Summative Evaluation of the Industrial Research and Development Internship (IRDI) Program

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LIST OF ACRONYMS

BMP	Bourses en Milieu Pratique
CECR	Centres of Excellence for Commercialization and Research
CFI	Canada Foundation for Innovation
CREATE	Collaborative Research and Training Experience
FQRNT	Fonds de recherche du Québec – Nature et technologies
GDP	Gross Domestic Product
IPS	Industrial Postgraduate Scholarships
IRAP	Industrial Research Assistance Program
IRDF	Industrial R&D Fellowships
IRDI	Industrial Research and Development Internship
NCE	Networks of Centres of Excellence
NRC	National Research Council
NSERC	Natural Sciences and Engineering Research Council
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
S&T	Science and Technology
YES	Youth Employment Strategy

EXECUTIVE SUMMARY

PURPOSE AND METHOD OF STUDY

The Industrial Research and Development Internship (IRDI) program creates private sector internship opportunities for graduate students and postdoctoral fellows. During an internship, the intern receives a minimum stipend of $10,000 for a placement term of four months to six months; the federal contribution (including the contributions from the IRDI program) cannot exceed 50% of the total eligible cost of the internship. The remainder of the stipend is paid through contributions from eligible private sector sponsor organizations and other non-federal sources. Sponsor companies gain access to graduate interns, guided by an academic supervisor, who work on research and development projects designed to address the needs of the business. The academic supervisors gain new ways to connect with Canadian companies through the internships.

This summative evaluation focuses on the relevance, achievement of expected outcomes, design, implementation, and efficiency and economy of the IRDI program. This is the first evaluation of the program and covers activities implemented from the origin of the program in 2007-08 to 2011-12. The federal government provided $25.5 million in total funding to the program over this five year period. The IRDI is administered by the Networks of Centres of Excellence (NCE) Secretariat, which reports administratively to NSERC, and delivered by two third party recipient organizations: Mitacs through its Accelerate program and AUTO 21 through its Connect Canada program

The evaluation utilizes various lines of evidence, including: document and literature review; review of administrative data on costs and participants; interviews with 52 key informants; surveys of 536 interns, 353 sponsors, 411 supervisors, and 20 prospective interns and sponsors who applied to the program but were not approved, or were approved did not proceed with the internship; and seven case studies of selected internships. The samples were drawn entirely from internships delivered through the Mitacs-Accelerate program given that AUTO 21's Connect Canada program only began operations in 2011-12.

CONCLUSIONS

Relevance

There is a strong rationale for the IRDI program, given that Canada lags other developed nations in terms of industrial innovation and business investment in research and development (R&D) activities. The focus of the IRDI program is consistent with key strategies outlined in literature to promote industrial innovation, particularly with respect to facilitating collaboration and linkages between academia and industry, supporting skills development, and increasing access to funding.

The IRDI program occupies a niche among the other programs in Canada that involve internships or other student placements. While some may share certain objectives and design features with the IRDI program, these other programs tend to be defined more narrowly than the IRDI in terms of target participants, regions and sectors, involve longer placements (e.g., of 12 months or longer), and involve fewer participants. The level of duplication or overlap between IRDI and other placement-related programs (such as other NSERC supported programs) is not significant, in large part because the focus of IRDI on shorter-term four to six month placements. However, the potential for overlap with other programs increases as the duration of the IRDI internships increases; duration is a function of the length of the internships (four to six months) and the number of internships per intern.

The program is directly aligned with federal government roles and priorities in the area of science and technology as outlined in Canada's Science and Technology (S&T) Strategy, the Innovation Canada: A Call to Action report in 2011, the Speech from the Throne 2011, Budget Plan 2012, Canada's Science and Technology Strategy 2007, and the strategic outcomes of the three granting agencies.

Effectiveness

The program has made significant progress in terms of its immediate and intermediate outcomes, although it is too early to determine the extent to which the program will achieve its longer-term outcomes. The program meets the needs of most interns, sponsors and academic supervisors. The internships enabled interns to gain exposure to real-world business problems, and relevant industry experience. Participation increases the research skills and level of experience of almost all interns. A small majority of interns (just over one-half) were employed full-time, of whom nearly one-half were employed in the private sector and mostly in positions that are research intensive and use scientific and technical skills. Most of those employed in the private sector reported that the internship was important in obtaining their current position.

Most businesses reported that the internships were effective in addressing their business needs, although nearly one-fifth were not able to fully meet their needs through the IRDI program, which was attributed most commonly to the short duration and scale of the internship. Sponsors reported that their use and likely future employment of graduate students and postdoctoral fellows has been enhanced, which some hiring interns subsequent to the internship. Sponsors participate to solve business needs and to access graduate students and postdoctoral fellows with specific project or technology development expertise. Internships improved sponsor organization's knowledge and technology base (70%), R&D capabilities (67%), scientific and technical activities (65%), and R&D investments (53%).

The internships facilitate further collaboration between industry and academia by strengthening existing or creating new relationships with the other party, as well as by identifying research issues or topics and increasing the focus on research relevant to business needs and issues. A majority of supervisors note that the internships impacted their research by creating or increasing collaboration with the sponsor organizations, increasing the emphasis placed on business issues and opportunities, opening new avenues of research, leveraging further funding, and leading to papers or publications.

Implementation

The IRDI program has been implemented largely as planned. The recipient organizations have delivered 3,182 IRDI-funded internships over the past four years, which represents 94% of the target of 3,400 internships set by the IRDI program. While some improvements have been made to the reporting system, further improvements are needed. More specifically, there is a need to improve the quality and integrity of participant data collected; more clearly differentiate between interns, internship units, applications and projects; comment directly on performance against specific terms of the funding agreements; and ensure the exit surveys collect adequate data for measuring immediate and intermediate outcomes.

The recipient organizations are well connected with industry and academia as a result of past operations and the delivery model builds on their existing resources, systems, capabilities and activities. Recipient organizations take a hands-on business development and customer-relationship approach to the development of internships. Most interns, sponsors and supervisors are satisfied with the hands-on assistance provided by the recipient organization, eligibility requirements, evaluation process, response time, and reporting requirements. The hands-on approach is proving effective

although there is concern about the costs of delivery. The use of more than one recipient organization has only been in place for one fiscal year and more time is needed to determine whether the potential benefits of the model outweigh the possible disadvantages.

Efficiency and Economy

While administrative costs of the recipient organizations are within the program's limit of 25% of the total amount of the IRDI grant, administration costs are high in comparison to those of other programs. The total administrative costs have averaged 26.6% of total program-related expenditures over the past four fiscal years including the operating expenditures incurred by the recipient organizations (23.0%) and the Networks of Centres of Excellence (NCE) Secretariat and NSERC (3.6%). The higher costs of administration relative to other programs reflect the key features of the program's delivery including the significant effort involved in generating internships as well as the large number of low dollar value internships, and the relative newness of the program. It is expected that administrative costs (but not necessarily the IRDI contribution towards those costs under the existing model) may be expected to decline somewhat over time as awareness increases, the program becomes more established (e.g., an increasing segment of supervisors and sponsor organizations participate on a regular basis) and there is greater use of the websites to facilitate proposal development and review. Within the scope of the evaluation, there is insufficient detailed cost data readily available on the delivery of internships to determine what level of operating expenditures would be reasonable in the future. It will be important for the IRDI program to improve the information currently collected on operating expenditures (e.g., differentiating operating costs from business development activities) to better understand the costs associated with delivery of the IRDI program by the recipient organizations, particularly as the Mitacs-Accelerate program undergoes significant expansion with the addition of funding from Industry Canada.

Overall, the IRDI program is a low risk program delivered by well-established and capable recipient organizations, targeting clearly-defined groups, and operating within a set of program guidelines that have been further defined over time. While the program has been effective in monitoring existing and emerging risks, further improvements are needed with respect to reporting on performance against the program guidelines. Two areas which need to be monitored on an on-going basis relate to the ability of the recipient organizations to achieve their targets and the impact of other sources of funding on their operations.

RECOMMENDATIONS

Recommendation #1: In the context of evolving programs, a forward looking review should be undertaken of the relative role of the IRDI program within the broader environment of funding for internships and other industrial placements.

To date, overlap between the IRDI program and other industry placement-related programs is not significant. However, other federal or provincial sources of funding accessed by the Mitacs-Accelerate program can be used to fund follow-on internships, which raises the possibility of overlap between Mitacs-Accelerate and other programs even if there is no overlap between the IRDI program (where funding is normally limited to two internships) and other programs. Based on the results of the review, consideration should be given to making adjustments, where warranted, to ensure that IRDI is well-coordinated with other sources of funding to the recipient organizations and complementary to other industrial placement programs.

The review should focus on clearly defining the role of IRDI funding relative to the other sources of funding. The review would benefit from the active participation of federal government sources of

funding for these internships but should, at minimum, seek input from those organizations. Any future agreements should more explicitly define the expected role of the IRDI funding. Annual reporting requirements should be structured to enable the NCE Secretariat to gain a clear understanding of how the IRDI funding was utilized and fits into the financial statements of the IRDI funded internship program.

Recommendation #2: The program should continue to monitor the effectiveness and efficiency of using multiple recipient organizations and, prior to the next competition, determine whether to continue to allow multiple recipient organizations or restrict to a single recipient organization.

The multi-deliverer organization model has only been in place for one fiscal year. More time is needed to determine whether the potential advantages of the model (i.e., increased program reach and opportunities to benchmark performance, compare different approaches, and share best practices and lessons learned) outweigh the possible disadvantages (confusion among stakeholders, greater difficulties in establishing a recognizable brand, overlap in program promotion, and increased overhead cost through diseconomies of smaller scale operations).

The assessment should compare the advantages and disadvantages of the current model. Based on the results, refinements could be made to the process for selecting and funding recipient organizations, the selection criteria, and the types of organizations and delivery models eligible to receive IRDI grants. Should the decision be made to continue to allow for multiple recipient organizations, a formal outreach strategy should be developed to increase the number of qualified applications received.

Recommendation #3: The performance measurement strategy and reporting requirements should be revised to improve the usefulness, comprehensiveness and integrity of the information reported and ensure that the data reported annually by recipient organizations enables the NCE Secretariat to effectively monitor, assess and report on the results of the IRDI program and support future evaluations.

While some improvements have been made to the reporting system, further improvements are needed. There is a need to improve the accuracy, validity and comprehensiveness of participant data; more clearly differentiate between interns, internship units, applications and projects; comment directly on performance against specific terms of the funding agreements (e.g., the percent of interns who have never participated before, sponsors have not participated within the past two years, and interns who have participated in more than two internship units); and ensure the exit surveys collect adequate data for measuring immediate and intermediate outcomes.

The program should establish standards with respect to data capture, storage and reporting by recipient organizations to ensure clear differentiation between interns, internships, proposals and projects; facilitate improved reporting against specific terms of the funding agreements; improve the quality and integrity of participant data; improve the usefulness of the exit survey information; and better align the results with the information needs of future evaluations. The number, timing and content of the exit surveys should be defined clearly to ensure coordination across recipient organizations and alignment with the performance measurement strategy and future evaluations. When revising the performance measurement system and reporting requirements, consideration should be given to working with the recipient organizations and other sources of federal government funding for the internship programs to develop common data requirements, procedures and definitions for reporting.

Recommendation #4: The NCE Secretariat should work with the recipient organizations to develop a better understanding of the future costs associated with delivering the IRDI program and, where possible, identify opportunities to reduce these costs over time as a percent of total expenditures.

