BCTECH ASSOCIATION

2016

TechTalentBC Report

Funding provided through the Canada-British Columbia Labour Market Development Agreement.

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FOREWORD

As the province continues to shift to a knowledge economy, successfully scaling BC's strong base of tech startups into globally competitive anchor companies is of critical importance to the province's future prosperity.

Talent fuels the BC tech industry. Building a solid foundation of human capital, whether home grown or globally sourced, is among our critical success factors.

However, worldwide competition for the best talent is fierce and intensifying. BC tech companies are expressing a deepening concern that they are not able to access the talent they need, and that the gap between talent supply and demand is constraining their growth.

Signs of this gap exist. The supply and demand imbalance has manifested in tech sector wage inflation that has far outstripped employment growth. Average tech sector wages increased from $64,000 in 2008 to $82,000 in 2014, and now sit at a level 76% higher than the average wage in BC.

Yet despite the high paying jobs, tech companies seeking talent continue to sound the alarm, communicating the difficulty they experience recruiting, retaining, and developing technical and business talent, along with key senior and executive management that know how to grow companies from startup to scale-up to anchor.

To explore these concerns and develop strategies on how best to grow BC's tech talent base, the BC Tech Association set out to conduct a comprehensive labour market study of tech employment over five years. This study follows on previous editions of TechTalentBC studies, published in 2007, 2010, and 2012.

This report is one of a series of initiatives under a Sector Labour Market Partnership (LMP) program supported by the Province of British Columbia's Ministry of Jobs, Tourism & Skills Training (JTST) and in partnership with the Information and Communications Technology Council (ICTC), and the Vancouver Economic Commission (VEC). This study aims to quantify the tech sector's talent supply and demand imbalance and to illuminate the areas that require attention from industry, policymakers, academia, and other key players.

The result of our study is the 2016 TechTalentBC Report. It validates tech companies' concerns. Our study showed that the gap between talent demand and supply not only exists, but is increasing. In fact, in just a few years, tens of thousands of tech jobs will go perpetually unfilled in British Columbia.

The findings of our research, which included extensive consultations with BC's tech companies, have been distilled into key insights and recommendations in the 2016 TechTalentBC Report. To nurture homegrown talent, we need educational institutions

to supply the sector with great minds, ready to take on challenges, and equipped with the most in-demand tech sector skills. To fill senior and specialized roles, we need to ensure straightforward access to international talent. To meet demand needs, we must turn our attention to currently overlooked sources of talent and facilitate the movement of non-tech professionals who are ambitious and looking to transition to the tech sector.

Important steps have already been taken. Talent was a key pillar in the province's 2016 #BCTECH Strategy. The federal government has committed to renewing Canada's Innovation Agenda. The Global Skills visa has just been unveiled, and additional investments in post-secondary education are being discussed.

Nonetheless, the talent shortfall in BC's tech sector is real and will only continue to grow.

Acting on the recommendations in this report and renewing investments that have already been made will go far to ensure that an adequate supply of talent is available for BC's tech companies, so that they can grow and remain in BC.

Bill Tam

President and CEO
BC Tech Association

EXECUTIVE SUMMARY

The impact of technology is reshaping all aspects of the economy. From intelligent resource extraction to financial services innovations (mobile payments and the block-chain) to regenerative medicine and personalized healthcare, technology advance-ments are redefining business models and processes for organizations of all sizes. This expanding adoption creates an ever-growing demand for a skilled, diverse, and adaptable workforce.

In Canada, the tech sector has become a pillar of the national economy, creating over 1.4 million jobs for Canadians. Companies across Canada are investing in new technology, innovating to provide solutions and new business opportunities for every industry, and in the process, creating high-paying tech jobs.

British Columbia has established itself as one of the leading tech ecosystems in the country, boasting a host of successful companies in information and communications technology, interactive and digital media, cleantech, lifesciences, and engineering services. Growing by a compound annual growth rate (CAGR) of 6% over a 10-year period ending in 2014, BC's tech sector revenue growth has outpaced tech sector revenue growth in Ontario and Québec.[1]

Spurred by business growth and employer demand for top talent, **BC's tech sector employment, defined in this report by 32 key occupations, reached approximately 149,000 jobs in 2015, and is on pace to grow to more than 165,500 by 2021, adding 16,500 net new jobs at an average annual growth rate of 1.8%.**

	2015 EMPLOYMENT		2021 EMPLOYMENT
Constrained Growth	149,000	+16,500 (12,500 tech, 4,000 non-tech)	165,500
Expanded Growth	149,000	+47,000 (36,000 tech, 11,000 non-tech)	196,000
Unmet Demand		30,500 (23,400 tech, 7,100 non-tech)	

See Appendix 1 to see a detailed numerical breakdown

Demand for talent is most acute for a collection of information technology-centric roles, including systems engineers, programmers, and software developers. However, as BC's tech companies continue to grow and extend their market reach, roles for experienced management, business development, and sales and marketing professionals are also becoming increasingly important to fill.

The rapid expansion of the BC tech sector will result in a demand for more than 47,000 additional workers by 2021. However, based on the current employment growth and talent availability numbers, only 16,500 of these vacancies will be filled. 30,500 tech-related job openings will remain vacant.

