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Diversity – The Competitive Edge: Implications for the ICT Labour Market

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Executive Summary

Diversity: The competitive edge

Rapid technological change, globalization, the demand for skills and education, an aging workforce and greater diversity in the labour market have forever changed the employment landscape. Demographic shifts, the growing participation rates of women and the increased reliance on immigration, in particular, have shaped the Canadian workforce. The 'talent war' has become the single most important competitive issue in virtually every sector and has been a particular issue for employers needing skilled Information and Communication Technology (ICT) workers.

Without a talented workforce, Canadian businesses cannot effectively compete. The Royal Bank of Canada has noted that "From an economic point of view, how well Canada continues to meet the challenges of diversity will determine our future success in attracting talented immigrants as global competition for talent intensifies with the aging of Western societies…in the face of potential labour shortages, employers will miss out on opportunities for growth unless they recognize the potential of all groups in Canadian society" (RBC, 2005).

Leading companies are leveraging diversity to achieve their corporate goals. There is growing evidence that providing equitable opportunities for under-represented groups – such as women, visible minorities, aboriginal peoples and the disabled – produces tangible benefits to corporations, although it does require a long-term, integrated and strategic approach. Large public companies, governments and banks have tended to lead the way in implementing strategies to leverage diversity. Benefits that they have identified as a result include recruitment and retention of highly qualified workers, better alignment with diverse global markets, increased creativity and productivity, and higher overall corporate performance.

In spite of the long-term advantages, many employers are not taking full advantage of Canada's diverse workforce. Small and medium enterprises (SMEs) – which often have more limited resources, less flexibility and shorter planning horizons – tend not to pay as much attention to human resources planning and management, at their peril. Canadian women have made great strides in the workplace, but still face a "glass ceiling" and are under-represented in management positions and some professions. Indeed, while female participation in law, medicine, business and even engineering has increased dramatically, female participation in computer science has actually declined. Canada's track record on successfully integrating internationally educated professionals (IEPs) into the workforce is also slipping.

Although IEPs are better educated in general, they have higher rates of unemployment and lower rates of career success compared to other Canadians. Although it is not widespread at this time, there is evidence that many well-qualified IEPs who believe that their opportunities here are limited are leaving Canada and, in some cases, returning to their place of origin as those economies grow (Rao, 2001). The Royal Bank of Canada has estimated that there is a significant economic cost associated with failing to ensure internationally-born workers and women achieve their full potential.

Barriers to full participation

There are complex factors which account for these trends. Research has shed light on some of the barriers to full participation in the ICT workforce facing women and internationally educated professionals. While there is a long list of issues to be addressed, our study suggests that there are no simple solutions to such complex problems. The most difficult barriers to address are systemic, embedded in organizational human resources practices and culture, and often unintentionally reinforced by government and the media.

Some of the most significant barriers are:

Barriers Specific to Women

1) Socialization and Early Education: The research shows that in North American society, girls' attitudes to mathematics and technology are already being formed in primary grades. Their self-perceptions are often not congruent with their abilities, and they begin defining themselves and their career aspirations at an early age. Cultural forces and parents, along with formal education, play important roles.
2) Negative Perceptions of Computing and Related Work: Problems associated with the perception of the IT profession have affected enrolments in the discipline generally and seem to have affected female enrolments most dramatically. Studies have shown that beliefs that the dot.com bust destroyed opportunities in the sector or the notion that the job is "boring" (and focused on coding) have contributed to the decline in female participation in university programs feeding the pipeline.
3) Systemic Barriers in Post-Secondary Institutions: Inflexible entry requirements, a focus on theory in curriculum, traditional models of curriculum, lack of experiential and cooperating pedagogy and the absence of role models are among the barriers to entry and retention in education programs relevant to ICT.

4) Misalignment of Job Descriptions and Job Requirements: In some organizations, concerns have been expressed about the lack of effective integration between functional areas and human resources. Research has also suggested that there are systemic barriers resulting from the misalignment between the skills required to do the job (which heavily emphasize communication and general business skills over technical skills) and the job requirements that are often advertised (which tend to emphasize formal technical training, often in computer science and engineering). Equating "IT professional" with "computer scientist" or "engineer" rather than focusing on the skills required to do the job often leads to the exclusion of women, who are already under-represented in these disciplines. Careful auditing of jobs is needed to ensure that the advertised requirements reflect the job demands.
5) Lack of Workplace Support: Inadequate support in the workplace for women with young families is one of the most significant barriers, but there are others including exclusion from informal networks, the absence of role models, inadequate mentoring, and career development support.

Barriers Specific to Internationally Educated Professionals

1) Inadequate Information about the Labour Market and Processes Prior to Immigration: Many IEPs are ill-equipped to succeed when they arrive. Often, prospective IEPs do not have access to accurate information about what they will face when they come to Canada and what they can do to better prepare themselves. For example, while the process of finding employment is often long and arduous for Canadian-born university graduates, it is even more difficult for IEPs. Credentials in other countries and even work experience are often not adequately recognized. This often leads to expectations which will not be satisfied.
2) Settlement and Job Search Challenges: New IEPs frequently lack the financial resources and skills needed to navigate the complex and largely informal job market in Canada.
3) Inadequate Communications/Cultural Skills: Even in the IT sector, employers emphasize the importance of communication skills and general business knowledge more than IT skills. While language skills are important, communication skills are much broader and cultural competency is hard to define. Even IEPs with competent language skills may need to develop their understanding of culturally specific conventions, nuances and interpersonal behaviours.
4) Systemic Barriers in Employment Practices: The three most significant barriers related to employment practices are a) the reliance on informal networks to recruit; b) demand for Canadian work experience (this presents an interesting paradox, since you cannot get Canadian work experience unless you have Canadian work experience); and c) lack of recognition of international credentials.
5) Inadequate Support in the Workplace: Once employed, internationally educated professionals may not have the same level of access to the informal networks that are often critical to professional success. Culture or customs may, for example, lead them to be excluded from informal social events which are often critical to the formation of relationships, informal communications networks and deal-making. There is also evidence of inequities in access to professional development and career advancement.

Recommendations

Given their prominent numbers in the Canadian labour market, effectively tapping into the supply of well-qualified women and internationally educated professionals could go a long way to addressing current and projected labour shortages in the ICT sector as well as helping companies achieve their competitive goals. Research shows that there are ways in which these barriers to full participation can be overcome, but that effective programs must be 1) strategic, 2) integrated, 3) sharply focused, and 4) evaluated. In addition, there are broad social and cultural factors which shape perceptions and expectations – for example, around women and technology – which must be addressed.

All stakeholders – government, employers, educators, workers, and media – have roles to play in removing barriers and promoting full participation and achievement of all Canadians. There is much to be done in this regard. The top recommendations are:

Initiatives Specific to Women

1) Socialization and Early Education: As the early years are most critical in shaping an individual's self-perception and aspirations, we need focused and integrated efforts beginning in the primary grades to encourage girls to participate in math and technology courses. This means addressing teaching and curriculum as well as educating parents, teachers and guidance counsellors. While boards of education talk about diversity, more needs to be done to implement fact-based programs. This, of course, requires resources.

2) Improve Understanding of Careers in ICT: Concerted, cooperative efforts are needed to counter the perceptions that there are fewer opportunities in ICT and that the job is not stimulating. This is not an easy task and requires the industry to take an active role in communicating more effectively. High schools need to focus on ensuring improved counselling about ICT career opportunities and education. The way in which IT is taught (discussed below) also needs to be more applied, incorporating experiential work to ensure students understand the range of opportunities available and nature of a career in ICT.

3) Systemic Action to Improve Participation of Women in Post-Secondary Institutions: Canadian post-secondary institutions and the governments which support them need to be more responsive to employment trends on the one hand, and to the participation of women on the other. Although progress has been made, barriers continue to exist and there is limited attention paid to the issue. Post secondary institutions need to track representation of women as students, faculty and administrators in IT and related disciplines and carefully examine all aspects of the practices that may affect their participation. Hiring practices, salaries, promotional policies, and research support dramatically affect the ability to attract and retain highly qualified women in IT teaching roles. Such factors, in turn, affect the availability of role models for young women in these disciplines. All aspects of IT educational programs, including admission requirements, curriculum, and pedagogy, need to be reviewed with input from industry on required workplace skills. The Carnegie Mellon case shows that with a concerted effort, representation of women can be dramatically increased in computer science programs. In addition, given the substantial evidence of the need for "hybrids," more opportunities should be provided for combined majors and minors in information technology. Governments and associated agencies need to reinforce this by ensuring diversity is incorporated as an important performance measure in funding educational programs, research and projects.

4) Employers Need to Remove Systemic Barriers to Recruitment: Employers must ensure that job descriptions and recruitment strategies are aligned with job requirements. At present, the significant demand for communication skills and general business knowledge in addition to technology skills is not always reflected in recruitment approaches. Recognizing and deliberately exploiting the multiple pathways to the ICT sector can significantly increase the representation of women. Employers should work with educational institutions to provide job specific IT training to generalists with other high-demand skills – namely, communications skills, project management and general management skills.

5) Employers Need to Provide Better Supports in the Workplace: Progressive workplace policies related to parental leave, job-sharing, flexible work arrangements and on-site daycare have a significant impact. Crafting approaches which support mentoring, informal networks and career development for women in non-traditional fields are also important.

Initiatives Specific to Internationally Educated Professionals

1) Manage Expectations: Making better information resources and preparation available to internationally educated professionals, prior to their entry to Canada, would help ensure they are better equipped to deal with the realities they will face on arrival. In particular, access to assistance with communication and cultural training, credential recognition, information about the complexity of job search processes including resume preparation, and other resources in advance of arrival would greatly reduce the time taken to acquire full employment.

2) Improve Initial Settlement and Job Search Success: In order to ease the settlement and initial job search processes, the following are essential: a) coordination among government in consultation with employers of policies and services related to attracting, selecting and settling IEPs, b) adequate resources available on arrival, c) support and mentoring for the initial job search. The evidence is clear that IEPs who take their time finding a position and have access to good support such as mentoring are more likely to wait longer but eventually secure more appropriate jobs. This has a very significant impact on their career trajectory.

3) Bridging the Employment Gap: The three most important measures which can be adopted are: a) removing systemic barriers in recruitment practices (e.g., providing access to informal networks used in most job placements), b) strengthening collaborative programs involving business, government and educators to enable internationally educated professionals to gain Canadian experience through internships, work study programs, mentoring and other efforts and c) streamlining the recognition of international credentials.

4) Communications/Cultural Skills Training: While internationally educated professionals often have excellent technical skills, the evidence suggests that employers also place emphasis on communication and general management skills. The biggest challenge faced by IEPs is the need to be effective communicators, which requires not just language skills but also cultural awareness and interpersonal skills. Making targeted, effective programs

available to support new IEPs on arrival and during employment will substantially enhance their opportunities to success.

5) Improved Workplace Support for Diversity: The importance of an integrated approach to supporting an inclusive workplace is discussed in more detail below, but in short: providing additional support for communications and cultural awareness in the workplace, targeted mentoring programs and a commitment to training and professional development are among some of the most promising ways to improve workplace support for diversity.

Towards an Integrated Strategy

The full range of stakeholders – government, educational institutions, associations, employers, workers and the media – need to be engaged. Within organizations there is a need to erode the barriers which often exist between functional areas and human resources. Some strategies for accomplishing that goal include:

1) Diversity Audit and Scorecard: There is no "one size fits all" approach to diversity. Organizations which are committed to embracing diversity need to walk the talk. All too often, well-intentioned diversity programs do not address the systemic barriers to full participation, nor do they establish specific targets and accountabilities.

   While Crown corporations and regulated companies must provide formal reports on diversity, practices are uneven across the ICT sector. In the educational sector, school boards, colleges and universities and related councils and agencies also lack effective monitoring and assessment of their performance. The organizations which have most effectively exploited diversity are, not surprisingly, those which have invested in systematic, comprehensive, top-down approaches. Effective programs require:

— senior management commitment and support;

— link to strategic business objectives;

— reinforcement throughout operational plans in functional areas;

— support with a comprehensive human capital strategy (recruitment, development, promotion); and

— measurable targets and accountabilities.

2) Diversity Research: While much has been written on the benefits of diversity, there is still room for improving our understanding of what does and does not work. Better data and more research examining current practices will help advance our understanding of processes for developing strategies which "fit" in particular contexts. Best practices must be innovative, make a measurable difference, have a sustainable effect, be replicable and serve as a model for generating initiatives elsewhere.

3) Diversity Watch: Corporations should ensure they use their influence in their dealings with suppliers, post-secondary institutions and the media to identify opportunities to promote a climate which reinforces and nurtures diversity. We need constant attention to the broad cultural forces that shape expectations and perceptions of women, IEPs and other represented groups. Media, including news, advertising and entertainment, are a powerful force. Companies committed to diversity need to also be committed to shaping the cultural environment. Recognizing and acting on the under-representation and stereotypes that reinforce systemic barriers should not be left to small and often-marginalized "advocacy" groups. If companies are serious about diversity, they should leverage their influence to ensure better representation and balance in the images that bombard us daily and subtly shape expectations. The fact that many eastern European and Asian countries have higher representation of women in engineering professions than Canada suggests that cultural values and beliefs may play a role in affecting choices concerning education and career. The images and assumptions that permeate our culture have a significant impact on the career aspirations of young women as well as internationally educated professionals. Positive images and role models are essential to efforts to promote equal opportunities for all. Stereotypes and the absence of role models play subtle roles in limiting the opportunities for women and internationally educated professionals.