The IRDI program, as currently designed, is an expensive program to administer. While there is a desire to reduce administrative costs, there is also the recognition that a unilateral reduction in the allowable costs may reduce administrative expenditures but also significantly reduce the level of internships and outcomes generated. Administrative costs (but not necessarily the IRDI contribution towards those costs under the existing model) may be expected to decline somewhat over time as awareness increases and the program becomes more established. The maximum rate that can be charged under the existing grant agreement is equal to 25% of total expenditures, which is higher than the administrative costs for the Mitacs-Accelerate program overall (which totalled 21% in 2011-12). The IRDI program needs to better understand the administrative costs incurred by recipient organizations to deliver internships in general, and specifically IRDI funded internships, and what level of administrative costs are reasonable to deliver industrial internships.

The IRDI program should work with the recipient organizations, possibly in association with the other federal government sources of funding for the internship programs, to review the existing cost structure and the role of the various sources of funding in supporting operating expenditures, conduct internal and external benchmarking, review the business development and administrative processes, identify possible best practices, and analyze opportunities to enhance program promotion and business development, streamline processes, promote cost savings and increased efficiencies. Based on this understanding, the program should define more clearly the role of the IRDI funding in supporting the operating expenditures of the recipient organizations and, in that context, assess the appropriateness of the current funding model for administrative expenses including the definition of eligible expenses and the funding formula.

I. INTRODUCTION

A. THE INDUSTRIAL R&D INTERNSHIP PROGRAM

Structure of the Program

In support of the Government of Canada's Science and Technology Strategy, *Mobilizing Science and Technology to Canada's Advantage* (released on May 17, 2007), *Budget 2007* included funding for three new programs delivered by the NCE Secretariat to increase private sector investment in research, support the training of skilled researchers, and connect the resulting ideas and talent to industry. The Industrial R&D Internship (IRDI) program was one of these programs.

The IRDI program creates private sector internship opportunities for graduate students and postdoctoral fellows. During an internship, the intern receives a minimum stipend of $10,000 for a placement term of four months to six months; the federal contribution (including the contributions from the IRDI program) cannot exceed 50% of the total eligible cost of the internship. The remainder of the stipend is paid through contributions from eligible private sector sponsor organizations and other non-federal sources.

The internships are intended to benefit sponsor companies, interns, and faculty who serve as academic supervisors. Interns further develop their skills and gain relevant industry experience by working on real world business problems. Sponsor companies gain access to graduate interns, guided by an academic supervisor, who work on research and development projects designed to address the needs of the business. Academic supervisors gain new ways to connect with Canadian companies through the internships. Over the intermediate term, the program will lead to on-going collaborations between universities and private sector and create longer-term positions for science and technology graduates, enhancing their job opportunities and use by the private sector. The intended final outcome is a change in business culture and increases private sector science and technology activities and investment in R&D. The logic model for the IRDI program is provided in Appendix III.

The IRDI program is overseen by a tri-agency Networks of Centres of Excellence (NCE) Steering Committee made up of the Presidents of the three granting agencies, the President of the Canada Foundation for Innovation (as an observer) and the Deputy Ministers of Industry Canada and Health Canada. The day-to-day administration of IRDI is provided by the NCE Secretariat, which reports directly to the NCE Steering Committee.

The program employs a third party delivery model; non-profit organizations are selected via a competitive process to receive grant funding to deliver the program. Each recipient organization reports annually to the NCE Secretariat on its performance and impact against the program criteria. To select the recipient organizations, the NCE Secretariat issued calls for proposals which were reviewed by a selection committee, established by the NCE Secretariat, composed of domestic and international experts. The committee evaluated applications against the program selection criteria and recommended proposals for approval. The tri-agency NCE Steering Committee made the final decisions.

Delivery of the Program 2007-08 to 2011-12

In February 2008, Mitacs (through its Accelerate program) was selected as the sole recipient organization of grant funding to deliver the IRDI program from 2007-08 to 2010-11. The IRDI funding facilitated expansion of Mitacs-Accelerate, which had already been operating with funding from the

federal government (i.e., Western Economic Diversification, the Atlantic Canada Opportunities Agency, and the National Research Council) and various provincial governments. In the second competition, launched in the fall of 2010, Mitacs-Accelerate and AUTO21 through its Connect Canada program were selected to deliver the program from fiscal year 2011-2012 to 2015-2016.

From 2007-08 to 2011-12 (the period on which this evaluation focuses), the federal government budget for the IRDI program totalled $25.5 million, of which approximately $23.9 million was granted to Mitacs, $1 million was granted to Connect Canada, and slightly less than $600,000 was budgeted by NSERC for operating expenditures ($115,000 annually) and accommodation charges ($4,875 per year). The budget figures do not include the costs of audits or evaluations.

The programs delivered by Mitacs-Accelerate and Connect Canada are similar in structure although there are differences in the size of contributions. Under Mitacs-Accelerate, the federal government and the sponsor organizations each contribute $7,500 per internship which provides $10,000 for the stipend and $5,000 in funding which can be used to augment the stipend, purchase related equipment or supplies, provide training, or pay for the travel of the intern or the academic supervisor. Under Connect Canada, the federal government and the sponsor organizations each contribute $5,000 which covers the cost of the stipend. As such, the level of contribution from the government per internship is higher under the Mitacs model but so too is the contribution of the sponsor organization.

According to annual reports submitted by the recipient organizations, 3,182 internships were delivered (of which 3,165 were delivered by Mitacs-Accelerate from 2008-09 to 2011-12 and 17 internships were delivered through Connect Canada in its first year of operation in 2011-12) involving 2,343 interns (an average of 1.4 internships per intern). The annual reports do not indicate how many interns participated in more than one year (and therefore are counted more than once in the total of 2,343).

A second source of data on the number and characteristics of internships delivered during the first four years of operations is administrative data provided by Mitacs for the purposes of the evaluation. As indicated in the table below, the number of internships contained in the administrative dataset received for the evaluation is less than the numbers reported by the recipient organizations in their annual reports to the NCE Secretariat for three reasons.

- First, the dataset does not cover the full four year period (the latest internship start date included in the dataset is November 1, 2011) and does not include data from Connect Canada.
- Second, the annual data reported by Mitacs includes internships that were approved as of the fiscal year-end (March) and had started before July of the next fiscal year (i.e., before the annual reports are submitted) while the administrative counts include only projects with a start date during the fiscal year.
- Third, Mitacs reports on internship units such that an intern could complete two internship units (e.g., two four month periods) under the same project title with the same sponsor and supervisor, either consecutively or with a break in between. In some situations, as part of the process of cleaning the dataset and constructing the sample frame, multiple internship units were grouped together in the administrative data under the same project and counted as fewer internship units.

For the first three years, the administrative total (2,044 internships new internships started) is only about 8% less than what was reported by Mitacs in the annual reports (2,222 internships reported) which suggests that the difference is attributable mostly to timing (i.e., including internships which were approved in the fiscal year but started in first three months following the year-end). The aggregate number of interns is about 15% less than the total reported by Mitacs over the first three years, largely because of some interns participating in more than one fiscal year.

New Interns and Internships by Fiscal Year According to the Administrative Data As Compared to Interns and Internships Reported by the Recipient Agencies

	Administrative Data[1]			Reported Data	
	New Interns Participating for First Time	New Internships Started	Avg. Duration of Internships (Months)	Number of Interns Reported	Number of Internships Reported
2008/09	247	293	4.6	310	447
2009/10	472	677	5.2	556	801
2010/11	647	1,074	5.5	727	974
2011/12[2]	58	133	6.6	750	960
Total	**1,431**	**2,177**	**5.4**	**2,343**	**3,182**

Source: Analysis of administrative data provided by Mitacs; Data reported in annual reports by the recipient organizations

The administrative data and survey results indicate that interns come from a range of participating universities and disciplines, of which engineering is the most common. Sponsors are drawn from a range of economic sectors and are most commonly located in Ontario or British Columbia. Two-thirds of sponsors reported having an R&D department, most commonly with four or fewer employees.

Characteristics of the Participating Interns, Sponsors and Supervisors

Characteristics of Internships, Interns and Sponsors			
Based on the Administrative Data (n=1,431)			
Disciplines of the Intern	• Engineering (33%) • Computer science (10%) • Life sciences (10%)	• Social sciences/arts & humanities (7%) • Business (6%)	• Mathematical sciences (5%) • Earth sciences (5%) • Physical sciences (4%)
Education Level	• PhD (33%)	• Post-doc (15%)	• Masters (52%)
Participating Universities	• University of British Columbia (12%) • Simon Fraser University (10%)	• University of Toronto (9%) • University of Waterloo (5%) • University of Victoria (4%)	• University of Western Ontario (4%) • University of Manitoba (4%)
Region	• Ontario (38%)	• British Columbia (28%)	• Quebec (18%)
Based on the Survey Data (n=353)			
Sponsor Sector	• Professional, scientific and technical services (24%) • Manufacturing (14%)	• Mining, oil and gas (10%) • Finance and insurance (8%) • Health care and social assistance (8%)	• Utilities (7%) • Information and cultural industries (6%)
People Employed by the Sponsor	• 0 to 4 (13%) • 5 to 19 (20%) • 20 to 49 (11%)	• 50 to 99 (5%) • 100 to 299 (6%) • 300 to 499 (3%)	• 500 and higher (25%) • Do not know/no answer (17%)
Involvement of Sponsor Organizations in R&D	66% of sponsors have an R&D department. The reported number of staff in the department is: • 0 to 4 (37%) • 5 to 19 (19%) • 20 to 49 (6%)	• 50 to 99 (3%) • 100 to 299 (4%) • 300 and higher (1%)	• 500 and higher (3%) • Do not know/no answer (26%)
Percentage of Revenues invested in R&D	The median percentage was 20%. • Less than 5% (6%) • 5% to 14% (8%) • 15% to 24% (5%)	• 25% to 34% (3%) • 35% to 54% (5%)	• 55% and over (10%) • Do not know/no answer (63%)

Source: Administrative data and survey results

1 The administrative data does include start dates for internships involving 7 of the 1,431 interns
2 The latest start date for internships in the administrative data provided by Mitacs was November 1, 2011.

For each internship, the administrative file includes data on the total value, stipend, and contribution provided by the sponsor and IRDI. Stipends commonly vary from the minimum of $10,000 to $15,000. The average value of the internships is $14,463 of which $11,499 (80%) is the stipend. Other expenses, which may include travel, training or the purchase of equipment or supplies, were calculated by deducting the stipend from the total internship value. The sponsor and IRDI are the major sources of funding. According to Mitacs, the other sources of funding are the provincial governments.

Average Costs and Sources of Funding Per Internship

Years	Data Available	Uses of Funding			Sources of Funding		
		Stipend Amount	Other Expenses	Total Value	Sponsor Contribution	IRDI Amount	Other Sources
2008/2009	347	$11,396	$3,556	$14,952	$7,220	$5,675	$2,057
2009/2010	782	$11,564	$3,044	$14,608	$6,456	$5,776	$2,376
2010/2011	976	$11,443	$2,707	$14,150	$5,995	$5,796	$2,359
2011/2012	63	$12,109	$2,706	$14,815	$6,091	$6,054	$2,669
Total	2168	$11,499	$2,964	$14,463	$6,360	$5,777	$2,326

Source: Analysis of administrative data provided by Mitacs

B. FOCUS OF THE EVALUATION

This summative evaluation focuses on the continued need for the IRDI program; the extent to which the program has been implemented as planned; the extent to which it has achieved the expected outcomes; and the efficiency and economy of the program in the context of alternate delivery models. This is the first evaluation of the program and covers activities implemented from 2007-08 to 2011-12. The evaluation issues and questions are listed in Appendix II.