To meet the soaring demand for tech talent, BC policy makers, in partnership with industry and higher education institutions, must take action. There are three talent sources that must be actively supported in order to resolve the demand and supply

[1] BC Stats High Technology Sector Report (2015)

imbalance: new entrants (defined as graduates from BC's post-secondary institutions), immigrants, and other local supply that includes job transitioners and members of underrepresented demographic groups.

For each of the labour sources, there are large gaps between what BC is on track to produce and what is needed by the tech sector. Meeting the accelerated employment demand of BC"s tech sector requires the following changes:

NEW ENTRANTS

12,500 more graduates from BC post-secondary institutions will be needed by 2021 to meet tech sector demand.

IMMIGRANTS

8,500 more immigrants than are currently projected to arrive by 2021 will be required to meet tech sector demand.

OTHER LOCAL SUPPLY

9,500 more career transitioners and people from underrepresented groups will be needed by 2021 than are currently expected to be available.

These gaps need to be filled, but the solution goes beyond quantity alone. Tech talent must also be calibrated to the needs of BC's tech companies. This means individuals entering the sector must possess a blend of technical and 'soft' skills.

Organizations need employees that can produce value and hit the ground running by quickly assuming the responsibilities of their role, understanding organizational needs and company culture and building client relationships.

The demand and supply imbalance and the gap between employee skills and company needs must be resolved. To ensure BC's tech sector reaches its potential, this report recommends the following actions:

Increase the capacity of post-secondary programs to produce additional graduates each year in tech-relevant programs as well as non-tech (e.g. business, communications and arts) programs.

Increase the supply of immigrants and foreign workers for mid, senior and specialized roles.

Increase investment in retraining, upskilling, and retooling initiatives, enabling local non-tech and underrepresented workers to transition to the tech sector.

Increase investment to significantly expand co-op and experiential learning opportunities in both post-secondary and K-12, with an emphasis on developing students' interpersonal, communication, and team working skills.

Increase investment in pre- and post-arrival skills development programs for foreign talent to provide mentorship and training in management, leadership, business development, communication, and other interpersonal skills.

A company's ability to innovate, compete, and respond to an evolving market is determined in large part by the presence and quality of talented employees. In this domain, the BC tech sector is facing a crunch.

The implementation of this report's recommendations will help to mitigate the tech sector's impending talent shortfall and to support higher tech sector growth, provided there is cooperation and collaboration among BC's government, tech employers, post-secondary institutions, and other key stakeholders.

INTRODUCTION TO THE REPORT

In the last 15 years, BC's tech sector has outpaced the province's overall economy, growing by 91% to generate over $15 billion dollars in GDP per year[2]. The sector's prominence will only increase as technology products and services become ever more ubiquitous and deeply interwoven into all industries, including those not traditionally associated with tech.

Despite this promise, BC's tech sector faces a significant headwind: a growing talent deficit. The availability of talent has been a perennial concern for companies in the sector. This was perhaps most prominently highlighted in 2016's #BCTECH Strategy, in which tech talent was identified as a fundamental pillar of a thriving tech sector – and was suggested to be lacking in the province.

The goal of the 2016 TechTalentBC Report is to quantify this talent deficit and analyze its factors in order to diagnose difficulties and identify specific areas in which remedial action can be taken to ensure that BC's tech companies have access to the quantity and quality of tech talent required to compete and become global leaders.

The BC Tech Association has partnered with ICTC to conduct the BC Tech LMP Employer Survey, referred to throughout the report as simply the Employer Survey, which received over 400 responses from BC's technology companies. These responses were used to gain insight into four issues identified by sector stakeholders to be central to BC's tech labour market: job readiness, immigration, recruitment and retention, and diversity and outreach.[3]

ICTC has a nearly 25-year history of producing precise national and provincial labour market research that includes diverse perspectives. ICTC's recent report, Digital Talent: Road to 2020 and Beyond, created in partnership with Microsoft, highlighted future talent challenges facing the tech sector on a national scale, demonstrating ICTC's authority and proven methodology for creating comprehensive, data-intensive research regarding technology sector labour markets.

[2] As a point of comparison, BC's Forestry & Logging and Mining, Quarrying and Oil & Gas Extraction sectors generated an average of $1.9 billion and $10 billion annually over the last 15 years (CANSIM table 379-0030).
[3] The 4 workforce development issues (job readiness, immigration, recruitment & retention, diversity & outreach) were identified during Phase 1 of the BC LMP study. These 4 issues were expanded via workforce development committee meetings and regional roundtable meetings, along with in-depth primary and secondary quantitative research. The data findings were validated with the data analysis committee, comprising of leaders from BC's tech companies, industry associations and representatives from the BC provincial government.

The result of our research into BC's tech labour market is organized in this report in four sections:

Section 1: The BC Tech Sector

A definition of the sector itself and an examination of its historical employment growth trends, current employment levels, and geographic and subsector considerations, all of which provide context for the sector's projected talent challenges.

Section 2: Tech Labour Supply and Demand: 2016 to 2021

The supply and demand forecast between 2016 and 2021, followed by a breakdown of labour supply by source in two scenarios:

The Constrained Growth Scenario
A forecast based on the current supply conditions

The Expanded Growth Scenario
A forecast based on an adequate supply of labour

Section 3: Examining Supply Source Challenges

A description of challenges faced by BC's tech employers in four domains: job readiness, immigration, recruitment & retention, and diversity & outreach.

