All Board, staff, reviewers and panel members are required to sign a no-conflict-of-interest statement.
- the CFI reports regularly to the media. The coverage of the CFI is widespread and almost uniformly positive.
- the CFI operates in an open and transparent manner and stands ready to brief parliamentarians and parliamentary committees (12 to date including this one).
- the CFI is cognizant of the trust placed in it and accepts this with profound humility and a deep sense of responsibility to spend taxpayers' money wisely in part by requiring the institutions to report on their achievements to the people of Canada.

The recent report on the New Opportunities Fund commented explicitly and positively on:

- increasing the quality of research and research productivity
- attracting and retaining excellent faculty members
- transforming research
- fostering the development of partnerships with the provinces and others
- encouraging research planning
- generating enthusiasm in the research community
- attracting students and providing them with better training

- encouraging collaboration and multidisciplinary approaches
- generating concrete social, economic, health and environmental benefits
- increasing research funding

13. Have new governance models emerged?

- The CFI itself is a remarkable new model of governance that is highly regarded across Canada and is being emulated in a number of jurisdictions.
- There are many examples of new governance approaches.

Pan-Canadian Institutions include:

- High Performance Computing - C3Ca Associates, a consortium of institutional members
- Digital Library - managed by the University of Ottawa on behalf of 64 universities
- Research Data Centres - 6 regional centres managed and coordinated by the University of Montreal with assistance from StatsCan
- Canadian Century History Research Project - managed by the University of Ottawa with several nodes across the country
- Canadian Light Source - managed by the University of Saskatchewan and attracting institutional and provincial partners
- WestGrid - a consortium of western universities, hospitals, colleges and the Banff School of Fine Arts
- Several private sector groups (e.g. aerospace) are forming or have formed consortia with client institutions

14. Are there concerns and complaints about the CFI?

- The overall story of the CFI is one of satisfied and enthusiastic clients.
- With an overall success rate of 50% in the innovation fund competition, there are individual researchers or teams of researchers that are disappointed. This is much less true at the institutional level.
- Small universities often feel they are not getting their “fair” share. We have no criterion related to shares, but overall the success rate in the innovation fund of the small universities is as high as that of the large institutions. Their competitive results at the CFI are comparable to their success rates in the granting council competitions.
- There are many discipline groups that make special cases for earmarked fund competition for their particular niche. We have not found a need to have a top

down discipline allocation process. Partnerships are now being developed with the CFI client institutions or consortia of institutions. This type of partnership is emerging both with the private sector and with some of the granting councils (e.g. SSHRC and the institutes of CIHR).

- University managed and driven consortia are the norm in many countries, especially the United States. In Canada, we could consider digital libraries, Canadian light sources, high performance computing and many others supported by the CFI to now be in this category.
- Sometimes, client institutions are concerned that their priorities have not been honoured. High priority projects may be rejected because they don't meet the CFI standards. This poses a difficulty for the institutional management, but we review all such requests carefully to ensure that no mistakes were made in the process and that they receive a full report from us.
- Why is there not an appeal process? Institutions receive a summary of the process and the reasons from the CFI, but the CFI does not intervene in the judgement of the experts and the panels. The institutions are always free to submit proposals in future competitions (and often do so). On request, the CFI does review for the possibility of administrative error.
- Some institutions claim to have difficulty finding operating funds. The creation of the operating fund for projects approved after July 1/2001 (to be used before 2005) has been of great help and very well received.
- Are projects on time? Most projects are on time or have acceptable delays. Some of the major construction projects have significant delays due to the complexity of the project and often due to provincial and/or municipal regulatory requirements.
- Why are the social sciences and humanities not eligible? In fact they are eligible and in the most recent competition several projects have been successful.
- The Atlantic provinces' institutions claim to be disadvantaged because of lack of matching funds. This in our view is more perception than reality. New Brunswick and Nova Scotia have formally embraced the importance of innovation and set up foundations to assist. The creation of the $300 million Atlantic Innovation Fund puts them on a fully competitive level playing field.
- Private sector contributions are often in the form of deep discounts and are available everywhere.
- Some individual parliamentarians would like to get both full credit for the decision, and some would like to influence the decision. The CFI was set up explicitly so that there could be no collective or individual influence by politicians on the decisions. This has worked well and the institutions accept both positive and negative decisions. This complete independence, and perception of independence, is the most significant element for the success that

the institutions have in raising matching funds, especially from their provincial government since they know the decision was credible and based on merit. The CFI is committed to do everything possible to give parliamentarians credit for the CFI program. The balance is extremely delicate in some cases and we may urge parliamentarians not to claim too much credit, as the institutions still need to bring 60% to the table.

15. What do the CFI client institutions need if they are going to play their role in branding Canada and in helping Canada to reach the top 5 countries in GERD/GDP by 2010?

- The federal government can take great credit for re-energizing and supporting the research endeavour in Canada in the context of the white papers "Achieving Excellence".
- These new programs are branding Canada around the world and talented people are choosing to stay in Canada, to return to Canada or to come to Canada.
- The CFI provides the enabling techniques and technologies that are the basis for innovation.
- It is the same magnet that is drawing the best to Canada that is reinforcing Canada's existing and emerging clusters.
- Most of Canada's research is carried out in the CFI client institutions and government is to be congratulated for recognizing the need to reinforce research outside government.
- One university and its affiliated hospitals alone (the University of Toronto) now receives over $400M/year in research funds from federal and provincial governments, from the private sector, from the volunteer sector and from international sources. A few others are not far behind.
- Including the internal funds they spend on research, this makes U of T one of the largest research performer in Canada exceeding even the National Research Council. All of this support is won through competitive processes.

