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ICTS Jobs 2.0:

How Canada can win in the 21st century global marketplace for Information and Communications Technologies and Services (ICTS)

By David Ticoll
CEO, Convergent Strategies
Research Fellow, Knowledge Media Design Institute,
University of Toronto

REPORTS

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Executive Summary

Global job mobility, technological change, demographics, declining enrollments, and shifting business investment patterns have combined to create uncertainty in Canada's information and communications technologies and services (ICTS) labour markets. Employers, employees, and future students wonder whether, and how, ICTS will be a growth industry. Meanwhile, the labour market is tightening, and employers are having trouble finding the people they need. ICTS will continue to be a leading industry for Canada, and a career option that offers better opportunities than ever. To capitalize on this opportunity, leading stakeholders must clearly articulate and market Canada's "ICTS Jobs 2.0" as a new portfolio of opportunities for employees, students and educators.

Stakeholders wonder – is the cup half empty or half full for Canada's ICTS labour market?

In fact, the information and communications technologies and services (ICTS) sector is doing very well. Though highly cyclical, it has grown by 2.5% per year since 2000, and now stands at about some 600,000 people. This is much better than overall employment growth in the economy, which was 1.8% per year. The Information and Communications Technology Council (ICTC) projects that sector employment growth will remain relatively stable at a compound annual rate of 2.3% through 2010. This will yield net growth of some 58,000 jobs over the next 3-5 years. So despite rumours to the contrary, the ICTS sector offers many opportunities to current and future employees.

Nevertheless, for students, employers, and policy makers, the ICTS labour market remains a question mark. On the one hand, as Andrew Sharpe of the Centre for the Study of Living Standards has shown, Canadian firms spend only about half as much on ICTs as their US counterparts – and this explains a large part of the country's productivity deficit. On the other hand, offshoring to low cost locations like India and Brazil could mean that many Canadian ICTS jobs become "exported" and overall sector employment declines dramatically. These countries are gaining capacity in human resources, entrepreneurial capability, and increasingly, the ability to innovate. Also, their growing domestic markets are driving demand for globally competitive ICT capabilities. These economies can increasingly stand toe to toe with their North American and European rivals – delivering quality, innovative results at a fraction of the rich economy price. Is Canada's ICTS labour market cup half empty or half full?

Today's graduating high school student – or her guidance counsellor – can be forgiven for believing the cup is half empty. Most people lack good information about where ICTS job markets are headed, and the nature of the underlying forces. As a result, declining enrolments in IT-related programs have a basis in common, credible perceptions.

— The dotcom crash turned the industry from a beacon of wealth and glamour to one that seems fraught with risks.

— Today's Web 2.0 resurgence has been received with scepticism as dot-com redux. Also, it's a consumerist phenomenon that turns ICTS into something apparently mundane, that anyone can easily master. For some young people, the lustre of a computer career has dimmed, but not the effort and financial cost.

— According to the Organisation for Economic Co-Operation and Development (OECD), Canada is both an active importer of ICT services ($1 billion in 2003) and also an overall net exporter of these services (a positive trade balance of $1.25 billion). However most of this trade is with other rich countries like the United States. If Canada's per capita use were equal to that of the US, it would be buying about $7 billion worth of offshore IT and business process services from India per year instead of $1 billion. Canada's banks, manufacturers, retailers and energy firms might, some day soon, decide to catch up with the US and rapidly expand their offshoring of IT operations to low cost economies. Why enter a profession where jobs are at risk of being exported to India or Poland?

— Women in ICTS remain marginalized. Only one in four ICTS employees are women, and they tend to do jobs like Web site design and multimedia – not hard core stuff like systems analysis, architecture, or coding. For a young woman, choosing an ICTS career (rather than one in health science, for example) means picking an uphill fight.

— Though IT was the hot technical field during the 1980s and 1990s, health sciences, biotech, environmental and materials sciences – and of course resource engineering – are on the rise today.