C. METHOD OF STUDY

The evaluation utilizes various lines of evidence including:

- Review of program documents, annual reports prepared by the recipient organizations, funding agreements, Reports on Plans and Priorities, Department Performance Reports, Speeches from the Throne, and financial budgets and reports.
- Literature review focused on the need to boost innovation and R&D in Canada, similar programs in Canada, and effectiveness of internships in the transfer of knowledge.
- Review of administrative data on program costs as well as the characteristics of internships, interns, sponsors and academic supervisors participating in the program.
- Interviews with 52 key informants including senior management from the NCE Secretariat; representatives of NSERC, Canadian Institutes of Health Research, Social Sciences and Humanities Research Council, and Industry Canada; senior management, business development officers, Board members, and review committees and consortium members associated with the recipient organizations; members of the selection committee which reviewed applications from prospective recipient organizations in 2008 and 2010 as well as organizations that applied unsuccessfully to become a recipient organization. The sample was designed to obtain input from a wide of key informants, with a particular emphasis on recipient organization members to collect information on the implementation of the program (i.e., delivery models and operations).
- Surveys of 536 interns, 353 sponsors, and 411 supervisors who participated in internships starting between May 1, 2008 and November 1, 2011. The samples were drawn entirely from internships delivered through Mitacs-Accelerate given that AUTO 21's Connect Canada only began operations in 2011-12. Administered over a seven week period, from August 1 to September 21,

2012, the response rate to the survey, as a percent of the representatives reached, ranges from 40% to 53% for interns, 38% to 46% for sponsors, and 47% to 51% for supervisors[3].

- Survey of 20 prospective interns and sponsors who applied to the program but were not approved, or were approved did not proceed with the internship. Of the 53 potential respondents, 20 (7 sponsors and 13 interns) completed the survey, yielding a 38% response rate.
- Case studies of seven internships. To be selected as a case study, the intern, sponsor and academic supervisor must each have completed the survey and agreed to participate. Each case study involved interviews with the intern and sponsor as well as the supervisor (if available) as well as review of the project proposal, exit surveys of the participants, and any final reports.

Strengths of the evaluation include the use of multiple lines of evidence to address each evaluation question, high response rates, and the large numbers of respondents representing the wide range of participants and other representatives associated with the program. Two possible limitations, which are considered in the analysis and interpretation of the results, are the potential for respondent bias and non-response errors amongst both participants and key informants. Some key informants (particularly those associated with the recipient organizations) as well as the interns, supervisors, and sponsor organizations are direct beneficiaries of the program who have a vested interest. Consequently, the findings may be biased towards more favourable program outcomes. To reduce the effect of biases and validate the survey results, the answers of respondent groups were cross-checked with those of other groups for consistency and validation and, wherever possible, the findings from surveys and key informant interviews were triangulated and validated with the results of the document and file review as well as the case studies. Recognizing that most key informants are associated with the recipient organizations, the key informant interview results are generally presented by respondent group.

Factors that contributed to the potential for non-response errors among program participants included issues associated with the Mitacs database (i.e., completeness, consistency, accuracy and currency of data provided by Mitacs); the timing of the surveys (during August and September when the target groups are more likely to take vacation); the length of time since the internships were completed (up to four years ago which impacts the currency of the contact information and the willingness or ability of participants to respond); and survey fatigue. To mitigate the potential effects, a census approach was used under which all potential respondents were invited to participate, the NSERC Evaluation Division conducted web searches and phone follow-ups for potential respondents with missing or incorrect contact information, three to four e-mail reminders and five rounds of follow-up phone calls were made to interns and sponsor organizations, and the deadline for the surveys was extended into September. The characteristics of participants were compared with those in the sampling frame to ensure consistency based on the data currently available. As the characteristics were similar, no weighting has been applied in presenting the findings.

D. STRUCTURE OF THE REPORT

This evaluation report is divided into three chapters. Chapter II summarizes the major findings summarized by evaluation issue and Chapter III presents the major conclusions and recommendations.

3 The minimum response rate is calculated by dividing the number of respondents by the total population less the number known not to have been contacted (i.e. the email bounced and there was no valid phone number). The maximum response rate is calculated by dividing the number of respondents by the total population less the number who did not view the survey (i.e. click on the link in the email to visit the website) and could not be contacted by telephone (i.e. wrong number, no longer working there or residing there, number not in service, or no phone number provided in the database).

II. MAJOR FINDINGS

This chapter summarizes the major findings drawn from the various lines of evidence regarding the relevance, effectiveness, design and delivery, and efficiency and economy of the IRDI program.

A. RELEVANCE

Evaluation questions related to relevance focus on whether there is a continued need to fund industrial R&D internships for graduate students and postdoctoral fellows (and what niche the program fills within that context), whether there is a necessary role for the federal government in providing the program, and the extent to which the program is aligned with federal government priorities in the area of science and technology. The results of the evaluation demonstrate that:

- *There is a continued need for programming given that Canada lags behind other developed nations in business expenditures on R&D activities, innovation, commercialization and productivity and there is continuing demand for IRDI internships.*

- *The program fills a niche, relative to other similar programs in Canada, particularly with respect to the focus on short-term (four to six month) placements. While the potential for overlap with other programs increases with the length of the internship, some participants noted that the short duration is a disadvantage to the extent that an intern may not be able to complete the research project that he or she started.*

- *The program is directly aligned with federal government roles and priorities in the area of science and technology, as outlined in Canada's Science and Technology (S&T) Strategy, the Innovation Canada: A Call to Action report in 2011, the Speech from the Throne 2011, Budget Plan 2012, and the strategic outcomes of the three granting agencies.*

Continued Need for the Program

Canada lags behind other developed nations in business investment in R&D and commercialization of R&D products. At 1% of Gross Domestic Product (GDP), Canada's business expenditure on R&D is well below the OECD average of 1.6% (Industry Canada, 2011, pg. 2-6) despite very favourable targeted tax measures and substantial public investments in primary research (Department of Finance, 2006, paragraph 3). According to the Conference Board of Canada's publication *How Canada Performs: A Report Card on Canada 2009* (2010, pg. 6), Canada ranks 14th among the 17 Organisations for Economic Co-operation and Development (OECD) countries in terms of innovation.

There is empirical evidence that R&D performed by business, rather than by universities and governments, contributes most directly to productivity growth (Council of Canadian Academies, 2009, pg. 8). Low levels of business investment in R&D and innovation are reflected in lower levels of business productivity, which is significant given that increases in labour productivity are the largest contributor to improved standards of living (Boothe P. & Roy R., 2008, pg. 4). When compared to other developed countries, Canada ranks 17th among 20 OECD countries, and 6th among G7 countries in terms of productivity increases over the last 30 years (Boothe P. & Roy R., 2008, pg. 5). In 2007, the level of business sector labour productivity in Canada was only 75% of the level in the United States (Boothe P. & Roy R., 2008, pg.5).

Low levels of business spending on R&D activities in Canada are, in part, attributable to the resource-based nature of the economy and the prevalence of foreign-controlled companies in Canada.

However, the low levels are primarily a function of limited access to resources, low levels of collaboration between businesses and universities, limited access to talented and educated people, and the lower commitment of Canadian businesses to innovation-based strategies relative to their counterparts in the US and many other economically-advanced countries (Council of Canadian Academies, 2009). Collaboration between business and universities (which perform the majority of basic and, to some extent applied research) is narrowly-based (Industry Canada, 2011, pg. 2-12). Canada ranks near the bottom of OECD countries in the proportion of businesses collaborating with universities for R&D, and Canadian innovative firms are significantly less likely to consider universities and federal and provincial labs as an important source of information (Science, Technology and Innovation Council, 2008, Section 4. Digest of Key Indicators, para. 43). The 2008-2009 Global Competitiveness Report published by the World Economic Forum identified low levels of collaboration between universities and industry as a competitive disadvantage for Canada (Klaus and Porter, 2009, pg. 129). Canada also lags behind in preparing doctoral graduates and science and engineering (S&E) specialists who could help to boost innovation. In 2005, Canada placed 21st among OECD countries in the percent of new degrees awarded in science and engineering (Science, Technology and Innovation Council, 2008, Section 4. Digest of Key Indicators, para. 21). The IRDI program is designed to address these constraints to business spending on R&D by facilitating collaboration and linkages between academia and industry, supporting skills development, strengthening the commitment of business to innovation-based strategies, and increasing access to funding.

There is continuing demand for IRDI internships among interns, sponsor organizations and academic supervisors. Most sponsors (86%) would be interested in sponsoring another IRDI intern, while only 3% indicated that they would not be interested. More than half (58%) of sponsor organizations that participated in 2011-12 were returning sponsors that had participated in the previous two years. Ninety percent of academic supervisors indicated interest in supervising another IRDI intern in the future (only 4% indicated that they would not be). In fact, one-quarter (27%) of the supervisors indicated that they had served as an academic supervisor for another IRDI funded internship(s) delivered through Mitacs-Accelerate subsequent to the internships which were the focus of the survey. Among unfunded applicants, 60% of unfunded interns and 86% of sponsors indicated interest in participating in the program in the future.

Program Niche

There are other programs in Canada that involve internships, scholarships, fellowships or other placements in the private sector. One-fifth of interns and over one-half of sponsors and supervisors have participated in another program. The characteristic of programs similar to the IRDI program are outlined in Appendix IV. Participants most commonly identified the advantages of IRDI funded Mitacs-Accelerate program to be the higher value of the financial assistance; the support provided for interns and sponsor organizations (e.g., matchmaking); and a user-friendly application and approval process which facilitates participation. The disadvantage most commonly identified was the short duration of the internships, which does not allow some interns to complete the research projects that they had started.

While some of these other programs share certain objectives and design features with the IRDI program, they tend to be defined more narrowly in terms of target participants, regions and sectors, and involve longer placements (e.g., of 12 months or longer) and fewer program participants per year. The level of duplication or overlap between IRDI and other programs (such as other NSERC supported programs) is not significant, in large part because the focus of the IRDI program is on shorter-term four to six month placements. The potential for overlap with other programs increases as the duration of the IRDI funded internships increases; duration is a function of the length of the internships (four to six months) and the number of internships per intern. Mitacs-Accelerate receives significant funding from

other federal and provincial government sources which could be used to fund follow-on internships, thereby creating the potential for overlap between Mitacs-Accelerate and other programs even if there is no overlap between the IRDI program (where funding is normally limited to two internships) and other programs.

Alignment With Federal Government Roles and Responsibilities

The objectives of the IRDI program are consistent with the roles and responsibilities of the federal government, particularly those outlined in *Canada's S&T Strategy 2007*. The S&T Strategy indicates that the federal government has a responsibility to support skills development and education through activities such as by providing access to internships, scholarships grants and student loans. In particular, the report states that *"…the federal government can create additional opportunities for skilled graduates by linking them with businesses that can make use of their talents. The government can do so by supporting internship programs that expose students to research opportunities and careers in the private sector. These programs also stimulate business interest in S&T by demonstrating the benefits from hiring highly qualified people"* (pg.77).

The Jenkins Report (2011) recognizes the development of talent and skilled labour as well as partnerships between universities, businesses and governments as important contributors to innovation and productivity. The Report stresses government's role in developing talent, stating that *"the Government of Canada plays an important role through the granting councils and can have a particular focus on the deployment of talent in support of business innovation" (Industry Canada, 2011, pg. 5-14)*. The report recognizes the importance of providing students with hands-on research experience that exposes them to the realities of business and teaches professional and entrepreneurship skills. The granting agencies are a key funding mechanism through which the federal government promotes and supports research and innovation, and student research training and skill development. The IRDI program represents the intersection in the roles of the federal government to support students as well as to support research and innovation.

Alignment with the Priorities of the Federal Government

The objectives of the IRDI program are consistent with the priorities of the federal government, particularly as outlined in *Canada's S&T Strategy 2007*, the *Speech from the Throne 2011*, *Budget Plan 2012*, and strategic outcomes of the three granting agencies. The *Speech from the Throne* (2011) highlighted federal government commitments to enhance the skills of Canadians, stating it will make *"sure that all Canadians have the skills and opportunities to contribute, to innovate and to succeed … [and]… will provide assistance for workers who want to learn new skills and seize opportunities"* (para. 4), and support innovation by stating that *"our Government will continue to make targeted investments to promote and encourage research and development in Canada's private sector and in our universities, colleges and polytechnics. It will look for ways to support innovation while ensuring that federal investment in research and development is effective and maximizes results for Canadians"* (para. 17).