Summary

Meeting the challenges of diversity will have a profound impact on the growth of the Canadian ICT sector. Increasing the participation of women and effectively integrating internationally educated professionals will help ensure the supply of highly skilled workers meets growing demands in an intensively competitive labour market. Leveraging diversity can offer a competitive edge but it requires a long term orientation and integrated strategy involving the full range of stakeholders. The experience of leading companies shows the payoff can be significant. Effectively addressing diversity is no longer just a matter of human rights or equity, it is a competitive necessity.

1. Introduction

There are definite challenges to describing and projecting the future composition of the Information and Communications Technology (ICT) workforce. It is generally acknowledged that the "talent war" is a major global competitive issue affecting virtually every industry sector, as demographic trends coupled with changing workforce demands create labour shortages and intense competition for skilled workers. The precise impacts of an aging workforce, the growing dependence on immigration, and technological change in the ICT sector are the subject of some debate. However, there seems to be a generally accepted view that there will be a shortage of well-qualified ICT workers. Consequently, it is important to develop an integrated approach to developing the supply of such workers. Encouraging more students to choose ICT-relevant areas of study, promoting multiple entry points to the profession, ensuring full participation by under-represented groups, and attracting and retaining well-qualified internationally educated professionals (IEPs) are elements of the solution. In addition, there is evidence to suggest that ensuring the diversity of the ICT workforce parallels the diversity of ICT markets offers strategic advantages to corporations.

The Information and Communications Technology Council (ICTC; previously the Software Human Resources Council) and others have systematically analysed Canada's ICT workforce and the factors affecting demand and supply. The high rate of growth in these occupations and the rapid pace of change have led to industry concerns about a shortage of skilled information technology workers in many countries, especially during the late 1990s (Stager, 2001; ITAC, 1999; Gunderson, 2005). Even after the decline in the IT sector in 2001-2002, the Information Technology Association of Canada reported high demand for product-specific technical skills (ITAC, 1999; 2002). However, others have reported that the issue is less the overall supply of technical skills than the match between the skills required and the skills available. For example, employers have reported difficulty recruiting senior-level people who combine a solid technical background with experience and management skills such as project management, strategic planning, marketing and business writing (ACST, 2000). Consequently, a nuanced analysis of the ICT labour-market demand is needed to understand the nature and dimension of the skills shortage as well as the impact of increasing the participation of women and internationally educated professionals in the workforce.

Effectively addressing diversity is essential to attracting and retaining high performing qualified workers in the ICT industry, but diversity can also provide organizations with other competitive advantages. Having a diverse workforce can improve the bottom line, create global business opportunities and improve relationships with clients, customers and suppliers. Diversity can also enhance creativity and innovation within the organization, as well as improve an organization's reputation. Several studies link workplace diversity and company performance. Lockwood (2005) provides a detailed review of these:

— Diversity Practices That Work (NUL, 2004)

  Companies with diversity practices collectively generated 18% greater productivity than the U.S. economy overall. Key factors that had the greatest impact on overall perceived effectiveness of diversity initiatives were: 1) a track record of recruiting diverse people; 2) management that is accountable for diversity progress and holds others accountable; 3) leaders who demonstrate commitment to diversity; 4) rewarding people who contribute in the area of diversity; and 5) training and education to increase awareness and help employees understand how diversity can impact business results.

— Diversity and Business Performance (Kochan et al., 2002)

  This study suggests racial diversity has a positive effect on overall performance in companies which use diversity as a resource for innovation and learning. It also found that the best performance outcomes occur when diversity is present across entire organizational units.

— Impact on Corporate Performance and Gender Diversity (Catalyst, 2004)

  Based on an examination of 353 Fortune 500 companies, this study connects gender diversity and financial performance. It suggests that the group of companies with the highest representation of women on their top management teams had better financial performance than the group with the lowest women's representation, including a 35% higher return on equity and 34% higher total return to shareholders. It did not, however, establish causality.

A survey by the Society for Human Resource Management on the impact of diversity on the bottom line suggested that diversity initiatives provide organizations with a competitive advantage by generating positive improvements in corporate culture, employee morale, retention and recruitment. A survey of 310 Fortune 500 companies identified a number of ways companies attempt to leverage the diversity of employees. (See Table 1)

Table 1: Diversity and Competitive Advantage (SHRM, 2005)

Question: In what ways does your organization actively leverage the diversity of employees for the purpose of increasing competitive advantage (Number of Respondents = 310)	
By ensuring leadership development programs reach all employees	40%
By meeting the needs of diverse customers (bilingual, etc.)	39%
By integrating diversity into the organization's business strategy	35%
By increasing innovation by tapping employees of all backgrounds	34%
By utilizing diverse experience levels on projects/assignments	31%
By using diverse employees to recruit new employees	30%
By improving the performance of teams	29%
By attracting customers of a particular market or demographic	25%
By using diverse employees as mentors to help employees improve their performance	24%
By increasing productivity with motivation techniques that apply to a variety of employees	20%
By conducting culture audits to benchmark diversity progress against competitors	7%
Other	2%
Not Applicable: my organization does not actively leverage workforce diversity	30%

Many leaders in the ICT sector are explicit about the importance of diversity to their corporate positioning and have put in place comprehensive strategies to exploit diversity. Some examples:

"In 2001, IBM began assigning executives to develop relationships with the largest women- and minority-owned businesses in the US. .....these business sectors are growing fast and their leaders are often highly visible role models, and their IT needs will grow. Already, these assignments have yielded impressive revenue streams with several of these companies." (Thomas, 2004)

"At HP, we believe that diversity and inclusion are key drivers of creativity, innovation and invention." Hewlett-Packard Canada (Diversity & Inclusion, HP website – http://www.hp.com/hpinfo/abouthp/diversity/)

"At Microsoft Canada Co., we believe that diversity enriches our performance and products, the communities in which we live and work, and the lives of our employees. As our workforce evolves to reflect the growing diversity of our global marketplace, our efforts to understand, value and incorporate differences become increasingly important." Microsoft Canada (Microsoft Canada Career Centre, Pride in Diversity, Microsoft website – http://www.microsoft.com/canada/employment/pride_in_diversity.mspx)

"The success in attaining corporate objectives is directly related to the advantage of having an inclusive and diverse workforce. A workforce of inclusion brings a wealth of ideas, innovation, and drive to the organization. Women's networks at Cisco are supported and recognized as critical to the foundation of an inclusive organizational culture." Cisco Systems (Women's International Networking website sponsor page – http://www.winconference.net/sponsors.asp)

"At Intel, we strive to hire and retain the best talent from an increasingly global and diverse labor pool. We believe this will result in a better understanding of our customers' needs, better products tailored to those needs, and ultimately advance Intel's global leadership position." Paul Otellini, President and CEO of Intel Corporation (Jobs at Intel – http://www.intel.com/jobs/diversity/paul.htm)

"Finding new ways to provide the same services can help us be more competitive globally. We recognize the creative and fresh thinking that immigrants bring to Convergys." Theaston White, Diversity Consultant, Convergys (http://www.hireimmigrants.ca)

2. Composition of the ICT Workforce and Projections

2.1. The current size, composition and geographic dispersion of the ICT workforce

Overall, there has been significant growth in IT-related work in Canada from 1961 to 2005. The trend is one of steady growth from 1960 to about 1980, followed by almost continuous high growth from 1980 to 2002, peaking at about 625,000 jobs, and then hitting what amounts to a plateau at around the 600,000 level over the last four years (Wolfson, 2006). From 1991 to 2001, IT employment grew at a rate of about 12% per year, compared to an overall growth in the Canadian workforce of around 1.3% per year throughout that period.

The 2000-2005 analysis also provides data on unemployment rates in IT jobs. Unemployment among IT professionals peaked at about 6% in mid-2002 and has declined steadily since then to 1.9% (Wolfson, 2006). By comparison, overall unemployment in Canada was almost 8% in mid-2002 and about 7.6% at the end of 2005.

Some findings regarding the shape of the workforce (Wolfson, 2006, O'Grady, 2006) include:

— most IT workers work in large firms – this pattern prevails across most occupations;

— ICT workers are almost evenly divided between end-user organizations and technology providers (including both services and manufacturing);

— growth in ICT services has dramatically outpaced growth in ICT manufacturing during the period 1997-2004;

— financial services is one of the most ICT-intensive sectors;

— half of IT workers are located in Montreal, Toronto and Vancouver with a further 20% in Ottawa-Gatineau and Calgary-Edmonton. Surprisingly, more than 40% of provincial public-sector IT workers are in Quebec;

— it is a relatively young workforce, more so in the private than public sector, with some variation by occupation and region;

— most jobs are male-dominated;

— representation of visible minorities varies considerably by occupation and region; more representation in larger firms;

— the most prominent areas of work are software, Web/Internet/Intranet, and database – however, most IT occupations engage in multi-tasking across various areas of work; and

— in the private sector, 40% of IT workers are concentrated in three occupations: computer programmer, information systems business analyst/consultant, and software engineer. Similar trends are present in the public sector, except that they are more concentrated, software engineers are less prominent, and user support is more prominent.

Table 2: Percentage of overall workforce and IT workers by region in Canada

	% of the full-time Canadian workforce in 2006 (Statistics Canada, 2006)	% of all workers that are IT workers (Wolfson,2006)	Unique factors
Canada	100%		
Atlantic	6.6%	5%	More technicians
Quebec	22.8%	23%	High percentage of public servants; fewer engineers
Ontario	39.3%	49%	More engineers; more analysts
Prairie	18.3%	13%	Fewer engineers
BC	13%	11%	Fewer analysts

While Ontario has 39.3% of the total Canadian workforce, it has a higher percentage of the IT workforce. Not only are a large proportion of high-tech companies headquartered in Ontario, but so are many corporate head offices of large IT-intensive organizations (for example, banks). Among the IT employment taxonomy of 21 occupations, six occupational groups made up almost two-thirds of the workforce:

Table 3: Occupations in the IT workforce (Gunderson et al., 2005)

Position	Percentage of IT workforce
Computer Programmer	18.0%
Business Analyst/Consultant	12.4%
Software Engineer	9.9%
User Support Technician	8%
Computer/IS Manager	7.8%
IT Project Manager	7%

2.2 The impact of global trends

Globally, there has been much discussion about the shortage of workers in general and in the ICT sector in particular. Organizations such as UNESCO, as well as the national governments of the USA, Great Britain, Australia and Singapore have studied the phenomenon. In addition, major IT vendors such as Microsoft and IBM have identified this shortage as a major competitive threat. A recent report by Microsoft, for example, noted that South Korea is graduating the same number of engineers as the U.S., despite having a population one-sixth the size. By 2010, 90% of the world's scientists and engineers will be living in Asia (Microsoft, 2006). Critical global trends identified include the aging of the workforce, outsourcing and the emergence of new global sources of competition.

Much has been made of the demographic shifts which will fuel a global "talent war" as the availability of skilled labour in Canada will flatten with the aging of the population. The supply of Canadian workers will not keep up with the projected growth in demand. It has been suggested that by the year 2011, 100% of workforce growth in Canada will be fuelled by immigration (Bloom and Grant, 2001).

Given the relative mobility of IT and the movement of work and workers offshore in response, there is some evidence that "outsourcing" is increasing (Clott, 2004; GAO, 2005; Grant and Babin, 2006b; Prism, 2004). A global ICT workforce allows companies in some segments working to deadlines to "follow the sun" on IT development projects. The trend towards outsourcing certain aspects of ICT work has altered the shape of demand for labour, and in particular the availability of entry-level positions. To date, off-shoring has had the most impact on production-oriented jobs.

The explosive growth of the ICT sector in emerging economies in the Far East and Southeast Asia presents opportunities for, as well as threats to, companies in North America. Many, for example, have taken advantage of highly skilled and inexpensive IT labour abroad. At the same time, it presents competition for attracting highly qualified foreign-born workers.

2.3 Demand for ICT workers

Overall Projected Demand

Addressing the problem of matching demand with supply requires a clear and nuanced understanding of the requirements. However, there has been limited success in projecting IT skills demands in detail. In 1997, for example, there was significant concern about the shortage of computer scientists and engineers, resulting in a huge push to "double the pipeline and increase the educational capacity in Canada and elsewhere in these fields" (Roth, 1998). Four years later, ITAC (2002) sponsored a survey of Ontario-based users and suppliers which estimated that Ontario actually had a surplus of 24,531 IT qualified professionals. It concluded at that time that the issue was not the availability of workers *per se* but the skills of those workers: "clearly some skills are in greater demand than others." In the same year, the Canadian Advanced Technology Alliance (CATA) maintained that technological skills are not the only ones needed and that in fact the projections may have been based on inaccurate assumptions. As CATA's study noted:

> When Industry Canada first became interested in the software industry in 1987, it assumed that the industry's biggest problem was a lack of programmers. Software execs said that while it certainly was hard to find enough good ones, the real problem was finding sales and marketing people. When I put the question to the CEOs who serve on the CATA Alliance board today, I get the same answer, 'Marketers are harder to find than engineers' (CATA, 2001).