Policy makers, as well as business leaders who employ ICTS workers (whether inside ICTS industries or in other industries where ICTS is crucial to performance), face comparable challenges. ICTS industries are repeatedly shocked by discontinuous change – most recently the rise of the Internet and the explosion of outsourcing and offshoring. Predicting the future in ICTS is fraught with peril.

The debate about the impact of offshoring sometimes seems like Chicken Little vs. Pollyanna. Some economists and employers believe that any service job capable of being done over a network will go to the lowest cost location in the world, or will be subject to a downward pressure on wages that results from global competition. Demographic shifts could also threaten domestic IT employment. At one end of the workforce, baby boomers are preparing to retire, or at least cut back. At the other, IT-related post-secondary enrolments have plummeted. And as jobs shift offshore, routine entry-level jobs will arguably go first – perhaps pushed over the edge due to a dearth of graduates. This combination of factors could well produce an offshoring snowball, driven by a combination of retirement dropouts at one end and lack of entry-level workers at the other.

Other economists contend there are lots of reasons not to worry. Wages in today's low cost economies will inevitably increase (as did Japanese wages in the 1970s and 1980s though it might take 20 years in this case). In fact, middle and top management employees in major Indian ICTS operations are becoming globally mobile – and their salaries are ramping up fast. The optimists also argue that the number of rich economy jobs at risk is minimal, and those displaced in Canada will be educated workers who can readily refocus their careers.

David Ticoll
CEO, Convergent Strategies
Research Fellow, Knowledge Media Design Institute, University of Toronto

Canada's "ICTS Jobs 2.0" career profiles of today are a product of the very forces that undermine yesterday's ICTS occupational model

In preparing this report, we interviewed several IT services provider executives. They collectively represent some 60,000 workers – about 10% of the entire industry workforce. They are primarily on the supply side, and much of what they do is outsource work or provide staffing services for "user" organizations. HR executives in firms told us that the issue is not job losses – on the contrary, it's a talent shortage. This despite the fact that firms involved in outsourcing increasingly use a "global delivery model" where they farm out work globally based on where it can be performed best, fastest and cheapest.

It might seem that the talent shortage can be put down to the fact that outsourcers are busily taking jobs out of the rest of the marketplace. But staffing agencies, which provide workers for "end user" firms, face shortages too. In fact, the basis of competition in today's staffing industry is not so much winning customers as it is delivering talent. The firm that snags the right talent fastest wins the business.

On the other side, "end user" executives we interviewed are convinced that their firms and industries are at the cusp of an ICTS offshoring boom: that their companies are offshoring laggards, but will likely catch up over the next five years. Offshoring is likely to accelerate, they believe, for several reasons. Their small scale pilots have proven successful, and they have learned valuable lessons about how to manage an offshoring project, including issues like supplier and contract management, global communications, process design, etc. Their management is increasingly convinced that offshoring is not a fad, but a long term trend. Competition is heating up in several Canadian industries, such as retail, financial services, and telecommunications – forcing firms to cut costs. And the rising Canadian dollar makes purchasing services domestically more expensive, and going offshore cheaper.

Nevertheless, observers and analysts agree that demand for ICTS talent within Canada will continue to grow at a modest pace, and we believe that this is for structural reasons: the domestic economy will continue growing, ICTS will continue to proliferate and seep into ever more dimensions of business and consumer life, and competition will force Canadian firms to close the ICT investment gap discussed earlier in this paper. However the talent profile will change. It remains to be seen how well Canada will rise to the new opportunity. Four high potential Canadian "ICTS Jobs 2.0" career profiles will focus on innovation:

— Business-IT Leader/Advisor: The "package" of business knowledge, communication skills, leadership, project management, interpersonal effectiveness, and ICTS. These are essentially client and general management capabilities with an ICTS flavour.