Government of Canada's *Budget Plan 2007* announced allocation of $4.5 million to launch the IRDI program and *Budget Plan 2012* specified areas where the government will take concrete steps to promote innovation, such as increasing funding for R&D by small and medium-sized companies, and promoting linkages and collaborations, and supporting research, education and training with new funding for universities, granting councils and leading research institutions (Government of Canada, 2012). *Budget Plan 2012* also highlighted IRDI as an example of successful internship program and committed additional resources (pg. 63). IRDI objectives are aligned with the priorities of the funding

agencies both in terms of the type of support and wide range of disciplines on which the program focuses.

B. PERFORMANCE (EFFECTIVENESS)

Evaluation questions related to performance (effectiveness) focus on the impacts on interns, private sector sponsor organizations and collaborations between universities and private sector sponsor organizations. The results of the evaluation demonstrate that the program has made significant progress in terms of its immediate and intermediate outcomes, although it is too early to determine the extent to which program will result in the development of long-term university-private sector collaborations, the creation of long-term S&T positions by the private sector, and long-term changes in business culture, R&D investments, and S&T activities. More specifically:

- *Interns and sponsors report that internships have enabled interns to gain exposure to a wide variety of real world business problems and research-related activities, obtain relevant experience, and further develop their skills. Interns also report improvement in their career prospects and increased interest in pursuing a career in industry. At the time of the survey, 53% of the former interns were employed full-time and 11% were employed part-time, and nearly one-half of those employed were working in the private sector.*

- *The internships generated a wide range of impacts on sponsor organizations. Most businesses reported that the internships were effective in addressing their business needs. Sponsor organizations report that their use and likely future employment of graduate students and postdoctoral fellows has been enhanced, with some reporting the hiring of interns subsequent to the internship. Sponsor organizations also reported increases in their knowledge and technology base, R&D capabilities, scientific and technical activities, and investments in R&D.*

- *Approximately two-thirds of the sponsors and supervisors reported that the internships have facilitated further collaboration between industry and academia, with the collaboration taking the form of new internships and research projects, networking and other professional relations. Supervisors who had previously collaborated with a sponsor organization were those most likely to indicate the program had led to further collaboration which is expected to continue in the future.*

Impact on the Interns

Through the IRDI program, interns gain exposure to real world business problems and research-related activities. According to interns and sponsors, the internship projects focused most commonly on the development of new technology, development of new products or processes, evaluation of technology new to the organization or refinement of existing products or processes. In terms of research-related activities, interns most often reported extensive involvement in developing strategies and approaches to address research problems, data analysis, data collection, defining the research questions or problem of interest, working with others as part of a team or group, disseminating research results (e.g., through publications, peer-reviewed journal articles, conferences, or presentations), and providing administrative or technical support. The intern's role in the project tended to increase with level of education; for example, postdoctoral fellows were those most likely to be involved in developing research approaches, supervising or managing others, or writing grant applications.

Almost all interns (95%) and supervisors (96%) surveyed reported one or more areas in which the intern further developed skills and gained experience. According to the interns, the areas where the development was greatest on average included their knowledge of the discipline (average rating of 5.7

and 80% provided a rating of 5 or more on a scale of 1 to 7, where 1 is not at all, 4 is to some extent, and 7 is to a great extent), critical and creative thinking (5.5; 76%), ability to conduct research to address private sector problems (5.5; 74%), analytical techniques and experimental methods (5.4; 74%), technical skills, expertise and know-how relevant to the private sector (5.4; 74%), competence in research development and design (5.3; 72%), and report writing and publications (5.2; 68%). The areas of intern improvement most frequently identified by supervisors included the ability to conduct research to address private sector problems; knowledge of the discipline; technical skills, expertise and/or know-how relevant to the private sector; analytical techniques and experimental methods; and communication and interpersonal skills. The findings of the case studies of internships are consistent with the survey of interns and sponsors and indicate that the main impact of the internships on interns was the opportunity to gain practical experience with industry, increase awareness of career opportunities in the private sector, and apply theoretical knowledge in a real-world setting. In addition to learning on the job, interns in the Mitacs-Accelerate program may also participate in a skills training and entrepreneurship program (STEP) workshop where they may receive training in "soft-skills," including project management skills, presentation skills, networking, and entrepreneurial skills.

Participating in the internship was viewed by interns surveyed as improving their career prospects (83% agreed) as well as increasing their interest in pursuing a career in industry (71% agreed) and in R&D (68% agreed). At the time of the survey, 53% of the interns surveyed were employed full-time and 11% were employed part-time. Of those employed, 47% were employed in the private sector. Over half (53%) of the interns employed full-time in the private sector indicated that the job is a research-intensive position, 30% indicated being employed with the company where they interned, and 59% indicated that the internship was important to obtaining the position, usually because they gained experience and skills relevant to the position and sector and expanded their professional and personal network. Each of the seven internships which were the focus of case studies provided an opportunity for interns to apply their theoretical knowledge from academia in a real world setting and gain practical experience in business environment; five of the interns became interested in careers with the private sector (two decided to pursue further education and academic careers), which they had not considered before, and two gained employment in the industry as a result of the internship (one with the sponsor organization and the other with a private sector company via the internship).

Employment Status of Interns At the Time of the Survey

Current Status	Percent
Employment (n=541)	
Working full-time	53%
Not working and looking for work	14%
Working part-time	11%
Not working and not looking for work	10%
On leave from a full time position	1%
Other	11%
Employment By Sector (n=354)	
Private sector	47%
University	38%
Government	7%
Not-for-profit	5%
Other	3%

Of all interns surveyed, one-quarter (24%) were subsequently employed by the sponsor organization after completing the internship including 10% who worked again as an intern, 12% who became employed full-time, and 6% who became employed part-time (some were employed in more than one capacity since completing their internship). Only 19% of interns indicated that a main reason for participating in the internships was to obtain a longer-term position with the sponsor organization. Of

the interns who became employed full-time with the sponsor, 59% were still working there at the time of the survey. Interns with master degrees were more likely than interns with doctoral degrees and postdoctoral fellows to obtain subsequent employment with the sponsor organization and be currently employed in the private sector.

One-in-five (22%) interns working in the private sector indicated that participating in the internship enabled them to obtain a higher starting salary (an average of 23% higher) in their current position than they otherwise would have. Sponsors were more likely (45% versus 22%) to indicate participation in the internship enabled interns they hired to earn a higher starting salary (by an average of 20%).

Impact on the Sponsor Organization

The internships were effective in addressing the needs of sponsor organizations (sponsors provided an average rating of 5.3 on a seven point scale where 7 is a large positive impact, with 73% providing a rating of 5 or more, while supervisors provided an average rating of 5.6, with 83% providing a rating of 5 or more). In particular, sponsors reported that the internship contributed to new or significantly improved process (41%), new or significantly improved products and services (39%), improved quality of existing products and services (28%), and increased the range (15%) and quality (15%) of available services. However, nearly one-fifth of sponsor organizations indicated that the internship did not fully meet their needs, which was attributed most commonly to its short duration and limited scale.

Sponsors surveyed also reported that internships contributed to increases in their organization's knowledge and technology base (average rating of 5.2 with 70% providing a rating of 5 or greater on a seven point scale), R&D capabilities (5.1; 67%), scientific and technical activities (4.9; 65%), and investments in R&D (4.4; 53%). Amongst the sponsor organizations that reported increased investment in R&D, 39% attributed the increase directly to the results of the intern's research project. Other factors included increased awareness of the benefits of scientific and technical expertise (30%), increased awareness of the benefits of R&D (27%), and the results of other research projects (22%). Case study findings indicate that internships have resulted in the development of a wide range of new products and knowledge (e.g., software, computer model, industry practices) and produced significant impacts on sponsors in terms of increased profile among industry, increased revenues, improved competitiveness, and access to new knowledge and better decision making capacity.

The impact of the internships on large companies (i.e., with more than 100 employees) tends to be similar but somewhat less significant than those on smaller companies. On average, smaller companies rated the impact of the internships higher in terms of addressing their needs (5.5 vs. 5.2), increasing the knowledge and technology base of the organization (5.3 vs. 4.8), increasing investments in R&D (4.9 vs. 3.9), and increasing the likelihood the sponsor will employ graduate students and postdoctoral fellows in the future (5.5 vs. 4.7). Large companies are somewhat more likely to have R&D departments and sponsor organizations with R&D departments are more likely to hire interns after the internship and create long-term positions requiring scientific and technical skills.

The employment of graduate students and postdoctoral fellows by the sponsor organizations has been enhanced by the internships, with a majority of sponsors reporting increased likelihood they will employ science and technology graduate students and postdoctoral fellows in the future and some hiring interns subsequent to the internship. Sponsors also reported a moderate impact (average rating of 4.1) in terms of their organization creating long-term positions requiring scientific and technical skills.

Twenty-two percent of sponsor organizations reported hiring one or more of their former interns who were the focus of the survey, including 17% that had one or more still working with them. The internship was important in the sponsor's decision to hire the intern (86% provided a rating of 5 or

higher), usually because it provided skills and experience relevant to the position and the sector. Those who did not hire the intern attributed the decision most commonly to a lack of budget, having no suitable position available, or a poor fit between the intern's skills/research interests and the organization's requirements. Sponsor organizations that hired tended to be more satisfied (average rating of 6.4) with what the student achieved as an intern than were those who did not hire (5.4).

Of the 353 sponsor organizations surveyed, 219 (62%) provided an estimate of the number of graduate students and postdoctoral fellows the organization had hired since the end of the internship(s) in question (89 organizations indicated they had not hired any graduate students or postdoctoral fellows). The total number of graduate students and postdoctoral fellows hired by the 219 sponsor organizations was 356, of which the former interns accounted for 20% (71 graduate students and postdoctoral fellows).

Collaboration Between Universities and Sponsor Organizations

Both sponsors and supervisors report that the program has led to further collaboration between sponsor organizations and university researchers which is generally expected to continue. When asked to rate the impact of the internship in leading to further collaboration, sponsors and supervisors provided average ratings of 5.2 and 5.3 respectively on scale of 1 to 7 where 1 is no impact at all, 4 is a moderate impact, and 7 is a large positive impact (with 72% and 73% respectively providing a rating of 5 or more). Subsequent collaborations most commonly consisted of networking, paid research collaborations or projects, professional relationships, additional internships, and unpaid research collaborations. The internships led to further collaboration by strengthening existing or creating new relationships with the other party as well as identifying research issues/topics and increasing the focus on research relevant to business needs. Both sponsors and supervisors expect collaboration to continue (average ratings of 5.6 and 5.5 respectively). After one internship that was reviewed as part of the case studies, the supervisor created a spin-off company with the sponsor company, which will function as a collaborative project between the supervisor and sponsor with profits and benefits shared between the two.

Nearly one-half of the supervisors (47%) indicated that they had collaborated with the sponsor prior to becoming involved in the IRDI internship. Supervisors who had previously collaborated with sponsors were more likely to indicate that the program led to further collaboration with the sponsor organization (5.7 vs. 5.0) and that they will continue to collaborate with the sponsor in the future (6.2 vs. 4.9). In addition, supervisors who participated in the program for a longer duration of time, especially those who supervised internships longer than eight months, reported greater impacts on collaboration with the sponsor compared than did those who participated for a shorter duration of time.