In other words, the issue is not simply the overall demand and supply of IT professionals, but the fit or alignment between the skills and competencies needed and those

available (Grant and Babin, 2006a). The IT industry needs workers who are well-rounded and have a diverse array of skill sets. Consequently, the problem of the ICT workforce must be understood not just in terms of a shortage in the number of workers available, but also in terms of the specific skills required for a variety of positions in the ICT sector.

The ICTC's most recent study (O'Grady, 2006) has considered a range of factors and estimates that approximately 58,000 new IT jobs will be created over the next three to five years. While Statistics Canada suggests retirements do not contribute significantly to replacement demand in this sector, the estimated net growth including replacement of retirees is 89,000 jobs. The demand varies by job category, industry segment, region and type of enterprise (e.g., public versus private, or small versus large).

Overall, demand for IT professionals has increased significantly in recent years. The GTA remains the single-largest market for IT professionals in Canada as Toronto has the largest concentration of private IT facilities in Canada, and the third-largest in North America, behind San Francisco and New York (CNC, 2006). Demand is outpacing supply and finding talented candidates in a number of roles is becoming increasingly difficult. According to the ICTC, Canada's IT sector has 1.9% unemployment rate in 2005, a rate much lower than the overall unemployment rate. Yet an IT World Canada survey released in June reported that companies across Canada are planning to increase their IT departments by an average of 23% in 2006 (CNC, 2006). The projected shortage of workers is not confined to Canada: the Communications Research Association in the US, for example, projects a shortfall of more than 100,000 IT workers by 2012 (CNC, 2006).The demand for ICT workers is neither confined to nor does it affect the ICT sector alone. Information systems departments in virtually every sector of the economy are also being affected.

Work is ongoing to project the supply and demand of ICT workers. The market is complex and projections are difficult because of the variety of definitions for the terms "ICT workers" and "ICT sector." In general, the demand for ICT workers in Canada is driven by:

— increases in general levels of economic activity;
— technological changes;
— research and development;
— investments in ICT; and
— exports of ICT (O'Grady, 2006).

Improvements in productivity and offshoring can dampen the growth in demand.

Specific Skills Demanded by Employers

There are different demands in segments of the ICT market, but there are less data to illuminate demands in these segments. For example, demand is higher in service industries than among manufacturers. Demand historically has been higher in Ontario than other parts of the country, but general economic growth in Western Canada is being accompanied by growing demand for IT workers.

Addressing the demand for ICT workers depends on a clear understanding of the precise nature of the skills required, yet this is the subject of much debate. A recent study by the ICTC, for example, found that the principal demands were for:

— communications skills;
— general IT skills; and
— general business skills.

Table 4: Demands reported by Employers (Gunderson et al., 2005)

	Very important	Somewhat important	Less important	Not required
Personal Skills	53.6%	31.2%	10.8%	4.3%
General IT Skills	31.4%	27%	20.6%	20.9%
Business Skills	23.3%	23.7%	15.7%	29.3%

While general IT skills are very important (31.4%) or somewhat important (27%) personal skills are considered more important with 53.6% saying they are very important and 31.2% saying they are somewhat important. Almost 47% also say business skills are very important (23.3%) or somewhat important (23.7%) suggesting significant demand for "hybrids" who combine communication and general business skills with IT skills. In addition:

— employers regard experience as more important than education across all industries and occupations, and generally where more contract workers are used;

— main fields of study in university generally relate to subsequent jobs, but often workers come from other fields;

— responses highlighted the importance of broad-based generic training;

— multi-tasking is seen to be important in IT, with IT workers expected to do a wide range of tasks that constantly change. Task boundaries are not easily defined in broad-based, ever-changing job requirements; and

— multi-skilling is also viewed as essential so that IT employees will be equipped to fulfil the multiple roles expected of them, and will be prepared for ever-changing job requirements.

While a broad range of skills is required to meet a range of tasks, personal and interpersonal skills are often cited as being more important than general IT skills, which in turn are more important than business skills. Within IT skills, analytical and communication skills are also more important than narrow, specific, technical skills. Individuals and educational institutions should consider this as they prepare for their careers.

When ICT jobs are advertised, they often include detailed lists of specific qualifications. According to recruiters and sector experts, the new demands are based on technological systems that are increasingly complex. "A company may have ten technology systems that require more than ten different skill sets because the systems use different programming languages and operating systems and have different applications. This fragmentation of technology creates increased specialization and has reduced the interchangeability of IT workers from one project to another" (Jobstart, 2001). Along with the requisite general skill categories, other studies have suggested that employers have highly specific and precise technical requirements. More research is needed to better understand the skill requirements of employers. For example, a study for ICTC by IDC defined the top 15 skills in demand for 2005 and changes over previous years. The leading requirements included:

— Windows XP;

— TCP/IP;

— Security skills;

— Windows 2000/MA; and

— Microsoft SQL Server (IDC, 2005).

However, prospective employees suggest that there should be more recognition of the transferability of skills as well as training to allow workers to upgrade their skills to meet emerging needs. Once a student has a grasp of programming principles, learning framework another language or application is relatively simple. While it is important to project demand for particular skills, it is also important to consider capacity to develop those skills.

In addition, it is important to ensure that the skills demanded by recruiters actually fit the real job requirements. For example, recruiters may focus only on computer science graduates even though a detailed skill analysis would suggest that others could fulfil the job requirements, for example a Bachelor of Commerce holder with an IT specialization. This has important implications: only 17% of computer science graduates are female compared to 50% of BCom graduates.

The fact that experience and informal methods of skill acquisition are more important than formal training and education suggests that employers need to structure aspects of the work environment to encourage such informal methods (e.g., mentoring, coaching, job rotation, teams). They also need to ensure access to them and to provide incentives to recognize and reward the sharing and passing on of knowledge acquired through experience.

Most employers want employees who can "hit the ground running" and have previous experience. This is a paradox for many recent graduates as well as internationally educated professionals, particularly as more and more entry-level positions are being offshored. There is no substitute for relevant work experience, but a wide range of experiential learning techniques can be incorporated at educational institutions as well as in the workplace. Given the evidence that entry-level positions – normally the source of experience – are being outsourced, as well as the challenges facing IEPs, innovative approaches are needed.

There is an urgent need for increasing placements for co-ops, interns and transitional workers. Employers must be prepared to invest more time and energy in training and development.

Many employers prefer to rely on contract workers rather than maintain a full-time staff. While this provides more flexibility it also reduces commitments to training and development, in some ways reinforcing the ICT skills shortage.

2.4 Factors affecting supply

The supply of IT professionals for Canada comes from several sources:

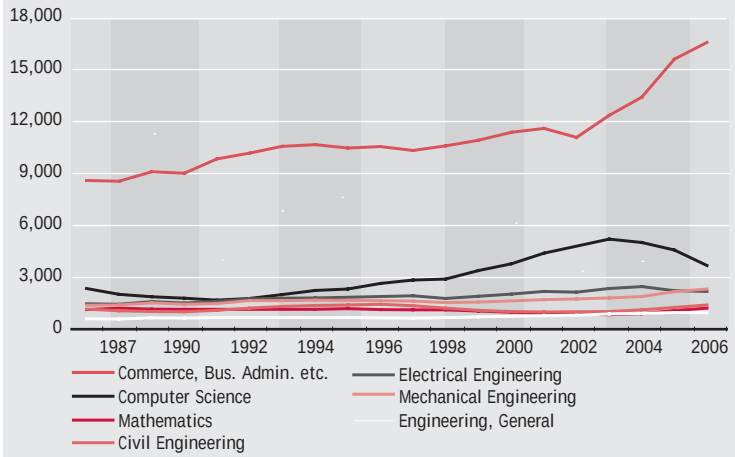
— Canadian university graduates in computer science and engineering;
— Canadian university graduates in allied disciplines, e.g. management, informatics;
— international students graduating in computer science and engineering;
— new IEPs with IT training and experience; and
— the retirement rate of experienced workers.

Several factors are reducing these sources of IT professionals:

— the aging population and a smaller workforce generally;
— the decreased choice of computer science and engineering among high school students;
— the significantly decreased choice of computer science and engineering among women;
— competition from allied areas;
— more competition from other nations for internationally educated professionals as IT industry abroad grows dramatically, decreasing numbers of international students staying in Canada;
— retention of workers in the sector; and
— "brain drain" to the U.S. market (however, evidence is uneven).

University enrolments in computer science have declined compared to enrolments in other disciplines, a trend which is causing significant concern to employers (De Guzman, 2006). In Canada, enrolments in the combined category of mathematics, computer and information sciences grew from 31,940 students in 1992/1993 to a peak of 45,355 in 2001/2002 then declined to 40,900 in 2004/2005. In Ontario, there was significant growth in computer science enrolments for a number of years, peaking at 4,968 students in 2002 then falling to 3,426 in 2004/5, a decline of over 30%. This is in part, it would appear, due to the negative publicity associated with the dot.com bust. During the last five years, enrolments in engineering have increased modestly during the period while commerce and business enrolments have increased dramatically.

Figure No. 1
University Enrolments by Discipline in Ontario (COU, 2007)



Factors affecting university program choice

Although there is ample evidence that opportunities in the ICT sector are growing (in spite of the dot.com bust) (El Akkad, 2005), students appear to be turning away from IT-related disciplines. Many factors have been identified which have contributed to the declining enrolments in IT-related disciplines.

— students perceive opportunities in computing as rapidly vanishing or at least unstable, in part because of the publicity around the dot.com bust;
— the poor image of computing professions and inadequate information;
— women in particular perceive the profession as uninteresting, irrelevant and not "sexy";
— a poor early education leaves many unprepared for and disinclined toward the computing fields; and
— while girls outperform boys in mathematics at an early age, lack of self-efficacy tends to stream them out of math and science.

The challenge for universities is changing the misconception that a career in IT is unstable, uninteresting and irrelevant. Market research firm Youthography recently surveyed Canadian students between the ages of 17 and 20 and found that only 36.3% were interested in pursuing a career in IT. Of those who were not interested in computer science, 35% cited "it's boring" as the top reason. Among the female respondents who participated in the Microsoft-sponsored survey, only 28% were considering a career in IT, despite 75% of them claiming to be proficient in computers in their daily lives (Microsoft, 2006).

Investments in Training

Training is an important way to ensure a well-qualified workforce and provide multiple points of entry. Training is needed in response to the development of new products and technologies, and often includes manufacturer-specific training as well as college-level programs. It has been suggested that Canadian IT firms do not invest sufficiently in training their employees to the degree necessary to keep their skills current, but rather leave employees to supply their own training. This training is often expensive, and there are reports that some movement of IT workers to the U.S. is due to the greater willingness of U.S. firms to offer training (ITAC, 2002). As well, the size of Canadian firms may affect their ability to attract and retain workers, and to provide training (ACST, 2000).

Rates of Retirement

The ICT workforce is generally younger than the Canadian workforce, except in the public sector. It has therefore been suggested that the industry as a whole will be less impacted by the aging population and retirements than other sectors. However, if experienced older workers in IT are approaching retirement and have skill sets that are in great demand, they may be difficult to replace with younger workers. It has also been suggested that there is evidence of ageism and over-valuation of youth in IT work (McMullin & Cooke, 2004). In addition, the age structure of public-sector ICT workers is comparable to the rest of the Canadian workforce, and consequently the federal and provincial governments are likely to be most affected by retirements. In addition, as the public sector tends to pay less than the private sector and attracts fewer IEP workers, they are more likely to have difficulty meeting the demand for ICT workers than the private sector.

Participation of Women

Several studies have identified various barriers to increased participation by women in IT work and IT-related education (Hughes, Lowe, & Schellenberg, 2003; Cukier et al., 2002), and there is evidence that the representation of women in IT is declining (Stager, 2001). There is research which shows that girls in particular have unfavourable perceptions of the profession and from an early age perceive themselves as unable to do mathematics. Positive perception of their own skills is a prerequisite for a person's success in computing.

Internationally Educated Professionals

The IT workforce also benefits from a large number of IEPs skilled in IT occupations (Stager, 2001). However, studies have suggested that IEPs in the ICT sector, as in other sectors, are under-utilized and have difficulty obtaining employment. Increasingly, however, there is international competition for IEPs as the demand for workers grows in emerging economies.

Retention Issues and "Brain Drain"

There are gender differences apparent in retention issues at the organizational level. Men are more likely to change jobs for promotions and women for quality of life. IEPs are often young, single and mobile. Studies have suggested that some IEPs are likely to choose to work in the U.S., given the choice. Concerns have been expressed about the movement of skilled IT workers to the United States, who do so primarily in search of higher salaries. However, the reality of the "brain drain" remains very much in doubt (Stager, 2001). It does appear that IT workers might be more mobile than other employees, partly because the labour force is predominantly young and male (Wolfson, 2006). In addition, studies of particular segments – for example, Asian IEPs in Canada – have suggested a high level of willingness to relocate to the U.S., in part, it has been suggested, because of inadequate information.