Section 4: Recommendations

Action items that aim to ensure consistent and sustainable short and long term growth in the tech sector.

Within the report are summaries and illustrations of forecasts and key insights based on quantitative and qualitative data collected by the LMP partners in 11 stakeholder surveys, including the Employer Survey, which received responses from over 400 tech companies. Qualitative research centered on multiple discussions with five subsector advisory committees and five workforce development committees, as well as over 20 key informant interviews with leaders in the tech sector.

Complementing ICTC's primary research, secondary data sourced from BC Stats, Statistics Canada, BC HEADset, and others, were used to help develop the picture of the tech sector. The report also provides performance comparisons with other BC economic sectors and other Canadian and international jurisdictions to provide context for BC's tech sector performance.

Specific data provides the confidence to take specific steps. The approaching talent shortfall can now be defined: 30,500 unfilled jobs by 2021. With that understood, stakeholders can take action to address it.

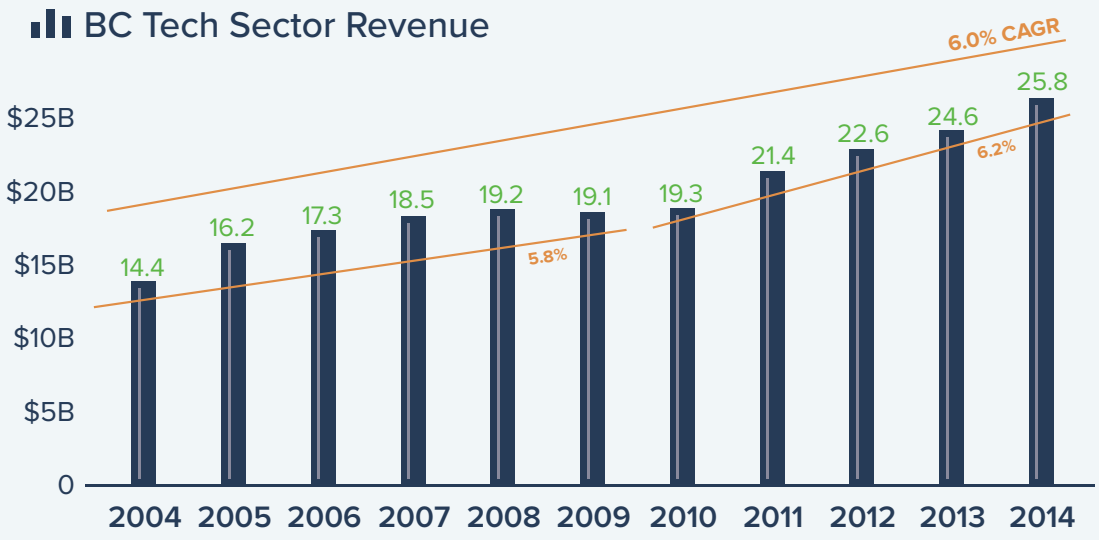
THE BC TECH SECTOR

Homegrown tech leaders such as Avigilon, Ballard Power Systems, Bardel Entertainment, Global Relay, Hootsuite, MDA, Sierra Wireless, STEMCELL Technologies, TELUS, Westport Fuel Systems, and Zymeworks reside in BC alongside multinational tech giants Amazon, Electronic Arts, GE, Microsoft, SAP, Schneider Electric, and Sony. These companies anchor a tech community that includes world-class research facilities, top-ranked universities, and over 9,500 tech companies ranging in maturity from startups to publicly listed firms employing thousands.

Capital has been flowing into the sector. Each year from 2013 to 2015, over $450 million in venture capital was invested alongside an increasing amount of angel investment, which topped $100 million in 2015.[4] Add to this the $100 million BCTECH Fund outlined in the 2016 #BCTECH Strategy, and the capital the sector needs to flourish is improving.

The results have been impressive. From 2009-2014, the five-year compound annual growth rate (CAGR) of tech sector revenue totaled 6.2% and averaged 6% over the 10-year period from 2004-2014. In 2014, BC's tech companies combined to generate revenues of over $25 billion, including $5 billion from exports.[5] This continuous growth is advancing the province's shift to a knowledge economy. Driving this shift is a workforce with advanced technical knowledge and skills.

CHART 1



Source: BC Stats, High Technology Report (2015)

The tech sector encompasses a broad and diverse group of companies that extend beyond traditional information technology companies. In fact, technology is now woven throughout every industry, and talent with tech-related skills is in demand throughout the entire provincial economy. This report organizes the tech sector according to **five subsectors** as delineated in the 2016 BC Technology Report Card. For a more detailed breakdown of BC's technology subsectors according to industry classifications, please refer to Appendix II.

[4] 2016 BC Technology Report Card
[5] BC Stats High Technology Sector Report (2015)

Information and Communications Technology (ICT)

Information & Communications Technology companies include those specializing in software, cloud computing, information technology, telecommunications, and electronics manufacturing.

Lifesciences (LS)

Lifesciences companies include those commercializing pharmaceuticals, medical devices, research, and testing platforms.

Interactive and Digital Media (IDM)

Interactive and Digital Media companies specialize in new platform technologies for mobile applications, social media marketing, augmented and virtual reality, film and video game and digital animation.

