



FORECAST

THE SMART ECONOMY RESHAPING CANADA'S WORKFORCE

LABOUR MARKET OUTLOOK 2015—2019



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ICTC's labour market research captures critical economic and labour market indicators to inform competitive business and human resource strategy planning, decision-making and career development in ICT, thereby driving the development of a more prosperous Canadian ICT workforce and industry in a global digital economy. Occupational demand and supply outlooks are affected by a variety of factors and change over time. Multiple sources of information should always be considered prior to making HR decisions based on estimations.

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FOREWORD

The global economy is upon us and emerging digital technologies have the potential to significantly heighten Canada's competitive advantage.

Demographic shifts, globalization of markets, changing consumer habits and expectations, and fierce competition are all radically altering how markets function and businesses operate. At the heart of this rapid transformation are innovative technologies – a critical enabler behind any modern economy such as Canada. Over the next 5 years, the adoption of smart and connected technologies powered by hyper-scale cloud computing will reshape all sectors of our economy including manufacturing, natural resources, financial services, health, transportation, and many others.

As ICTC asserts, a 1% increase in labour productivity as the result of adopting advanced technologies would yield \$8 billion to the Canadian economy. Despite the compelling argument for greater technology adoption, Canadian enterprises, particularly small and medium-size enterprises (SMEs), are slow to adopt new technologies. This contributes to Canada's well-known and persistent productivity gap relative to the U.S., our largest trading partner. And while differences in scale economies and access to capital have historically been cited as inherent disadvantages for Canadian businesses with global aspirations, cloud computing is ushering in a new era in which technology is more affordable, secure and scalable than ever before. Cloud computing is the great equalizer of our era.

Although greater technology adoption holds tremendous promise for the Canadian economy, we need to ensure that we have the right talent to lead the adoption and use of these new tools. However, the ICTC's labour market report indicates that by 2019, over 182,000 critical ICT positions will be left unfilled. This at a time when young Canadians are facing unemployment levels of approximately 12.8%. We must not miss the opportunity to train young Canadians to fill the digital jobs of the future, a central theme of Microsoft's YouthSpark initiative in Canada. Talent is critical to our ability to leverage the full potential of exciting new technologies that will drive the future growth and prosperity of the Canadian economy.

Microsoft is committed to empowering people and organizations to do more and achieve more. We are grateful to the ICTC for its insightful analysis and look forward to expanding and deepening this discussion to address the key catalysts and policy measures needed to secure Canada's future prosperity in an increasingly global and competitive environment.

Janet Kennedy
President, Microsoft Canada Inc.

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ACRONYMS

GTA	Greater Toronto Area
HR	Human Resource
ICT	Information and Communications Technology
ICTC	Information and Communications Technology Council
IOT	Internet of Things
IT	Information Technology
SMAAC	Social, Mobile, Analytics, Apps, and Cloud
STEM	Science, Technology, Engineering, and Mathematics

EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

The 2015 edition of *Labour Market Outlook* is the fourth in a series of ICTC analytics that began with the first edition published in 2006. The aim of this latest edition in this series of studies is to highlight and provide new insights on conditions affecting Canada's ICT workforce across all economic sectors from demand- and supply-side perspectives. This study tracks and projects the evolution of 15 ICT occupations in 18 municipalities, 10 provinces, and Canada as a whole.

The latest innovations in ICTs – in particular the internet of things (IOT) as well as Social, Mobile, Analytics, Apps, and Cloud (SMAAC) – have become key drivers of innovation, productivity, and growth. These enabling technologies have changed the ways Canadians communicate and live their daily lives, as well as creating new business and employment opportunities. Social and economic transformations have changed the demand for skills, and changing skill needs are reshaping the entire labour market across all sectors.

This study aims to provide evidence on future labour market developments to help informed decision making. The results and findings of this study cover key aspects of the technological renaissance and economic, demographic, and educational outlooks from the viewpoint of their impacts on the demand and supply of ICT talent and skills. This study updates the forecasts carried out in 2011 by applying improved data and methods and forecasts for the ICT skills demand and supply in Canada up to and including 2019.

The analytical framework is based on robust labour market research and intelligence. The data for all [15 occupations](#) identified by the 4-digit National Occupational Classification (NOC) codes were collected at the municipal and provincial levels, which were further analyzed, and summarized. The 2015-2019 *Labour Market Outlook* was further improved through use of the latest available labour force data and use of comprehensive industry feedback. The forecasts consider major economic and socio-demographic trends and examine their implications for ICT occupations. This is done by incorporating relevant trends and policies, feedback from in-depth consultation with over 1,000 representative employers across Canada, inputs of five regional focus group discussions and validation webinars with representatives from industry and other stakeholder groups, and valuable insights of a 22-member distinguished multinational [Labour Market Outlook Advisory Group](#) in the analytical framework.

The highlights of ICTC's latest *Labour Market Outlook* are presented below.

HIGHLIGHTS

We face a growing gap between the demand for, versus supply of, ICT talent and skills.
Hiring requirements in Canada are expected to reach:

182,000

by 2019



5 occupations will be in strong demand.



Information System Analysts
& Consultants



Computer Programmers &
Interactive Media Developers



Computer & Information
Systems Managers



Software Engineers & Designers



Graphic Designers & Illustrators

The demand-supply imbalance will affect all provinces, and could reach over:

76,300	Ontario
49,600	Quebec
20,900	British Columbia
17,300	Alberta
4,000	Manitoba
3,900	Saskatchewan
3,800	Newfoundland and Labrador
3,200	Nova Scotia
2,200	New Brunswick
1,500	Prince Edward Island



HIGHLIGHTS

Canada faces a growing gap between the demand for and the supply of ICT talent and skills...

- ❖ 811,200 ICT professionals are currently employed in Canada. Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of total hiring requirements. Under a baseline scenario, cumulative hiring requirements in Canada for ICT talent are expected to be **182,000** by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements.
- ❖ With the advent of numerous emerging and enabling technologies, the quest for ICT talent is heightening in all economic sectors. Closing the gap between the demand for and the supply of ICT talent and skills will help accelerate Canada's digital advantage in an increasingly connected global environment. And therein lies the opportunities for building a robust talent supply, creating excellent career opportunities, particularly for Canada's youth.
- ❖ Highly skilled professionals needed to innovate and apply ICTs are in high demand across Canada. Basic ICT skills needed to function effectively in today's connected digital workplaces have expanded. Certain trends that have been prevalent in recent times – including increase in skill-intensive jobs, higher demand for better qualified workers, and significant employment growth in ICT – are set to continue.
- ❖ With many tasks becoming automated with the emergence of IOT and SMAAC, the demand is growing for information-processing and other high-level cognitive skills. In addition, ICT workers must be equipped with various “business” skills, including critical thinking, interpersonal communication, self-management, and the ability to learn. Employers' inclination to find the right blend of technical and business skills makes the demand-supply imbalance even more challenging.

As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits, demand-supply imbalances will affect some occupations more than others...

High demand occupations:

- ❖ information systems analysts and consultants
- ❖ computer and network operators and web technicians
- ❖ computer programmers and interactive media developers
- ❖ software engineers
- ❖ graphic designers and illustrators
- ❖ computer and information systems managers
- ❖ database analysts and data administrators

Medium demand occupations:

- ❖ electrical and electronics engineering technologists and technicians
- ❖ web designers and developers
- ❖ computer engineers
- ❖ electrical and electronics engineers
- ❖ user support technicians
- ❖ systems testing technicians

Low demand occupations:

- ❖ telecommunications carriers managers
- ❖ broadcast technicians

Demand-supply imbalances will affect all provinces to some degree, with increasing demand for talent. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits:

- ❖ **British Columbia** would have to fill 20,900 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 15,500 in Vancouver, over 1,700 in Victoria, and over 3,600 in rest of British Columbia.
- ❖ **Alberta** would have to fill 17,300 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 10,600 in Calgary, over 4,000 in Edmonton, and over 2,500 in rest of Alberta.
- ❖ **Saskatchewan** would need to fill 3,900 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 1,400 in Regina, over 1,100 in Saskatoon, and over 1,300 in rest of Saskatchewan.
- ❖ **Manitoba** would need to fill 4,000 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 3,300 in Winnipeg and over 600 in rest of Manitoba.
- ❖ **Ontario** would need to fill 76,300 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 52,700 in the greater Toronto area, over 9,700 in Ottawa-Gatineau, over 3,800 in the Kitchener-Cambridge-Waterloo region, and over 9,900 in rest of Ontario.
- ❖ **Quebec** would need to fill 49,600 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 35,600 in Montreal, over 9,900 in Quebec City, and over 3,900 in rest of Quebec.
- ❖ **New Brunswick** would need to fill 2,200 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 900 in Moncton, 800 in Fredericton, 300 in Saint John, and 100 in rest of New Brunswick.
- ❖ **Nova Scotia** would need to fill 3,200 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 2,900 in Halifax and over 300 in rest of Nova Scotia.
- ❖ **Prince Edward Island** would need to fill 1,500 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 900 in Charlottetown and over 500 in rest of Prince Edward Island.
- ❖ **Newfoundland and Labrador** would need to fill 3,800 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 2,400 in St. John's and over 1,200 in rest of Newfoundland and Labrador.

Technological trends will impact the labour market...

- ❖ Technology trends – notably the emergence of IOT and SMAAC – will strengthen the demand for ICT skills. Availability of Canadian solutions will ensure that outsourcing and off-shoring do not increase and results in undercutting demand for ICT skills. Nevertheless, most employers will still have difficulty recruiting individuals with the right blend of technical and business skills. Unless adequately addressed, this will cause particular strife to Canada's prosperity, as growth in Canadian workers' productivity levels has fallen notably since 2001.

Attracting and retaining women in ICT professions important...

- ❖ Despite some recent improvements, gender imbalance in ICT has not much changed in the last decade. ICT professions are male-dominated, borne out by the fact that three out of four ICT professionals in Canada are men, with a solitary woman among them. The skills shortage challenge is further compounded by this chronic gender imbalance, as Canadian employers can only recruit from a limited and rather homogenous talent pool.

Attracting youth to ICT professions critical...

- ❖ Despite high demand and excellent opportunities, youth uptake in growing and rewarding ICT professions remains low. Only one out of every twenty ICT jobs are held by youth currently, compared to one out of every seven jobs held by youth below 25 in the overall economy. Job seeking youth – in most municipalities, provinces, and occupations – with work experience gained through co-op or internship programs will obtain employment that is commensurate with their skills and qualifications. Youth lacking industry experience, however, will find it difficult to secure gainful employment. Training young Canadians to fill the digital jobs of the future is an opportunity not to be missed, as talent is critical to growth and prosperity of the Canadian economy.

Quest for the global talent heating up ...

- ❖ The proportion of immigrants working in ICT professions in Canada has been consistent in recent years at above a third of the workforce. This is in sharp contrast with the overall economy, where a quarter of all jobs are held by immigrants. This is further evidence of strong demand for skilled ICT workers throughout the economy. Labour market outlook, however, is not equally optimistic for all immigrants. Immigrants lacking Canadian labour market experience will have considerable difficulty in securing an ICT job that is commensurate with their qualifications. Bridging programs that combine training in Canadian workplace, business practices and communications, and a work placement component will create excellent opportunities for newcomer jobseekers to obtain employment that is commensurate with their skills and qualifications.