Surveyed supervisors reported that participating in the internships also benefitted their research (average rating of 5.1, 67% provided a rating of 5 or more) through increasing collaboration with the sponsor organization and others, increasing the focus on business opportunities and issues, opening up new avenues of research, leveraging further funding or increasing access to new funding, leading to papers or publications, and increasing access to data. This is consistent with the findings from the case studies that show that supervisors apply the results of the research projects undertaken by the internships (e.g., apply technology created to other research areas, conduct additional research, and use the research results in teaching).

C. DESIGN AND DELIVERY

The evaluation question related to design and delivery focused on whether the program was implemented as planned, the delivery models and management practices employed by the recipient

organizations, the appropriateness of the internship duration and value, and program design and delivery (particularly the selection and use of multiple third party recipient organizations). The results of the evaluation indicate that:

- *The model was implemented largely as planned although some notable changes were made, particularly with respect to restricting the number of internships per intern. The program has achieved 94% of the number of internships targeted and performance has largely been consistent with the terms of the current funding agreements.*

- *Mitacs-Accelerate has implemented an effective delivery model and management practices to achieve program outcomes. Key aspects include the presence of proactive, qualified, and experienced staff members (particularly on-the-ground business development officers located across the country) and the systems in place to manage and oversee operations. Most interns, sponsors and supervisors are satisfied with the various elements of the program as delivered by Mitacs-Accelerate. It is too early to assess the model employed by Connect Canada.*

- *The progress reported by interns, sponsors, and supervisors indicates that the internship duration and value has been generally appropriate for achieving the program outcomes. While some key informants, interns, sponsors and supervisors would prefer greater flexibility with respect to duration, longer internships would increase the potential for duplication between the IRDI programs and other programs. While most participants and key informants are satisfied with the level of funding per internship, there may be a need to adjust amount of stipend based on cost of living across regions as well as level of educational attainment.*

- *The hands-on, business development approach to delivery facilitates achievement of the intended program outcomes although there are concerns about the high administration costs. The model builds on the existing resources, systems, capabilities, and activities of the recipient organizations as well as their connections with industry and with academia. The multiple recipient organization model has only been in place for one fiscal year and more time is needed to determine whether the potential benefits of the model outweigh any disadvantages.*

Implementation

To date, the IRDI program has been implemented largely as planned although some notable changes were made. In 2010, a guideline was introduced which restricted the number of internships for most students to two (up to 5% of interns can participate in more than two Internships over the course of their academic and post-academic career); the change was made to provide internship opportunities to a greater number of applicants and reduce the potential for duplication with programs that provide for a longer placement. Other changes that were made during implementation included more clearly branding the IRDI funded component of the Accelerate program to distinguish it from other Mitacs activities and more clearly define the terms "intern"[4] and "internship"[5] for reporting purposes. In addition, the recipient agencies have further developed and refined strategies, processes, tools and resources over time as would be expected with any new program. These changes strengthened the

4 "Intern" means graduate student or post-doctoral fellow enrolled in a Canadian Participating Institution which is eligible to receive and manage funds under the guidelines of the Granting Agencies in any area of research (IRDI Funding Template, 2011).

5 "Internship" means a period between four to six months, during which an Intern will work full-time on a research project in Canada jointly developed by a Private Sector Host Organization, the Intern's Supervisor and the Intern, as more particularly described in the IRDI Program Guide. At least 50% of the Intern's time must be spent at the Private Sector Host Organization (IRDI Funding Template, 2011).

program by enhancing the reach (e.g., involving more students), better aligning delivery with some intended outcomes, reducing the potential for overlap, raising the profile of the program, and improving program reporting.

Over the first four years of operations, the program has achieved 94% of the targeted number of internships. Budget 2007 noted that, when fully in place, IRDI would support up to 1,000 internships each year. However, the initial IRDI funding agreement with Mitacs (2008) and the first amendment to that agreement did not include targets for either the number of interns or the number of internships (although an internal target of 400 internships was established by the program). The second amendment to the first funding agreement (April 2010) introduced the target of "approximately 1000 internships per year." According to the annual reports submitted by Mitacs, Mitacs-Accelerate delivered 3,165 IRDI-funded internships over the past four years which represents 97% of the target of 3,250 set by the IRDI program.

Number of Interns Reported, Internships Reported and Internship Targets by Recipient Organization, 2008-09 to 2011-12

Years	Interns	Internships	Average # of internships	Internship Target	% of Target
Mitacs					
2008-09	310	447	1.4	400	112%
2009-10	556	801	1.4	1,000	80%
2010-11	727	974	1.3	1,000	97%
2011-12	733	943	1.3	850	111%
Total	**2,326**	**3,165**	**1.4**	**3,250**	**97%**
Connect Canada					
2011-12	**17**	**17**	**1.0**	**150**	**11%**
Combined Total					
2008-09 to 2011-12	**2,343**	**3,182**	**1.4**	**3,400**	**94%**

Sources: IRDI Financial Statistical Reports 2008-2009 to 2011-2012 (MITACS) and 2011-12 (Connect Canada) and IRDI funding agreements

The 17 internships delivered by Connect Canada during the first year of its implementation is far less than the target of 150. Both recipient organizations reported that it took longer than expected to access the funding in the first year, establish or expand its administrative, legal, and communications systems, develop marketing materials, engage and train employees (particularly business development officers), create awareness amongst its target groups, and attract participants. Connect Canada may have faced greater challenges in that, unlike Mitacs, it was not accessing IRDI funding to build on an existing industrial internship program. Furthermore, the number of internships generated by Connect Canada in its first year of operation was affected by a vacancy in a key business development position and some challenges in finalizing the on-line intern recruiting and matching system software. Representatives of Connect Canada report that the pace of placements has been accelerating in the second year, although data has not yet been reported to the NCE Secretariat for fiscal year 2012-2013.

A review of administrative data indicates that the recipient organizations have met the terms of the current funding agreements with respect a minimum of 30% percent of interns having never participated before (the percentage of interns new to the program was 100% in 2008-09, 89% in 2009-10, 81% in 2010-11, and 46% to November 1, 2011); a minimum of 25% of sponsors having not participated within the past two years (the percentage was 100% in 2008-09, 89% in 2009-10, 82% in 2010-11, and 42% to November 1, 2011), and total funding from all levels of government not exceeding 75% of eligible expenditures (total government funding averaged 52% in 2008-09, 56% in 2009-10, and 58% in 2010-11). While 7% of interns participated in more than two internships over course of their

academic and post-academic career which is greater than the current guideline of 5%, almost all first participated in an IRDI internship prior to the normal limit of two internships per intern being introduced (59% of the interns participated in only one internship and 34% participated in two).

Recipient Organization Delivery Model and Management Practices

Significant effort is often required to bring together the interns, sponsors and supervisors for an internship project. Mitacs-Accelerate has implemented an effective delivery model and management practices to achieve program outcomes. Key strengths include the presence of proactive, qualified, and experienced staff members located across the country (at the time of the interviews, Mitacs employed 24 business development officers, and related management and staff in 13 offices across Canada); the ability to build off existing connections with industry and academia; the systems in place including boards and committees; well-established business processes; and the ability to lever other resources, capabilities, and activities of the organization.

Most interns, sponsors and supervisors are satisfied with the assistance provided by Mitacs-Accelerate staff during the application process, the eligibility requirements, evaluation process, promptness of the notification after applying, and reporting requirements. The average length of the application process for standard applications is 40 days and most applications (i.e., cited by Mitacs at over 95%) are eventually approved. As indicated in the table below, unfunded applicants to the program were those least satisfied with respect to evaluation process, and eligibility requirements.

Satisfaction with Various Elements of the IRDI Program

On a scale of 1 to 7, where 1 is completely dissatisfied, 4 is neither dissatisfied or satisfied, and 7 is completely satisfied, how satisfied are you with the following elements of the IRDI Program as delivered by Mitacs-Accelerate?	Average Rating On a Scale of 1 to 7				
	Interns (n=424-439)	**Sponsors**(n=229-248)	**Supervisors** (n=312-328)	**Unfunded interns** (n=10)	**Unfunded sponsors** (n=7)
Assistance provided by Mitacs-Accelerate staff to you	6.0	6.0	6.4	5.8	5.7
The promptness of the notification on the outcome of your application	5.8	5.8	6.0	5.4	4.8
Eligibility requirements	6.0	5.5	6.0	5.9	4.8
The application forms available on-line	5.9	5.4	6.1	6.2	4.8
The internship evaluation process	5.8	5.6	6.0	4.9	3.5
The reporting requirements during the internship	5.7	5.6	6.1	-	-
The reporting requirements after the internship	5.7	5.5	6.0	-	-
The information available on the existence of this internship	5.4	5.4	6.0	5.7	5.7
The information available to you about how to apply for the internship	5.1	5.4	6.1	6.1	5.2

It is too early to assess whether the Connect Canada has implemented an effective model to achieve program outcomes. The Connect Canada model uses a variety of strategies to attract participants including use of social media, attendance at trade shows and conferences, staging of networking events and information sessions (e.g., at universities), dissemination of print materials, and use of its website, through which students and sponsors can register and can submit an internship proposal. At the time of the interviews, Connect Canada employed only one business development officer and was advertising for another. The Connect Canada website also has matchmaking capabilities whereby students can view and apply to available intern opportunities while sponsor organizations can view resumes and communicate with potential interns.

Duration and Value of Internships

The four to six month guideline was designed to reduce potential overlap with other longer-term programs and give students exposure to business while not significantly extending the time required to complete their degree. Four months conforms with the academic term and enables internships to be integrated more easily into degree programs.

Most interns (76%), sponsors (73%), and supervisors (69%) who expressed an opinion are satisfied with the length of the internships. Only 9% of interns, 13% of sponsors, and 17% of supervisors expressed dissatisfaction. The groups rated the length as appropriate given the level of effort required, the nature of work performed, the time required to complete the research project, and the skills and experience of the intern. While some interns, sponsors, supervisors and key informants would prefer more flexibility to allow for longer internships when warranted by the project and the potential benefits for the students and sponsors, longer internships increase the potential for duplication between the IRDI and other programs.

The progress reported by interns, sponsors, and supervisors indicates that the internship duration and value has generally been appropriate for achieving the program outcomes. However, the results of the surveys suggest that the impacts increase with the length of the internship. Interns who interned for a longer term (especially those participating for more than six months) reported greater involvement in various research activities, further development of skills and experience, increased career prospects and increased interest in pursuing a career in research. Similarly, sponsors and supervisors who participated in longer internships were more likely to be satisfied with the length of the internships compared to those who hosted or supervised internships for less than a ten month period.

Most interns (78%) and supervisors (78%) are satisfied with the level of funding associated with the internship (only 11% of interns and 10% of supervisors expressed dissatisfaction)[6]. The percentage of interns expressing dissatisfaction with the stipend ranged from 9% amongst master's students to 12% amongst PhD students and 15% amongst postdoctoral fellows. According to the administrative data, the average stipend paid per internship ranged from $11,261 amongst master's students to $11,147 amongst PhD students and $ 12,415 amongst postdoctoral fellows. Interns from regions with relatively lower costs of living such as Newfoundland, Saskatchewan, and Quebec were more likely to consider the stipend as appropriate compared to interns from higher cost regions such as Ontario and BC. Some key informants also noted that the stipend is not sufficient for interns with higher levels of education such as postdoctoral fellows and the cost of living varies across cities (a stipend may be adequate in one city but not in another).

Most sponsors (83%) who expressed an opinion were satisfied with the cost of the internship to their organization (only 6% were dissatisfied). Most sponsors view the costs as appropriate given the benefits, the nature of work performed, the length of the internship, and the costs of other similar programs. Larger organizations, especially those with more than 100 employees, were more likely to be satisfied than were smaller organizations, especially those fewer than 5 employees.