Cleantech (CT)

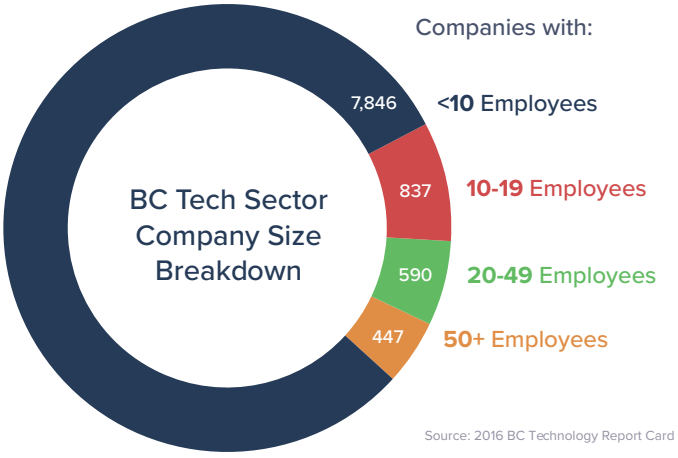
Cleantech companies develop solutions related to alternative energy generation, storage, environmental remediation, and resource management systems.

Engineering Services (ES)

Engineering Services companies specialize in information technology, engineering, and environmental services.

BC's Tech Sector Demographics

Over 80% of the more than 9,500 tech companies in BC are considered small, employing fewer than ten people. In a sign of progress, the number of companies growing from small to medium and large sizes has increased. Between 2012 and 2014, the number of companies employing 10-19 people grew by 17%, the number of companies employing 20-49 people grew by 18%, and the number of companies employing 50+ people grew by 14%.[6]



Source: 2016 BC Technology Report Card

CHART 2

[6] 2016 BC Technology Report Card

Employment Level

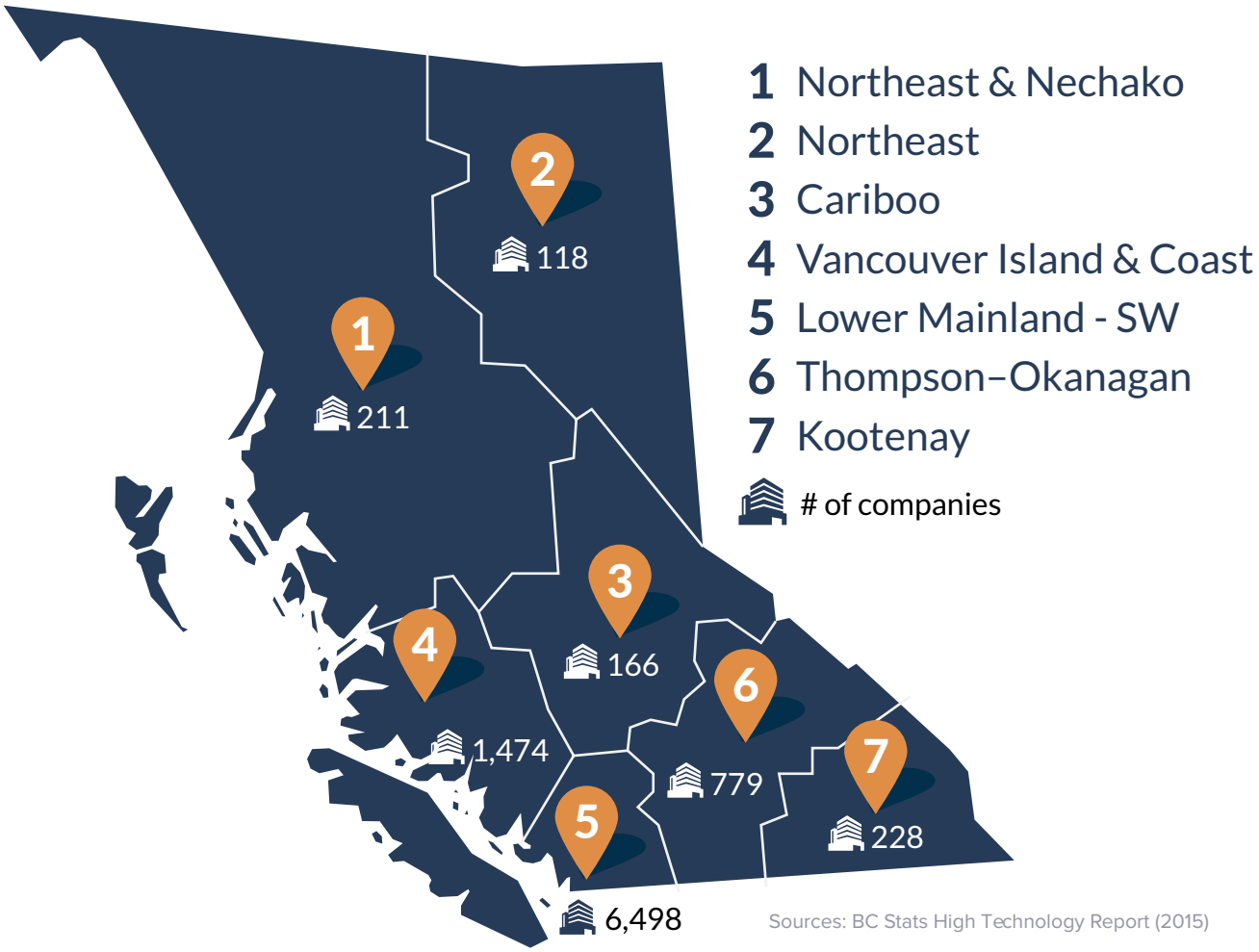
This report examines tech sector labour trends across seven economic regions as identified by Statistics Canada.