ROADMAP FOR THE FUTURE

The availability of homegrown ICT talent will not be sufficient to meet the hiring requirements over the next five years. There is also a continued concern of skills mismatch. ICTC's in-depth consultation with industry and other stakeholders highlights several dimensions to these challenges and guides the way forward to a comprehensive, multipronged approach needed to overcome such challenges.

Not "upskilling", but "right skilling"...

- ❖ Skills mismatch is often influenced by the cyclical gap between demand and supply, and as such, all aspects of the mismatch must be addressed. ICTC's *Labour market Outlook Survey* points out that 31% of surveyed employers face difficulty and/or delay in filling ICT positions due to the lack of suitable talent. While most new graduates of today are facing uncertainty with respect to securing employment, ICT and STEM students are graduating from the education system with a much better labour market prospect. Collaborative focus needs to shift to "right skilling" of the workforce, as an appropriate skills strategy that is aligned with economic and digital strategies is crucial for Canada's competitive strength.

Industry-led skills enhancement with a conducive policy environment essential ...

- ❖ Ineffective recruitment and training strategies are often liable for vacancies being difficult to fill. Canadian employers and in particular micro and SMEs find it the hardest to provide on the job training. Programs to support on-the-job training – through mechanisms such as wage subsidies – that improves the job-readiness of youth or enables 'nearly qualified' candidates to acquire necessary work-related skills are vital going forward.
- ❖ Programs are needed that target youth at a younger age (e.g. pre-high school) when they are still making decisions about their courses and career options, when they are being influenced by peers, teachers, and parents away from STEM in some cases due to misinformation about the opportunities.
- ❖ Industry support is required in the design and delivery of responsive and diversified programs that focus on applied learning. It is widely perceived and acknowledge that the industry is a critical partner for validating relevance, improving quality, and increasing efficiency in skills training. Industry-educator partnerships, internships, co-op, and placement programs are mechanisms by which the matching of skills with jobs can be strengthened. In addition, both employed and jobseekers need continuous professional development. Employers must invest in and offer learning opportunities to their workforce.
- ❖ The creation of innovation centres or talent incubators can bring together employers and jobseekers to provide hands-on experience. These innovation centres or talent incubators will facilitate expanded innovative research and development, and help foster new ideas for knowledge mobilization. In today's environment when traditional institution-based delivery is giving way to web-based delivery mechanisms, such new ideas can spark innovation and growth. Employment services such as career guidance and placement are crucial to constraints to workforce entry. Work placements and internships are assuming even more prominent roles in strengthening the link between educators and employers. These hands-on training mechanisms need to be modernized so that they are not

Given the impending opportunities and skills needs offered by emerging technologies, the need for a comprehensive "e-talent strategy" has never been as critical. This should include:

- ❖ Attracting and building the talent supply from an early age
- ❖ Enabling targeted programs to leverage all human capital in Canada (diversity and inclusion)
- ❖ Developing incentives and programs to "right-skill" within respective industry
- ❖ Enabling more avenues for formal and informal training
- ❖ Facilitating regular LMI forecast to help build the right education programs

perceived as a source of cheap labor to the industry. On-the-job training is also crucial for improved skills match. Lifelong learning and training are crucial for continued workforce participation.

- ❖ With many tasks becoming automated with the emergence of IOT and SMAAC, the demand is growing for information-processing and other high-level cognitive skills. ICTC's *Labour market Outlook Survey* shows a sharp increase in the demand for "business" skills, including critical thinking, interpersonal communication, self-management, and the ability to learn. The right combination of business skills and technical skills contributes to successful performance in the workplace, as business skills enhance application of technical skills. These skills are sometimes considered even more important than technical skills for performance in the workplace. This has implications for the design of curriculum and its delivery, the combination of courses on offer, and their regular renewal.
- ❖ A conducive policy environment is needed for industry to finance and provide skills training. Implementing several supportive measures in place will help foster a culture of partnership. Making compulsory employer representation on the governing boards and establishing employer advisory committees for all academic programs will speed updating and renewal of the curriculum to reflect employer expectations.

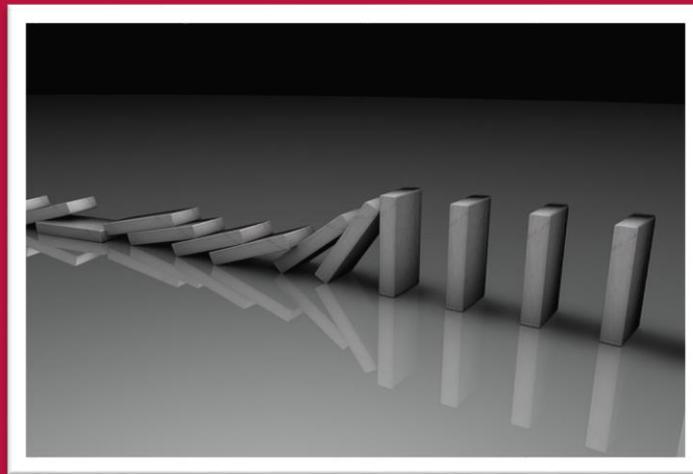
A "ground up" approach needed to engage all available talent...

- ❖ Canada's competitiveness depends on the skills level of its workforce. Many businesses entities have outsourced ICT functions. Outsourcing is a principal vehicle for off-shoring Canadian ICT work and also significantly alter the regional distribution of ICT employment by locating work in regions where labour costs are lower. Off-shoring gets bandied around quite extensively in the media and it creates apprehension among parents and youth, who worry that ICT jobs are being outsourced. They are uncomfortable in choosing STEM-related career paths, hence enrolment in STEM programs has been disappointing for some time.
- ❖ Women are 50% of the population, 47% of the overall Canadian workforce, yet greatly underrepresented in the ICT workforce. ICT professions face significant image and perception problems, including the view that these jobs are singularly computer-focused, male-dominated, lacking in social relevance, and predominantly anti-social. A gender-bias in STEM education and employment is widely known and thus there are few visible role models for young women. Concerted, cooperative promotion and outreach efforts are needed to counter the perceptions that there are fewer opportunities in STEM and ICT and that the careers are not stimulating. This is not an easy task and requires the industry to take an active role in communicating career paths more effectively. An outreach campaign is critical to reducing the negative perceptions that have become associated with careers in the ICT sector.
- ❖ Many experts are of the opinion that providing incentives to employers to recruit members of specific group(s) may help with diversity of the ICT workforce. ICTC's *Labour Market Outlook Survey*, however, illustrates that to not be the case. Over 90% of Canada's ICT employers have no diversity recruitment policy in place. They may monitor the demographic composition of their staff and conduct additional outreach to underrepresented groups. When it comes down to making that vital hiring decision, however, they want to hire the best candidate regardless of gender, age, or race.
- ❖ "Mid-stream" approaches – involving incentives to recruit members of certain diversity groups – do not have a successful track record of promoting inclusion and diversity in ICT professions. Only a broadly-based "ground-up" strategy – founded on a guardian-industry-educator partnership – has the potential to alter the current gender and age imbalances. There is a significant disjuncture between the prevailing perception of ICT careers as quintessentially technical occupations and the way that ICT occupations have transformed in recent years. This mismatch between prevailing perceptions and the new reality of what ICT careers are actually about limits the flow of talent into ICT and thereby perpetuates many of the skills shortages that characterize the ICT labour market. There is a significant lag between broader perceptions of ICT careers and understanding the actual nature of those careers and the capabilities they require.



- ❖ ICTC's labour market forecasts and ongoing real-time trends reporting currently provides in-depth digital economy labour market research and analysis for 18 municipalities in 10 provinces, to be expanded into additional municipalities. The disaggregation of data to such a granular level means all stakeholders – job seekers, career transitioners, ICT professionals, employers, policymakers, and educators – can use this powerful information in decision making as well as really understanding whether efforts to address various labour market opportunities and challenges are broad-based enough and inclusive of all talent streams.

BACKGROUND



1.0 BACKGROUND

OVERVIEW

The 2015 edition of Labour Market Outlook is the fourth in a series of ICTC analytics that began with the first edition published in 2006. The aim of this latest edition in this series of studies is to highlight and provide new insights on conditions affecting Canada's ICT workforce across all economic sectors from demand- and supply-side perspectives. This study tracks and projects the evolution of 15 ICT occupations in 18 municipalities, 10 provinces, and Canada as a whole.

The latest innovations in ICTs – in particular the internet of things (IOT) as well as Social, Mobile, Analytics, Apps, and Cloud (SMAAC) – have become key drivers of innovation, productivity, and growth. These enabling technologies have changed the ways Canadians communicate and live their daily lives, as well as are creating new business and employment opportunities. Social and economic transformations have changed the demand for skills, and changing skill needs are reshaping the entire labour market across all sectors.

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ANALYTICAL FRAMEWORK

The analytical framework is based on robust labour market research and intelligence. The data for all [15 occupations](#) identified by the 4-digit National Occupational Classification (NOC) codes were collected at the municipal and provincial levels, which were further analyzed, and summarized. The 2015-2019 *Labour Market Outlook* was further improved through use of the latest available labour force data and use of comprehensive industry feedback.

The forecasts consider major economic and socio-demographic trends and examine their implications for ICT occupations. This is done by incorporating relevant trends and policies, feedback from in-depth consultation with over 1,000 representative employers across Canada, inputs of five regional focus group discussions and validation webinars with representatives from industry and other stakeholder groups, and valuable insights of a 22-member distinguished multinational [Labour Market Outlook Advisory Group](#) in the analytical framework.

Further details on the analytical framework can be found at the [end of the report](#).