The North American IT labour market has been in a "tight" state for most of its 40 years, a fact demonstrated by high growth, a low unemployment rate and significant job vacancies. However, when viewed from an economist's perspective, describing this as a labour "shortage" may not be accurate (Freeman & Aspray, 1999). Rather, it may be more appropriate to describe the situation as a shortage of certain skills or a misalignment between employers' demands and the supply of IT workers.

As noted earlier, it is estimated that in the next three to five years there will be an increased demand for about 58,000 IT workers (O'Grady, 2006). The number of graduates in IT-related areas will not be sufficient to meet this demand

2.5. Current levels of representation of specific populations and the potential benefits of increasing their participation.

Strategically, the importance of improving participation of under-represented groups has been acknowledged at the international level as well as in North America. Yet at a time when the demand for skilled workers is increasing, female participation in some segments of the ICT sector is being eroded, in part because of precipitous declines in the percentage of women enrolling in computer science and engineering programmes. There is also evidence that well-qualified IEP workers are often under-employed due to lack of Canadian work experience, transferability of international credentials and the lack of official language skills.

Others have examined the ways in which improving the participation of specific groups of workers – women, visible minorities, IEPs, and others – can help address the labour needs of the Canadian ICT sector. For a number of years, there have been programmes aiming at increasing the participation of women, facilitating the processing of information technology workers through the immigration process.

A recent ICTC (formerly SHRC; 2005d) study of under-represented groups concluded that a number of groups are under-represented in the IT profession generally, and in particular segments.

Table 5: Participation of Under-represented Groups (ICTC – formerly SHRC, 2005d)

	Proportion of Workforce	Proportion of IT Labour Force			
		Overall	Private	Federal public sector	Provincial public sector
Women	46.7%	28.1%	27.4%	27.0%	29.9%
Immigrants	19.9%	4.5%	8.5%	3.1%	1.9%
Older Workers	39%	39.4%	31.6%	39.2%	40.9%
Visible Minorities	12.6 %	10.3%	9.7%	14.0%	7.1%
Aboriginal	2.7%	1.2%	1.0%	1.6%	0.9%
Disability	12.4%	1.5%	1.0%	7.25%	4.0%

While women comprise 46.7% of the Canadian workforce, they account for only 28.1% of IT workers. In some regions, women account for a higher proportion than in others (e.g., 32.6% in Newfoundland compared to 25.1% in Manitoba).

They are concentrated in some IT job categories more than others. For example, almost one-third of analysts are women compared to only 9% of engineers.

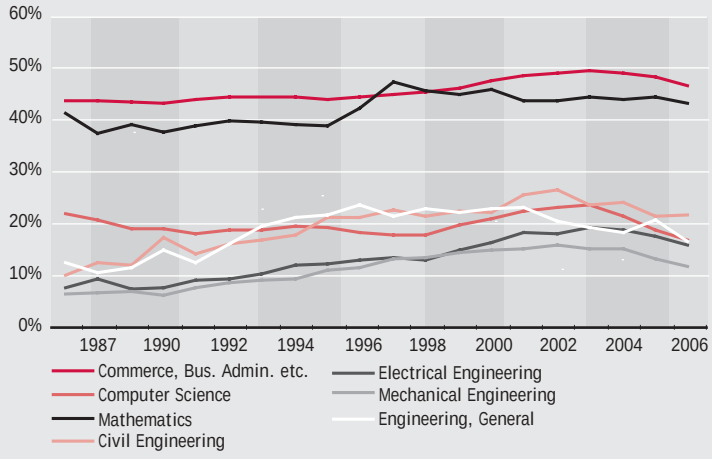
Table 6: Female Participation in 14 ICT Occupational Groups in the Private Sector (Gunderson et al., 2005)

Writers	74.3%	Trainers	21.2%
Graphic Designers and Illustrators	60.8%	Managers	19.6%
Analysts	36.8%	Programmers	16.7%
Support	29.9%	Operators	15.5%
Data	25.7%	Technicians	14.8%
Project Managers	24.9%	Software Engineers	13.0%
Multimedia Developers	21.3%	Engineers (except software)	9.0%

While the number of women in the ICT sector is growing, the number of men is growing faster, resulting in a decline in the percentage of women in the sector. According to the most recent Statistics Canada study of the sector (Vaillancourt, 2003), while the proportion of women working in all other industries slowly but steadily increased over the 1990-2002 period, the proportion of women in ICT industries decreased during this time. Between 1990 and 2002, employment growth in all other industries was nearly twice as high for women than for men. In ICT industries, though, employment growth for women was only two-thirds that of men – but still substantial at nearly 51%.

The percentage of women in IT and computer science disciplines at universities is also declining at a time when their participation in other disciplines is increasing. While female enrolment in many technical disciplines has declined in recent years, computer science is the only discipline where the percentage of women is lower than it was in 1992-93.

Figure No. 2
Representation of Females Enrolled in University Programs in Ontario (COU, 2007)



There are fewer specific data available concerning IEPs in the Canadian ICT workforce. However, we do know that 15% of IT workers immigrated to Canada in the 1990s and that the percentage of recent IEPs working in IT is higher than in other occupations (Habtu, 2003). Of all private sector ICT workers, 90.4% are Canadian citizens and 8.5% are landed immigrants. But trainers (24.6%), programmers (17.7%) and software engineers (12.4%) are more likely to be landed immigrants (Gunderson et al., 2005). There are data on self-identified visible minority employees in the ICT sector and it is reasonable to assume many of these are also IEPs.

Table 7: Proportion of Visible Minorities by 14 Occupational Groups (Gunderson et al., 2005)

Writers	10.4%
Graphic Designers and Illustrators	2.8%
Analysts	12.0%
Support	6.5%
Data	14%
Project Managers	6.0%
Multimedia Developers	10.8%
Trainers	4.9%
Managers	3.9%
Programmers	21.7%
Operators	8.1%
Technicians	5.0%
Software Engineers	13.4%
Engineers (except software)	16.8%

The concentration of visible minority workers in the technical segments (engineering and programming) is not surprising. Recent IEPs with post-secondary education are more likely than the Canadian-born population to have majored in the physical sciences, engineering and trades (43% compared to 33%).

Table 8: Major Field of Study, Persons aged 15+ with Post-secondary Credentials, Canada, 2001 Census (CLBC, 2003)

	Immigrated 1991-2001	Canadian-born
Number with post-secondary qualifications	772,700	7,934,370
Physical Sciences, Engineering and Trades	42.7%	32.8%
Agricultural and Biological Sciences	5.1%	4.6%
Engineering, Applied Sciences and Trades	27.6%	25.4%
Physical Sciences and Mathematics	10.0%	2.8%
Health Professions, Sciences and Technologies	9.4%	11.3%

Although there are no specific data concerning the ICT sector, in general IEPs earn less than Canadian-born workers and are less likely to be in managerial roles (Reitz, 2005). We also know that IEPs have higher rates of unemployment than Canadian-born workers. The unemployment rate of internationally educated professionals is more than three times as high as for other people in Ontario. Approximately 60% of internationally educated professionals who took jobs unrelated to their training when they first came to Canada held the same job three years later. Less than one-quarter of internationally educated professionals who were employed were working in their exact field, and 47% were doing something unrelated to their field (Hamilton Training Advisory Board, 2004). Preliminary results from a new study from Catalyst and the Ryerson Diversity Institute based on a survey of 6,000 middle to senior managers shows a significant gap between the career satisfaction of visible minorities and that of white/Caucasian workers. Most visible-minority respondents were not new Canadians but had an average of 12 years' work experience at large Canadian companies. A sizable proportion of the respondents were also internationally educated professionals, and of these half felt that their credentials were not considered on par. Visible minority respondents with international qualifications were the least satisfied with their careers and were more likely to explore career opportunities outside Canada (Catalyst and The Diversity Institute, 2007). Again, although these results were not specific to the ICT sector, they underscore the importance of addressing diversity effectively: career satisfaction has a significant impact on employee performance and retention.

Implications

The Royal Bank of Canada and others have argued that there is a substantial cost associated with the under-utilization of women and internationally educated professionals. If IEPs to Canada were employed at the same rate as non-IEPs, it would add 400,000 extra workers to the labour force with $13 billion in added income. If women were employed at the same rate and level as men it would produce 1.6 million extra workers along with $168 billion in added income (RBC, 2005).

2.6 Diversity Performance in the high-tech sector

The representation of women and visible minorities in this sector remains below average, according to a study by the Canadian Business for Social Responsibility Advisory Services Group (CBSR) (2005). According to the study, the representation of women in senior management and board positions in the high-tech sector is lower than average. While visible minorities are well-represented in the workforce, they are largely absent from the ranks of senior executive and board positions. The labour demands vary from segment to segment and company to company, but it is clear that some organizations – particularly the larger ones – have addressed diversity strategically. This is reflected in their ability to attract and retain women and internationally educated professionals. Tracking is difficult because many companies track according to self-declared visible minority status rather than place of origin. Nevertheless, the participation rates of visible minorities and IEPs are often correlated in Canada.

CBSR noted that Hewlett Packard regularly ranks among the highest in corporate social responsibility (CSR) in part because of its diversity policy. Three of nine directors are women and women make up 43% of the senior executive team as well as 27% of the management workforce overall. It was named by the National Association for Female Executives as the number one IT company for women workers. Similarly, IBM has made diversity a strategic priority. When Lou Gerstner became CEO, he initiated a diversity task-force initiative that would "uncover and understand differences among the groups and find ways to appeal to a broader set of employees and customers" (Thomas, 2004). Since then, the number of female executives in the company has grown by 370%, ethnic minority executives have jumped 233% and the number of self-identified gay, lesbian, bisexual, and transgender executives gained 733% (Thomas, 2004).

Data on the representation of women and internationally educated professionals in ICT sector companies is uneven for a variety of reasons. Many individuals do not self identify and many companies do not report. Canada's Employment Equity Act requires regulated employers in the private sector and Crown corporations with 100 or more employees to report each year on their progress towards achieving a representative workforce. The data collected from these companies are analyzed and the findings are published in an annual employment equity report. As a result, in general, publicly regulated companies including banks and telecommunications services providers are observed to tend to have systematic, clearly articulated diversity strategies, often with specific targets and supporting performance measures. Companies receive scores on a scale of A (the highest) to D for their integration of female, aboriginal, visible minority and disabled employees. Each employee group within a company is compared to: its overall labour market availability; to each group's share of hiring, promotions, and terminations; and to the salary level and occupational distribution of each group as compared to other employees.

In the telecommunications services sector, companies tend to score reasonably well. Although they are limited, data from Jantzi Research (2007), an information services provider focused on corporate social responsibility, suggests service providers and large companies have the highest representation of women and visible minorities and are more likely to have systematic strategies for diversity in place than the hardware sector and smaller companies.

One Canadian company which has achieved significant progress is TELUS. The company has established defined targets and made significant progress in meeting them. Female representation on the company's senior management team increased from 7% in 2002 to 30% in 2005.

Table 9: Gender Statistics – Senior Leadership (TELUS 2005)

	2005	2004	2003	2002
Executives				
Male	70.0%	81.2%	87.5%	93.0%
Female	30.0%	18.8%	12.5%	7.0%
Vice Presidents				
Male	85.7%	83.0%	84.0%	84.8%
Female	14.3%	17.0%	16.0%	15.2%

According to Jantzi (2007) most of the hardware companies did not score as well as the services companies. Some had no diversity policy and no women on the board or in senior management positions.

3. Barriers to participation of identified populations

3.1. Overview

There are complex factors which account for the levels of representation of different groups in the ICT labour force. Research has illuminated some of the barriers to full participation in the ICT workforce facing women and internationally educated professionals. There is a long list of issues to be addressed and our study confirms that there are no simple solutions to these complex problems. The most difficult barriers to address are those which are systemic, embedded in organizational human resources practices and culture, and often unintentionally reinforced by government and the media.

The implications are broad-reaching and affect government, employers, educators, the public and the workers themselves. For example, doubling the pipeline or increasing the capacity of educational institutions to train engineers and computer scientists is of little value if students do not choose the programmes. Increasing the number of graduates in computer science and information systems programs will not solve the problem if they do not have the skills needed or if employers want only experienced recruits.

For each of these populations, barriers were identified and ways to potentially increase their participation were noted. Reasons why women and IEPs do not choose careers in ICT or are excluded from them include:

— awareness of opportunities and perceptions of the profession;

— lack of encouragement and role models;

— approaches to training and education;

— access to computer-related education and equipment;

— lack of appropriate skills and abilities;

— lack of appropriate experience or opportunities (e.g., Canadian experience); and

— systemic discrimination, for example, hiring policies and practices which are not directly tied to skills needed for the positions (SHRC, 2005c. SHRC, 2005b).