These regions are: Lower Mainland – Southwest, Thompson-Okanagan, Vancouver Island & Coast, Cariboo, Kootenay, Northeast, and North Coast & Nechako.

Over two thirds of the provinces' tech companies are found in the Lower Mainland – Southwest region.

Vancouver Island & Coast and Thompson-Okanagan also have significant shares of the province's tech companies at approximately 15% and 8% respectively.

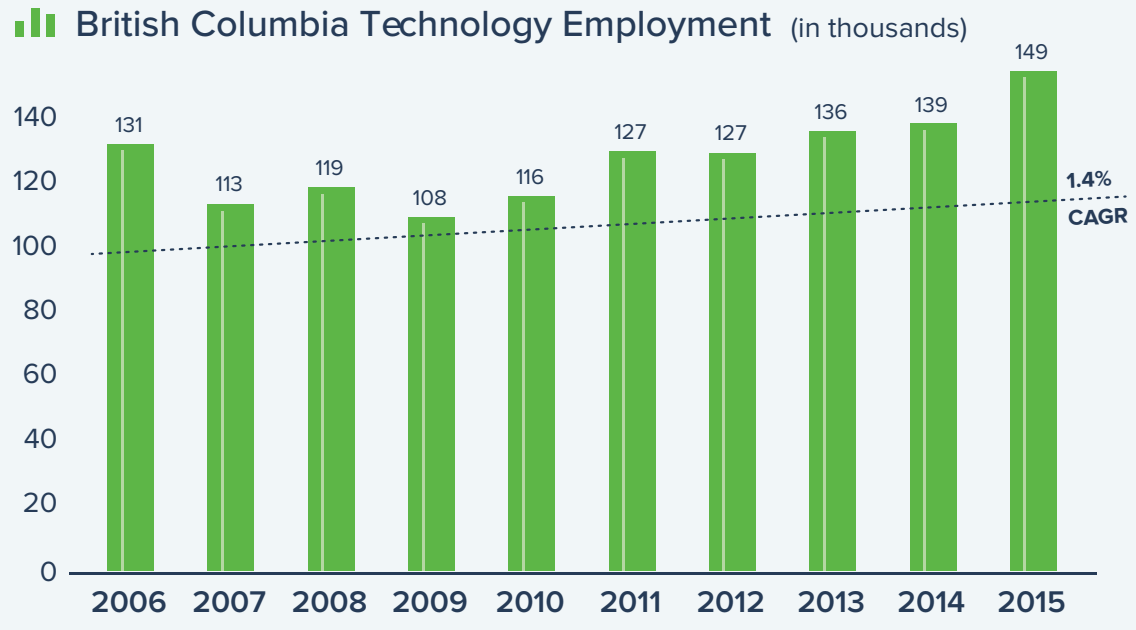
The Kootenay, Cariboo, Northeast, and North Coast & Nechako regions combine to account for the remaining 10% of the province's tech companies. While the proportion of tech companies in these regions is small, it is significant, as it demonstrates that tech companies can develop and create value from any geographic area.



Sources: BC Stats High Technology Report (2015)

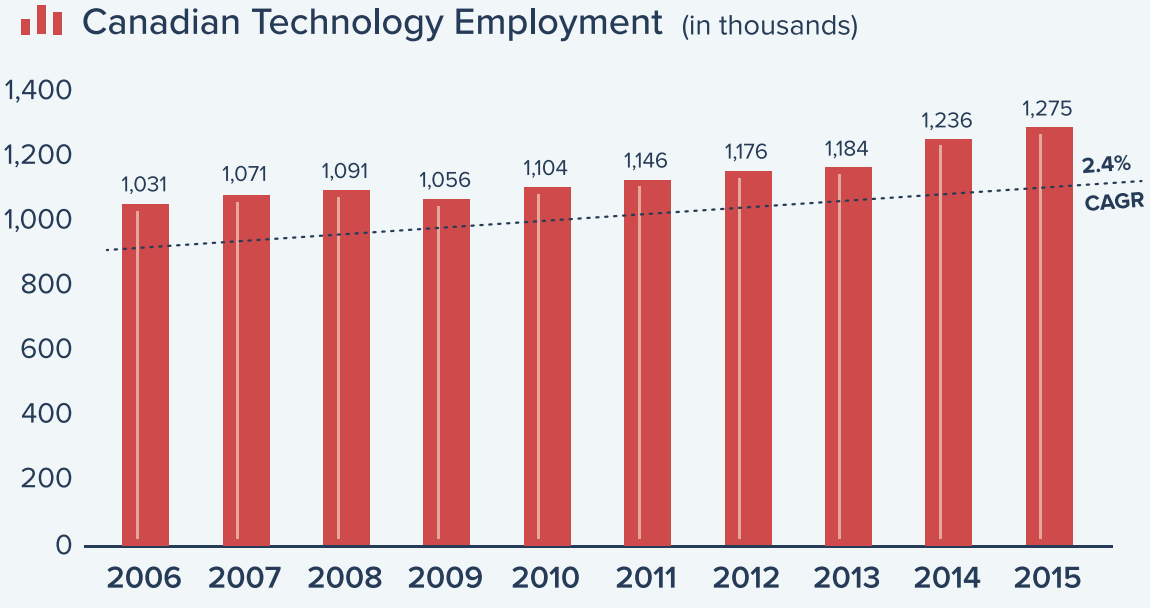
Using ICTC's methodology that maps tech employment across 32 National Occupation Codes (NOCs)[7], employment in BC's tech sector grew from 131,100 jobs in 2006 to 148,800 jobs in 2015, weathering the great recession of 2008-2009 and maintaining its upward advance.