CANADA



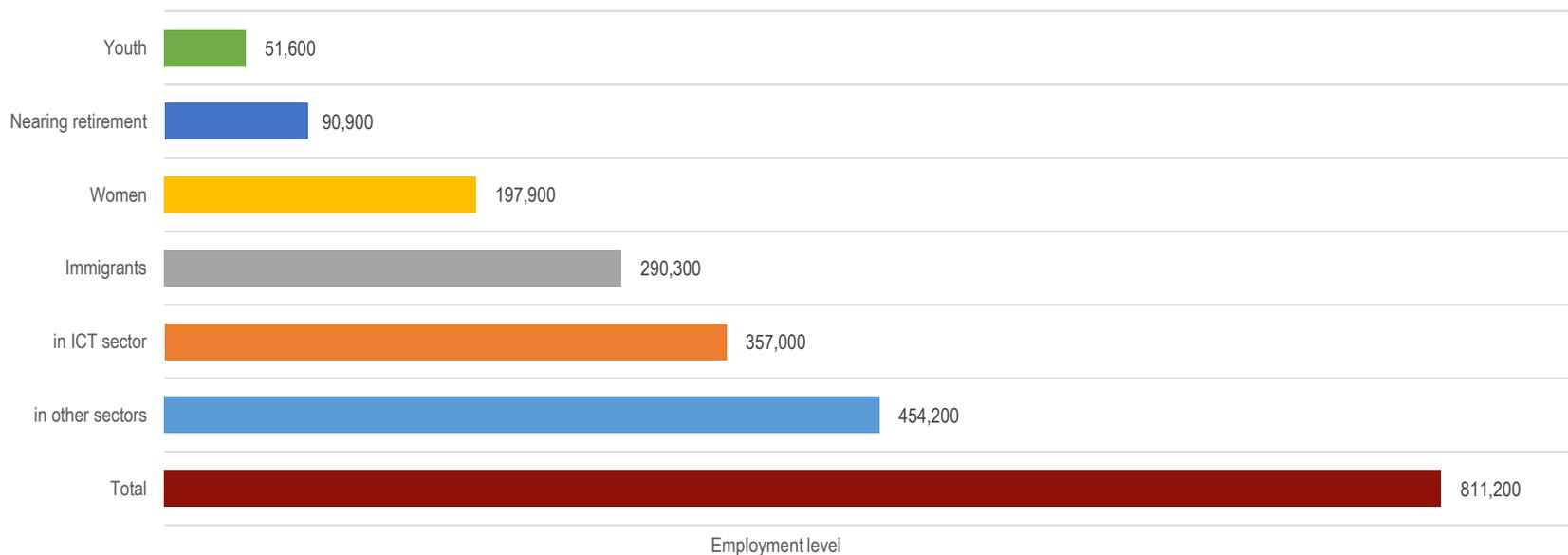
2.0 CANADA

CURRENT LANDSCAPE

811,200 ICT professionals are employed in Canada in early 2015. Of them, 51,600 are youth aged 25 or younger, 90,900 are nearing retirement, 197,900 are women, and 290,300 are immigrants. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 357,000 (44%) work in the ICT sector, while 454,200 (56%) work in other sectors (e.g. finance, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Canada's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total Canadian workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 84,000 new ICT jobs are expected to be created in Canada by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Canada would need to fill over 182,000 ICT professionals over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 76,000 in Ontario, over 49,000 in Quebec, over 20,000 in British Columbia, over 17,000 in Alberta, over 4,000 in Manitoba, and over 3,900 in Saskatchewan.

Projected hiring requirements to 2019 by province

	Cumulative hiring requirements to 2019
British Columbia	20,900
Alberta	17,300
Saskatchewan	3,900
Manitoba	4,000
Ontario	76,300
Quebec	49,600
New Brunswick	2,200
Nova Scotia	3,200
Prince Edward Island	1,500
Newfoundland and Labrador	3,800
Total	182,700

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 161,000 compared to the baseline scenario hiring requirements of 182,000. Alternatively, in an expansionary scenario, Canadian employers will need to hire 232,000 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	161,400
Baseline	182,700
Expansionary	232,800

Source: ICTC, 2015



As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits, demand-supply imbalances will affect some occupations more than others...

High demand occupations:

- ❖ information systems analysts and consultants
- ❖ computer and network operators and web technicians
- ❖ computer programmers and interactive media developers
- ❖ software engineers
- ❖ graphic designers and illustrators
- ❖ computer and information systems managers
- ❖ database analysts and data administrators

Medium demand occupations:

- ❖ electrical and electronics engineering technologists and technicians
- ❖ web designers and developers
- ❖ computer engineers
- ❖ electrical and electronics engineers
- ❖ user support technicians
- ❖ systems testing technicians

Low demand occupations:

- ❖ telecommunications carriers managers
- ❖ broadcast technicians

BRITISH COLUMBIA



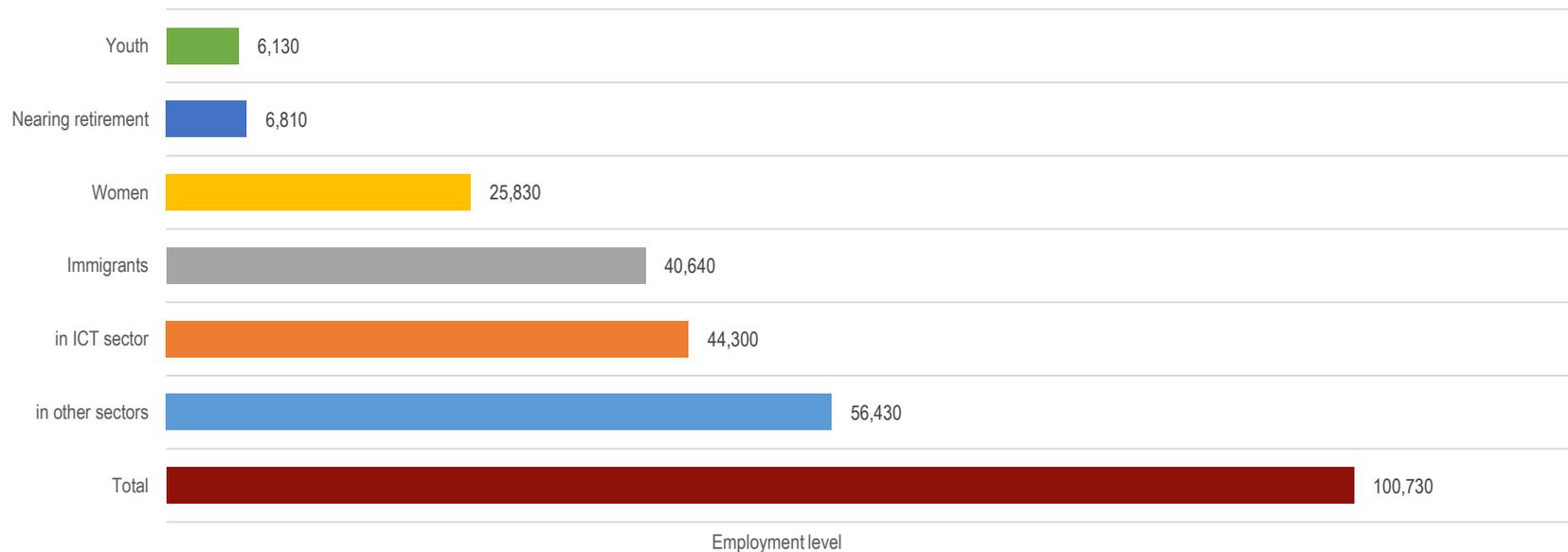
3.0 BRITISH COLUMBIA

CURRENT LANDSCAPE

100,730 ICT professionals are employed in British Columbia in early 2015. Of them, 6,130 are youth aged 25 or younger, 6,810 are nearing retirement, 25,830 are women, and 40,640 are immigrants. In addition, 74,530 work in Vancouver, 7,870 work in Victoria, and another 18,330 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 44,300 work in the ICT sector, while 56,430 work in other sectors (e.g. finance, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit British Columbia's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 14,000 new ICT jobs are expected to be created in British Columbia by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, British Columbia would have to fill 20,900 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 15,500 in Vancouver, over 1,700 in Victoria, and over 3,600 in rest of British Columbia.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Vancouver	74,530	15,516
Victoria	7,870	1,791
British Columbia - other	18,330	3,643
Total	100,730	20,950

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 19,100 compared to the baseline scenario hiring requirements of 20,900. Alternatively, in an expansionary scenario, British Columbia employers will need to hire as many as 35,000 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	19,130
Baseline	20,950
Expansionary	35,045

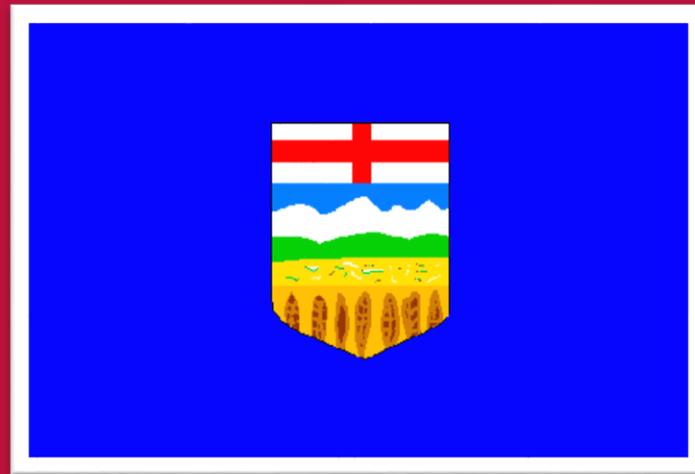
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – British Columbia would need to fill the following ICT positions:

- ❖ 4,430 computer programmers and interactive media developers
- ❖ 2,330 software engineers
- ❖ 2,020 user support technicians
- ❖ 1,750 database analysts and data administrators
- ❖ 1,380 graphic designers and illustrators
- ❖ 1,380 computer and information systems managers
- ❖ 1,220 information systems analysts and consultants
- ❖ 1,180 computer and network operators and web technicians
- ❖ 1,100 web designers and developers
- ❖ 1,020 electrical and electronics engineering technologists and technicians

ALBERTA



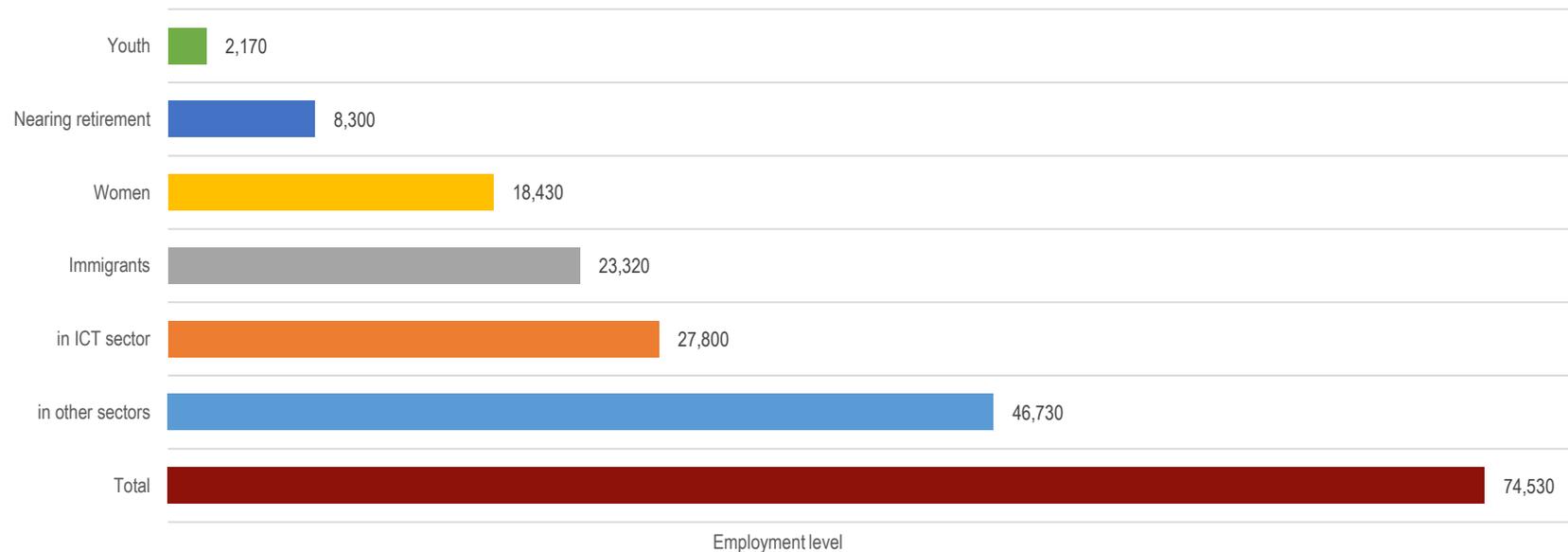
4.0 ALBERTA

CURRENT LANDSCAPE

74,530 ICT professionals are employed in Alberta in early 2015. Of them, 2,170 are youth aged 25 or younger, 8,300 are nearing retirement, 18,430 are women, and 23,320 are immigrants. In addition, 44,970 work in Calgary, 18,770 work in Edmonton, and another 10,790 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 27,800 work in the ICT sector, while 46,730 work in other sectors (e.g. energy, finance, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Alberta's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 8,900 new ICT jobs are expected to be created in Alberta by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Alberta would have to fill 17,300 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 10,600 in Calgary, over 4,000 in Edmonton, and over 2,500 in rest of Alberta.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Calgary	44,970	10,603
Edmonton	18,770	4,065
Alberta - other	10,790	2,591
Total	74,530	17,259