— Industry IT Specialist: Subject-specific business knowledge, combined with applicable ICTS skills, in a domain where a Canada-based IT/business process services centre of excellence (where a focused industry investment has proven successful and sustainable). Examples include insurance (in Ontario & Quebec), electric utilities (BC), utilities (Alberta), and financial services (Ontario).

— Advanced Computational Technologist: Leading edge expertise at the intersection of a topic domain and ICTS, combined with a strong dose of innovation and creativity. This applies in a wide variety of fields, such as business analytics, logistics, game design, multimedia, bioinformatics, nanotechnology, industrial design, information security, and computational geology.

— Same time/same place Technician: Many companies, including domestic telecommunication firms (e.g., Bell, Rogers, Telus) and international technology vendors (Dell, Ericsson), will continue to see Canada as a great location for technical support services (both physical and call center-based), supporting both domestic and hemispheric markets. Canada's total operating costs are cheaper than the US, and it also enjoys cultural and linguistic affinity, time zone and geographic proximity. In addition, some technical services, such as hardware and network installation and maintenance, must be conducted on-site and will remain relatively impervious to globalization.

For all ICTS Jobs 2.0 profiles, Canada already has robust, in-demand workforces engaged in significant value-adding – and competitive – business activities. These don't just serve domestic users, but also global and nearshore international users. Business-IT leader/advisors and industry IT specialists provide competitive, value-added insourced and outsourced services to US companies; major players like Accenture, CGI and IBM have set up global centres of IT services excellence devoted to utilities (in British Columbia), insurance (in Ontario and Quebec) and oil & gas (Alberta). Advanced computational technologists compete globally in best-in-class industrial R&D, analysis and specialist services. Vancouver's multimedia game development industry, Edmonton's nanotechnology initiatives, and Toronto's biotech industry are some examples. Some on-site technicians (like a Montreal-based Ericsson team) support not just Canada, but the entire western hemisphere.

Evidently, what's missing from this list are "ICTS Jobs 1.0" like coding, help desk, application maintenance, and the like. Of course, many of these jobs will remain in Canada – but these will also be the jobs that are most vulnerable to offshoring. Some of these jobs will migrate outside Canada; many of those that remain will be subject to downward pressure on wage rates. Dell Computer, for example, repatriated some help desk services from India to Ottawa, and recently announced an expansion of this operation. Cultural and time zone proximity, as well as employee retention, are factors that keep such services in Canada. But this is an economic trade-off. The question is not so much what is the fate of these jobs, as it is, why are three of our four preferred profiles (other than intrinsically immobile same time/same place technicians) likely to remain here?

In fact, the very forces that undermine ICTS Jobs 1.0 capabilities will drive demand for ICTS Jobs 2.0 skills:

— As ICTS Jobs 1.0 decline in relative importance within Canada and move offshore, there will be a growing need for professionals who can work at the intersection of business, IT, personal effectiveness, and leadership.

— Demand for hybrid business-technology skills will be further accelerated by technological change, as software becomes easier to use and more accessible. Examples range from user-friendly business application development capabilities to "consumerization" phenomena like mashups (a mashup is a Web site or application that combines content from more than one source into an integrated experience.) and wikis (a wiki is a Web site that allows the visitors themselves to easily add, remove, and otherwise edit and change available content).

— ICTS innovation, pervasiveness, and cost-performance continue to accelerate, becoming ever more integral to all aspects of life and work (see page 5-6). This growth in the use of technology will increase absolute demand for ICTS skills, particularly in new and emerging areas. Some of the resulting jobs will move offshore – but others (especially in leading edge areas) will reside here if we build our cadre of Jobs 2.0 professionals.

— In highly specialized areas – at the intersection of ICTS and deep industry knowledge, or the intersection of ICTS and other complex and advanced technologies – there will be a global war for talent and delivery capability. In areas where Canada can prove its worth, it will enjoy demand. The intersection of technology, skill, context, industrial clustering and subject-specific expertise, keep Research In Motion in Waterloo and IBM's software lab in Toronto.