Design and Delivery of the Third Party Delivery Model

The IRDI program is considered well-designed to achieve its expected outcomes, particularly with respect to the use of the third party delivery model. The recipient organizations are well connected with industry and academia as a result of their past operations, particularly their experience as research

6 The questions varied by survey group. Interns were asked to comment on their satisfaction with the stipend he or she received, sponsors were asked to comment on the cost of the internship to their organization, and supervisors were asked to comment on the overall level of funding provided for the internship (most of which covers the cost of the stipend).

networks funded by the NCE program. It would be more difficult for the NCE Secretariat to develop the internships because it does not have business development resources available on-the-ground or the same connections and history of working directly with the sponsor organizations. Because of the connections, experience and on-the-ground resources, a third party agency is in a better position to focus on service delivery, take a business development and customer-relationship approach to the development of internship, provide more hands on assistance, and more directly respond to the needs of industry. An issue relating to the existing delivery model, is the high overhead costs as a percentage of the total program budget (costs are discussed in Section D of this chapter).

The process for selecting the recipient organizations in 2008 and 2010 was generally effective. The main challenge related to the limited number of expressions of interest received. According to the NCE senior staff members, the process would have benefited from more extensive promotion and outreach to attract better applications and more qualified applicants. In addition, potential applicants could have been provided with more time to plan and develop proposals. Unfunded applicants noted that the history of Mitacs in delivering the program conferred a significant competitive advantage to them and likely impacted the number of organizations applying as well as the level of effort that applicants dedicated to the process. The unsuccessful applicants recommended that more effort could have invested in attracting organizations from various sectors and regions.

The use of more than one recipient organization has only been in place for one fiscal year and more time is needed to determine whether the potential benefits of the model outweigh the possible disadvantages. Involving multiple recipient organizations could enable the program to better reach out to various industries and involve more universities and students in delivery (each recipient organization has its own experience, expertise, network, and contacts, which may better enable them to reach out to certain niches, regions, and sectors); create opportunities to benchmark performance (possibly contributing to a more competitive environment), compare different approaches, explore alternative delivery models and strategies, and share best practices and lessons learned; and spread the program risk as the delivery of the program is not dependent on the performance of any one delivery partner. The potential disadvantages are that it could create confusion among stakeholders and make it more difficult to establish a recognizable brand for the IRDI program; lead to overlap or duplication of efforts in program promotion; increase administrative costs (through diseconomies of scale); and make it more difficult to monitor how many students participate in more than two internships.

D. PERFORMANCE (EFFICIENCY AND ECONOMY)

The evaluation question related to performance (efficiency and economy) reviews whether effective and efficient means are being used to deliver the program in the context of other delivery models, with a particular focus on whether the program is collecting appropriate information to monitor recipient organization performance, the extent to which the program is effectively managing existing and emerging risks, and whether there are more cost-effective ways of delivering the program. The results of the evaluation indicate that:

- *While the IRDI performance measurement system collects and reports on the types of data needed to monitor performance, there is a need to collect additional output data, improve the performance measurement system with respect to the quality of participant data, and ensure the exit surveys collect adequate data for measuring immediate and intermediate outcomes.*

- *The IRDI program is a low risk program, operating within clearly defined guidelines and target groups, and delivered by well-established and capable organizations. The program has been effective in monitoring existing and emerging risks. Areas which require continued monitored*

relate to the ability of the recipient organizations to achieve their targets over time and the impact of other sources of funding on their operations.

- *Administration costs are high in comparison to those of other programs delivered by the granting agencies. The high costs are offset, to some degree, by the extent to which the IRDI funding is levered with funding from other sources. As awareness of the program and its processes increases, the level of effort involved in developing internships may be reduced. There is insufficient data to determine whether the level of administrative costs is reasonable. Potential strategies to improve cost-effectiveness include undertaking a review of program processes, researching promising practices, and enhancing program promotion.*

Performance Reporting

The performance data collected and submitted by recipient organizations is generally sufficient to fulfill requirements of the funding agreements and annual reporting template as well as measure program outputs and some short-term impacts. While some improvements have been made to the reporting system, further improvements are needed. More specifically, there is a need to clearly differentiate between interns, internship units, applications and projects and to comment directly on performance against specific terms of the funding agreements; improve the quality and integrity of participant data collected by Mitacs;[7] and provide more detailed information on business development that would provide funders with a clearer understanding of the process and how the funds are utilized.

In addition, improvements could be made to the exit surveys conducted with interns, sponsors and supervisors to improve the usefulness of the information and be better able to support future evaluations. The exit surveys could be improved by using more structured, closed-ended questions; clearly defining the content and timing of the exit and follow-up surveys in the context of the larger performance measurement strategy and evaluation plans; ensuring that the survey covers all immediate and intermediate outcomes outlined in the IRDI logic model (only 5 of 8 are currently addressed); and providing for greater standardization across that recipient organizations.

Managing Existing and Emerging Risks

IRDI is a low risk program, operating within clearly defined guidelines and target groups, and delivered by well-established and capable organizations. The program has effectively managed existing and emerging risks. Some changes have been made to the program to manage risks including limiting the number of internships in which a student can participate to reduce the potential overlap between IRDI and other programs and making improvements to the performance reporting.

Consistent with other programs delivered by the NCE Secretariat, IRDI provides grants rather than contributions to the recipient organizations. In general, grants tend to be subject to fewer conditions for both the funder and the recipient than contributions; whereas, with a contribution, the funder tends to be in a stronger position to demand information and to review operations of the recipient. In this situation, the relationship between the funder and the recipient organizations is similar to that which would exist under a contribution agreement in that there are clearly defined program guidelines, targets and reporting requirements. The recipients are meeting their annual reporting requirements and have

7 The administrative data provided by Mitacs for use as a sampling frame required significant cleaning because it contained data entry errors, missing data, out-of-date data, and invalid data. The absence of unique numerical identifiers for participants and projects made it very difficult to identify duplicates. There is a need for Mitacs to revise its data collection and reporting procedures and processes to ensure the quality and validity of the collected participant data. Towards that end, Mitacs has introduced a new database system that is intended to manage all aspects of the internship process.

been forthcoming with additional information upon request. The available administrative data suggest that the grants have been utilized in accordance with the funding agreements. NSERC and the NCE Secretariat have extensive experience in managing grant programs and achieving financial accountability, although the IRDI program is somewhat different than other programs administered by the NCE Secretariat in that it involves grants to third party recipient organizations for the delivery of industrial internships.

Three areas of risk need to be monitored going forward. The first area relates to the ability of the recipient organizations to achieve their targets over time, which can be affected by external factors such as economic conditions, the tax regime, availability of other sources of funding, and the priority that companies place on investing in research-related activities. To address this risk, Mitacs has extensive business development resources in place and the program tracks performance on an on-going basis. There continues to be some uncertainty as to whether Connect Canada will meet its targets. Performance is monitored by the NCE Secretariat on an annual basis.

Second, the program has built on the core capabilities of the recipient organizations, the continued availability of which may be subject to the ability of those organizations to continue to receive funding from other sources. Mitacs has on-going funding agreements in place from the federal and provincial governments for its internship programs. NCE funding for Auto21 is in place until 2015.

Third, the internship programs of the recipient organizations that receive funding from the IRDI program also have the ability to access funding from other sources. In 2011-12, the IRDI program funding accounted for 29% of the funding for Mitacs-Accelerate. Assuming all other funding remains the same, the addition of the $7 million in annual Industry Canada funding matched by industry would reduce the IRDI program's share of Mitacs-Accelerate funding to 19%. At this point, it is uncertain how the various sources of federal and provincial government funding will come together in the future to support the delivery of internships and whether the other funding will contribute to increased overlap between the IRDI funded internship programs and other programs.

Cost-effectiveness

For the period under review, operating expenditures incurred by the NCE Secretariat and NSERC total 3.6 cents for every dollar in grant funding provided to the recipient organizations, which is generally consistent with that of other programs administered by the NCE Secretariat. The ratio of operating expenditures to amount of grants awarded was somewhat higher than that of the Centres of Excellence for Commercialization and Research Program (2.8 cents) and the NCE Program (3.1 cents) but lower than that of the Business-Led Networks of Centres for Excellence program (5.3 cents). The higher ratio may be explained in part by IRDI having similar operating expenditures associated with program start-up, competitions and administration for grants which are smaller than those awarded by the CECR and the NCE programs. The ratio is also somewhat lower than that incurred by the NSERC's IRDF (3.9 cents), and IPS (4.0 cents) programs, which directly award fellowships and scholarships respectively rather working through recipient organizations.

The following table summarizes the sources and uses of the IRDI funding by the recipient organizations related in the fiscal years from 2008/2009 to 2011/2012. During this four year period, the recipient organizations received $24.9 million in NCE grants. Actual expenditures were slightly lower, totalling $24.0 million of which approximately $5.7 million was spent on administrative expenditures and $18.3 million was used in funding internships. As such, the administrative costs of the recipient organizations averaged 23.9% of their program expenditures funded by IRDI, which do not exceed the limit of 25% of the total amount of the IRDI grant for eligible administrative costs. The salaries of staff represent 68% ($3.9 million) of the operating expenditures incurred by recipient organizations. When

the operating expenditures incurred by the NCE Secretariat and NSERC are included, the total operating expenditures for the program are 26.6% of program expenditures for the period under review

Sources and Uses of the NCE Secretariat Funding for the IRDI Program by the Recipient Agencies from 2008/2009 to 2011/2012

Budget Items	Mitacs				Connect Canada	Total
	2008/9	2009/10	2010/11	2011/12	2011/12	2008/9 - 2011/12
Income						
A. NCE grants	$4,260,000	$6,880,000	$6,880,000	$5,871,000	$1,009,000	$24,900,000
B. Balance carried forward from previous year	0	$1,029,364	$1,607,614	$1,240,682	$0	$0.00
C. Funds available (C=A+B)	$4,260,000	$7,909,364	$8,487,614	$7,111,682	$1,009,000	$24,900,000
Expenditures of the Recipient Organizations						
D. Administration	$702,304	$1,625,750	$1,689,002	$1,463,507	$246,689	$5,727,252
E. Internships	$2,528,333	$4,676,001	$5,557,931	$5,426,294	$85,000	$18,273,559
F. Total expenditures	$3,230,637	$6,301,751	$7,246,933	$6,889,801	$331,689	$24,000,811
G. Administration/total expenditures	21.7%	25.8%	23.3%	21.2%	74.4%	23.9%
Total Expenditures (including NCE Operating and Recipient Organization Administration and Internships)						
H. Recipient organization administration	$702,304	$1,625,750	$1,689,002	$1,710,196		$5,727,252
I. NCE operating	$123,203	$213,707	$227,314	$215,498		$887,223[8]
J. Total admin costs	$825,507	$1,839,457	$1,916,316	$1,925,694		$6,614,475
K. Internships	$2,528,333	$4,676,001	$5,557,931	$5,511,294		$18,273,559
L. Total expenditures (NCE and recipient org)	$3,353,840	$6,515,458	$7,474,247	$7,436,988		$24,888,034
M. Admin expenditure as % of total expenditures	24.6%	28.2%	25.6%	25.9%		26.6%

While the administrative costs are high relative to other programs, the costs may be reasonable given the stage of the program's development, the hands-on approach to business development and customer-relations that requires significant on-the-ground effort to develop successful internships (particularly given the significant expansion in the program over the past few years), and the large number of low dollar value internships generated compared to other programs. It is noteworthy that other programs do not feature a hands-on approach to the development and delivery of industry placements.

The efficiency of the programming benefits from the extent to which the IRDI funding is levered with funding from other sources and the extent to which a common program infrastructure (e.g., business development officers) is used to develop and administer internships funded by different government departments. More specifically:

- The high costs are offset to some degree by the extent to which IRDI funding is levered by funding from other sources. Over the four years, sponsor contributions for IRDI funded internships totalled $19.2 million and funding from non-NCE government sources totalled $2.9 million. Taken together, these sources provided $0.89 for every dollar of total expenditures by the IRDI program ($24.9 million) and $1.21 for every dollar expended by the IRDI program on internships ($18.3 million). When funding provided by the sponsor organizations and other non-

8 The total NCE operating costs of $887.223 include $107,500 in expenditures incurred in 2007-08 prior to any grants being awarded to the recipient organizations as well as aggregate costs of $769,723 shown in the table from 2008/9 to 2011/12.