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 15,300 compared to the baseline scenario hiring requirements of 17,300. Alternatively, in an expansionary scenario, Alberta employers will need to hire over 19,700 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	15,322
Baseline	17,259
Expansionary	19,793

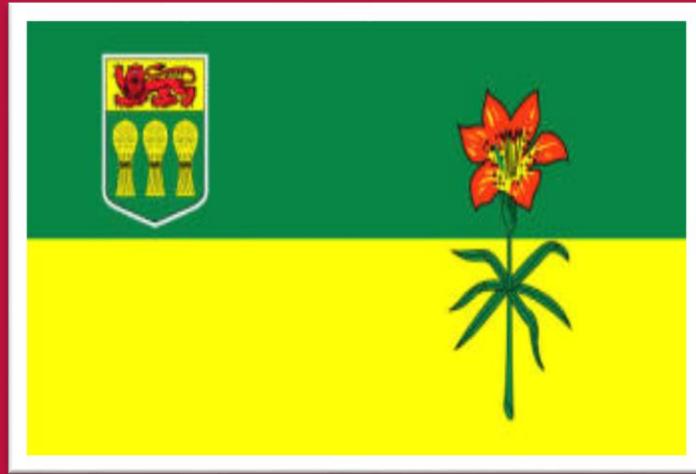
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Alberta would need to fill the following ICT positions:

- ❖ 5,380 information systems analysts and consultants
- ❖ 3,110 software engineers
- ❖ 1,750 computer and network operators and web technicians
- ❖ 1,630 user support technicians
- ❖ 1,550 database analysts and data administrators
- ❖ 1,320 electrical and electronics engineering technologists and technicians
- ❖ 1,120 electrical and electronics engineers
- ❖ 1,030 computer engineers

SASKATCHEWAN



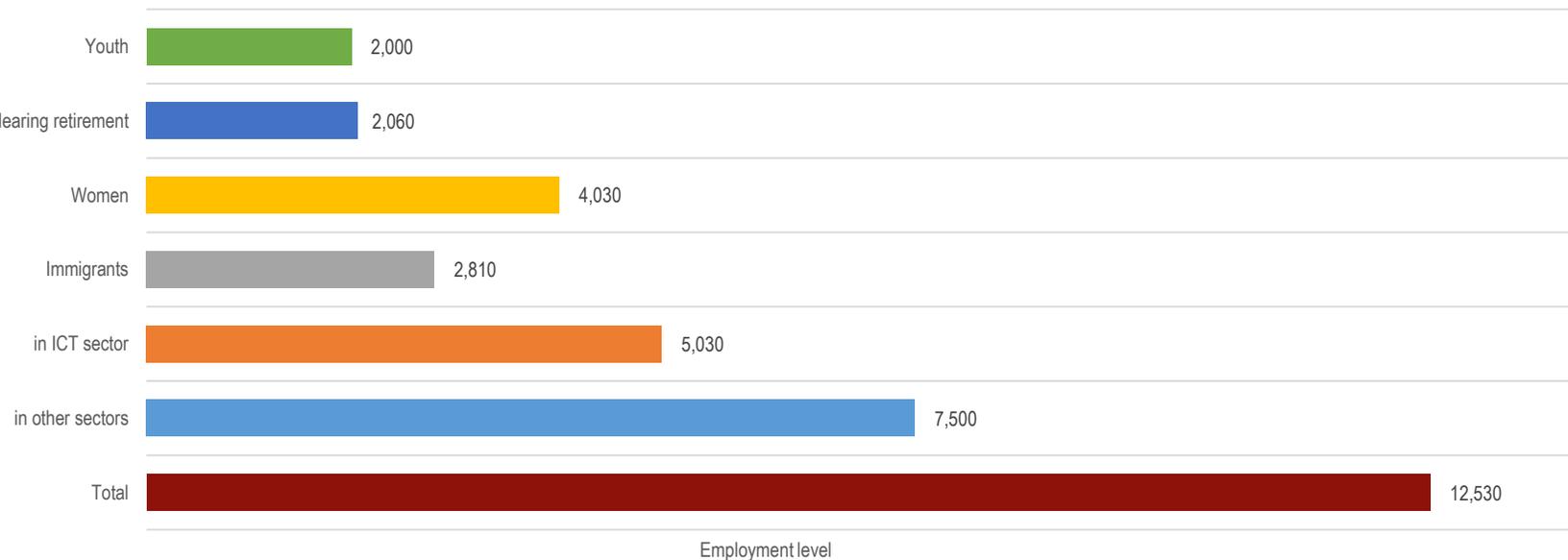
5.0 SASKATCHEWAN

CURRENT LANDSCAPE

12,530 ICT professionals are employed in Saskatchewan in early 2015. Of them, 2,000 are youth aged 25 or younger, 2,060 are nearing retirement, 4,030 are women, and 2,810 are immigrants. In addition, 5,500 work in Regina, 4,470 work in Saskatoon, and another 2,560 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 5,030 work in the ICT sector, while 7,500 work in other sectors (e.g. energy, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Saskatchewan's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 1,800 new ICT jobs are expected to be created in Saskatchewan by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Saskatchewan would need to fill 3,900 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 1,400 in Regina, 1,100 in Saskatoon, and 1,300 in rest of Saskatchewan.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Regina	5,500	1,471
Saskatoon	4,470	1,100
Saskatchewan - other	2,560	1,316
Total	12,530	3,888

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 3,300 compared to the baseline scenario hiring requirements of 3,900. Alternatively, in an expansionary scenario, Saskatchewan employers will need to hire 5,300 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	3,318
Baseline	3,888
Expansionary	5,374

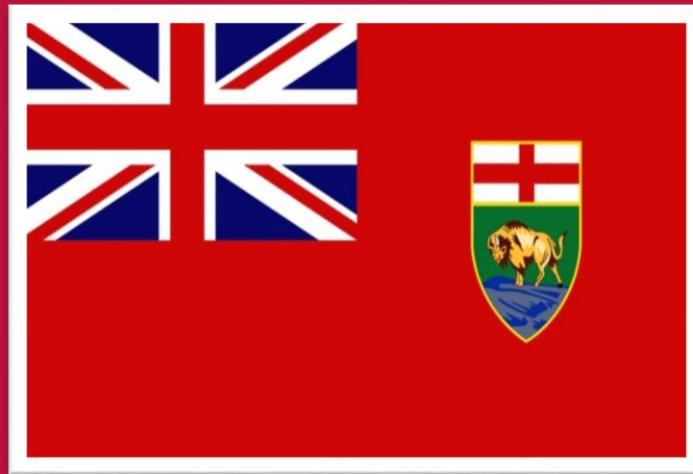
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Saskatchewan would need to fill the following ICT positions:

- ❖ 480 graphic designers and illustrators
- ❖ 330 electrical and electronics engineering technologists and technicians
- ❖ 310 software engineers
- ❖ 310 computer and network operators and web technicians
- ❖ 280 systems testing technicians
- ❖ 270 computer engineers
- ❖ 270 database analysts and data administrators
- ❖ 250 electrical and electronics engineers
- ❖ 230 user support technicians

MANITOBA



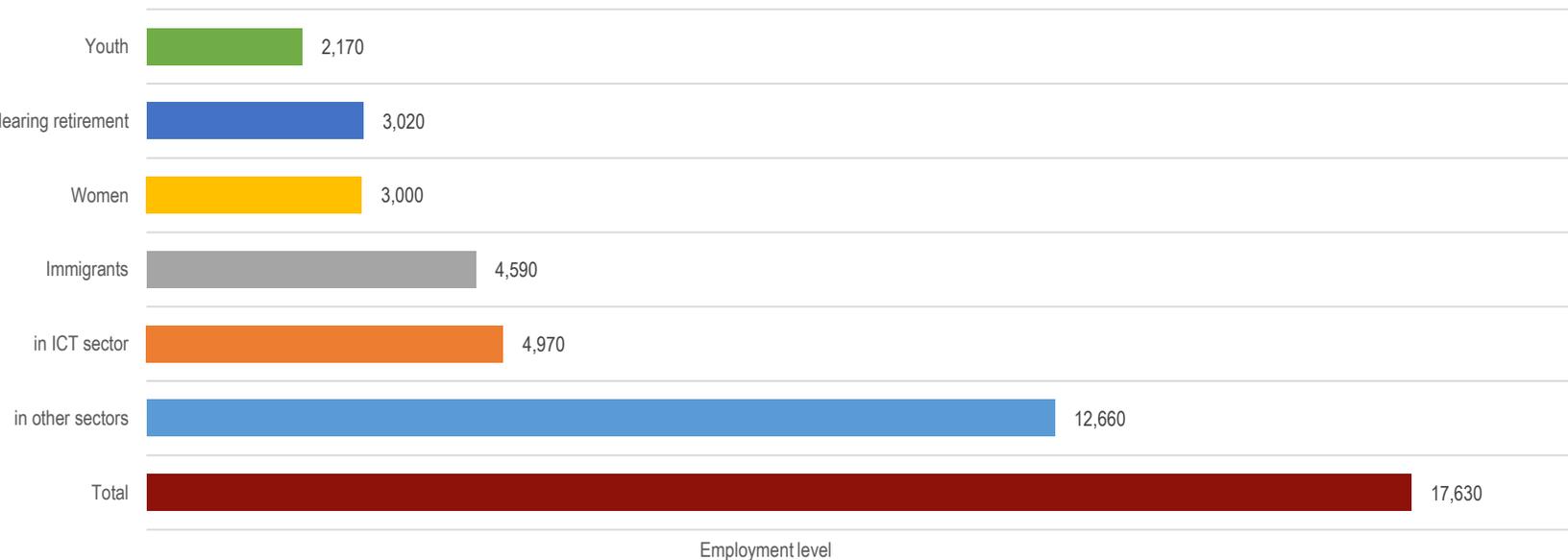
6.0 MANITOBA

CURRENT LANDSCAPE

17,630 ICT professionals are employed in Manitoba in early 2015. Of them, 2,170 are youth aged 25 or younger, 3,020 are nearing retirement, 3,000 are women, and 4,590 are immigrants. In addition, 16,430 work in Winnipeg and another 1,200 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 4,970 work in the ICT sector, while 12,660 work in other sectors (e.g. education, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Manitoba's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 1,000 new ICT jobs are expected to be created in Manitoba by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Manitoba would need to fill 4,000 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 3,300 in Winnipeg and 600 in rest of Manitoba.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Winnipeg	16,430	3,338
Manitoba - other	1,200	613
Total	17,630	3,951