Institution-Based Support

Equipment and facilities - CFI
Replacement faculty positions - Canada Research Chairs
Research environment - a start has been made with indirect costs
Graduate student and post doctoral fellow support - a small start with the Trudeau Scholarships

Researcher-Based Support

Increased support to the granting councils

16. What will it take for the CFI to maintain the momentum to 2010?

- The uniqueness of the CFI is that the institutions have been able to get funds from the CFI and from their partners including the provinces in the absence of a federal-provincial agreement and without political intervention. They are uniquely positioned to bring in partners and to work with their local communities.
- It is changing the culture of research and research planning across the country as the institutions set what have become the national priorities, as they explain the benefits to Canadians and as they compete to attract and retain the very best minds in Canada.
- The CFI (along with the other initiatives) is empowering non-government, not-for-profit, research-performing institutions and their researchers to "go for the gold".
- Awareness of the activities of the CFI is becoming widespread. The attached (#8) set of articles from various national, international and airline magazines document some of the exciting research being done with the CFI supported facilities.
- Newspaper coverage is extensive - often local - and almost all positive.
- An electronic magazine has been launched.
- The demand for the CFI funds shows no sign of abating. In fact, the CFI is receiving more and better proposals from institutions and various consortia. If the demand, quality and ability to find matching funds is maintained, it will be necessary to have additional money to maintain Canada's race to the top.
- Extend the Infrastructure Operating Fund beyond 2004/5;
- Extend the International Funds beyond 2002;
- Ongoing support for the Canada Research Chairs, as replacements are recruiting beyond 2004/5.

Attachment 1

Provincial distribution of population, cumulative CFI awards, Canada Research Chairs and Granting Council awards

	Canadian Population		Federal Research Grants SSHRC, NSERC and CIHR (3 year total)		Canada Research Chairs Allocation		CFI Awards		Number of CFI Awards	
	Total	**%**	**$m**	**%**	**No. of chairs**	**%**	**$m**	**%**	**No. of awards**	**%**
NFLD	538.8	1.75	23.2	1.15	22	1.11	11.2	0.77	26	1.32
PEI	138.9	0.45	2.2	0.11	5	0.25	4.6	0.32	9	0.46
NS	941.0	3.10	64.5	3.19	77	3.90	23.2	1.63	73	3.80
NB	756.6	2.50	21.0	1.04	27	1.40	8.7	0.60	39	1.98
QUÉ	7,372.4	24.00	557.8	27.54	562	28.34	425.5	29.34	509	25.86
ONT	11,669.3	37.90	773.3	38.18	735	37.00	531.9	36.68	731	37.11
MAN	1,147.9	3.70	58.3	2.88	61	3.10	26.9	1.86	81	4.11
SASK*	1,023.6	3.30	46.5	2.30	43	2.20	41.5	2.87	58	2.99
AB	2,997.2	9.80	221.0	10.91	211	10.60	163.9	11.31	213	10.80
BC	4,063.8	13.20	257.3	12.70	241	12.10	212.2	14.63	229	11.61
Total							**1,449.9**	**100**	**1968**	**100**
National Projects							114.1		7	
Infrastructure Operating Fund							183.7		-	
Total							**1,748.0**		**1975**	

* If the CLS is added to the Saskatchewan total, Saskatchewan has received 98M for a total percentage of 6.31%

Attachment 2

Projects approved by the CFI (Cumulative to March 28, 2002)

Institution	Maximum CFI Contribution	# of projects
British Columbia Institute of Technology	$639,990	3
Forintek Canada Corp.	$1,362,000	2
Malaspina University-College	$1,775,744	4
Okanagan University College	$676,568	3
Open Learning Agency	$514,000	1
Royal Roads University	$250,000	2
Selkirk College	$543,756	1
Simon Fraser University	$10,898,680	33
Technical University of British Columbia	$1,455,671	4
University of British Columbia	$149,816,484	139
B.C. Cancer Research Centre	$27,800,000	1
Subtotal - University and Affiliated Hospital(s) /		
Sous-total - Université et hôpital(aux) associé(s)	**$177,616,484**	**140**
University of Northern British Columbia	$1,902,964	8
University of Victoria	$14,000,392	27
Vancouver Aquarium Marine Science Centre	$617,859	1
Total - British Columbia / Colombie-Britannique	**$212,254,108**	**229**
Athabasca University	$450,316	4
King's University Collge (The)	$250,000	1
Lethbridge Community College	$716,740	1
Olds College	$1,807,727	4
Southern Alberta Institute of Technology	$406,400	1
TRLabs	$3,727,387	1
University of Alberta	$110,940,271	116
University of Calgary	$43,853,347	80
University of Lethbridge	$1,741,701	5
Total - Alberta	**$163,893,889**	**213**
Saskatchewan Indian Federated College	$351,924	1
University of Regina	$4,925,883	11
*University of Saskatchewan	$36,236,097	46
Total - Saskatchewan	**$41,513,904**	**58**
Brandon University	$673,305	3
Red River College of Applied Arts, Science and Tech.	$550,788	1
University of Manitoba	$23,702,666	70
St. Boniface General Hospital	$1,050,809	2
Subtotal - University and Affiliated Hospital(s) /		
Sous-total - Université et hôpital(aux) associé(s)	**$24,753,475**	**72**
University of Winnipeg	$954,776	5
Total - Manitoba	**$26,932,344**	**81**