NCE sources is included, the administrative costs of the recipient organizations and NCE Secretariat are equal to 14.1% of total program expenditures, which includes 1.9% expended by the NCE Secretariat and 12.2% by the recipient organizations (this calculation does not include administrative costs associated with sponsor or non-NCE funding). Please note that the administrative costs calculated above for other programs (e.g., NCE and NSERC programs) do not include the sponsor contributions levered by these programs in the administrative costs calculation.

- IRDI funded internships are not administered separately from other internships delivered through Mitacs-Accelerate. In fact, a proposed internship will not be assigned to a specific funding source until after it has been approved. Under the existing model, the recipient organizations are able to allocate administrative costs to the IRDI program up to the maximum percentage defined in the funding agreements (subject to a maximum regarding the total expenditures that can be claimed per internship). For example, subject to a maximum total expenditure claim per internship, Mitacs-Accelerate can claim up to 25% of total expenditures for administration, a rate which is higher than the administrative costs for the Mitacs-Accelerate program overall. Under this model, any reductions in administrative costs will not necessarily reduce the administrative costs claimed from the IRDI program.

It is expected that, as awareness of the program and its processes increases amongst academic supervisors and sponsors, the level of effort involved in developing internships may ease. Furthermore, the program will be able to build on the experience gained, identifying and implementing best practices and making incremental improvements to operations. Within the scope of the evaluation, there is insufficient detailed cost data readily available on the delivery of internships to determine what level of operating expenditures would be reasonable in the future. It will be important for the IRDI program to improve the information currently collected on operating expenditures (e.g., differentiating operating costs from business development activities) to better understand the costs associated with delivery of IRDI funded internships by the recipient organizations, particularly as Mitacs-Accelerate undergoes significant expansion with the addition of funding from Industry Canada. Potential strategies to further improve cost-effectiveness include researching promising practices and identifying best practices that can be shared between the two recipient agencies (e.g., review the success of the online matching service of Connect Canada and assess whether Mitacs could benefit from a similar approach); reviewing program processes with a particular focus on the business development function and streamlining application, review and administrative processes; and enhancing program promotion, particularly through use of websites, targeted marketing, and other promotional activities.

III. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Relevance

There is a strong rationale for the IRDI program, given that Canada lags other developed nations in terms of industrial innovation and business investment in R&D activities. The focus of the IRDI program is consistent with key strategies outlined in the literature to promote industrial innovation, particularly with respect to facilitating collaboration and linkages between academia and industry, supporting skills development, and increasing access to funding.

The IRDI program occupies niche among the other programs in Canada that involve internships or other student placements. While some may share certain objectives and design features with IRDI, these other programs tend to be defined more narrowly than the IRDI in terms of target participants, regions and sectors, involve longer placements (e.g., of 12 months or longer), and involve fewer participants. One-fifth of interns and over one-half of sponsors and supervisors surveyed indicated that they had participated in one or more of these other programs.

The level of duplication or overlap between the IRDI program and other placement-related programs (such as other NSERC supported programs) is not significant, in large part because the focus of the IRDI program on shorter-term four to six month placements. However, the potential for overlap with other programs increases as the duration of the IRDI internships increases; duration is a function of the length of the internships (four to six months) and the number of internships per intern. One recipient organization, Mitacs-Accelerate, currently receives significant funding from other federal or provincial sources of funding which could be used to fund follow-on internships, thereby creating the possibility of overlap between Mitacs-Accelerate and other programs even if there is no overlap between the IRDI program (where funding is normally limited to two internships) and other programs.

From the perspective of participants, the advantages of the IRDI funded Mitacs-Accelerate program were identified most commonly to be the higher value of the financial assistance; the support provided for interns and sponsor organizations (e.g., matchmaking); and a user-friendly application and approval process which facilitates participation by all stakeholders. The disadvantage most commonly identified was the short duration of the internships, which does not allow some interns to complete the research projects that they have started.

The program is directly aligned with federal government roles and priorities in the area of science and technology. The IRDI program objectives are aligned with Canada's Science and Technology (S&T) Strategy, which defines the roles and responsibilities of the federal government in supporting research, science and technology, and skills development as well as with the Innovation Canada: A Call to Action report in 2011, which emphasized the development of talent and skilled labour as well as partnerships between universities, businesses and governments. There are also direct linkages between the objectives of the IRDI program and the Speech from the Throne 2011, Budget Plan 2012, Canada's Science and Technology Strategy 2007, and the strategic outcomes of the three granting agencies.

Effectiveness

The program has made significant progress in terms of its immediate and intermediate outcomes, although it is too early to determine the extent to which the program will achieve its longer-term

outcomes. The program meets the needs of most interns, sponsors and academic supervisors. The internships enabled interns to gain exposure to real-world business problems and relevant industry experience. Participation increases the research skills and level of experience of almost all interns. A small majority of interns (just over one-half) were employed full-time, of whom nearly one-half were employed in the private sector and mostly in positions that are research intensive and use scientific and technical skills. Most of those employed in the private sector reported that the internship was important in obtaining their current position.

Most businesses reported that the internships were effective in addressing their business needs, although nearly one-fifth were not able to fully meet their needs through the IRDI program, which was attributed most commonly to the short duration and scale of the internship. Sponsors reported that their use and likely future employment of graduate students and postdoctoral fellows has been enhanced, which some hiring interns subsequent to the internship. Sponsors participate to solve business needs and to access graduate students and postdoctoral fellows with specific project or technology development expertise. Internships improved sponsor organizations' knowledge and technology base (70%), R&D capabilities (67%), scientific and technical activities (65%), and R&D investments (53%).

The internships facilitated further collaboration between industry and academia by strengthening existing or creating new relationships with the other party, as well as by identifying research issues or topics and increasing the focus on research relevant to business needs and issues. A majority of supervisors note that the internships impacted their research by creating or increasing collaboration with the sponsor organizations, increasing the emphasis placed on business issues and opportunities, opening new avenues of research, leveraging further funding, and leading to papers or publications.

Implementation

The IRDI program has been implemented largely as planned although some notable changes were made, particularly with respect to restricting the number of internships per intern. The recipient organizations have delivered 3,182 IRDI-funded internships over the past four years, which represents 94% of the target set by the IRDI program, and performance has been consistent with the terms of the funding agreements.

While some improvements have been made to the reporting system, further improvements are needed. More specifically, there is a need to improve the quality and integrity of participant data collected (i.e. ensure the accuracy, validity and comprehensiveness of the data over its life cycle); more clearly differentiate between interns, internship units, applications and projects; comment directly on performance against specific terms of the funding agreements (e.g. the percentages of interns per year who have never participated before, sponsors have not participated within the past two years, and interns who have participated in more than two internship units over the course of their academic and post-academic career); and ensure the exit surveys collect adequate data for measuring immediate and intermediate outcomes.

The recipient organizations are well connected with industry and academia as a result of past operations (i.e., research networks funded by the NCE program) and the delivery model builds on their existing resources, systems, capabilities and activities. Recipient organizations take a hands-on business development and customer-relationship approach to the development of internships. The hands-on approach is proving effective although there is concern about the costs of delivery.

While the use of multiple recipient organizations can create confusion and lead to some overlap or duplication, it can also increase the program reach and provide opportunities to benchmark

performance, test and compare different approaches, and share best practices and lessons learned. The use of more than one recipient organization has only been in place for one fiscal year and more time is needed to determine whether the potential benefits of the model outweigh the possible disadvantages.

Most interns, sponsors and supervisors are satisfied with the hands-on assistance provided by the recipient organization, eligibility requirements, evaluation process, response time, and reporting requirements. The most common suggestions for improvement focus on broadening eligibility; increasing flexibility to allow for longer-term internships; and increasing the amount of the stipend that can be funded by IRDI at least for students in some regions or in more advanced degree programs.

Efficiency and Economy

While administrative costs of the recipient organizations are within the program's limit of 25% of the total amount of the IRDI grant, administration costs are high in comparison to those of other programs. The total administrative costs have averaged 26.6% of total program-related expenditures over the past four fiscal years including the operating expenditures incurred by the recipient organizations (23.0%) and the Networks of Centres of Excellence (NCE) Secretariat and NSERC (3.6%). From 2008/2009 to 2011/2012, administrative costs averaged $2,079 per internship including $1,800 incurred by the recipient organizations and $279 incurred by the NCE Secretariat and NSERC. The higher costs of administration relative to other programs reflect the key features of the program's delivery including the significant effort involved in generating internships as well as the large number of low dollar value internships, and the relative newness of the program.

It is expected that administrative costs (but not necessarily the IRDI contribution towards those costs under the existing model) may be expected to decline somewhat over time as awareness increases, the program becomes more established (e.g., an increasing segment of supervisors and sponsor organizations participate on a regular basis) and there is greater use of the websites to facilitate proposal development and review. Within the scope of the evaluation, there is insufficient detailed cost data readily available on the delivery of internships to determine what level of operating expenditures would be reasonable in the future. It will be important for the IRDI program to improve the information currently collected on operating expenditures (e.g., differentiating operating costs from business development activities) to better understand the costs associated with delivery of IRDI funded internships by the recipient organizations, particularly as the Mitacs-Accelerate program undergoes significant expansion with the addition of funding from Industry Canada.

The IRDI program is a low risk program, delivered by well-established and capable recipient organizations, targeting clearly-defined groups, and operating within a set of program guidelines that have been further defined over time. Overall, the program has been effective in monitoring existing and emerging risks; however, further improvements are needed with respect to reporting on performance against the program guidelines. Two areas which need to be monitored on an on-going basis relate to the ability of the recipient organizations to achieve their targets and the impact of other sources of funding on their operations.

B. RECOMMENDATIONS

Recommendation #1: In the context of evolving programs, a forward looking review should be undertaken of the relative role of the IRDI program within the broader environment of funding for internships and other industrial placements.

To date, overlap between the IRDI program and other industry placement-related programs is not significant. However, other federal or provincial sources of funding accessed by the Mitacs-Accelerate program can be used to fund follow-on internships, which raises the possibility of overlap between Mitacs-Accelerate and other programs even if there is no overlap between the IRDI program (where funding is normally limited to two internships) and other programs. Based on the results of the review, consideration should be given to making adjustments, where warranted, to ensure that IRDI is well-coordinated with other sources of funding to the recipient organizations and complementary to other industrial placement programs.

The review should focus on clearly defining the role of IRDI funding relative to the other sources of funding. The review would benefit from the active participation of federal government sources of funding for these internships but should, at minimum, seek input from those organizations. Any future agreements should more explicitly define the expected role of the IRDI funding. Annual reporting requirements should be structured to enable the NCE Secretariat to gain a clear understanding of how the IRDI funding was utilized and fits into the financial statements of the IRDI funded internship program.

Recommendation #2: The program should continue to monitor the effectiveness and efficiency of using multiple recipient organizations and, prior to the next competition, determine whether to continue to allow multiple recipient organizations or restrict to a single deliverer.

The multi-deliverer organization model has only been in place for one fiscal year. More time is needed to determine whether the potential advantages of the model (i.e., increased program reach and opportunities to benchmark performance, compare different approaches, and share best practices and lessons learned) outweigh the possible disadvantages (i.e., confusion among stakeholders, greater difficulties in establishing a recognizable brand, overlap in program promotion, and increased overhead cost through diseconomies of smaller scale operations).