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 3,700 compared to the baseline scenario hiring requirements of 4,000. Alternatively, in an expansionary scenario, Manitoba employers will need to hire 6,300 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	3,718
Baseline	3,951
Expansionary	6,331

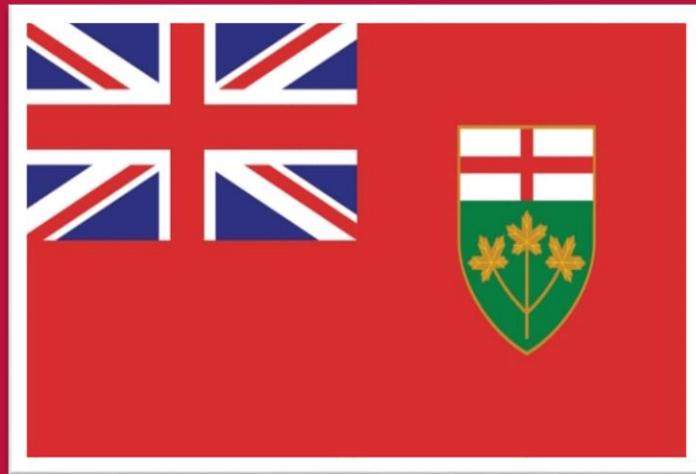
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Manitoba would need to fill the following ICT positions:

- ❖ 630 information systems analysts and consultants
- ❖ 450 computer and information systems managers
- ❖ 420 user support technicians
- ❖ 420 computer programmers and interactive media developers
- ❖ 290 database analysts and data administrators
- ❖ 270 computer engineers (except software engineers)
- ❖ 270 software engineers
- ❖ 260 computer and network operators and web technicians
- ❖ 250 electrical and electronics engineering technologists and technicians
- ❖ 240 electrical and electronics engineers

ONTARIO



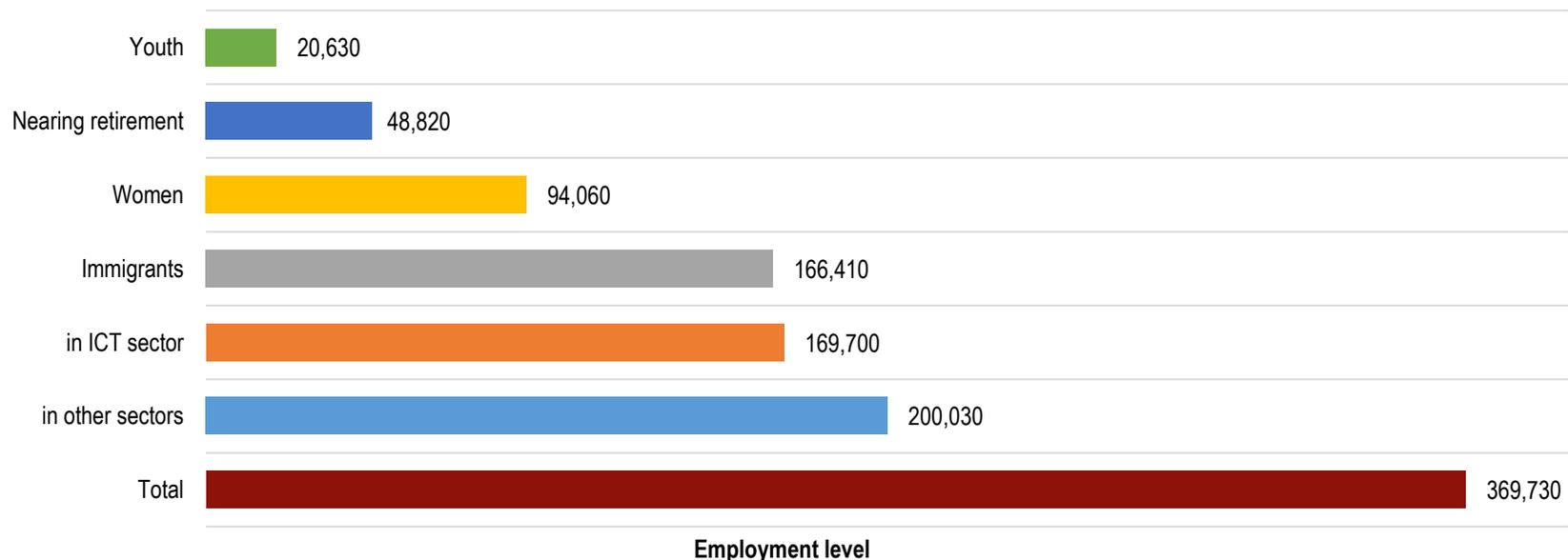
7.0 ONTARIO

CURRENT LANDSCAPE

369,730 ICT professionals are employed in Ontario in early 2015. Of them, 19,000 are youth aged 25 or younger, 50,000 are nearing retirement, 116,000 are women, and 177,000 are immigrants. In addition, 218,670 work in Toronto (greater Toronto area), 72,430 work in Ottawa (Ottawa-Gatineau), 7,770 work in Kitchener-Cambridge-Waterloo region, and another 70,860 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 169,700 work in the ICT sector, while 200,030 work in other sectors (e.g. finance, service).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Ontario's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 27,000 new ICT jobs are expected to be created in Ontario by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Ontario would need to fill 76,300 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 52,700 in the greater Toronto area, over 9,700 in Ottawa-Gatineau, over 3,800 in the Kitchener-Cambridge-Waterloo region, and over 9,900 in rest of Ontario.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Toronto (GTA)	218,670	52,741
Ottawa-Gatineau	72,430	9,724
Kitchener-Cambridge-Waterloo	7,770	3,804
Ontario - other	70,860	9,994
Total	369,730	76,263

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 69,200 compared to the baseline scenario hiring requirements of 76,300. Alternatively, in an expansionary scenario, Ontario employers will need to hire 99,500 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	69,233
Baseline	76,263
Expansionary	99,565

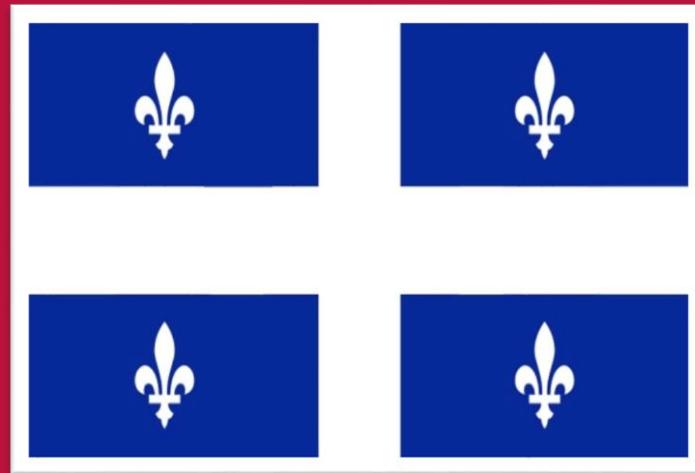
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Ontario would need to fill the following ICT positions:

- ❖ 35,510 information systems analysts and consultants
- ❖ 9,880 computer and network operators and web technicians
- ❖ 9,320 computer programmers and interactive media developers
- ❖ 7,410 software engineers
- ❖ 5,380 computer and information systems managers
- ❖ 2,760 web designers and developers
- ❖ 2,670 graphic designers and illustrators
- ❖ 2,640 computer engineers
- ❖ 2,290 electrical and electronics engineering technologists and technicians

QUEBEC



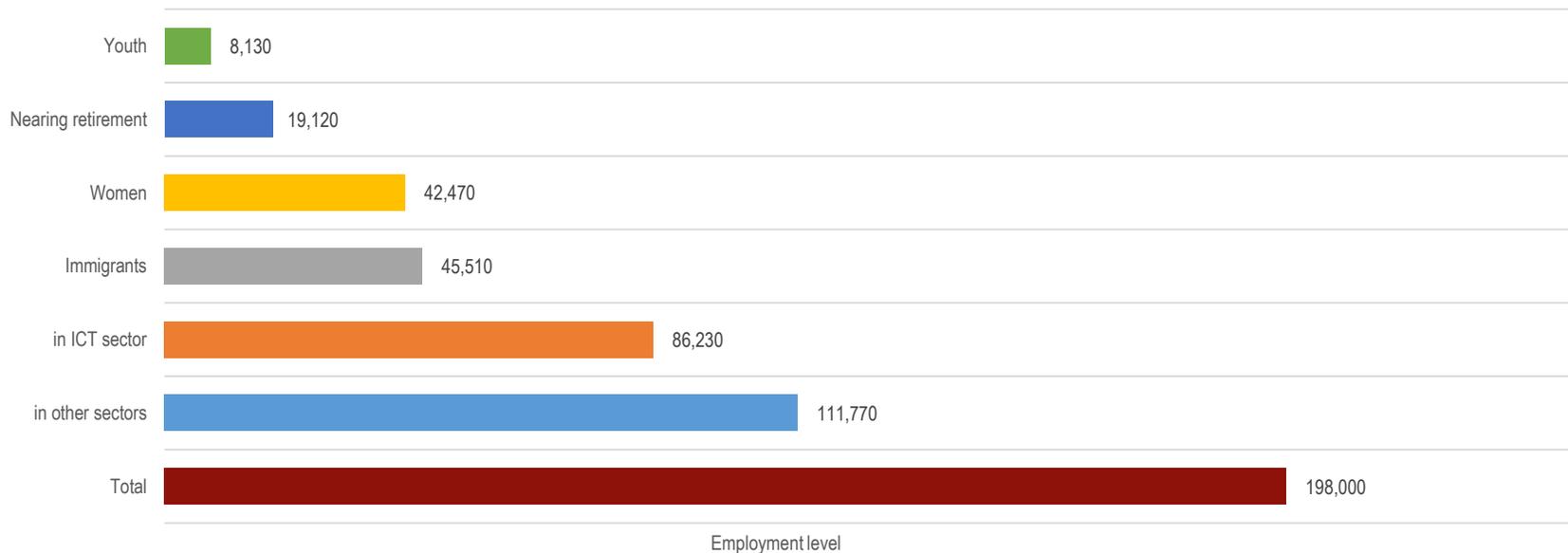
8.0 QUEBEC

CURRENT LANDSCAPE

198,000 ICT professionals are employed in Quebec in early 2015. Of them, 8,130 are youth aged 25 or younger, 19,120 are nearing retirement, 42,470 are women, and 45,510 are immigrants. In addition, 134,600 work in Montreal, 25,930 work in Quebec City, and another 37,470 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 86,230 work in the ICT sector, while 111,770 work in other sectors (e.g. manufacturing, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Quebec's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. Under a baseline scenario, over 30,000 new ICT jobs are expected to be created in Quebec by 2019. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Combined with replacement demand due to retirements and other exits, Quebec would need to fill 49,600 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 35,600 in Montreal, over 9,900 in Quebec City, and over 3,900 in rest of Quebec.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Montreal	134,600	35,652
Quebec City	25,930	9,939
Quebec - other	37,470	3,997
Total	198,000	49,588

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 41,400 compared to the baseline scenario hiring requirements of 49,600. Alternatively, in an expansionary scenario, Quebec employers will need to hire 52,400 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	41,498
Baseline	49,588
Expansionary	52,444

Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Quebec would need to fill the following ICT positions:

- ❖ 9,570 graphic designers and illustrators
- ❖ 9,520 information systems analysts and consultants
- ❖ 9,130 computer and network operators and web technicians
- ❖ 8,700 computer programmers and interactive media developers
- ❖ 3,470 database analysts and data administrators
- ❖ 2,740 web designers and developers
- ❖ 2,600 software engineers
- ❖ 1,390 systems testing technicians
- ❖ 1,220 computer and information systems managers
- ❖ 1,030 computer engineers

NEW BRUNSWICK



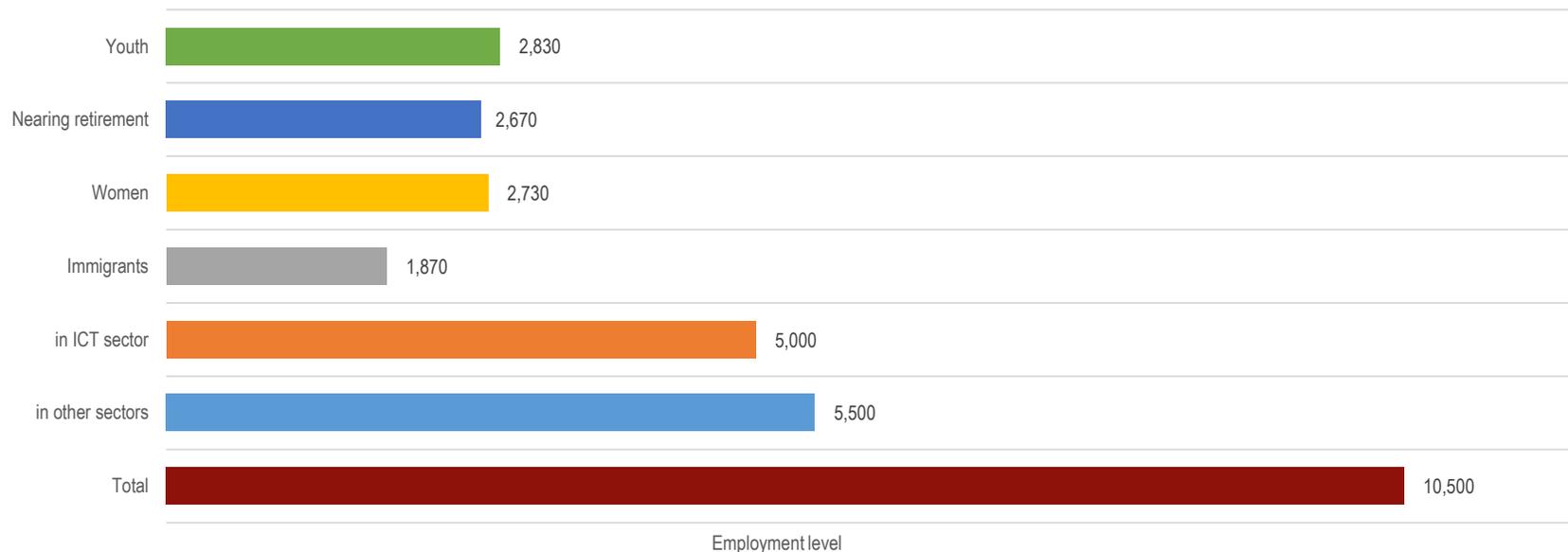
9.0 NEW BRUNSWICK

CURRENT LANDSCAPE

10,500 ICT professionals are employed in New Brunswick in early 2015. Of them, 2,830 are youth aged 25 or younger, 2,670 are nearing retirement, 2,730 are women, and 1,870 are immigrants. In addition, 3,260 work in Moncton, 3,170 work in Fredericton, 2,940 work in Saint John, and another 1,130 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 5,000 work in the ICT sector, while 5,500 work in other sectors (e.g. education, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit New Brunswick's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Under a baseline scenario, the combination of employment growth and replacement demand due to retirements and other exits could result in needing to fill 2,200 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 900 in Moncton, 800 in Fredericton, 300 in Saint John, and 100 in rest of New Brunswick.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Moncton	3,260	947
Fredericton	3,170	845
Saint John	2,940	302
New Brunswick - other	1,130	126
Total	10,500	2,220

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 2,000 compared to the baseline scenario hiring requirements of 2,200. Alternatively, in an expansionary scenario, New Brunswick employers will need to hire 3,000 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	2,033
Baseline	2,220
Expansionary	3,014

Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – New Brunswick would need to fill the following ICT positions:

- ❖ 480 user support technicians
- ❖ 280 database analysts and data administrators
- ❖ 210 electrical and electronics engineering technologists and technicians
- ❖ 200 systems testing technicians
- ❖ 200 computer and information systems managers
- ❖ 190 computer engineers
- ❖ 180 software engineers
- ❖ 170 web designers and developers

NOVA SCOTIA



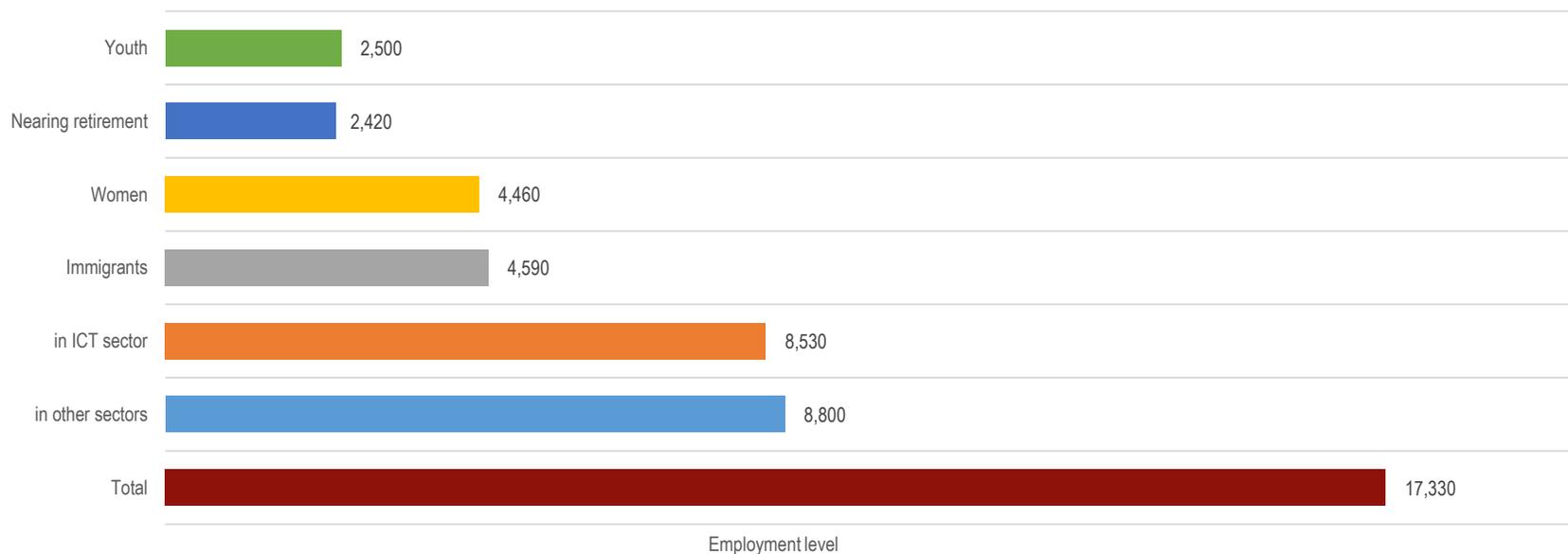
10.0 NOVA SCOTIA

CURRENT LANDSCAPE

17,330 ICT professionals are employed in Nova Scotia in early 2015. Of them, 2,500 are youth aged 25 or younger, 2,420 are nearing retirement, 4,460 are women, and 4,590 are immigrants. In addition, 14,160 work in Halifax and another 3,170 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 8,530 work in the ICT sector, while 8,800 work in other sectors (e.g. digital media, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Nova Scotia's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Under a baseline scenario, the combination of employment growth and replacement demand due to retirements and other exits could result in needing to fill 3,200 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 2,900 in Halifax and 300 in rest of Nova Scotia.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Halifax	14,160	2,929
Nova Scotia - other	3,170	313
Total	17,330	3,242

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 2,900 compared to the baseline scenario hiring requirements of 3,200. Alternatively, in an expansionary scenario, Nova Scotia employers will need to hire 4,500 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	2,987
Baseline	3,242
Expansionary	4,560

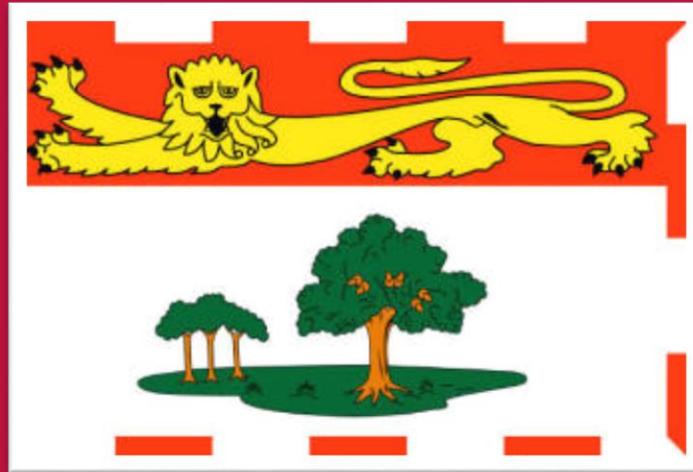
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Nova Scotia would need to fill the following ICT positions:

- ❖ 590 computer and information systems managers
- ❖ 550 electrical and electronics engineers
- ❖ 530 software engineers
- ❖ 420 information systems analysts and consultants
- ❖ 340 database analysts and data administrators
- ❖ 330 computer programmers and interactive media developers
- ❖ 300 computer and network operators and web technicians
- ❖ 220 web designers and developers