Algonquin College of Applied Arts and Technology	$781,244		1
Brock University	$2,524,147		10
Carleton University	$14,233,439		24
Fanshawe College	$369,473		2
Lakehead University	$2,594,283		20
Laurentian University	$2,541,703		9
McMaster University	$46,039,854		80
St. Joseph's Hospital (Hamilton)	$11,262,736		2
Subtotal - University and Affiliated Hospital(s) /			
Sous-total - Université et hôpital(aux) associé(s)	**$57,302,590**		**82**
Niagara College	$797,110		1
Perimeter Institute for Theoretical Physics	$5,624,892		1
Queen's University	$34,893,990		64
Ryerson Polytechnic University	$2,210,018		11
Sault College	$1,532,535		3
Seneca College	$676,035		2
Sheridan College	$1,584,492		3
Sir Sandford Fleming College	$1,060,487		2
Trent University	$3,801,232		11
University of Guelph	$40,294,223		42
University of Ottawa	$49,078,031		66
University of Toronto	$109,525,362		145
Baycrest Centre for Geriatric Care	$10,712,000		1
Mount Sinai Hospital	$24,868,314		3
St. Michael's Hospital	$3,520,595		2
Sunnybrook and Women's College Hlth Sc. Centre	$16,597,506		4
The Hospital for Sick Children	$9,657,115		4
University Health Network	$10,028,757		3
Subtotal - University and Affiliated Hospital(s)			
Sous-total - Université et hôpital(aux) associé(s)	**$184,909,649**		**162**
University of Waterloo	$41,230,444		68
University of Western Ontario	$53,622,972		74
London Health Sciences Centre	$3,196,857		1
London Regional Cancer Center	$211,500		1
St. Joseph's Health Centre of London	$2,864,000		1
The John P. Robarts Research Institute	$5,097,759		3
Subtotal - University and Affiliated Hospital(s)			
Sous-total - Université et hôpital(aux) associé(s)	**$64,993,088**		**80**
University of Windsor	$5,056,656		18
Wilfrid Laurier University	$6,099,544		21
York University	$7,775,088		28
Total - Ontario	**$531,964,393**		**731**
Bishop's University	$125,000		1
CÉGEP de Chicoutimi	$152,119		1
CÉGEP de La Pocatière	$957,360		2
CÉGEP de l'Abitibi-Témiscamingue	$594,000		1

CÉGEP de Lévis-Lauzon	$1,017,104		2
CÉGEP de Rimouski	$204,000		1
CÉGEP de St-Hyacinthe	$879,960		2
CÉGEP de Trois-Rivières	$1,300,368		3
CÉGEP Vanier College	$140,170		1
Collège de Maisonneuve	$108,455		2
Collège Shawinigan	$683,000		2
Concordia University	$17,734,633		13
École des Hautes Études Commerciales	$1,436,079		2
École Polytechnique de Montréal	$35,747,676		22
Institut Tech Agro-Alim de La Pocatière	$52,700		1
Institut Tech Agro-Alim de St-Hyacinthe	$879,597		1
McGill University	$134,813,654		121
Université de Montréal	$77,784,721		131
Université de Sherbrooke	$14,886,414		36
Université du QC École de technologie supérieure	$4,760,709		8
Université du QC INRS	$18,622,002		17
Université du Québec à Chicoutimi	$2,151,704		8
Université du Québec à Hull	$801,768		4
Université du Québec à Montréal	$3,097,413		14
Université du Québec à Rimouski	$6,540,115		5
Université du Québec à Trois-Rivières	$5,094,657		14
Université du Québec en Abitibi-Témiscamingue	$1,273,270		2
Université du Québec Télé-université	$1,230,656		2
Université Laval	$92,460,047		90
Total - Québec	**$425,529,351**		**509**
Collège communautaire du Nouveau-Brunswick	$187,338		1
Mount Allison University	$1,028,113		3
St. Thomas University	$249,975		1
Université de Moncton	$1,507,557		8
University of New Brunswick	$5,768,145		26
Total - New Brunswick / Nouveau-Brunswick	**$8,741,128**		**39**
Acadia University	$948,274		3
Dalhousie University	$15,126,409		47
Mount Saint Vincent University	$139,020		1
Nova Scotia Agricultural College	$3,850,314		10
Nova Scotia Community College	$1,115,000		2
Saint Mary's University	$1,121,475		5
St. Francis Xavier University	$887,058		4
University College of Cape Breton	$63,867		1
Total - Nova Scotia / Nouvelle-Écosse	**$23,251,417**		**73**
University of Prince Edward Island	$4,619,807		9
Total - Prince Edward Island / Ile-du-Prince-Edouard	**$4,619,807**		**9**
College of the North Atlantic	$670,060		1
Marine Institute	$350,000		1

Memorial University of Newfoundland	$10,202,459		24
Total - Newfoundland / Terre-Neuve	**$11,222,519**		**26**
Total - Province	**$1,449,922,860**		**1968**
National "System-on-Chip" Research Network / Réseau canadien de recherche du système sur puce			1
Canadian Light Source / Centre canadien du rayonnement synchrotron			1
National Site Licensing Project / Projet de licences national de sites	$20,000,000		1
National Microelectronics and Photonics Testing Collaboratory / Laboratoire national collectif d'essais en microélectronique et en photonique			1
National Solid State Ultrahigh Field NMR Facility / Installation nationale de résonance magnétique nucléaire (RMN) à ultra-haute résolution en phase solide			1
Research Data Centres / Centre d'accès aux données de recherche	$5,380,089		1
Text Analysis Portal for Research (TAPoR) / Portail d'analyse textuelle de recherche (PATeR)			1
Total - Canada National Projects / Projets nationaux	**$114,052,782**		**7**
Total - Infrastructure projects / Projets d'infrastructure	**$1,563,975,642**		**1975**
Infrastructure Operating Fund – Maximum Allocation ** /	**$184,032,270**		**-**
Fonds d'exploitation des infrastructures - enveloppe maximale **			**-**
Grand Total	**$1,748,007,912**		**1975**

Attachment 3

Overall Awards to Date by Institution Type (March 2002)

$1.74B (CFI share) to 1975 projects

40 smaller universities
26 larger universities
30 colleges
13 teaching hospitals
3 additional not-for-profit institutions

_____
112 institutions

Attachment 4

Analysis of reports on impacts and outcomes of infrastructure projects funded by the Canada Foundation for Innovation and other funding partners

Volume 1–Overview

Mireille Brochu
May 2002

Table of contents

1 Introduction

This overview summarizes the outcomes and impacts of research infrastructure provided by the Canada Foundation for Innovation to universities, hospitals, colleges and research institutes. The overview is based on the analysis of information found in institutional reports submitted by 67 universities and other institutions and in 796 project reports submitted by project leaders in early 2002. Reports cover outcomes that occurred in 2001.