3.2 Specific Barriers to Women in IT

Studies have identified barriers to the participation and success of women in science, technology and engineering disciplines which begin in primary school and persist through university, into the workplace and society at large. These include:

1) Socialization and Early Education: Computers are perceived as belonging to the male domain of mathematics, science, electronics, and machinery (Inkpen et al., 1994). Computer use and expertise have been associated with masculinity from a very early age (Fletcher-Flinn & Suddendorf, 1996). While women in the workplace and in academia encounter their fair share of obstacles, experts say that kindergarten classrooms serve as breeding grounds for feelings of inadequacy and low self-esteem. In fact, recent studies indicate that although elementary school girls' achievement levels in math and sciences are as high, if not higher, than boys', their confidence levels are disturbingly low. Female students also scored lower in perceived "self-efficacy" in computer use, defined as the belief in one's own ability to use computers successfully (Busch, 1995). The gap between performance and self-perception are evident as early as grade 3 and gets more acute as girls grow older. This has been characterized as "the impostor syndrome" — even when they perform well they do not believe they belong.

   Cultural forces and parenting, along with formal education, play important roles. The absence of role models begins in primary school, runs through university and into the work force. Teachers have been reported to play a role both in perpetuating gender socialization and negatively affecting girls' experience with computers (Shashaani, 1997). Compared to boys, girls spend less time per day playing video and computer games at home, own fewer games, and are less interested in and knowledgeable about gaming (Inkpen et.al., 1994). They are more likely to be attracted to communicative activities (such as texting), but most computer games and activities are seen as male-oriented. This may be changing with growing emphasis on computing communications including instant messaging as well as social networking (for example, facebook.com).

2) Negative Perceptions of Computing and Related Work: Problems associated with the perception of the IT profession have affected enrolments in the discipline generally and seem to have affected female enrolments most dramatically. Studies have shown that people believe that the dot.com bust destroyed opportunities in the sector and there is a notion that IT jobs are "boring," focused on coding and without relevance to people (Rola, 2003). These beliefs have contributed to the decline in female participation in the university programs feeding the pipeline. Interest in IT careers is often formulated by age 10-14 and assumptions about gender and profession are often reinforced externally.

According to one study, 54% of female engineering students reported someone had tried to discourage them from pursuing engineering, compared to 16% of male engineering students (Waxer, 2000).

3) Systemic Barriers in Post-Secondary Institutions: Inflexible entry requirements, a focus on theory in curriculum, traditional models of curriculum, lack of experiential and cooperative pedagogy, and the absence of role models are among the barriers to entry and retention in educational programs related to information systems. Women's ways of learning are different than men's and there is strong evidence that female-centered pedagogy can affect girls' interest in mathematics, computing and technical subjects (Gilligan et al., 1990; Tisdale, 1993). Often approaches to teaching math and computing-related subjects do not take into account female learning styles or include examples to which girls can relate.

4) Misalignment of Job Descriptions and Job Requirements: Often there is a lack of effective integration between functional ICT areas and human resources in organizations. Research has also suggested that there are systemic barriers resulting from the misalignment between the skills required to do the job (which heavily emphasize communication and general business skills over technical skills) with the job requirements that are often advertised (which tend to emphasize formal technical training, often in computer science and engineering). Equating "IT professional" with "computer scientist" or "engineer" rather than focusing on the skills required to do the job often leads to the exclusion of women, who are already under-represented in these disciplines. Careful auditing of jobs is needed to ensure that the advertised requirements reflect the job demands. Women are more likely to enter the IT sector through multiple entry points, often moving from other disciplines or areas of employment. Given the priority on skills such as communications and management as well as the success of many who have entered through non-traditional routes, there is ample evidence that there are a variety of ways women can enter the profession provided they have adequate training opportunities.

5) Lack of workplace support: Inadequate support in the workplace for women with young families is one of the most significant barriers to their participation and advancement. There are also systemic barriers in the workplace in terms of recruitment and training, the absence of female role models, and the "glass ceiling" which limits the promotion (Fountain, 1999). Exclusion from informal networks, inadequate mentoring and career development are also problems. Girls and women with an interest and aptitude for information technology are often in a minority in classes, programs and jobs, and the absence of support structures has an impact on their performance and retention rates (AAUW, 2000).

3.3 Specific Barriers to Participation of IEPs in ICT Sector

Barriers to IEP workers in ICT are lower than to other professions (e.g., doctors and lawyers) because there is more flexibility in credentials. Other barriers continue to exist, although research (SHRC, 2005b, ICTC, 2006) has revealed that employers highlight one set of issues while workers highlight others. Some of the key issues which emerge from the research (Jobstart, 2001) are outlined below.

1) Inadequate Information about the Labour Market and Processes Prior to Immigration: Many IEPs are ill-equipped to succeed when they arrive. Often prospective IEPs do not have access to good information about what they will face when they come to Canada and what they can do to better prepare themselves. For example, the process of finding employment is often long and arduous even for Canadian-born university graduates and is much more difficult for internationally educated professionals. Credentials in other countries and even work experience are often not adequately recognized. As a result, many immigrants arrive with expectations which will not be satisfied.

2) Settlement and Job Search Challenges: Often new IEPs lack the financial resources and skills needed to navigate the complex and largely informal job market in Canada.

3) Inadequate Communications/Cultural Skills: Even in the IT sector, employers emphasize the importance of communication skills and general business knowledge more than IT skills. While language skills are important, communication skills are much broader and cultural competency is hard to define. Internationally educated professionals acknowledge the need to improve their language and communication skills.

4) Systemic Barriers in Employment Practices: The three most significant barriers related to employment practices are: the reliance on informal networks to recruit; demand for Canadian work experience, which presents a paradox: you cannot get a job providing Canadian work experience unless you have worked in Canada; and lack of recognition of international credentials. The majority of IT jobs are not advertised and learning to

navigate the recruitment process can be challenging. The process of creating cover letters, resume-writing and interviews is not only technically challenging, there are also cultural barriers. For example, while North American employers may value assertiveness and confidence, some cultures value modesty and economy of expression. As a result, many IEPs may not perform well in the interview process.

IEPs indicate that when they try to acquire Canadian experience by applying for junior positions they are often turned down because they are over-qualified. They also note that employers often demand specific skills or knowledge of specific computing applications. While IEP applicants believe that the principles and logic of programming can be applied to all languages and, with training, they could fulfill the job requirements.

Many Canadian employers are also not familiar with international educational institutions or credentials or how to evaluate them. Consequently, many IEPs report difficulty having their qualifications recognized.

5) Inadequate Support in the Workplace: Once employed, internationally educated professionals may not have the same level of access to the informal networks that are often critical to professional success. Many report feeling excluded from the networks that in turn play an important role in professional success. Culture or customs may, for example, lead them to be excluded from informal social events which are often critical to the formation of relationships, informal communications networks and deal-making. There is also evidence of inequities in access to professional development and career advancement.

4. Interventions to increase participation of identified populations

4.1. Overview

Given their prominence in the Canadian labour market, effectively tapping into the supply of well-qualified women and internationally educated professionals could go a long way toward addressing current and projected labour shortages in the ICT sector as well as helping companies achieve their competitive goals. Research shows that there are ways in which the barriers to full participation can be overcome, and that effective programs share certain characteristics and approaches (Matton & Hernandez, 2004). Specifically, successful workplace diversity initiatives hinge on committed leadership, defined goals/targets or measures of effectiveness, strong diversity professionals, employee involvement and ties to performance evaluation, as well as data to identify, quantify and communicate progress and challenges. At the same time, organizations operate within a social context. There are broad social and cultural factors, including stereotypes, which shape perceptions and expectations, and which must be addressed. Meeting the demands for skilled IT workers in Canada requires a systemic and integrated approach to addressing diversity.

4.2. Current Diversity Practices in Canadian High-Tech Companies

Although no comprehensive review of diversity practices is available in the Canadian high tech sector, there are a number of sources of information from which we can infer trends. Key elements in assessing a company's performance on diversity, according to Jantzi Research (2007), include the reported levels of women and visible minorities on their boards and in senior management positions as well as:

— explicit policy on diversity/employment equity;
— public reporting on diversity issues;
— recruitment/retention/promotion programs;
— employee training and communication;
— performance objectives and targets;
— systems to track diversity data;
— maternity/parental benefits;
— other diversity initiatives/benefits; and
— diversity controversies.

While many ICT companies are not regulated, many (as noted above) have taken an aggressive approach to diversity. Many have integrated approaches to diversity including senior management responsibility, specific targets, integrated plans and measurement systems.

According to the federal government's recent Employment Equity Annual Report, companies reporting on their diversity initiatives indicate a range of benefits of implementing employment equity practices, including:

— a workforce that reflects Canadian culture and diversity;
— increased global competitiveness and productivity;
— high employee morale and less absenteeism;
— better relations with customers and clients;
— improved corporate reputation; and
— greater profitability and a better bottom line (Canada, 2005).

Better data and more research on current practices will help advance our understanding of processes for developing strategies which "fit" in particular contexts. "Best practices" which are innovative, make a difference, have a sustainable effect, and can be replicated and applied in other contexts need to be further explored.

Examples of Innovative Corporate Practices to Support Diversity

RECRUITMENT

— Husky Injection Molding Systems is developing a metrics system to determine which overseas institutions are producing the skill sets most valuable to the company, so they can build a relationship with these institutions.
— At RBC Financial Group, candidates in the first round of recruiting are moved forward based on their experience and education, regardless of where those were obtained. A bias-free interview guide was also developed that acknowledges international credentials.
— American Express Canada recruits skilled IEPs through outreach to ethno-specific job fairs and community-based agencies as well as through an employee referral program (Omidvar, 2006).
— ATI Technologies often seeks specific skill sets that are not widely found in the Canadian labour force. Its HR strategy has been expanded to source candidates from international universities and labour markets. Employees are recruited from across North America, Europe and Asia, including China, Taiwan, Korea and India. These candidates are recruited through global employee referrals, global and local recruitment agencies, targeted campaigns in specific companies, and Web and applicant tracking tools.
— More than 30% of the Iris Engineering workforce was educated outside North America. During the Iris recruitment process, applicants are asked to take tests that are most relevant to the position sought: sales applicants give presentations, assembler applicants demonstrate

soldering skills, and engineers display their practical skills. Through this approach, Iris is better able to focus on the applicant's technical competency, rather than on areas that may be secondary to the position being filled. It also helps Iris include candidates who may not have been initially considered, such as skilled IEPs, by removing barriers that might occur in a traditional interview process (The Maytree Foundation, 2005).

— Nortel Networks has been a sponsoring company of INROADS, a non-profit organization that aids in the training and development of young people of colour for professional careers in business and industry. It offers multi-year summer internships, year-round coaching, and training activities. In addition to sponsorship fees, corporate sponsors are expected to provide a professional internship opportunity each summer for an intern and to consider hiring the intern for full-time employment upon graduation.

HR POLICIES: Childcare, Mentoring, Language and Skills Training

— For sixteen years in a row, IBM has made it to the top 10 in Working Mother Magazine's top 100 companies to work for. It has numerous childcare programs and is considered a leader in promoting work-life balance (CBSR, 2005).

— Nortel includes diversity and employment equity compliance training as part of all its management training.

— Like many other companies, TELUS has committed to mentoring and supporting networking for women. Connections – the TELUS Women's Network – offers women at all levels of the organization the opportunity to pursue excellence in their careers by building a supportive network and participating in mentoring relationships (TELUS, 2005).

— Gennum Corporation, a Burlington, Ontario-based medium-sized company in the semiconductor market, reports that approximately 20% of employees have emigrated from other countries. Gennum established mentoring programs to match new employees with a staff member from the same culture to try to help ease their integration.

— Gennum offers free training and development opportunities for its employees, including "Communicating Effectively in the Workplace" classes and a Social Styles assessment course which helps employees gain insight into their social style and how that style brings strengths to Gennum. Employees have said the class helps them see how they are perceived by colleagues and how it plays out in their interactions with co-workers; Gennum also offers English as a Second Language (ESL) training (The Maytree Foundation, 2005).

PROCUREMENT POLICIES

— Celestica has adopted the Electronic Industry Code of Conduct, a voluntary code that commits participants to ensuring that they and their first-tier suppliers do not engage in "discrimination based on race, colour, age, gender, sexual orientation, ethnicity, disability, pregnancy, religion, political affiliation, union membership or marital status." In addition, the code calls on participants to not subject workers or potential workers to "medical tests that could be used in a discriminatory way."

4.3. Other Interventions Aimed at Increasing the Participation of Women in IT

There are many programs that have been developed in recent years in an effort to promote the participation of women in IT. More recently, there has been an emphasis on attempting to promote the participation of IEPs. However, to date there have been few systematic evaluations to assess their impact. Most of the evaluations to date focus on process (e.g., did you enjoy the program?) rather than impact (e.g., did the program increase the employment of women in IT?).

Strategies which have been developed to promote women in IT, then, tend to be designed to respond to identified barriers, and are broadly intended to:

— increase the interest of females in the discipline and of the opportunities which exist

— improve core skills and confidence in mathematics and computer programming

— increase the sense of belonging, particularly in environments where they are in the minority, often by developing networking opportunities with other women in IT.

A recent study (Cukier and Chauncey, 2004) revealed that there are many programs in Canada targeting university age women and some aimed at school girls as young as six (see Appendix 1). Some target special populations such as disabled women, female IEPs or those in low socio-economic groups. Many involved partnerships with industry and some were collaborations among a number of educational institutions.