CHART 3



Source: ICTC Historical Employment Trends in the BC Tech Sector (2016)

CHART 4

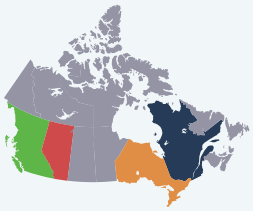


Source: ICTC Historical Employment Trends in the Canadian Tech Sector (2016)

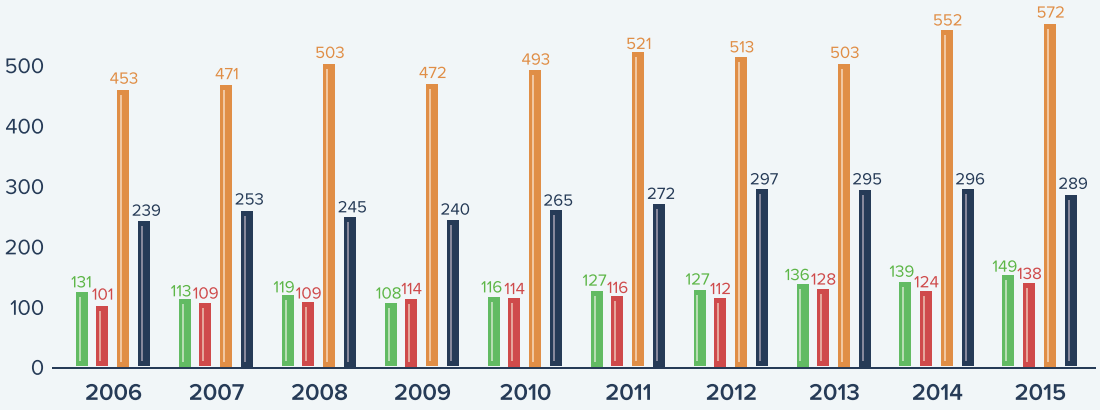
[7] ICTC's methodology for employment analysis and forecasting uses 32 National Occupation Codes that are pertinent to the tech industry. This differs from BC Stats employment calculation of 92,700 in 2014 which used an employment methodology based on North American Industry Classification System (NAICS)

CHART 5

Provincial Comparison of Technology Employment (in thousands)



British Columbia
Alberta
Ontario
Quebec



Source: ICTC Historical Employment Trends in the Tech Sector – Province by Province Comparison (2016)

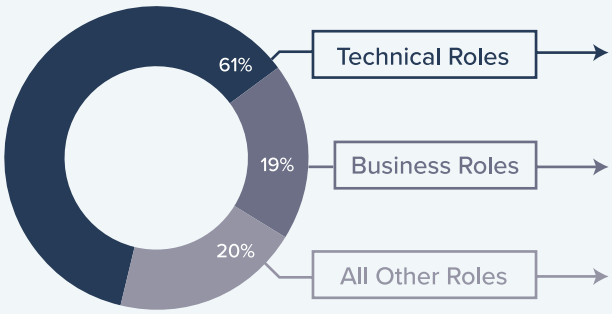
Types of Roles

In this report, tech sector roles are divided into two broad categories: technical and non-technical.

Responses from the Employer Survey indicate that technical roles comprise 61%[8] of all roles in BC's tech companies. The Lifesciences subsector has the largest proportion of technical roles at 70%, and the Cleantech subsector has the lowest at 52%. The same survey revealed that 64% of BC's tech companies will have an increased need for technical talent over the next 12 months, while only approximately 40% will have an increased need to source talent for business roles and 34% will see an increased need for all other roles (i.e. HR personnel, administrative staff, etc.)

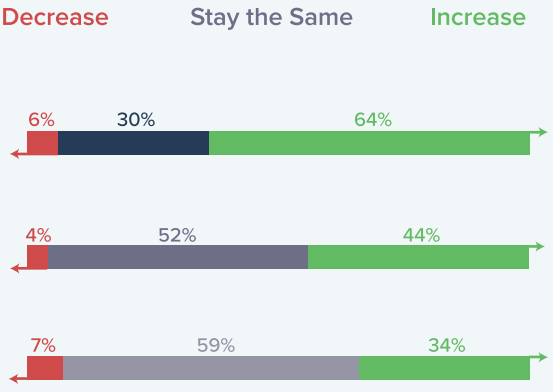
CHART 6

Employment Composition



Source: BC Tech LMP Employer Survey (2016)

Anticipated Hiring Needs Over Next 12 Months



Source: BC Tech LMP Employer Survey (2016)

The Top Technical Roles

The top five occupations in BC's tech sector as of the end of 2015 were information systems analysts, computer programmers and interactive media developers, advertising, marketing and public relations specialists, graphic designers and technical sales specialists.