The assessment should compare the advantages and disadvantages of the current model. Based on the results, refinements could be made to the process for selecting and funding recipient organizations, the selection criteria, and the types of organizations and delivery models eligible to receive IRDI grants. Should the decision be made to continue to allow for multiple recipient organizations, a formal outreach strategy should be developed to increase the number of qualified applications received.

Recommendation #3: The performance measurement strategy and reporting requirements should be revised to improve the usefulness, comprehensiveness and integrity of the information reported and ensure that the data reported annually by recipient organizations enables the NCE Secretariat to effectively monitor, assess and report on the results of the IRDI program and support future evaluations.

While some improvements have been made to the reporting system, further improvements are needed. There is a need to improve the accuracy, validity and comprehensiveness of participant data; more clearly differentiate between interns, internship units, applications and projects; comment directly on performance against specific terms of the funding agreements (e.g., the percent of interns who have never participated before, sponsors have not participated within the past two years, and interns

who have participated in more than two internship units); and ensure the exit surveys collect adequate data for measuring immediate and intermediate outcomes.

The program should establish standards with respect to data capture, storage and reporting by recipient organizations to ensure clear differentiation between interns, internships, proposals and projects; facilitate improved reporting against specific terms of the funding agreements; improve the quality and integrity of participant data; improve the usefulness of the exit survey information; and better align the results with the information needs of future evaluations. The number, timing and content of the exit surveys should be defined clearly to ensure coordination across recipient organizations and alignment with the performance measurement strategy and future evaluations. When revising the performance measurement system and reporting requirements, consideration should be given to working with the recipient organizations and other sources of federal government funding for the internship programs to develop common data requirements, procedures and definitions for reporting.

Recommendation #4: The NCE Secretariat should work with the recipient organizations to develop a better understanding of the future costs associated with delivering the IRDI program and, where possible, identify opportunities to reduce these costs over time as a percent of total expenditures.

The IRDI program, as currently designed, is an expensive program to administer. While there is a desire to reduce administrative costs, there is also the recognition that a unilateral reduction in the allowable costs may reduce administrative expenditures but also significantly reduce the level of internships and outcomes generated. Administrative costs (but not necessarily the IRDI contribution towards those costs under the existing model) may be expected to decline somewhat over time as awareness increases and the program becomes more established. The maximum rate that can be charged under the existing grant agreement is equal to 25% of total expenditures, which is higher than the administrative costs for the Mitacs-Accelerate program overall (which totalled 21% in 2011-12). The IRDI program needs to better understand the administrative costs incurred by recipient organizations to deliver internships in general, and specifically IRDI funded internships, and what level of administrative costs are reasonable to deliver industrial internships.

The IRDI program should work with the recipient organizations, possibly in association with the other federal government sources of funding for the internship programs, to review the existing cost structure and the role of the various sources of funding in supporting operating expenditures, conduct internal and external benchmarking, review the business development and administrative processes, identify possible best practices, and analyze opportunities to enhance program promotion and business development, streamline processes, promote cost savings and increased efficiencies. Based on this understanding, the program should define more clearly the role of the IRDI funding in supporting the operating expenditures of the recipient organizations and, in that context, assess the appropriateness of the current funding model for administrative expenses including the definition of eligible expenses and the funding formula.

APPENDIX I: EVALUATION ISSUES AND QUESTIONS

Relevance: These questions assess the extent to which the program continues to address a demonstrable need and is aligned with the goals, priorities and role of the federal government

1. To what extent is there a continued need to fund industrial research and development (R&D) internships for graduate students and postdoctoral fellows?
    - 1.1. What niche, if any, does the program occupy in relation to similar programs in Canada?
2. Is there a necessary role for the federal government in providing the program?
3. To what extent is the program still aligned with federal government priorities in the area of science and technology?

Design and Delivery: These questions assess the extent to which the program has been implemented as planned and established an effective delivery model

4. To what extent has the program been implemented as planned?
    - 4.1. To what extent has the recipient organization implemented an effective delivery model and management practices to achieve program outcomes?
    - 4.2. Is the current internship duration and amount (stipend and private sector sponsor organization funds) appropriate to achieve program outcomes?
    - 4.3. To what extent has program design and delivery facilitated or inhibited the achievement of program outcomes?

Performance (Effectiveness) – Achievement of Expected Outcomes: These questions assess the program progress toward expected outcomes, with emphasis on the impact of the program on intern and private sector sponsor organizations

5. What has been the impact of the program on interns?
    - 5.1. To what extent are the interns exposed to and develop solutions for real-world business problems?
    - 5.2. What professional, technical and/or scientific experiences and skills have been acquired by interns?
    - 5.3. To what extent have interns obtained employment in science and technology positions in the private sector?
6. What has been the impact of the program on private sector sponsor organizations?
    - 6.1. How and to what extent have business needs been addressed by the internships?
    - 6.2. To what extent has the program enhanced the ability of private sector sponsor organizations to access and to employ science and technology graduate students and postdoctoral fellows?
    - 6.3. To what extent has the program exposed private sector sponsor organizations to the benefits of science and technology?
    - 6.4. To what extent has the program enhanced the business culture, activities and investments in science and technology, and research and development of private sector sponsor organizations?
7. To what extent has the program created long-term collaborations between universities and private sector sponsor organizations?

Performance (Efficiency and Economy) – Demonstration of Efficiency and Economy: These questions assess the efficiency and economy of the program, monitoring of recipient organization performance, risk management and alternative delivery models

8. To what extent are efficient and effective means being used to deliver the program in the context of other delivery models?
    - 8.1. To what extent is the program collecting the appropriate information to monitor recipient organization performance?
    - 8.2. To what extent has the program effectively managed existing and emerging risks?
    - 8.3. Are there more cost-effective ways of delivering the program?

APPENDIX II: LIST OF REFERENCES

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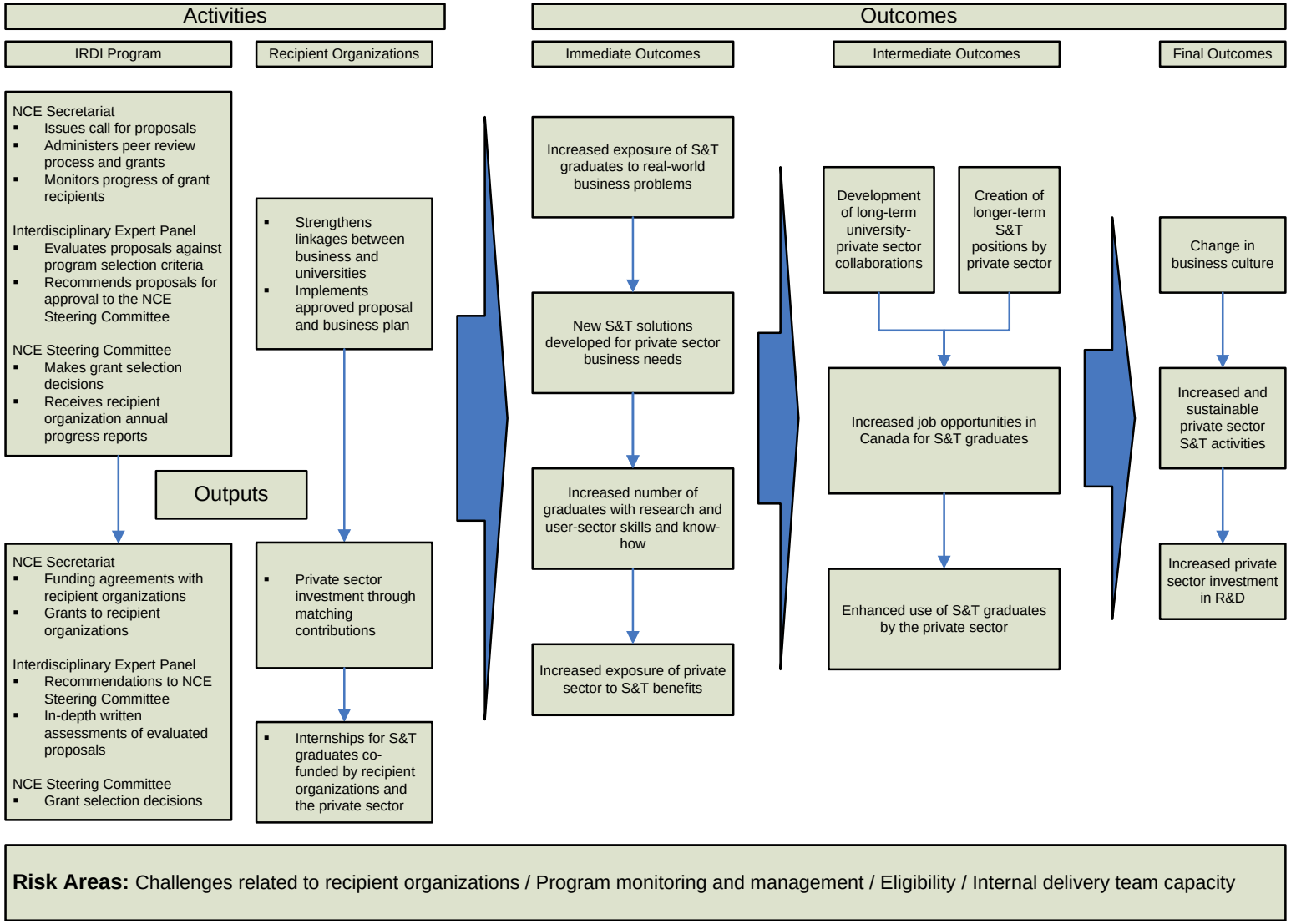
APPENDIX III: LOGIC MODEL FOR THE IRDI PROGRAM

Industrial R&D Internship (IRDI) Program Logic Model



APPENDIX IV: CHARACTERISTICS OF OTHER PROGRAMS

Characteristic	IRDI	NSERC IPS	NSERC IRDF	NRC-IRAP YES	Elevate	NSERC Engage	BMP	Fed Dev Ontario GEI	CREATE
Delivered By	Mitacs and AUTO21	NSERC through universities	NSERC	NRC	Mitacs	NSERC	NSERC and FQRNT through universities	Fed Dev Ontario Graduate Enterprise Internship	NSERC
Supports	Internships	Scholarship	Fellowship	Internships	Internships	Research projects	Internships	Internships	Training programs
Duration	4-6 months	Graduate students 12 to 24 months Doctoral students 24 to 36 months	24 months	6-12 months	24 months	6 months	24 months for Master students and 36 months for PhD students	6 months	6 years
Program Contribution	$5,000 (minimum)	$15,000 to $45,000	$60,000	Portion of salary cost	$115,000	$ 25,000	$14,000 for Master students and $18,000 for PhD students per 2 years	$15,000 for graduate students and $10,000 for undergraduate students	$150,000 first year and $300,000 annually
Sponsor Investment	$5,000 (minimum)	$6,000 to $18,000	$20,000	All remaining cost	$50,000	n/a	$7,000 for Master students and $9,000 for PhD students per 2 years	$7,500 for graduate students and $5,000 for undergraduate students	$0
Target Sponsors	Private sector	Private sector	Private sector	Private sector companies with less than 500 employees	Private sector	Private sector	Private-sector Non-profit Public	Private sector	Up to 50% of grants dedicated to the industrial stream
Target Participants	Grad students and postdocs	Grad students and postdocs	Recent postdocs	Post-secondary graduates from 15 to 30 years old	Recent postdocs	Any	Grad students	Graduate students, recent graduates and undergraduate students	Teams of HQP and postdocs
Disciplines	All	Science and Engineering	Science and Engineering	Science, Engineering, Technology, Business and Liberal Arts	All	All	Natural Sciences and Engineering	Science, Technology, Engineering and Mathematics	All
University Participation	Academic supervisors	Administer scholarships	None	None	Administer scholarships	Administer grants	Academic supervisors	None	Administer funds
Region	National	National	National	National	BC, Ontario and currently Alberta	National	Québec	Southern Ontario	National