General education and awareness efforts include outreach programs aimed at raising awareness of computing and technology among children, parents and teachers. For example, some programs are designed to provide visits by volunteer scientists and engineers to K-12 classrooms. The Scientists and Innovators in the Schools (SIS) and Pathmakers programs are two such examples (http://www.scienceworld.bc.ca and http://www.carelton.ca/wise/pathmaker.htm). Others focus on organizing female role models as guest speakers and providing Internet-based career counselling resources.

There are workshops and courses that are aimed at developing particular skills or more specialized knowledge. Some, for example, focus on bringing together several hundred girls to provide them with hands-on experience with computing opportunities – see, for example, the Ms Infinity Program (http://www.harbour.sfu.ca/scwist/). Camps, fairs and career days are also sponsored by universities and associations such as the Canadian Information Processing Society (CIPS). Often, these programs have as their objectives increasing awareness of information technology opportunities for girls and debunking many of the stereotypes. In addition, they often include female-oriented pedagogic elements focused on the application of technology to serve people.

A wide range of computer literacy, formal education and certification programs are aimed at opening career opportunities for women. There are also some specialized university-based programs such as Alternative Routes to Computing (ARC). This program is an effort to attract women with non-traditional backgrounds to university computer science programs that are more accessible to, and more supportive of, women.

Considerable attention has been paid to the development of mentors for women in technology. Mentors play a critical role in motivation, confidence-building and problem-solving. Mentors play different roles at different stages in the education and career cycle. They can also help build an understanding of career opportunities for university students, and can provide assistance in navigating organizational cultures and problem-solving based on experience. Formal and informal mentoring programs are designed to meet these needs. Mentornet is one of the best-known mentoring programs with participants in more than 80 universities who are linked via email to mentors in the industry. Other universities run programs in conjunction with alumni and industry partners in order to help young women understand the potential for careers in information technology. Ryerson University's tri-mentoring program includes a high level of participation among IT students and women.

Some programs are specifically oriented towards providing financial incentives to women in order to encourage their participation — targeted scholarships and sponsored training programs are examples.

Most of these programs are designed based on the assumption that if they address identified barriers to women in information technology by increasing awareness, shifting attitudes, providing experience, etc., they will have an impact on female participation in information technology education and professions. However, very few have any formal evaluation to assess their impact. Consequently, it is difficult to determine which actually produce the intended results. In the absence of evaluation many of the benefits of programs aimed at increasing the participation of women in ICT are taken for granted. Given the continued poor participation rates of women in IT, it would seem that more examination of some of our assumptions is warranted. Well-designed programs with clearly elaborated assumptions, objectives and evaluations are critical to effective allocation of efforts and resources aimed at improving the participation of women in technology (Frehill et al., 2002).

Some of the programmes with formal evaluations and demonstrated results include (Cukier and Chauncey, 2004):

— Women in Scholarship, Engineering, Science and Technology (WISEST) at the University of Alberta, which did a longitudinal study of the 50 students which participated in the program. It also undertook a survey of the girls' teachers in order to assess their performance.

— The GenTech Equity Project of UBC and Simon Fraser University undertook a longitudinal study of participants.

— One of the most successful programs outside of Canada is at Carnegie Mellon University Computer Science, where female enrolments increased from 7% in 1995 to 42% in 2000. Key elements of the strategy included addressing the experience gap by offering multiple entry points, changing admissions, paying more attention to good teaching, contextualizing computer science, focusing on building a supportive culture and targeted outreach to high schools (Margolis and Fisher, 2002).

The bottom line is that, while there are some programs which have produced results, since 1989 there has been a great deal of activity in Canada aimed at increasing the participation of women in engineering and computer science, but the evidence of sustained change is uneven. It seems increasingly clear that fact-based approaches which address systemic problems with rigorous evaluation are essential to create sustainable change.

4.4. Programmes Aimed at Integrating Internationally Educated Professionals (IEPs)

As with programs to encourage the participation of women in ICT, programs aimed at IEPS need to address the barriers at each stage of the process. Interventions need to start at the beginning of the process, even before immigration to Canada, and must continue on arrival and in the workplace.

Needed Before Immigration

— Better training for embassy staff;
— Improved selection processes which correlate with labour market demands;
— Improved coordination of definition of labour needs and capacity at federal, provincial, municipal levels;
— Bilateral and multilateral relationships with education institutions in Canadian embassies;
— Information on labour market, occupational requirements and available programs for prospective immigrants;
— Assessment services to identify qualifications and any gaps to be filled; and
— Training and upgrades needed as well as access to online resources.

Needed On Arrival

— Time and money to support settlement and job search efforts;
— Improved initial settlement support and resources;
— Improved collaboration on long term integration strategies and better coordination of federal, provincial, municipal resources;
— Improved consultation between employers, educational institutions and regulatory bodies to define accreditation, qualifications and specific skill requirements;
— Improved coordination between educational institutions, local government and business community in developing policies;
— Better training for ESL/FSL, Canadian culture, job search and interviewing approaches;
— Support for training and upgrading relevant to Canadian ICT market needs; and
— Mentoring programs to build informal networks.

For Employers

— Improved diversity training for managers and staff;
— Specific diversity hiring targets and accountability;
— Wide range of options to provide bridging as well as experience options (shadowing, internships, workshops, etc.);
— Reassessment of job task requirements and flexible approaches to hiring, training and professional development;
— More substantial commitment to training and professional development (and incentives such as tax credits to do this); and
— Mentoring and support for new employees.

The attention focused on better integrating IEPs is relatively recent in Canada and there are few programs aimed at increasing the participation of IEPs in ICT that have been evaluated. The majority of programs offered to help IEPs find jobs include training for ESL/FSL, Canadian culture, job search and interviewing approaches, but do not account for specific needs to prepare them for a job in the ICT industry. Language training – and, more specifically, workplace language training – has been identified repeatedly as a gap. Employers in particular are most concerned by what they loosely term "communications skills." By this they mean not only the softer side of verbal communication, but also hard communication skills such as presentations, project planning and technical report writing. Workplace-oriented training programs designed with the participation of employers need to have defined outcomes to ensure credibility (Omidvar, 2006).

Because the focus on IEPs is relatively new, there are few specific programs which have been evaluated particularly related ICT. However, a number of programs have been shown to produce results.

Software Development Worker Pilot Project

This project began in May 1997 and involved an expedited visa process to bring 3000 temporary workers to Canada. An evaluation by Ekos Research (CIC Canada, 2002) showed:

— that the pilot project contributed to alleviating the skills shortage problem;
— no evidence that Canadian workers were being displaced;

— no downward pressure on wages paid to Canadian workers in the same industry; and

— evidence of skill transfer from international workers to existing staff.

Profession to Profession Mentoring Immigrants Program, City of Toronto

Established in 2004 as a pilot project between the City of Toronto as well as Consortium of Agencies Serving Internationally Trained Professionals (CASIP) and The Mentoring Partnership, an initiative of the Toronto Region Immigrant Employment Council (TRIEC).The Profession to Profession program matches professional City of Toronto staff with skilled IEPs in similar professions who have international experience and credentials, and who are looking for employment in their field. Mentors provide job search advice and support to help ease the transition of newcomers into the Canadian labour market. In 2006, the project included IT professionals among 10 occupational groups. Of the 77 mentors, 16 were IT specialists and 11 were engineers. It is too early to assess the results of the 2006 program, but as of April 2006, 66% of the 2005 those mentored had found employment, exceeding the objective of 60%, and 55% of those mentored found employment directly related to their field of expertise. Data specifically on IT professionals is not available, nor is there control data.

Toronto Region Immigrant Employment Council (TRIEC)

TRIEC is a multi-stakeholder council, comprised of employers, labour, occupational regulatory bodies, postsecondary institutions, assessment service providers, community organizations and all three levels of government, which offers services for skilled IEPs. It offers programs to provide skilled IEPs with Canadian work experience and to match skilled IEPs with established professionals in the same field. While not specific to ICT, the TRIEC program has produced impressive results.

TRIEC's mentoring project assisted IEPs in finding jobs in their field. While the control group (without a mentor) got jobs more quickly, their searches were less focused and the employment they secured was in general labour, assembly, security, data entry and telemarketing earning $8-22 per hour. In contrast, the mentored group spent more time researching companies and landed more interviews. They were employed as analysts, sales managers, project engineers, accountants and so on and earned an average of $55,000. More than half (55%) of those in a mentoring relationship found jobs in their field of training.

TRIEC's Career Bridge program provided internships and 86% of these resulted in full time permanent jobs, with 55% of the jobs being with the internship employer. However, the pool of employers that sign on for internships is small. There is a huge discrepancy between supply and demand for these internships. For every one internship position, there are at least 15 job-ready individuals ready to compete (Omidvar, 2006).

The number of programs with measurable results is still small but the experience to date does suggest that careful attention to support and mentoring of IEPs on arrival is critical to their long term success. However, recent research (Catalyst and The Diversity Institute, 2007) suggests that more attention needs to be paid to supporting IEPs in the workplace to ensure appropriate levels of career advancement and satisfaction.

5. Conclusions and recommendations

5.1. Overview

Well-qualified women and internationally educated professionals could play a critical role in addressing current and projected labour shortages in the ICT sector as well as helping companies achieve their competitive goals. Research shows that there are ways in which these barriers to full participation can be overcome, but that effective programs must be 1) strategic, 2) integrated, 3) sharply focused, and 4) evaluated. In addition, there are broad social and cultural factors which shape perceptions and expectations – for example, around women and technology – which must be addressed.

We have identified specific interventions aimed at addressing specific barriers but the evidence suggests the need for a systemic and integrated approach to improve the attractiveness of the industry, to the workforce generally, as well as to particular under-represented groups:

— public and political determination is critical;

— it requires commitment of key stakeholders including government, educational institutions, employers and associations;

— targets include government, educational institutions, employers, educators, students, and the general public, as well as the media;

— systemic change is needed with a long-term orientation;

— specific interventions vary from industry to industry, segment to segment; and

— combined efforts by all sectors are essential to success.

All stakeholders – government, employers, educators, workers, the media – have roles to play in removing barriers and promoting full participation and achievement of all Canadians. There is much to be done. The top recommendations include:

5.2. Initiatives Specific to Women

1) Socialization and Early Education: As the early years are most critical in shaping an individual's self perceptions and aspirations, we need focused and integrated efforts, beginning in the primary grades, to encourage girls to participate in math and technology courses. This means addressing teaching and curriculum as well as educating parents, teachers and guidance counsellors. While Boards of Education talk about diversity, more needs to be done to implement fact-based programs. This, of course, requires resources.

2) Improve Understanding of an ICT Career: Concerted, cooperative efforts are needed to counter the perceptions that there are fewer opportunities in ICT and that the job is boring. This is not easy task, and requires the industry to take an active role in communicating more effectively. High schools need to focus on ensuring improved counselling about ICT career opportunities and education. The way in which IT is taught (discussed below) also needs to be more applied with experiential work to ensure students understand the range of opportunities and nature of work a career in ICT offers.

3) Systemic Action to Improve Participation of Women in Post Secondary Institutions: Canadian post-secondary institutions and the governments which support them need to be more responsive to employment trends on the one hand, and to the participation of women on the other. Although progress has been made, barriers continue to exist and there is limited attention paid to the issue. Post-secondary institutions need to track representation of women as students, faculty and administrators, and carefully examine all aspects of the practices that affect their participation. Hiring, promotional policies and research support dramatically affect the ability to attract and retain highly qualified women in IT teaching roles; this, in turn, affects the availability of role models for young women in these disciplines. All aspects of IT educational programs, including admission requirements, curriculum and pedagogy, need to be reviewed with input from industry on workplace skills required. The Carnegie Mellon case shows clearly that with a concerted effort representation of women can be dramatically increased in computer science programs. In addition, given the solid evidence of the need for "hybrids," more opportunities should be provided for combined majors and minors in information technology. Governments and their agencies need to reinforce this by ensuring that diversity as an important performance measure in funding educational programs, research and projects.

4) Employers Need to Remove Systemic Barriers to Recruitment: Employers must ensure that job descriptions and recruitment strategies are aligned to job requirements. Currently, the emphasis on communication skills and general business knowledge as well as technology skills is not reflected in recruitment approaches. Recognizing and deliberately exploiting the multiple pathways to the ICT sector can significantly increase the representation of women. Employers should work with educational institutions to provide job specific IT training to generalists

with other high-demand skills – communications skills, project management and general management skills.

5) Employers Need to Provide Better Supports in the Workplace: Progressive workplace policies related to parental leave, job sharing, flexible work, and onsite daycare have a significant impact. Mindful approaches to developing mentoring, informal networks and career development for women in non-traditional fields are also important.

5.3. Initiatives Specific to Internationally Educated Professionals

1) Manage Expectations: Better information resources and preparation for internationally educated professionals prior to their entry to Canada would help ensure they are better equipped to deal with the realities they will face on arrival. In particular, resources to assist with language and cultural training, credential recognition, information about the complexity of job search processes including resume preparation, etc., in advance of arrival would greatly reduce the time to full employment.