A second volume presents a more complete analysis of the information. Volume 2 includes an analysis of the outcomes and impacts of each CFI Fund, namely the New Opportunities Fund, the Canada Research Chair Fund, the Innovation Fund, the University Research Development Fund and the College Development Fund. Volume 2 also includes specific examples of outcomes and more quantitative data. Institutional reports are posted on the CFI website, www.innovation.ca.

Institutions were asked to report on the impact of the CFI investments in achieving the objectives and priorities of institutional research plans in the past year as well as on the implementation and utilization of the infrastructure.

Project leaders were asked to report on the outcomes of their projects. For example, they had to answer quantitative questions on the impact of the infrastructure in attracting researchers and students and on any benefits to Canada that were realized in the past year. They also submitted a narrative description of the results attributable to the CFI infrastructure.

Some projects were approved in the second half of 2001. Also, many of the infrastructure projects involve the acquisition, construction, development and testing of complex facilities. Therefore, a significant number (357 or 45%) of reports relate to infrastructure that was not fully operational at the end of 2001.

2 The institutional perspective

There is no question that investment in infrastructure by the CFI, provincial governments and other partners of the institutions has a major impact on
research at Canadian institutions, particularly on:

- increasing the quality of research and research productivity
- attracting and retaining excellent faculty members
- transforming research
- fostering the development of partnerships with the provinces and others
- encouraging research planning
- generating enthusiasm in the research community
- attracting students and providing them with better training
- encouraging collaboration and multidisciplinary approaches
- generating concrete social, economic, health and environmental benefits
- increasing research funding.

The impacts are growing given the growing investment, of course, but also given that more and more projects are generating interesting results and that students who used the CFI infrastructure are now graduating and finding rewarding jobs.

The synergy between the CFI infrastructure and other new programs that fund human resources such as Canada Research Chairs, the Canadian Institutes of Health Research and a plethora of provincial initiatives in some provinces, particularly Ontario, Québec and Alberta, is truly remarkable. This has completely transformed Canadian research, boosted morale, attracted individuals and increasingly made Canadians real partners in international collaborations.

The matching requirements of the CFI have forced universities to seek partners in the funding of infrastructure. A number of universities mention that this has helped them forge new partnerships with their provincial government. Partnerships with industry and with various donors have also been strengthened. However, in some cases, finding matching funding remains very difficult. This is discussed in Chapter 4.

At its inception, the CFI made institutional planning a pre-condition to applying for funds. Many institutions commend the CFI for this requirement and state that this has helped them focus on their strengths. Not only did the CFI encourage institutions to identify their priority areas, it encouraged them to pool resources and join in the development and sharing of infrastructure. This joint planning and sharing is evident across the country but above all in Canada's largest cities that have a number of universities, hospital research institutes and colleges. For example: the British Columbia Institute of Technology, Simon Fraser and the University of British Columbia in Vancouver; and numerous universities and hospital institutes in Montreal. These are only examples; there are many more. In all regions, there is evidence of increased collaboration among institutions of all sizes and types.

The CFI has an impact on attracting and retaining faculty members, graduate students and other trainees. The combination of Canada Research Chairs and the CFI infrastructure is particularly powerful. It provides institutions with major development tools at the time when they are renewing their faculty complement.

New collaborations are developing around shared infrastructure. This is particularly noticeable in institutions that have moved to a system of major shared facilities. Such facilities also promote the effective management and use of the infrastructure.

Most institutions note the impact of the CFI infrastructure on research productivity, mentioning that researchers are now able to add new dimensions to their programs of research and to conduct studies that were previously not possible. The CFI enables greater depth and breadth of investigation, in addition to accelerating the research.

All institutions, but especially smaller ones, are convinced that the new infrastructure has already had a major impact on the ability of researchers to obtain research funding from a variety of sources.

3 The researchers' perspective

3.1 Innovative research capability

The CFI has provided new researchers with research infrastructure via the New Opportunities Fund. The Canada Research Chair Fund is giving a boost to newly appointed Canada Research Chairs by providing them with the infrastructure they need to initiate or accelerate their research program. Through the Innovation Fund, the University Research Development Fund (for smaller universities) and the College Research Development Fund, the CFI has provided institutions with the opportunity to enhance, develop and improve their research capability in their priority areas.

The CFI infrastructure has facilitated the creation or expansion of major centres in genomics, proteomics, bioinformatics, neurosciences, rehabilitation, tissue engineering, medical devices, drugs, information technologies, advanced materials, transportation, earthquakes, geomatics, manufacturing, food, agriculture, aquaculture, water, oceans and environmental sciences to give only a few examples.

The CFI infrastructure has enabled the creation of centralized instrumentation centres in numerous departments and faculties across Canada, particularly in the area of imaging technologies and analytical facilities. It has also facilitated the renewal of campus networks and the creation of high performance computing facilities accessible to researchers across the country.

The CFI has contributed to the modernization of animal care facilities. It has contributed to the creation and development of databases on the health and social conditions of Canadians. It has provided clinical researchers in the biomedical sciences with equipment and infrastructure to study major diseases and conditions. The CFI is providing researchers in all disciplines with access to shared library facilities. The list could go on.

3.1.1 Recruitment and retention of faculty

Researchers were asked whether the availability of the infrastructure had been an important factor over the past year in the decision of researchers (faculty members, PDFs and other researchers) to join the institution. The results, given in Table 1, show that the CFI had a major impact on attracting researchers in the last year. The impact was most pronounced in the Innovation Fund where 169 of 211 respondents said that the infrastructure had an influence in attracting researchers in the last year.

Table 1–Influence of infrastructure in attracting researchers in 2001*

	Yes	No	n/a	Total
New Opportunities	286 (66%)	169 (34%)	13	468
Innovation	169 (82%)	37 (18%)	5	211
University Research Development	51 (66%)	26 (34%)	4	81

*In this table and in all the subsequent ones, the percentage applies to the number of projects that answered the question and not to the total number of projects.