— Baby boomer retirements will accelerate demand for hybrid business-technology skills, since they tend to be seasoned employees filling leadership and business interface roles.

Sidebar: ICTS Future Scenario

Richard Karlgaard, publisher of *Forbes*, has described the current era as "the cheap revolution", with cheap computing, cheap storage, and cheap communications. Cheap means widely accessible to multitudes of people and uses. Imagine how some of today's cheap technologies will play out over the next decade.

— **Unlimited storage will be nearly free.** For under $1,000 you can now buy a mass market storage device for your computer or home network with a capacity of 1 terabyte. It can hold can hold up to 16,600 songs, 72 hours of high-resolution video or 768,000 photos. Before 2015, you will be able to get petabyte storage – 1,000 times as big, in a box the size of a paperback.

— **Analytical software will deliver hidden treasures.** With 750,000 low cost networked computers and the world's smartest collection of computer scientists, Google can mine the entire Internet (5+ petabytes and growing) to instantaneously deliver the result to a complex, unusual query – for free. Harrah's (a casino company) and the US Department of Homeland Security each sift through their separately assembled mountains of data to identify and respond to valued targets (high rollers and terrorists, respectively). Before 2015, the search and analysis tools of Google, Microsoft, Yahoo!, and the like will deliver user-friendly selection, recognition and analysis of any digital item: documents, drawings, photographs, conversations, and video clips.

— **Real and virtual will converge.** In Korea, 80% of households have a high speed Internet connection at least as fast as what Canada's phone and cable companies offer. Korean service providers now offer connections 50 times faster – and plan to sign up millions of consumers over the next couple of years. At this speed, 100 megabits per second, you can watch HDTV over the Internet, conduct true to life full screen video conversations, and play twitch-paced games – always available from the comfort of your living room or anywhere else. As speeds and innovations progress, networked video will go 3D. By 2015, we expect this – as a minimum – to be the standard offering in Canada. And mobile, wireless handhelds in cellular-type networks will be nearly as fast.

Mash together just these three changes – in storage, analytical software, and pervasive fast networks. Imagine the scenarios for new kinds of collaboration, entertainment, retail, manufacturing, resource extraction, government, health care or educational processes. Clearly, the past decade is mere prologue.

We envision five broad categories of ICTS innovation over the next decade. Within each of these, a variety of specific innovations will occur.

1. Price, performance and pervasiveness will continue o advance.
2. Software will be easier to get, easier to use, smarter, and collaborative.
3. ICTS, in combination with other sciences and technologies, will deliver powerful breakthroughs.
4. ICTS will drive and enable deep, powerful, highly specific performance-enhancing innovations in just about every industry.
5. By 2015, the ICTS-enabled commoditization of knowledge work, combined with the rise of emerging economies, will produce a new global division of labour.

We survey each of these changes below.

Price, performance and pervasiveness will continue to advance. Moore's Law and Metcalfe's Law predicts exponential improvements in power, cost, and physical presence of computing power. Over the next decade we expect to see:

— Pervasive, cheap, often free wireless Internet in most populated areas of the world

— Communicating intelligence in every sort of object and device – such as home appliances, roads, hospital beds, hardware tools, textiles, trees, and livestock

— Environmentally friendly batteries that let us be "untethered" for days at a time.

— High quality, low cost, lightweight computer, TV and device displays, including displays on thin sheets of plastic film that can be rolled up.

— High capacity solid state storage that lets you carry the entire classical music canon in your hip pocket.

— Next generation computer systems based on new approaches now being pioneered by the likes of Google: dozens, even thousands of cooperating machines that deliver flexibility, lightning-fast performance, high reliability, easy incremental growth, and low cost.

Software will be easier to get, easier to use, smarter, and collaborative. A series of revolutions in the design, delivery and use of software is well under way. The results will unfold over the next 10 years.