2) Improve Initial Settlement and Job Search Success: Efforts should be made to improve a) coordination among governments, in consultation with employers, of policies and services related to attracting, selecting and settling IEPs: b) resources are available on arrival and c) support services and mentoring for job search.

   The evidence is clear that IEPs who take time and have access to good support, such as mentoring, are more likely to wait longer and secure more appropriate jobs. This has a very significant impact on their career trajectory.

3) Bridging the Employment Gap: The three most important measures are: a) removing systemic barriers in recruitment practices (e.g., providing access to informal networks used in most job placements), b) strengthening collaborative programs involving business, government and educators to enable internationally educated professionals to gain Canadian experience through internships, work study programs, mentoring and other efforts, c) streamlining the recognition of international credentials.

4) Communications/Cultural Skill Training: While internationally educated professionals often have excellent technical skills, the evidence suggests that employers also place emphasis on communication and general management skills. The biggest challenge faced by IEPs is the need to be effective communicators, which requires not just language skills but also cultural awareness and interpersonal skills. Making targeted, effective programs available to support new IEPs on arrival and during employment will substantially enhance their opportunities to succeed.

5) Improved Workplace Support for Diversity: The importance of an integrated approach to supporting an inclusive workplace is discussed below but providing additional support for communications and cultural awareness in the workplace, targeted mentoring programs and a commitment to training and professional development are among the most promising.

5.4. Towards an Integrated Strategy

The full range of stakeholders – government, educational institutions, associations, employers, workers and the media – needs to be engaged. Within organizations there is a need to erode the barriers which often exist between functional areas and human resources.

1) Diversity Audit and Scorecard: there is no "one size fits all" approach to diversity. Organizations which are committed to embracing diversity need to walk the talk. All too often, well-intentioned diversity programs focus on "rainbow" posters and brochures but do not address the systemic barriers to full participation, nor do they establish specific targets and accountabilities.

   While Crown corporations and regulated companies must provide formal reports on equity, diversity practices and reporting are uneven across the sector. In the educational sector, which plays a major role in fostering workplace diversity, school boards, colleges and universities and related councils and agencies have uneven monitoring and assessment of their performance. The organizations which have most effectively exploited diversity are, not surprisingly, those which have invested in systematic and comprehensive approaches, starting at the top. The key elements include:

   — senior management support;
   — links to strategic business objectives;
   — reinforcement throughout operational plans in functional areas;
   — support from a comprehensive human resources strategy (recruitment, development, promotion); and
   — measurable targets and accountabilities.

2) Diversity Research: While much has been written on the benefits of diversity, there is still room for improving our understanding, particularly of what does and does not work. Better data and more research on current practices will help advance our understanding of "best practices", which are:
   - innovative;
   - make a difference;
   - have a sustainable effect; and
   - can be replicated and serve as a model for generating initiatives elsewhere, as well as processes for developing strategies which "fit" in particular contexts.

3) Diversity Watch: In addition, companies should ensure that they use their influence in their dealings with suppliers, post-secondary institutions and media to identify opportunities to promote a climate which reinforces and nurtures diversity. We need constant attention to the broad cultural forces that shape expectations and perceptions of women, IEPs and other represented groups. Media, including news, advertising and entertainment, is a powerful force and companies committed to diversity need to also be committed to shaping the cultural environment. Recognizing and acting on the under-representation and stereotypes which reinforce systemic barriers should not be left to small, often-marginalized "advocacy" groups. If companies are serious about diversity, they should leverage their influence to ensure better representation and balance in images which bombard us daily and subtly shape expectations, often limiting potential. The fact that many eastern European and Asian countries have higher representation of women in engineering professions than Canada suggests that cultural values and beliefs may play a role in affecting choices concerning education and career. The images and assumptions that permeate our culture have a significant impact on the career aspirations of young women as well as internationally educated professionals. Promoting positive images and role models is essential to efforts to promote equal opportunities for all. Stereotypes and the absence of role models play subtle roles in limiting the opportunities for women and internationally educated professionals.

5.5. Summary

This report has suggested that trends in the global labour market are dramatically increasing the competition for well qualified professionals in all sectors and are making the skills shortages in the ICT sector even more acute. The ability of the Canadian ICT sector to effectively meet the challenges of diversity will have a profound impact on its potential for growth. Increasing the participation of women and effectively integrating internationally educated professionals are two important ways in which the ICT sector can ensure the supply of highly skilled workers meets the growing demand in an intensively competitive labour market. There is ample evidence that leveraging diversity can offer a competitive edge but it requires a long term orientation and integrated strategy involving the full range of stakeholders. Failure to meet this challenge will have serious repercussions for individual companies, the sector and the nation. However, the experience of leading companies shows the payoff can be significant. Effectively addressing diversity is no longer just a matter of human rights or equity, it is a competitive necessity.

Appendix 1: Examples of Canadian Programs for Women in Technology

Name	Source	Comments
A Commitment to Training and Employment for Women (ACTEW)	http://www.actew.org/	A Commitment to Training and Employment for Women (ACTEW) is a provincial umbrella group of supporters, trainers, agencies, and organizations delivering employment and training services to women.
Association for Women in Science (AWIS) Mentoring Project	http://www.awis.org/careers/mentoring.html	Information on one-on-one, group and indirect mentoring programs as well as resources for mentoring.
Canadian Association for Girls in Science	www.publish.uwo.ca/~cagis/	CAGIS is a network of girls aged 7-16 who like science, technology, engineering, and mathematics and want to learn more.
Canadian Advanced Technology Alliance (CATA) – Women in Technology Forum (WIT)	www.cata.ca	The CATA WIT is a community network designed to boost women's participation and advancement in the high-growth technology sector.
Canadian Coalition of Women in Engineering, Science and Technology (CCWEST)	http://www.ccwest.org/	CCWESTT is a national coalition of groups that aims to promote women in science, engineering, trades and technology, celebrate their contribution and apply new vision to these fields.
Canadian Federation of Business and Professional Women's Clubs (BPW Canada)	http://www.bpw.ca/	The Canadian Federation of Business and Professional Women's Clubs (CFBPWC), better known as BPW Canada, is the national organization in Canada whose primary concern is the education, employment and economic status of employed women.
Canadian Information Processing Society (CIPS) – Women in IT	http://www.cips.ca/it/women/	A leading professional association for computing professionals which hosts a number of programs and events aimed at introducing high school girls to a range of career options in IT and technology.
Canadian Women in Mathematical Sciences	http://camel.math.ca/Women/index?menu=1	Resources including biographies, lists of published works, and other useful information.
Centre de documentation sur l'éducation des adultes et la condition féminine (CDÉACF)	http://www.cdeacf.ca/index.php?section=1&sous_section=1004	The Centre undertook the realisation of original projects aimed at increasing women's access and appropriation of ITC including Internet au féminin, Internet Alpha, community networking and the creation of a virtual library. Since 1994, the Centre has worked at enhancing ITS in women's groups across Quebec.
Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W)	http://taz.cs.ubc.ca/swift/cwic/Programs.html	Aims to provide information about women and computing in Canada and to provide information on the programs and individuals involved in addressing issues relating to women in computing. CRA-W undertakes research into how to encourage women into IT and computer science education and careers, and how to support women in IT and computer careers.

Name	Source	Comments
Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W) – Distinguished Lecture Series and Graduate recruitment workshops.	http://www.cra.org/Activities/craw/projects/applicationsDLS.html	Aims to encourage women and minorities to pursue graduate education in computer science and engineering.
Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W) – Distributed Mentor Program and the Canadian Distributed Mentor Program	http://www.cra.org/Activities/craw/dmp/index.php	Aims to increase the number of women entering graduate school in computer science and computer engineering.
Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W) – Career Mentoring Program	http://www.cra.org/Activities/craw/projects/mentoring/mentorWrkshp/index.php	Brings graduate students and new PhDs together with senior researchers to develop career strategies.
Conseil canadien des ingénieurs	http://www.ccpe.ca/f/prog_women.cfm	Mentoring program for women in engineering.
Digital Eve	http://www.digitaleve.org/about/index.html	An international women's organization dedicated to proactively helping women of all ages and cultures pursue technology careers and to make a positive difference in new media. Programs included web design, computer networking, etc. (Discontinued).
Division for the Advancement of Women in Engineering and Geoscience (DAWEG) – a division of the Association of Professional Engineers and Geoscientists of British Columbia	http://batman.mech.ubc.ca/~daweg/	Purpose is to implement programs which promote and encourage women in engineering and geoscience, and which increase and enhance the participation of women in these fields.
École de technologie supérieure and l'Université du Québec à Rimouski – Les filles et les sciences, un duo électrisant!	http://lesfillesetlessciences.ca/	Aims at eroding stereotypes on careers in science and technologies among young girls in Secondary 2 and 3. Participants have an opportunity to exchange in the context of a conference on specific fields of expertise. A mini-symposium for parents and teachers is parallel. Among the disciplines included are computer science and ICT.
Explore Career Pathways	http://www.harbour.sfu.ca/scwist/explore/	Stories of women in science.
HEC – Mentoring in IT program	http://tim.hec.ca/parrainageti/	Mentoring program with industry for BAA students.
IBM – Women in Technology Workshops		To encourage female students to stay in math and science classes.
IBM – Women in IT Chapters		Sponsors and coordinates chapters of women and IT at Canadian universities to build networks and offer workshops for girls in high schools.
IBM – Women in IT Mentoring		Linking IBM staff and industry role models with students in middle school.

Name	Source	Comments
IBM – Women in IT Camps		Aimed at elementary and high school students, the camps are intended to expose girls to the opportunities for careers in ICT.
Immigrating Women in Science	http://www.harbour.sfu.ca/scwist/IWIS/	The IWIS project was created by the Society for Canadian Women in Science and Technology (SCWIST). Its aim is to support immigrating professional women in science, engineering, and technology (SET).
Information Technology Association of Canada (ITAC)	www.itac.ca	ITAC is the voice of the Canadian information and communications technology industry and has announced a Women in Technology initiative.
International Network of Women Engineers & Scientists	www.inwes.org	To build a better future worldwide through full and effective participation of women and girls in all aspects of Science, Technology, Engineering, and Mathematics.
Inventive Women Inc.	http://www.inventivewomen.com	Multi-media company with a focus on innovation.
Lilith Rising – Outreach (mentoring) Program	http://www.lilithrising.com/	Formerly the Toronto chapter of Digital Eve.
Mentornet	http://www.mentornet.net	An e-mentoring program aimed at promoting the participation of women in science and engineering programs, available at several Canadian universities.
Microskills, Women's Technology Institute, Certification Programs, Women's Enterprise Centre, Training Program: Self-Employment Training Program For Women IT Professionals	http://www.microskills.ca/women_services.html	To offer women comprehensive skills training and support services to improve their employment opportunities within the Information, Telecommunication and Technology sector and to assist women in the IT profession to develop skills to operate their own business or gain more meaningful access to jobs in the information technology sector.
Ministère de l'éducation, du loisir et des sports – Hats off to you	http://www.mels.gouv.qc.ca/chapeau/2006-2007/PDF/BrochureChapeau_a.pdf	Held in every Quebec region, this contest invites young women enrolled in vocational and technical training programs leading to traditionally male-dominated trades and occupations to familiarize themselves with the many career options open to them, and providing support for those training for male-dominated trades and occupations until they can earn their diploma. The area of expertise includes computer science technology and computing support.
Office Workers Career Centre, Short Programs: employment related research and information, self-directed computer software training, career and skills workshops	www.officeworkers.org plus an email questionnaire	To assist unemployed clerical workers to plan long-term goals and to get back to work.

Name	Source	Comments
Ryerson University: Women in Technology (ITM Mentoring Program)	http://www.ryerson.ca/faculties/business/diversityinstitute/wit/	Available to male and female students, but with a particular emphasis on female students.
Society for Canadian Women in Science and Technology. Telementoring	www.harbour.sfu.ca/scwist/telementoring/default.htm	This electronic program is designed to facilitate an on-going guiding relationship between students and mentors – an opportunity for professional women to act as role models for young students.
Society for Canadian Women in Science and Technology – Evening networking evenings	http://www.harbour.sfu.ca/scwist/projects/xxevening.htm	Networking evenings designed to encourage women to explore careers in science and technology.
Status of Women Canada	http://www.swc-cfc.gc.ca/	Status of Women Canada (SWC) is the federal government agency which promotes gender equality, and the full participation of women in the economic, social, cultural and political life of the country. SWC focuses its work in three areas: improving women's economic autonomy and well-being, eliminating systemic violence against women and children, and advancing women's human rights.
Times Change Women's Employment Service, Short Programs: Career Planning Workshops, Job Search Workshops, Educational Counselling, job board, self-directed computer software training	www.timeschange.org	To serve the employment and educational counselling needs of women in Toronto.
Wired Women	http://www.wiredwoman.com/mc/page.do	To provide girls and women with educational programs, seminars, short courses and a variety of other educational opportunities to encourage women into careers in information technology and new media, and to help progress the careers of women in these fields. Programs including Introduction to the Internet, HTML for High School Girls, as well as other short courses, including the Under the Hood series
Women Entrepreneurs of Canada (WEC)	http://www.wec.ca/	WEC participates in initiatives which promote the interests of women entrepreneurs on a local, provincial, national and international level.
Women in Global Science and Technology	http://www.wigsat.org/	WIGSAT is an international non-profit organization. Its mission is: to promote the contributions women make in science and technology for development, and to help NGOs, governments, bilateral and multilateral agencies and women themselves understand the gender dimensions of S&T and the implications of this for development policy and practice.