Project leaders stressed the importance of the infrastructure in attracting and retaining faculty members, researchers and PDFs. Again and again, project leaders from large and small institutions mention that candidates for positions are excited by the availability of the infrastructure. Many state categorically that this is one of the most important reasons for their success in attracting first class people (faculty members, postdocs and students). Holders of Canada Research Chairs note that the Chair Program and the associated infrastructure played a role in attracting new faculty members in the last year (in addition to attracting/retaining the incumbent). Many New Opportunities researchers state that the infrastructure played a major role in their decision to stay in Canada or to come here (note that, in most instances, this occurred prior to 2001).

3.1.2 Recruitment of students

Project leaders were asked whether, in the past year, the infrastructure contributed to the recruitment of students from outside their institution. For a vast majority of projects, the infrastructure played a role in recruiting students in the last year. About 3% came from the US and 29% from other countries. Responses show that, for about half of the projects, more than three students were recruited last year.

In general, project leaders are satisfied with the quality of the students they recruited. They give numerous examples of scholarships and awards won by students. On the other hand, some project leaders are disappointed that they were not successful in recruiting students. They note that a number of research projects were delayed because no students were available.

3.1.3 Recruitment of professional and technical staff

Sixty-six percent of respondents mentioned the infrastructure had some influence on the creation of jobs in their groups or laboratories (Table 2). They generally referred to the research assistants, research associates, technicians, postdocs and students who joined in the past year. Most project leaders mention that their group is still growing.

Table 2–Number of projects reporting influence of infrastructure on job creation

No influence	Some	Considerable	Total
229 (36%)	396 (48%)	139 (18%)	764

Of course, the recruitment of professional and technical staff is limited by research funding available and by the availability of funding to operate, maintain and repair the infrastructure, and some project leaders so note in their report.

3.1.4 Access to world competitive infrastructure

In 58% of the projects, more than 3 researchers (faculty, PDFs and other researchers) substantially advanced their research in the past year because of the availability of the infrastructure (see Table 3).

Table 3–Researchers who advanced their research thanks to infrastructure

Number of projects reporting such researchers

1 researcher	2 researchers	3 researchers	>3 researchers	None	Total
65 (9%)	93 (12%)	99 (12%)	463 (58%)	76 (10%)	796

Researchers think highly of the quality of their infrastructure as shown in Table 4:

Table 4–Quality of infrastructure compared to other laboratories

Number of projects stating that the infrastructure is:

Below average	Average	Above average	Comparable to best in Canada	Comparable to best in the world	No answer
10 (1%)	79 (10%)	135 (17%)	275 (35%)	282 (36%)	15

Researchers stress that their infrastructure allows them to compete with other groups worldwide. Others state that the presence of the infrastructure allowed them to generate results much faster than previously, thus making their group more competitive.

3.1.5 Collaboration

A vast majority of respondents say that the presence of the CFI-supported infrastructure helped them to create, maintain or strengthen collaborations, particularly international collaborations, in the last year (Table 5).

Table 5–Influence of infrastructure on creating/maintaining/strengthening:

	Number of projects reporting			
	No influence	Some influence	Considerable influence	No answer
Informal linkages with colleagues at the institution	19 (4%)	160 (30%)	358 (67%)	259
Research collaborations	17 (3%)	182 (34%)	335 (63%)	262
Formal signed partnerships	219 (43%)	151(29%)	143 (28%)	283
International collaborations	143 (18%)	376 (48%)	262 (34%)	15

Project leaders describe many of these linkages. They talk about linkages among researchers in the same unit who share infrastructure. They comment that centralization of infrastructure fosters meetings and discussion that often evolve into collaborations. They talk about collaborations between institutions in a region, including universities and colleges. They note that, thanks to the infrastructure, they are better placed to initiate international collaborations and no longer play second fiddle to their international colleagues. They note new collaborations with government labs. They talk about new partnerships with industry and industrial use of the infrastructure. Often,

facilities are not purchased off-the-shelf and their development and implementation are a collaborative project with scientific equipment and instrumentation manufacturers.

3.1.6 Creation of, or support for, centres of excellence

Especially through the Innovation Fund, the CFI infrastructure contributed to the creation and expansion of numerous centres of excellence. Centres and networks are being created around the infrastructure, a significant number with provincial research funding, for example, in Ontario (Ontario Research and Development Challenge Fund) and Québec (Valorisation-Recherche Québec). Centres funded by Genome Canada and its regional partners are also mentioned.

The infrastructure also helped individual researchers gain access to centres or networks. For example, numerous New Opportunities researchers have been invited to participate in Networks of Centres of Excellence and some of them have played a leading role in the development of winning proposals in the most recent competition. They state that this would not have been possible without the infrastructure. Similarly, researchers in smaller universities note that they have definitely increased their participation in various networks of centres of excellence and Ontario Centres of Excellence. They are also included in multi-institutional projects funded by Valorisation-Recherche Québec.

3.2 Innovative research productivity

New Opportunities researchers who received funding in the first competition held in 1998 are starting to build impressive research records and a significant fraction of them state that the CFI-supported infrastructure helped them generate world-class results as shown in Table 6. In fact, two thirds of respondents from this Fund estimate that their research is at or exceeds international standards (if it is not too early for results):

Table 6–Self-assessment of the quality of research in the last year (New Opportunities Fund)

Too early	Modest advance	National standards	International Standards	Breakthrough	No answer
32	32	61 (14%)	74 (19%)	223 (52%)	4

In the case of the Innovation Fund, 71% of the projects for which it is not too early to tell report research that is at or exceeds international standards.

One recurring comment in the case of New Opportunities is that the new infrastructure enables researchers to start their research program more quickly and to generate high quality results faster and more effectively than they would have otherwise.