PRINCE EDWARD ISLAND



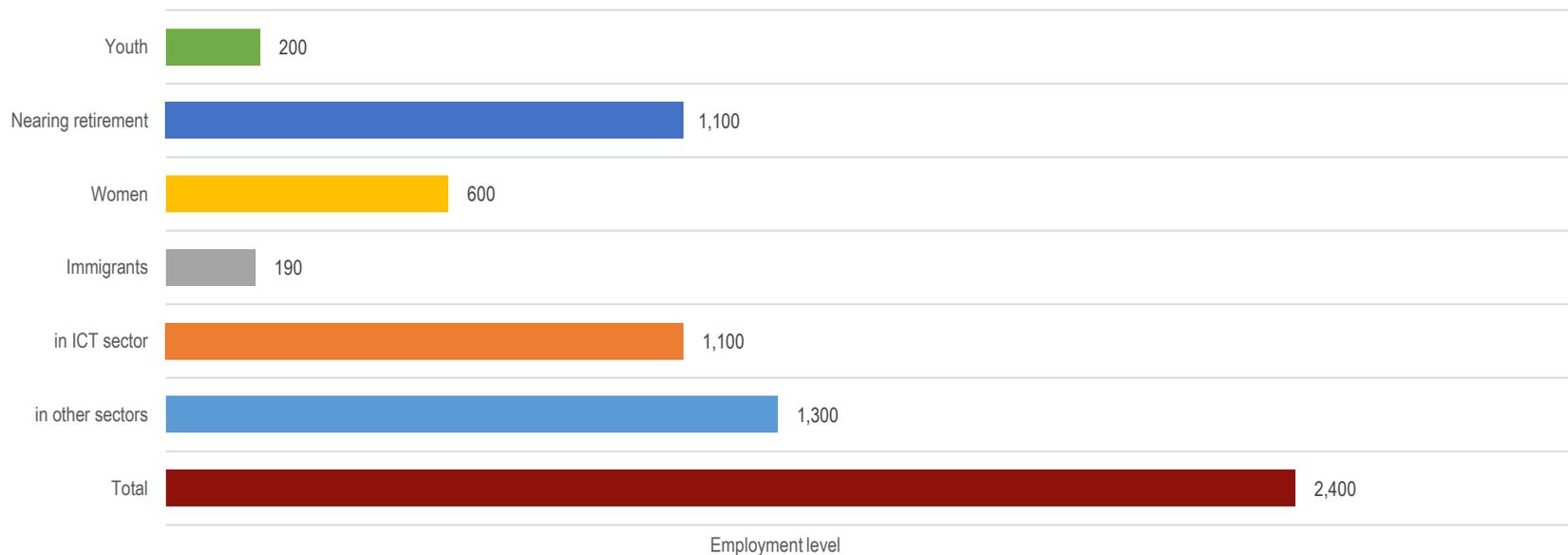
11.0 PRINCE EDWARD ISLAND

CURRENT LANDSCAPE

2,400 ICT professionals are employed in Prince Edward Island in early 2015. Of them, 200 are youth aged 25 or younger, 1,100 are nearing retirement, 600 are women, and 190 are immigrants. In addition, 1,680 work in Charlottetown and another 720 work in the rest of the province in areas such as Summerside. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 1,100 work in the ICT sector, while 1,300 work in other sectors (e.g. administration, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Prince Edward Island's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Under a baseline scenario, the combination of employment growth and replacement demand due to retirements and other exits could result in needing to fill 1,500 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 900 in Charlottetown and 500 in rest of Prince Edward Island.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
Charlottetown	1,680	981
Prince Edward Island - other	720	545
Total	2,400	1,526

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 800 compared to the baseline scenario hiring requirements of 1,500. Alternatively, in an expansionary scenario, Prince Edward Island employers will need to hire 1,600 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	887
Baseline	1,526
Expansionary	1,617

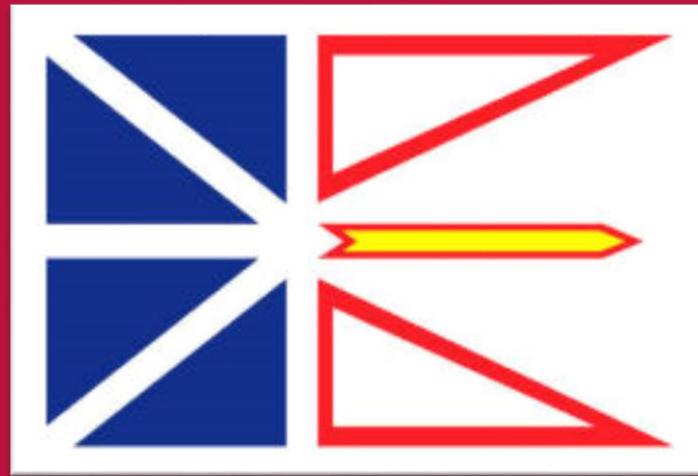
Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Prince Edward Island would need to fill the following ICT positions:

- ❖ 210 computer programmers and interactive media developers
- ❖ 140 information systems analysts and consultants
- ❖ 120 graphic designers and illustrators
- ❖ 110 web designers and developers
- ❖ 110 computer and network operators and web technicians

NEWFOUNDLAND AND LABRADOR



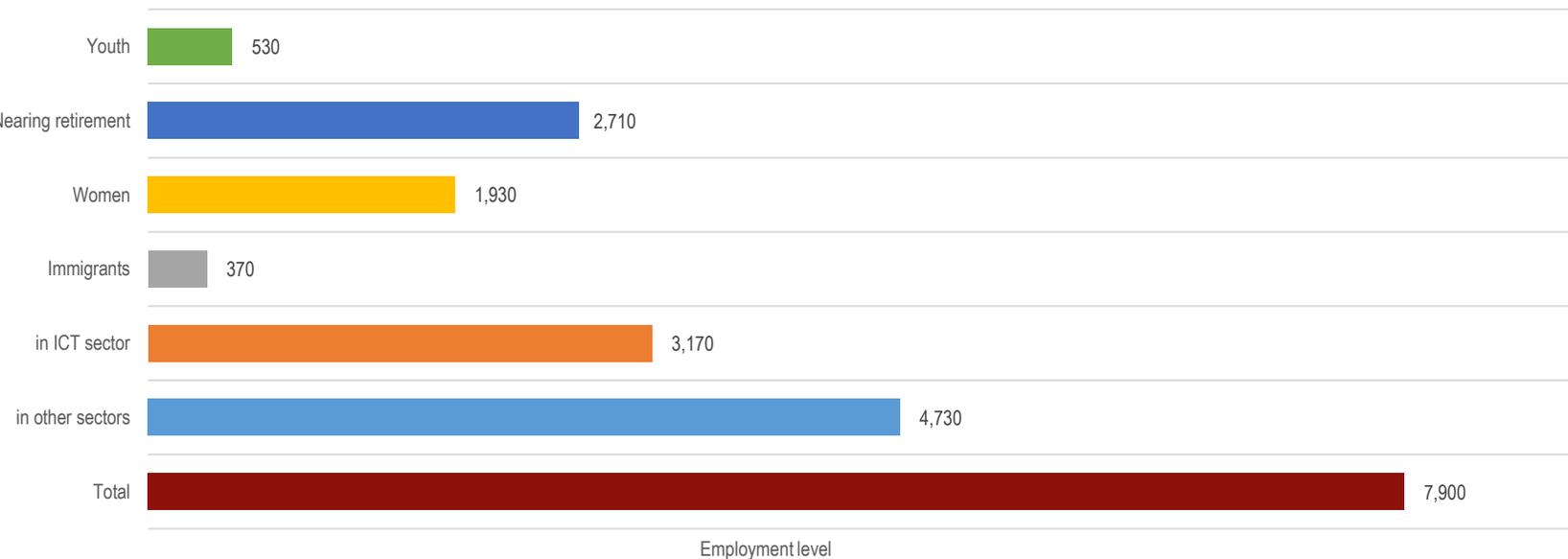
12.0 NEWFOUNDLAND AND LABRADOR

CURRENT LANDSCAPE

7,900 ICT professionals are employed in Newfoundland and Labrador in early 2015. Of them, 530 are youth aged 25 or younger, 2,710 are nearing retirement, 1,930 are women, and 370 are immigrants. In addition, 6,300 work in St. John's and another 1,600 work in the rest of the province. Industries outside the ICT sector are major users of ICT products and services. The demand for top ICT talent continues to grow and has resulted in expanding career options for ICT professionals, placing competitive pressure on the employers seeking technical ICT talent. Among employed ICT professionals, 3,170 work in the ICT sector, while 4,730 work in other sectors (e.g. education, health).

As the current ICT workforce ages, not many youth are opting for ICT careers, leaving a void that could potentially limit Newfoundland and Labrador's future competitiveness before long. Significantly fewer youth work in ICT professions than in other jobs. In contrast, ICT professions have a greater proportion of workers in the older age groups compared to the total provincial workforce.

ICT Employment



Source: ICTC; Statistics Canada

FUTURE OUTLOOK

Under three economic scenarios over a 5-year horizon, a combination of employment growth and replacement requirements produces estimates of cumulative hiring requirements. It is projected that the availability of homegrown ICT talent will not be sufficient to meet these hiring requirements. Under a baseline scenario, the combination of employment growth and replacement demand due to retirements and other exits could result in needing to fill 3,800 ICT positions over the next five years. By 2019, cumulative hiring requirements for ICT talent are expected to be over 2,400 in St. John's and 1,200 in rest of Newfoundland and Labrador.

Projected hiring requirements to 2019 by municipality

	Employment in 2015	Cumulative hiring requirements to 2019
St. John's	6,300	2,466
Newfoundland and Labrador - other	1,600	1,288
Total	7,900	3,755

Source: ICTC, 2015

Under a contractionary scenario, hiring requirements are projected to decline to 3,300 compared to the baseline scenario hiring requirements of 3,800. Alternatively, in an expansionary scenario, Newfoundland and Labrador employers will need to hire 5,100 ICT professionals. This outlook underscores the significance of accessing all available talent to address the demand-supply imbalance in ICT professions.

Projected hiring requirements to 2019 by scenario

Scenario	Cumulative hiring requirements to 2019
Contractionary	3,312
Baseline	3,755
Expansionary	5,128

Source: ICTC, 2015



Demand-supply imbalances will affect some ICT occupations more than others. As a result of employment growth – combined with replacement demand due to skills mismatch, retirements, and other exits – Newfoundland and Labrador would need to fill the following ICT positions:

- ❖ 620 electrical and electronics engineers
- ❖ 530 computer programmers and interactive media developers
- ❖ 500 information systems analysts and consultants
- ❖ 450 computer and network operators and web technicians
- ❖ 370 electrical and electronics engineering technologists and technicians
- ❖ 280 database analysts and data administrators
- ❖ 240 software engineers
- ❖ 200 systems testing technicians
- ❖ 160 computer and information systems managers

ROADMAP FOR THE FUTURE



13.0 ROADMAP FOR THE FUTURE

The availability of ICT talent will not be sufficient to meet the hiring requirements over the next five years. There is also a continued concern of skills mismatch. ICTC's in-depth consultation with industry and other stakeholders highlights several dimensions to these challenges and guides the way forward to a comprehensive, multipronged approach needed to overcome such challenges.

Not "upskilling", but "right skilling"...

- ❖ Skills mismatch is often influenced by the cyclical gap between demand and supply, and as such, all aspects of the mismatch must be addressed. ICTC's *Labour market Outlook Survey* points out that 31% of surveyed employers face difficulty and/or delay in filling ICT positions due to the lack of suitable talent. While most new graduates of today are facing uncertainty with respect to securing employment, ICT and STEM students are graduating from the education system with a much better labour market prospect. Collaborative focus needs to shift to "right skilling" of the workforce, as an appropriate skills strategy that is aligned with economic and digital strategies is crucial for Canada's competitive strength.

Industry-led skills enhancement with a conducive policy environment essential...