[8] 61% technical/39% non-technical roles represents the feedback extracted from the employer survey, wherein employers provided estimations of role composition at their respective companies. Quantitative evidence gathered from our 32 NOCs (24 Tech, 8 non-tech - see Appendix I) created an output more heavily skewed towards tech roles (77% tech, 23% non-tech).

The chart below shows the top five occupations along with the number of people employed in each.

Number of Jobs by Occupation (2015)

The following occupation definitions are based on those from the Statistics Canada National Occupational Classification.

Information Systems Analysts: Information systems analysts conduct research, develop information systems development plans, policies and procedures, and provide network security services. The majority of information systems analysts possess a university degree in computer science or software engineering. These jobs are primarily found in the ICT subsector.

Computer Programmers & Interactive Media Developers: Computer programmers create, edit, test and integrate software programs. Interactive Media Developers design and create user interfaces for websites, applications, and games. Most computer programmers and interactive media designers hold a post-secondary degree or diploma, though some do enter the occupation after building the requisite skills outside of university or college. These jobs are predominantly found within ICT and IDM subsectors, with a smaller presence within Lifesciences, Cleantech and Engineering Services.

Advertising, Marketing, Public Relations Specialists: Advertising and marketing specialists provide sales support and stakeholder and consumer relations. Employees in this occupation often possess post-secondary education in marketing, business, or communications. These jobs are found across all five subsectors.

Graphic Designers: Graphic designers and illustrators conceptualize and produce graphic art in a variety of contexts and forms, including advertising, film and TV, packaging, posters and other interactive media. The majority of graphic designers possess a Bachelor degree or college diploma in Graphic Design, Animation or Interactive Media, although may enter the field with a post-secondary certificate as well. These jobs are most often found in the IDM and ICT subsectors.

Technical Sales Specialists: Technical sales specialists sell a variety of hardware and software goods and services including scientific products, software, and computers. Most technical sales specialists possess a post-secondary education in business, marketing, or communications. These jobs are found across all five subsectors, most often among medium- and large-sized companies.

TECH LABOUR SUPPLY AND DEMAND *2016 to 2021*

> Wage competition with larger companies is becoming a challenge, in particular to source technical and business development positions. A significant category of talent taken out of the market is experienced middle-managers who can "graduate" to executive positions in smaller companies. This talent is like oxygen to a growing company...
>
> We're beginning to look at recruiting outside North America in order to fill some of these [talent] gaps, but there are obvious challenges in doing this for a smaller company.
>
> **Michael Fergusson**
> CEO Ayogo

Incorporating responses from the Employer Survey and data from BC Stats, the Labour Force Survey, and the National Household Survey, ICTC used a regressive econometric model to forecast the BC tech sector's labour supply and demand for each year between 2016 and 2021. A description of the model can be found in Appendix III. ICTC considered three sources from which talent will be supplied:

New entrants: graduates from a post-secondary program within the past year

Immigrants: individuals who have immigrated to Canada within the past year

Other local supply: individuals who are upskilling to transition into tech jobs from other sectors and individuals who are members of demographic groups underrepresented in the tech sector (women, First Nations, and individuals with disabilities)

Respondents of the Employer Survey indicated that the three sources comprised their hiring at proportions of 40%, 29% and 31%, respectively.

The model revealed that the aggregate demand in the tech sector between 2016 and 2021 will be to fill more than 47,000 additional net new jobs. However, recent trends from the three talent sources indicate that only approximately 16,500 workers will be available to fill key roles by 2021.

If current trends in labour availability continue, BC's tech sector will suffer an aggregate shortage of 30,500 skilled workers by 2021. These net new job openings in the province's tech companies will remain vacant with no supply to fill them. The following sections of this report present forecasts that break down the degree to which supply deficits occur for each of the three labour sources referenced above.

We analyzed employment scenarios for BC's tech sector under two sets of conditions. These two scenarios are called the Constrained Growth Scenario and the Expanded Growth Scenario.

The Constrained Growth Scenario is the analysis of the labour supply broken down

by source if current trends persists. Under this scenario, the total net new jobs that can be filled by 2021 will be 16,725, translating into a modest annual employment growth rate of 1.8% over the five-year period.

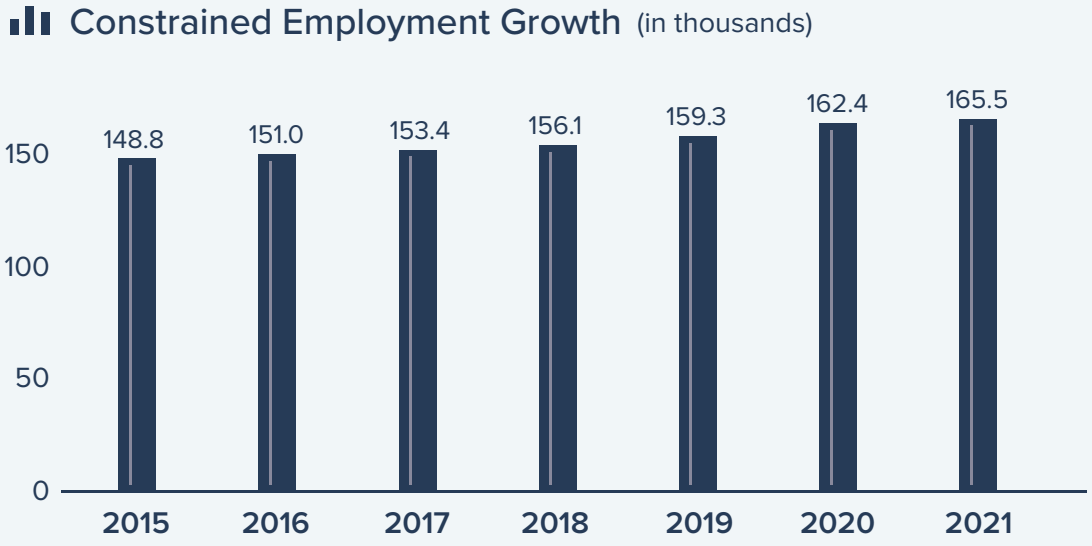
The Expanded Growth Scenario is the analysis of the labour supply broken down by labour source if the province is able to eliminate the shortfall and fill all 47,264 net new jobs available, translating to an elevated annual employment growth rate of 4.7%.