In the narrative part of the report, some researchers chose to list the numerous publications and presentations they generated with the help of the CFI-funded infrastructure. Others have stressed the high quality and impact of their discoveries, mentioning invitations to international conferences, noting that results had received international press coverage and referring to increasing grant support.

Researchers were invited to talk about the level of risk in the research undertaken. There is a difference in approach among respondents. Indeed, some researchers believe that taking risks early in their career could jeopardize future chances of research funding. Others are taking the gamble and saying that the infrastructure helped them in this regard as they could get better results faster. Some project leaders take a middle-of-the-road-approach, conducting both longer-term high risk projects that "push the envelope" and projects that generate results in a shorter time frame. Many state that, without the infrastructure, they would not be able to enter relatively unexplored areas.

3.3 Multidisciplinary nature of research activities

Without any doubt, the most striking outcome of the CFI is its major influence on fostering multidisciplinary research.

No less than 96% of respondents from all Funds replied that the availability of the infrastructure had enhanced their opportunities for interdisciplinary research in the last year:

Table 7–Number of projects reporting that interdisciplinary research has been enhanced

No	Somewhat	Considerably
30 (4%)	295 (38%)	456 (58%)

There are synergies between medicine and science, engineering and social sciences, between basic researchers and clinicians, computer scientists and researchers from numerous other disciplines. Furthermore, techniques honed in one discipline are used to solve problems in another.

3.4 Training for research and other careers

Very large numbers of students at all levels utilize the infrastructure. A majority of projects in the Innovation Fund involve three or more graduate students.
Students are trained in a multidisciplinary environment and researchers are convinced that their trainees are gaining skills that will help them find employment.

Again and again, researchers stress that the multidisciplinary environment prepares students very well for careers in industry. Students who have used the CFI infrastructure are starting to graduate and they indeed find jobs. In fact, researchers are quite proud of the employment record of their graduating students. Only a handful mention that their students had spent some time looking for work. A number of researchers note that graduating students choose to continue their studies abroad or find employment abroad. The lure of lucrative jobs in the United States and elsewhere is still there.

3.5 Benefits to Canada

Table 8 indicates the number of projects reporting various types of benefits enabled by the infrastructure in the last year. Only about 120 projects did not report any benefits in the last year. The majority are projects that are not fully operational or projects that became operational in 2001.

Table 8–Benefits enabled by the availability of the infrastructure

	# of projects reporting no benefits	# of projects reporting some benefits	# of projects reporting considerable benefits	No answer
Intellectual property	451 (59%)	208 (27%)	103 (14%)	34
Products and services	344 (45%)	279 (36%)	143 (19%)	30
Spin-off companies	632 (84%)	90 (12%)	33 (4%)	41
Cost savings	315 (42%)	311 (41%)	130 (17%)	40
Public policy improvements	599 (80%)	127 (17%)	25 (3%)	45
Health benefits	460 (61%)	249 (33%)	48 (6%)	39
Social benefits	574 (77%)	152 (20%)	22 (33%)	48
Environmental benefits	500 (67%)	175 (23%)	71 (10%)	50

Among the projects that mention intellectual property, most report patents (applied for and granted), some mention software, others licences. A number of patents resulted from collaborative work with companies. The infrastructure helped 422 projects with the development of new or improved products, processes or services. The examples below show that these projects represent an interesting range of devices, stemming from research in many disciplines.

Examples of products and processes improved or developed using CFI infrastructure in 2001

Chemical manufacturing processes that will lead to cleaner and more efficient manufacturing technologies

Improvements to electric motors and magnetic materials; processes for dehydrating food; design of automotive components; manufacturing and assembly operations in the electronics industry; products being used in fracture fixation for medical applications

Design and construction of a robot for neurosurgery

Enhancements to the efficiency of seismic imaging and the resulting resource exploration

Development of protective eyewear for electrical utility workers

Powder coating and pulmonary drug delivery technologies

New protocols for the analysis of inorganic compounds

Table 8 shows that the infrastructure contributed to the creation of spin-off companies in 123 projects. Examples include companies in medical applications, biotechnology, genomics, proteomics, veterinary immunotherapies, bioinformatics, software, information technologies, optoelectronics and nanotechnology. It is unlikely that 123 infrastructure projects led to the creation of spin-off companies in the last year alone. In reading the reports, it is obvious that respondents mentioned companies created since the infrastructure first became operational as well as companies that are at an early stage of planning. One must also remember that this does not mean 123 companies, but 123 projects. Some researchers who created companies are involved in more than one project.

With a few exceptions, the question on cost savings was interpreted not as long-term cost savings to the Canadian economy thanks to project outcomes (e.g., saving in health, education or correctional costs), but cost savings in the labs, due to the fact that the research is more effective and efficient.

Table 8 shows that a substantial number of researchers state that the infrastructure contributed to the generation of health improvements, policy improvements and social benefits. However, in the narrative part of the reports, it is evident that the real impact and benefits for Canadians lie mainly in the future. Indeed, in these areas, the time lag between the actual research and the outcomes is longer than in the "high tech" area (including information technology, advanced materials and biotechnology) where patents, spin-offs and process improvements can occur in a relatively short time frame.

Interesting outcomes were obtained in the environmental area, for example, with respect to monitoring environmental changes, bioremediation, air pollution, mercury and other metal pollution, potable water treatment, forest management, nuclear waste disposal, etc.

3.6 Awards, recognition (international, domestic)

The leverage effect of the CFI infrastructure is impressive. Respondents are convinced that the infrastructure has helped them increase their funding in the last year. In the opinion of project leaders, most impressive is the influence of the infrastructure on federal granting agency, provincial and industrial research funding.