Name	Source	Comments
Women In Leadership Foundation (WIL)	http://www.womeninleadership.ca	The Women In Leadership Foundation (WIL) is a proactive organization dedicated to advancing women in leadership roles by delivering inspiring, distinct programming across Canada and connecting Canadian employers with the leaders of tomorrow.
Women in Sciences and Engineering/ Femmes en Sciences et en Ingenierie (WISE/FSI)	http://www.wise-ottawa.ca/	To encourage women to seek higher education and achievement in science, engineering and related fields.
Women in Trade International	http://www.witi.com/	WITI is an international organization dedicated to advancing women through technology. Includes a links to conferences, job postings, research, and links to chapters.
Womenspace	http://www.womenspace.ca/	Affirms that development of ICTs provides enormous opportunities for women, who should be an integral part of, and key actors, in the information society. Committed to ensuring that the information society enables women's empowerment and their full participation on the basis on equality in all spheres of society and in all decision-making processes.
Youth in Motion		Youth in Motion (YIM) is a national, not-for-profit organization focused on developing the employability and life skills of today's youth to prepare them effectively for success in life and work. Programs are designed to provide access to career information and increase awareness about opportunities for youth and those impacting the career decisions of youth. Also has a mentoring program.

Appendix 2: Examples of Canadian Programs for Internationally Educated Professionals

Name	Source	Comments
Accessible Community Counseling and Employment Services for New Canadians (ACCES) – Bridging Engineers into the Workplace trained engineers with essential knowledge	www.accestrain.com/	Offers many services for new Canadians such as job search workshops, English language programs, and a comprehensive six-week program to provide internationally and skills to help them to connect with employers.
Canadian Information Processing Society – New Canadians IT Special Interest Group (SIG) Workshop	http://www.cipstoronto.ca/activities/event_info1.php?345	A new Canadians IT special interest group workshop that will help people to find a job in IT or to develop in their current one.
Career Bridge	http://www.careerbridge.ca/	Internships for internationally qualified professionals.
Catholic Cross-Cultural Services – Job Search Workshop (JSW)	http://www.cathcrosscultural.org/services/jsw.htm	Help the job seekers to develop a plan to research for jobs, and provide information about mentorship programs, retraining, education and volunteer opportunities in the community.
Centennial College, School of Engineering Technology and Applied Science – Fast Track to Technology Occupations (FTTO): A Fast Track Program for Integrating Internationally Trained Individuals (ITIs) in Key Technology Occupations in the Ontario Labour Market	http://www.centennialcollege.ca/future/iti.jsp	Allows students who have fully or partially completed a university degree to accelerate, or fast track, through to the three-year advanced diploma in Industrial Microbiology, Environmental Protection Technology, and Automation and Robotics Technology. These fast-track options are particularly attractive to IEPs who, through the school's cooperative education (co-op) component, will have work placements with Canadian companies.
Centre for Education and Training, Education, Training and Language services	http://www.tcet.com/educationTraining_q2.aspx?sel=q3	Provides newcomers who have basic to intermediate language abilities with higher levels of English courses. Will also develop assessment tools to help place learners with higher levels of English-language proficiency in appropriate language training programs.
Centre for Information and Community Services Ontario – Enhanced Language Training Initiative	http://www.cicscanada.com/en/all_pages.asp?aid=2365&cid=19	Helps IEPs in Toronto integrate successfully into the Canadian workplace targeting primarily four professions: accounting, IT, engineering, and health care.
Centre for Information and Community Services Ontario – Job Search Workshop for Newcomers	http://www.cicscanada.com/en/all_pages.asp?aid=2637&cid=154	Free workshops assist with cover letter and resume writing, identification and assessment of transferable skills, researching the Canadian Labour Market, effective job search tips and strategies, interview techniques, follow-up support and job-related information and referrals.
Centre for Skills Development & Training – Enhanced Language Training for Internationally Educated Professionals	http://www.thecentre.on.ca/AcademicUpgrading/ELT.asp	An advanced occupation-specific English language training program (CLB 6-7) for international-trained professionals and business people.

Name	Source	Comments
Citizen and Immigration Canada – Facilitated Processing for Information Technology Workers	http://www.cic.gc.ca/english/work/itw.html	CIC, HRSDC, and ICTC (formerly SHRC) project to streamline the entry of workers whose skills are in high demand in the software industry. (Discontinued)
Citizenship and Immigration Canada (CIC)	http://www.cic.gc.ca/francais/travailler/tech.html	In response to the need of employers to fill critical shortages in the software industry, Citizenship and Immigration Canada (CIC) collaborated with Human Resources and Skills Development Canada (HRSDC), Industry Canada and the Information and Communications Technology Council (formerly Software Human Resource Council – SHRC) on the development of a pilot project to streamline the entry of workers whose skills were in high demand in the software industry and whose entry into the Canadian labour market would have no negative impact on Canadian job seekers and workers. (Discontinued)
City of Toronto: Profession to Profession – Mentoring Immigrants Program	http://www.toronto.ca/diversity/mentoring/index.htm	Matches IEPs with experienced City of Toronto professionals who mentor them for a period of four to six months in one of the following fields - engineering, accounting/finance, information technology, human resources, purchasing, facility management, social work/social policy, urban planning, communications or event planning.
COSTI – Specialized English Instruction for Internationally Trained Individuals	http://www.costi.org/programs/service_details.php?stype_id=41	Offers specialized English instruction programs designed specifically for internationally trained individuals and tradespersons. Programs help newcomers to transition more quickly into the Canadian labour market, by offering training that addresses their specific employment and language needs.
CultureLink – Job search workshops and employment counselling	http://www.culturelink.net/	Workshops provide each participant with an updated resume, a job search action plan, improved interview skills, individual counselling, ongoing job search support, and access to phone, fax, computers, Internet, newspapers and photocopier. Individual employment counselling is for newcomers who have completed job search workshops.
George Brown College – Intensive English Program (FTP)	http://www.georgebrown.ca/Marketing/FTCal-Jan/access/R728.aspx#maincontent	This intensive English program helps students learn English quickly and easily by providing a supportive environment where students from around the world come together to learn English.

Name	Source	Comments
Humber College Institute of Technology and Advanced Learning – Centre for Internationally Trained Professionals	http://www.cftpt.org/	Four-week job search program which includes: assessment of educational and vocational background; subsidy for World Education Services credential evaluation may be available; assistance identifying career goals and marketable skills; development of successful job search strategies; and ongoing support and job development assistance. Mentoring and unpaid placement opportunities may be available upon completion of the program.
Immigrant Employment Loan Program	http://www.maytree.com/MaytreeInitiatives/FinancialAssistanceForImmigrantsAndRefugees/ImmigrantEmploymentLoanProgram.htm	Provides access to credit for newcomers to pay for short-term training (up to one year) in order to find employment in their occupation. The maximum loan considered is $5,000, and funds can also cover an assessment of credentials, examination and professional association fees.
Jobstart – Career Action for Newcomers	http://www.jobstart-cawl.org/newcomers/index.htm#Career_Action_for_Newcomers_(CAN)	Provides employment preparation and job search support to internationally trained professionals to find and keep jobs, commensurate with their prior work experience, education and skills.
Jobstart – IT Work Search	http://www.jobstart-cawl.org/newcomers/index.htm#IT	This three-week program assists IT professionals who are newcomers to Canada to find work in their field of choice.
JVS Toronto – Canadian Workplace Communication for Internationally Trained Individuals	http://www.jvstoronto.org/index.php?page=canadian_workplace_communication_for_internationally_trained_individuals	Delivers enhanced language training and communication courses for IEPs with experience or work background in banking/finance, information technology and engineering. This project is a partnership between JVS Toronto and the Consortium of Agencies Serving Internationally Trained People (CASIP). Participating CASIP member agencies are: A.C.C.E.S., Humber College Institute of Technology and Advanced Learning, Job Start, Community Microskills and Seneca College of Applied Arts and Technology.
MicroSkills – Job Search Workshop for Immigrants Program (JSW)	http://www.microskills.ca/employment_assistance.html	To find a job in the shortest possible time, preferably in their own field.
Ministère de l'immigration et des communautés culturelles	http://www.immigration-quebec.gouv.qc.ca/en/immigrate-settle/permanent-workers/preparing-departure/programs-newcomers/french-courses.html	A French as a second language program (full-time, part-time or tailored courses) for IEPs. They are provided in partnership with public educational institutions and community organizations. Most universities, colleges (CEGEPs) and school boards include French instruction in their adult education programs for the general public. These courses will also introduce to the practical aspects of daily life in Québec. In Montréal and in some regions, French courses are also offered in the workplace.

Name	Source	Comments
Ministère de l'immigration et des communautés culturelles	http://www.immigration-quebec.gouv.qc.ca/en/french-language/learning-online/index.html	Free online French classes.
Ordre des ingénieurs du Québec and CAMO – Programme Accès Rapide	http://www.micc.gouv.qc.ca/publications/fr/dossiers/AccesProfessionsMetiers-ProjetsJuillet2006.pdf	Program of tutoring offered for the past 4 years to candidates trained in an international country in preparation to undertake Canadian engineering recognition exams. The program includes mentoring between international and Canadian engineers.
Programme d'aide à l'intégration des immigrants et des minorités visibles en emploi (PRIIME)	http://www.micc.gouv.qc.ca/publications/fr/planification/PlanAction20042007-FichThemPRIIME.pdf	Program aimed at encouraging small and medium-size enterprises in Quebec to hire new IEPs and visible minorities. For newly arrived IEPs, PRIIME supports work experience in their field of expertise in Quebec. Available only as first job opportunity in Quebec.
Seneca College – Re-Employment Services for International Professionals	http://www.senecac.on.ca/resip/	Program workshops provide the job search and career planning strategies for find employment in Canada.
Sheridan Institute of Technology and Advanced Learning – Fast Track to Technology Occupations (FTTO): A Fast Track Program for Integrating Internationally Trained Individuals (ITIs) in Key Technology Occupations in the Ontario Labour Market	http://ftto.sheridaninstitute.ca	Provides education and experience assessment, bridging program: accelerated program completion in Communications and Information Technology or Engineering and Manufacturing Sciences, co-op placements, and mentoring service.
Toronto District School Board – Newcomer Opportunities for Work (NOW)	http://www.tdsb.on.ca/_site/ViewItem.asp?siteid=118&menuid=2185&pageid=1704	Three-week job search program including skills assessment, job search strategies, information on Canadian workplace culture and expectations, business etiquette and individualized job search assistance.
Toronto Region Immigrant Employment Council – The Mentoring Partnership	http://www.thementoringpartnership.com/index.asp	An alliance of community agencies in the City of Toronto, Peel Region and York Region that offer occupation-specific mentoring to skilled IEPs.

Appendix 3: Programs aimed at addressing the ICT skills gap

Technology First Work: Career Focus – This project will address skills shortages in technical and technological positions by increasing the supply of qualified new entrants to the labour force.

Canadian Technology Standards (CTS) Analysis – A study will be conducted on the key labour issues in Canada's engineering and technology work force related to the need for, and use and maintenance of, occupational standards.

Information and Communications Technology Council (ICTC): Expanding the Reach – This project will help the ICTC to address the broader skills issues of the information technology (IT) sector as a whole, as opposed to those uniquely tied to software. This project includes the development of five to 10 hardware-specific occupational profiles. These profiles are seen as necessary to acquiring labour market information on the breakdown of "software" versus "hardware" practitioners.

IT LMI Supply and Demand Project – Through this project, a comprehensive analysis of key supply and demand issues affecting, or about to affect, recruitment and retention of Canada's IT professionals will be developed. Based on this knowledge, human resources strategies will be developed to enhance Canada's competitiveness in IT across key sectors of the economy.

ICTC Career Focus – Through this project, the ICTC will provide employment opportunities for a minimum of 87 graduates, who will be placed with employers interested in the Career Focus Program for the 2005–2006, 2006–2007 and 2007-2008 fiscal years.

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The Information and Communications Technology Council (ICTC) is a non-profit sectoral council dedicated to creating a strong, prepared and highly educated Canadian ICT industry and workforce. ICTC is a catalyst for change, pushing for innovations that will provide labour market intelligence, life-long professional development and quality education and training for the Canadian ICT industry, educators, governments and the ICT workforce. We forge partnerships that help develop the quantity and quality of ICT professionals needed to improve Canada's position as a leader in the global marketplace.

To achieve its goals, ICTC focuses on four areas that are proven building blocks of a healthy, forward-looking sector:

- Skills Definition – defining the skills required to be a professional in the ICT sector.
- Labour Market Intelligence – providing up-to-date statistics and analyses of human resource developments in the ICT sector.
- Career Awareness – providing programs and tools to explore the career possibilities in Canada's ICT sector.
- Professional Development – dedicated to continuous learning for ICT workers so they can maintain and improve their skills sets and increase their opportunities within the sector.

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