— The software industry's business model will shift from purchased or licensed product that runs on the customer's own computer to subscription or advertising-supported service that runs on the Internet. Pioneered by the likes of Google and Salesforce.com, incumbents such as Microsoft and SAP have assertively embraced this model.

— Cheap storage, fast networks and powerful search and analysis applications have created a new paradigm for Internet-based consumer services. Business and government innovators that embrace the shift will gain productivity and competitive benefits. Advanced, powerful 'anticipatory intelligence' will become a must for efficient operational management and effective customer service.

— Technology-based global collaboration will intensify, driven by consumer (YouTube and Wikipedia) and corporate (mobility, offshoring, telework) trends.

— By 2015, many "end user" software tools – such as word processors and specialized business applications – will be available for free, whether "open source" or advertising-supported.

ICTS, in combination with other sciences and technologies, will deliver powerful breakthroughs. Nanotechnology, biotechnology, and microelectronic mechanical systems broadly intersect. Each is not just one thing, but an entire domain of technology and innovation. We have barely scratched the surface of any of these. By 2015 they will yield new products, services and capabilities in a wide array of domains.

ICTS will drive and enable deep, powerful, highly specific performance-enhancing innovations in just about every industry. For example:

— Construction/buildings/roads (e.g., online blueprints and project management)

— Education (distance learning, collaborative learning)

— Entertainment (digital distribution, consumer-created content, virtual worlds)

— Finance (mobile payments, microtransactions)

— Health care delivery (electronic health record, tailored medications)

— Materials science (smart textiles)

— Military/security (biometrics, advanced surveillance systems)

— Retail (personalized marketing, product customization)

By 2015, the ICTS-enabled commoditization of many knowledge work activities, combined with the rise of emerging economies, will produce a new global division of labour. By some estimates, transaction costs – the costs of finding, contracting, and controlling employees and suppliers – account for some 50% of US GDP, and Canada is likely not far behind. Pervasive ICTS slashes transaction costs, and presents firms with the opportunity to source work from the most cost-effective internal or external provider, and in the most cost-effective location. Collaboration and process management software, along with all the other aforementioned changes, will make global sourcing that much more feasible and rational. And the rise of ambitious, technically skilled, globally proficient workforces in emerging economies will make such decisions ever more practical. By 2015, a shakeout will have occurred and millions of the best knowledge-based jobs in the world will have become untethered.

Conclusion: These changes combined support the ICTS Jobs 2.0 scenario. ICTS will continue to innovate and proliferate, increasingly touching every aspect of our economy and our daily lives. ICTS will be the basis of innovation in nearly every other industry, and will require professional capabilities ranging from the most basic to the most esoteric and advanced. Managers of all stripes – whether of business or of technology – will need to get better than ever at achieving productive synergies between these two spheres. All this spells opportunity – not threat – but for the right kinds of people with the right kinds of skills.

David Ticoll
CEO, Convergent Strategies
Research Fellow, Knowledge Media Design Institute, University of Toronto

Maximizing Canada's ICTS Jobs 2.0 opportunity requires articulate leadership and direct communication to policy makers, educators and students

If we do nothing, Canada's ICTS labour market will move towards ICTS Jobs 2.0 – because this is its natural direction, and business leaders are already making the investment. If we seize the initiative, the payoffs will be significant. Stakeholders will be better prepared. Market adjustments will be smoother and more efficient. Canada's ICTS industries and workers will stake out bigger and more wealth-creating claims in the marketplaces of tomorrow.

Canada needs a national vision for ICTS Jobs 2.0 as genuine, exciting career opportunities for students, employers, and educators. The hurdles are, however, significant.

— Students no longer see mystery or excitement in ICTs: for them, these technologies are part of everyday life, as were refrigerators and cars for their parents.

— Anecdotal evidence suggests that some high school guidance counsellors tune out entirely at the thought of ICTS as a desirable career option.