- ❖ Ineffective recruitment and training strategies are often liable for vacancies being difficult to fill. Canadian employers and in particular micro and SMEs find it the hardest to provide on the job training. Programs to support on-the-job training – through mechanisms such as wage subsidies – that improves the job-readiness of youth or enables 'nearly qualified' candidates to acquire necessary work-related skills are vital going forward.
- ❖ Programs are needed that target youth at a younger age (e.g. pre-high school) when they are still making decisions about their courses and career options, when they are being influenced by peers, teachers, and parents away from STEM in some cases due to misinformation about the opportunities.
- ❖ Industry support is required in the design and delivery of responsive and diversified programs that focus on applied learning. It is widely perceived and acknowledge that the industry is a critical partner for validating relevance, improving quality, and increasing efficiency in skills training. Industry-educator partnerships, internships, co-op, and placement programs are mechanisms by which the matching of skills with jobs can be strengthened. In addition, both employed and jobseekers need continuous professional development. Employers must invest in and offer learning opportunities to their workforce.
- ❖ The creation of innovation centres or talent incubators can bring together employers and jobseekers to provide hands-on experience. These innovation centres or talent incubators will facilitate expanded innovative research and development, and help foster new ideas for knowledge mobilization. In today's environment when traditional institution-based delivery is giving way to web-based delivery mechanisms, such new ideas can spark innovation and growth. Employment services such as career guidance and placement are crucial to constraints to workforce entry. Work placements and internships are assuming even more prominent roles in strengthening the link between educators and employers. These hands-on training mechanisms need to be modernized so that they are not perceived as a source of cheap labor to the industry. On-the-job training is also crucial for improved skills match. Lifelong learning and training are crucial for continued workforce participation.

- ❖ With many tasks becoming automated with the emergence of IOT and SMAAC, the demand is growing for information-processing and other high-level cognitive skills. ICTC's *Labour market Outlook Survey* shows a sharp increase in the demand for "business" skills, including critical thinking, interpersonal communication, self-management, and the ability to learn. The right combination of business skills and technical skills contributes to successful performance in the workplace, as business skills enhance application of technical skills. These skills are sometimes considered even more important than technical skills for performance in the workplace. This has implications for the design of curriculum and its delivery, the combination of courses on offer, and their regular renewal.
- ❖ A conducive policy environment is needed for industry to finance and provide skills training. Implementing several supportive measures in place will help foster a culture of partnership. Making compulsory employer representation on the governing boards and establishing employer advisory committees for all academic programs will speed updating and renewal of the curriculum to reflect employer expectations.

A "ground up" approach needed to engage all available talent...

- ❖ Canada's competitiveness depends on the skills level of its workforce. Many businesses entities have outsourced ICT functions. Outsourcing is a principal vehicle for off-shoring Canadian ICT work and also significantly alter the regional distribution of ICT employment by locating work in regions where labour costs are lower. Off-shoring gets bandied around quite extensively in the media and it creates apprehension among parents and youth, who worry that ICT jobs are being outsourced. They are uncomfortable in choosing STEM-related career paths, hence enrolment in STEM programs has been disappointing for some time.
- ❖ Women are 50% of the population, 47% of the overall Canadian workforce, yet greatly underrepresented in the ICT workforce. ICT professions face significant image and perception problems, including the view that these jobs are singularly computer-focused, male-dominated, lacking in social relevance, and predominantly anti-social. A gender-bias in STEM education and employment is widely known and thus there are few visible role models for young women. Concerted, cooperative promotion and outreach efforts are needed to counter the perceptions that there are fewer opportunities in STEM and ICT and that the careers are not stimulating. This is not an easy task and requires the industry to take an active role in communicating career paths more effectively. An outreach campaign is critical to reducing the negative perceptions that have become associated with careers in the ICT sector.
- ❖ Many experts are of the opinion that providing incentives to employers to recruit members of specific group(s) may help with diversity of the ICT workforce. ICTC's *Labour Market Outlook Survey*, however, illustrates that to not be the case. Over 90% of Canada's ICT employers have no diversity recruitment policy in place. They may monitor the demographic composition of their staff and conduct additional outreach to underrepresented groups. When it comes down to making that vital hiring decision, however, they want to hire the best candidate regardless of gender, age, or race.
- ❖ "Mid-stream" approaches – involving incentives to recruit members of certain diversity groups – do not have a successful track record of promoting inclusion and diversity in ICT professions. Only a broadly-based "ground-up" strategy – founded on a guardian-industry-educator partnership – has the potential to alter the current gender and age imbalances. There is a significant disjuncture between the prevailing perception of ICT careers as quintessentially technical occupations and the way that ICT occupations have transformed in recent years. This mismatch between prevailing perceptions and the new reality of what ICT careers are actually about limits the flow of talent into ICT and thereby perpetuates many of the skills shortages that characterize the ICT labour market. There is a significant lag between broader perceptions of ICT careers and understanding the actual nature of those careers and the capabilities they require.
- ❖ ICTC's labour market forecasts and ongoing real-time trends reporting currently provides in-depth digital economy labour market research and analysis for 18 municipalities in 10 provinces, to be expanded into additional municipalities. The disaggregation of data to such a granular level means all stakeholders – job seekers, career transitioners, ICT professionals, employers, policymakers, and educators – can use this powerful information in decision making as well as really understanding whether efforts to address various labour market opportunities and challenges are broad-based enough and inclusive of all talent streams.

ANNEX A

ANALYTICAL FRAMEWORK

ANNEX A. ANALYTICAL FRAMEWORK

ICTC continues to adjust its proprietary labour market demand outlook model to enhance its precision. This model is able to predict municipal, provincial, and national demand for the following 15 occupations and can be expanded to predict demand for 690 occupations:

Index	National Occupational Classification (NOC)	Occupation Title
1	0131	telecommunication carrier managers
2	0213	computer and information system managers
3	2133	electrical and electronics engineers
4	2147	computer engineers
5	2171	information systems analysts and consultants
6	2172	database analysts and data administrators
7	2173	software engineers
8	2174	computer programmers and interactive media developers
9	2175	web designers and developers
10	2241	electrical and electronics engineering technologists and technicians
11	2281	computer network technicians
12	2282	user support technicians
13	2283	systems testing technicians
14	5224	broadcast technicians
15	5241	graphic designers and illustrators

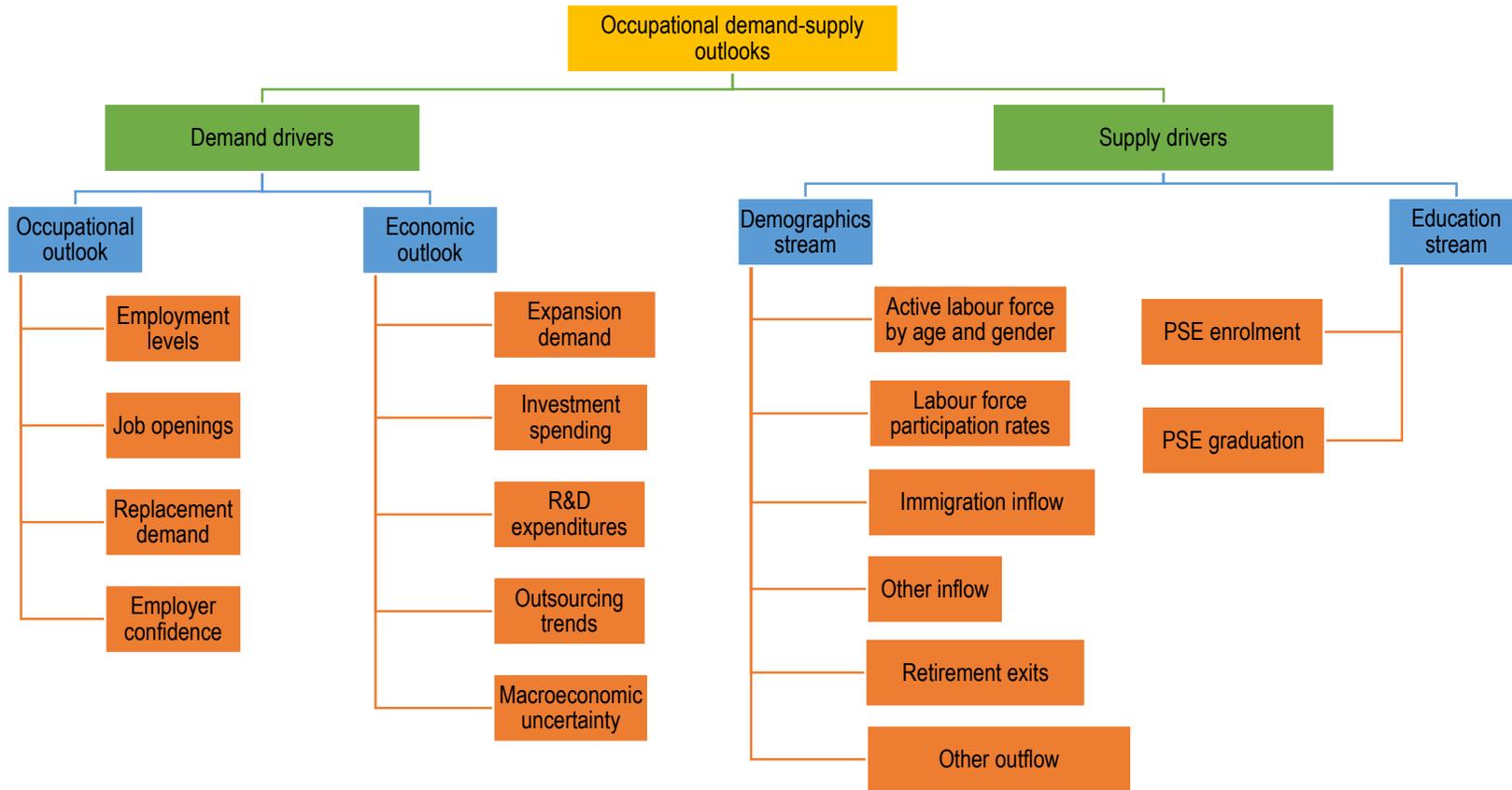
A counterpart labour market supply outlook model has also been developed that provides insight into current labour market supply and signals likely demand-supply imbalances for the forecast period. Combined results from the two models facilitate informed individual decision making with respect to selecting field of studies, jobs, and careers and collective decision making with respect to policies and programs.

A note of caution to bear in mind is that these projections carry assumptions that may change in the future. Hence, demand-supply outlooks for an occupation in a particular province may not be as robust as the models predict. The findings are intended to be indicative only.

ANNEX B

DEMAND AND SUPPLY DRIVERS

ANNEX B. DEMAND AND SUPPLY DRIVERS



ANNEX C

**COMPREHENSIVE INDUSTRY
CONSULTATION**



ANNEX C. COMPREHENSIVE INDUSTRY CONSULTATION

Labour Market Outlook 2015-2019 uses industry input to measure labour market conditions and trends. Industry was engaged extensively through:

- ❖ survey of over 1,000 representative employers across Canada, with representation of all provinces and sectors
- ❖ five focus group discussions and validation webinars with representatives from industry and other stakeholder groups, involving over 30 participants, to confirm and re-calibrate initial findings and conclusions
- ❖ The findings, conclusions, and recommendations are reviewed with Advisory Group members. As appropriate, the conclusions were adjusted to reflect the advice of the validation discussions

ANNEX D
ADVISORY GROUP

ANNEX D. ADVISORY GROUP

The contribution made by the Advisory Group members are greatly appreciated and the team thanks all members for their interactions, insights, and excellent feedback. ICTC is proud to present its distinguished multinational Labour Market Outlook Advisory Group:

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ABOUT ICTC



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The Information and Communications Technology Council (ICTC) is a leading not-for-profit national centre of expertise conducting research, policy development, and creating talent solutions for the digital economy.

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