Table 9–Impact of the infrastructure on the ability of its users to attract funds (leverage)

Funding source	# of projects with no CFI influence	# of projects with some CFI influence	# of projects with considerable CFI influence	No answer
Institution	215 (28%)	333 (44%)	212 (28%)	36
Federal granting agencies	110 (14%)	227 (29%)	434 (56%)	25
Other federal	327 (46%)	179 (25%)	198 (28%)	92
Provincial government	191 (25%)	214 (28%)	346 (46%)	45

Canadian industry	298 (40%)	239 (32%)	208 (28%)	51
International	356 (50%)	208 (29%)	153 (21%)	79

An impressive number of New Opportunities researchers have subsequently been awarded Canada Research Chairs. In part, they attribute their success in the Chair Program to the availability of the infrastructure, which helped them increase their research productivity early in their careers.

As well, project leaders and other principal investigators in the Innovation and University Research Development Funds have received Chairs.

Respondents also mention numerous prizes and awards as well as invitations to prestigious international conferences.

Finally, a number of researchers mention that their research has been featured in various media in the past year.

4. Implementation and utilization issues

Institutions were asked to discuss delays in implementation or utilization issues in their reports. In the narrative part of their reports, researchers were invited to describe measures taken to ensure the efficient management, use and sharing of the infrastructure. They were asked to describe any delays in implementing their projects and to comment on whether or not the infrastructure was adequately utilized.

4.1 Implementation

Institutions report that implementation took longer than anticipated, and listed numerous reasons for delays: long delay before award finalization by the CFI, delays in securing matching funds or in receiving such funds (from province or industry), delays in obtaining approval from the province, backlog with construction projects on campus, construction and renovation delays, lack of administrative resources, long regulatory approval process, lack of space, complex planning of complex projects, delays in delivery of equipment, defective equipment, changes in technology, lack of personnel. In total, perhaps 60% of the projects experienced delays.

This long list looks like a disaster story, but as shown from the impressive list of outcomes, most of these delays were overcome and the infrastructure is now up and running except for more recent projects and “older” very large and complex projects.

In general, smaller projects face shorter delays whereas delays of one year or more are not unusual for larger projects involving construction. Major construction projects take time even when there are no major delays. Therefore, a number of very large infrastructure projects funded in the first CFI competition are not fully operational yet. In such instances, equipment has been purchased and is used for research but benefits of the infrastructure will increase when all the user groups occupy the new space.

Provincial matching funding remains a potential challenge for institutions implementing their CFI-funded projects. In British Columbia, the change in government, which entailed a complete program review, delayed the approval of matching funding by several months. In Atlantic Canada, finding matching funding has been difficult and some institutions are unable to begin implementation of approved projects because they are still awaiting word on matching funding from various levels of government. These institutions are working hard with their provincial government and federal organizations to find the necessary resources to initiate these projects[1].

4.2 Utilization

In general, institutions report that infrastructure is used adequately, with a small number of projects where infrastructure is under-utilized and some where the infrastructure is so heavily used that they cannot meet demand. One university is organizing workshops to "advertise" under-utilized infrastructure to a broader community of potential users.

Quantitative data from project reports confirm the institutional assessment: 89% of projects are used appropriately or are even oversubscribed (Table 10).

Table 10–Utilization of infrastructure

Under-utilized	Adequate	Over-subscribed	No answer
85 (11%)	578 (75%)	112 (14%)	85 (11%)

Fifty-five of the 85 projects where infrastructure is under-utilized give completion dates in the future. The others give a variety of explanations, although essentially the reason is a lack of personnel to operate and use the infrastructure:

- faculty turnover;
- maternity leave;
- lack of students;
- high teaching loads mean that equipment is fully used in the summer only (this is mentioned by respondents from smaller institutions);
- insufficient technical staff;
- use depends on the stage of the research;
- reluctance of colleagues to pay user fees.

Some of the 578 respondents who state that their infrastructure is used adequately hint at under-utilization in the narrative part of the report. They generally say that they expect that use will increase in the next year because they will find the necessary human or financial resources to enlarge their group. Some new researchers would like to have more graduate students. In such cases, the barrier is not always the lack of funds, but the lack of student applications given that their laboratory is relatively new.

[1] At the time of writing this analysis (April 2002) there is renewed hope that a solution will be found shortly, with some provincial governments and the federal government developing mechanisms to overcome the issue.

Nevertheless, it is obvious that lack of staff and lack of funds cause problems in a number of cases and this may eventually lead to under-utilization, especially if equipment cannot be maintained in a timely fashion. The CFI Operating Fund will help future projects, but not most of those who reported this year because this new Fund applies only to infrastructure projects approved after mid-2001. Indeed, in institutional reports, several universities mention that it has been a struggle to find operating funds and they are happy that the CFI will now contribute to funding these costs.

4.3 Management of the infrastructure

A number of institutions, large and small, are strong proponents of shared, centralized facilities. They consider this the best means to ensure an efficient and economical use of complex infrastructure. It also facilitates the sharing of infrastructure.

For the most part, larger projects have formal management structures with a manager in charge and, often, with management committees. Smaller infrastructure is managed by the principal investigator(s) and shared on an informal basis.

If there are problems, they are due to lack of personnel to operate, maintain and repair the infrastructure.

5. Conclusion

This overview of the 2002 institutional and project reports submitted to the CFI has shown that CFI-funded infrastructure is having a major impact on research and that research results are starting to generate benefits to Canada. This confirms the conclusions of the recent independent evaluation of the New Opportunities Fund.

Institutional reports mention the impact of the CFI not only in leveraging matching funding for the infrastructure, but its effects on increasing provincial government investments in research as well. The fact that research planning is now commonplace in Canadian research institutions can also be linked directly to the CFI requirement for research plans.

The CFI investments have enhanced considerably the ability of institutions to attract and retain faculty members and researchers. The coupling of Canada Research Chairs and the CFI infrastructure is increasing this impact by providing universities with better tools to renew their research workforce.

Not only is the CFI influencing research capacity, it is also helping to transform the way research is done. Perhaps most remarkable is the impact on interdisciplinary research, where 96% of respondents state that the availability of the infrastructure had some or considerable influence on the interdisciplinary character of the research.