— University educators often lack the material incentives to invest in restructuring programs to meet the needs of ICTS Jobs 2.0. Academics are rewarded for continuing to do what they do, not for taking on the challenges of fundamental program change. As a result, only a handful of institutions (such as Ryerson University) have taken on the effort to create new, fully integrated IT/business programs.

— Many business leaders lack clarity about the future role of ICTs: some worry about the impact of change, while others no longer believe that ICTs provide competitive advantage. Meanwhile, Canada's organizationally divided, branch plant-dominated ICTS industry (unlike those of India, Ireland and the US) has provided some, but perhaps not enough, leadership on these issues.[1]

— Government policy leadership on this issue has also been limited, due to competition from more visible industry initiatives (e.g., resources, auto, and biotech).

It's important that any such initiative be business-led. Business executives have the credibility to identify and pick the marketplace "races" where they believe success is feasible. When business leaders speak about where they think the jobs are and will be, other stakeholders are inclined to listen. However, business people are not coming together on this issue. The Information and Communications Technology Council has the opportunity, the resources, and, indeed, the responsibility, to facilitate this process.

We recommend that ICTC embark on a four step program to position Canada for leadership in ICTS Jobs 2.0.

1. Form and support an ICTS Jobs 2.0 Partnership, an ongoing activist organization and policy driver, chaired by a leading business executive. It should include employers, educators, government, and multi-generations of students and employees. Its mandate should be to engage CEOs and senior human resources executives to:
   a. Define a public point of view on the specifics of the ICTS Jobs 2.0 opportunity for Canadians
   b. Define what needs to happen for Canada to maximize its ICTS Jobs 2.0 position in the global economy

[1] In India, executives worked together and through a single, powerful trade organization (NASSCOM) to develop the industry, foster ICT education, and improve government policies. Ireland moved from a European have-not nation to an ICT dynamo thanks to tax and investment policies driven by an industry-government partnership. US-based global firms created multiple generations of success by building ecosystems in several geographies (e.g., Boston, Silicon Valley, Seattle) that leveraged partnerships among firms, investors, and educational institutions.

c. Articulate this opportunity through a series of ICTC-supported programs for key stakeholders, including students, educators, government, and employers

d. Participate in an online reach out program for key stakeholders such as employers, employees, students, teachers, guidance counsellors, and parents.

2. Redefine the Occupational Skills Profile Model to recognize the skills and competencies – including business knowledge, leadership and communications skills — required to support the innovation focus of ICTS Jobs 2.0.

3. Launch and subsidize a national combined IT-business skills upgrading campaign and education program for mid-career IT professionals (HRSDC).

4. Conduct a census and demand analysis of Canada's ICTS centers of excellence in order to provide greater detail and specifics on the need and opportunity for ICTS Jobs 2.0 profiles as described in this report.

5. Revamp and re-launch the DiscoverIT.org site so that it effectively communicates the ICTS Jobs 2.0 message in a manner that appeals to today's students, using peer-community contributions and techniques such as social networking, blogs and wikis inspired by myspace.com and Youtube. The Internet is where today's youth source the information they need, and it's critical that ICTC use it to communicate with students in a contemporary manner. The ICTC should form a youth panel to assist it in designing and governing this initiative, to ensure that it remains vibrant and relevant.

Canada is a small country, and its ICTS workforce is even smaller. But ICTS's contribution to Canada's prosperity and innovation agendas is much greater than the employment numbers suggest, because investments in information and communications technologies yield productivity and growth in every industry. Keeping Canada's professionals gainfully employed will not be difficult. The challenge and opportunity is to build on our strengths to inspire the ICTS industry and workforce to maximize Canadian competitiveness in the global knowledge economy of the 21st century.

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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.

Information and Communications Technology
Council (ICTC)

116 Lisgar Street, Suite 300,
Ottawa, ON K2P 0C2
Phone: 613-237-8551
Fax: 613-230-3490

Email: info@ictc-ctic.ca

Canada

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www.ictc-ctic.ca