The nature and quality of training given to students and other trainees is also enhanced by their exposure to state-of-the-art infrastructure. Again and again, researchers comment that graduating students are better prepared for employment.

The availability of state-of-the-art infrastructure also helps increase the quality of research, as results are more reliable and can be generated faster. As a result, research productivity is enhanced.

The research conducted with the CFI infrastructure is starting to generate benefits to Canada in terms of the development of products and services, creation of intellectual property, health, social and environmental benefits. Reports promise more in the future.

Clearly, the CFI is achieving its intended objectives. However, there are some implementation problems. A significant proportion of projects experience delays. In some cases, these are due to difficulties in finding matching funding. In others, these are due to unforeseen complexity and increased costs.

Overall, infrastructure is used adequately but there is a danger of underutilization for lack of human and financial resources. The new CFI Infrastructure Operating Fund will help solve the situation for new projects but projects approved prior to mid-2001 (those that reported this year) will not benefit from this fund.

Attachment 5

Cumulative Totals - Commercialization Productivity (2002 data)

Performance Indicator per $1M U.S. of sponsored research	Productivity (U.S.$) (top 15 universities) U.S.*	Canada
Invention disclosures	0.64	0.69
Licence and options executed	0.22	0.22
Licence income received	36,810	18,864*
U.S. patents issued	0.21	0.11
Start-up companies formed	0.02	0.05**

- adjusted for indirect costs estimated at 52%

* Information provided during the survey about very significant licensing income increases at several institutions leads to a projection of about $30,000 in 2001.

** If McMaster and Waterloo spin-offs were recorded, it is estimated that this number would rise to .06 to.07.

Attachment 6

EU Priority Areas

1. Genomics and biotechnology for health

2. Information society technologies

3. Nanotechnology, intelligent materials, new production processes

4. Aeronautics and space

5. Food safety and health risks

6. Sustainable development and global change

7. Citizenship and Governance

8. Anticipating scientific/technological needs

Attachment 7

Calendar of activities

(X = competition deadline, review point or date of event)

Activity	JAN 2001	JAN 2002	JAN 2003	JAN 2004	JAN 2005	JAN 2006	JAN 2007	JAN 2008	JAN 2009	JAN 2010
Innovation Fund	_____X	_____X	_____X	----------	----------	to be determined - nature and frequency ----------				
Small Universities Colleges	Extensive consultation before calls for proposals									
Infrastructure Operating Fund		X	_____X	_____X	----------	----------	----------	----------	----------	----------
New Opportunities	__X__X__X__X__X__X__X__X__X__X__X									
	Evaluate & decide on future									
Canada Research Chairs	__X__X__X__X__X__X__X__X__X__X__X__X__X (400 per year to 2005)									
International Funds (Joint Venture & Access)	proposals X---------- future to be determined									
	two-step review									
Workshops	__X__X__X__X__X__X__X__X__X__X__X__X__X									
	decide on future									
Evaluations										
a) Royal Society	__X_____X_____ X ---- to be determined									
b) Full evaluation	__X_____X_____X_____X____X_____X ---- to be determined									
	N. Opp. Innov Chairs Intl N. Opp. Innov									
c) Institutional and project reports	__X_____X_____X_____X_____X --- to be determined									
Refinement of review process	--------ongoing----------									
Audit of contributions	--------ongoing----------									

Attachment 8

Articles with Relevance to the CFI

1. ***On the Cutting Edge*** -(TIME Magazine – 8 April 2002)
   Relevance: This article highlights many researchers in Canada. Several of these researchers work on projects funded by the CFI.

   - Through the Innovation Fund in January 2002, the CFI awarded the University of Montreal $1.3 Million for the project *"Réseau québécois d'études multicentriques en cardiologie"*. Jean-Claude Tardif of the Montreal Heart Institute is the project leader.

   - Christoph Sensen, featured in his 3-D CAVE (pg. 43) is the project leader for "Broadband Network Rewiring in Support of Bioinformatics and Imaging" a $1 Million CFI funded project.

   - Jeffrey Mogil at McGill University is the recipient of a Canada Research Chair, the CFI awarded $150K in Canada Research Chairs Infrastructure funding.

2. ***Brain Power*** (TIME Magazine, March 18, 2002)
   Relevance: Through their Innovation Fund in 1999 the CFI awarded the University of Toronto $7.3 Million towards the "University of Toronto Chemical and Molecular Sciences Research Centre" project led by Martin Moskovits.

3. ***Lighting the Way*** (Airlines – Westjet Jan/Feb 2002)
   Relevance: In 1999 the CFI awarded the University of Saskatchewan with funding for $56.4 million towards Dr. Bancroft's project "The Canadian Light Source Project" (a Synchrotron). To date (February 2002) this is the largest amount CFI has awarded to an individual project.

4. ***The Powerhouse*** - (McLean's – 21 January 2002)
   Relevance: In 1999 the CFI awarded the University of Saskatchewan with funding for $56.4 million towards Dr. Bancroft's project "The Canadian Light Source Project" (a Synchrotron). To date (February 2002) this is the largest amount CFI has awarded to an individual project.

5. ***The Bright Stuff*** - (TIME, 14 January, 2002)
   Relevance: Editorial piece written by Dr. David Strangway, President and CEO, Canada Foundation for Innovation about fighting the Brain Drain.

6. ***Digging Deeper*** (Westjet Dec. 2001)
   Relevance: Dr.El Molto's greatest personal achievement, as stated in this article, is his role in the development of Lakehead University's Paleo-DNA laboratory. The CFI awarded $260,000 towards the infrastructure costs of this project.

7. ***City of Bridges*** (Westjet Dec. 2001)
   Relevance: In 1999 the CFI awarded the University of Saskatchewan with funding for $56.4 million towards Dr. Bancroft's project "The Canadian Light Source Project" (a Synchrotron). To date (February 2002) this is the largest amount CFI has awarded to an individual project.