The examination of the Constrained Growth Scenario demonstrates the supply and demand dynamic for each source in order to identify areas in need of remediation. The Expanded Growth Scenario examines whether each of the three labour sources currently has the capacity to deliver the required number of workers.

1 The Constrained Growth Scenario

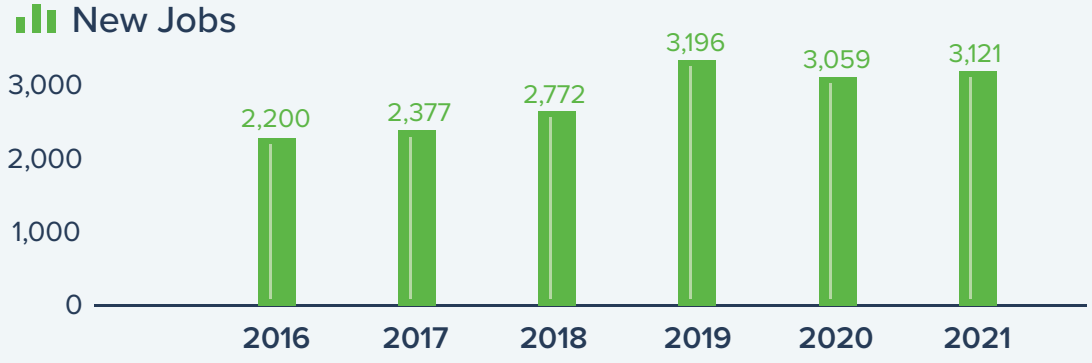
Currently, fewer than half of the average 7,500 vacancies posted by BC's tech companies are being filled each year. Assuming the current talent shortage in BC's tech sector continues at the same level, we calculated a total of 148,800 jobs in 2015 growing to 165,525 by 2021, an addition of approximately 16,500 net new jobs. This translates into an annual tech sector employment growth rate of 1.8%.

CHART 7



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

CHART 8



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

Labour Demand by Source

Using the hiring proportions derived from the Employer Survey, our forecast suggests approximate labour demand from each source as follows:

6,500
from new entrants

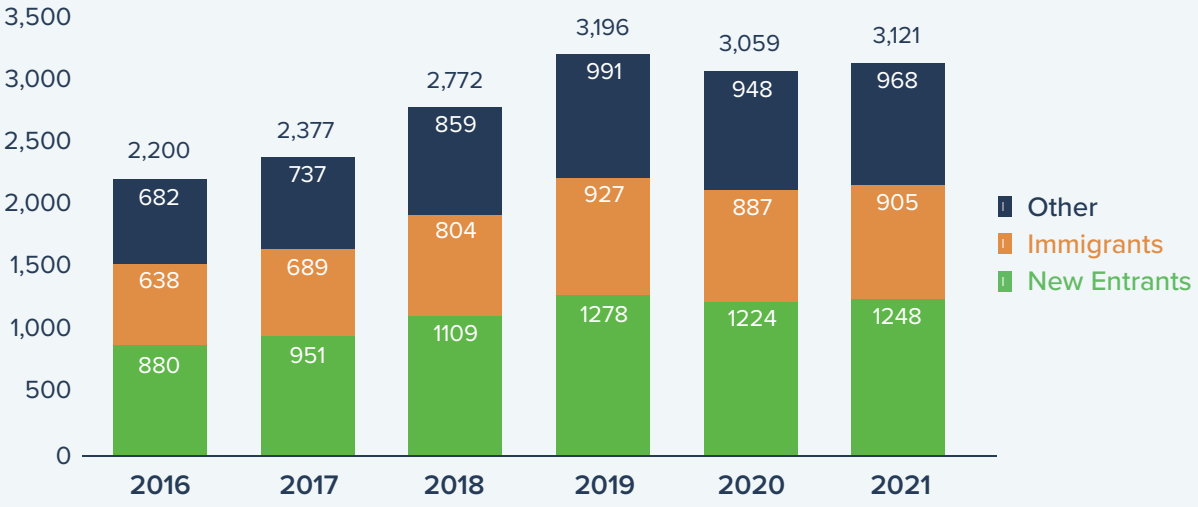
5,000
from immigration

5,000
from other local supply

CHART 9

Labour Demand in Constrained Growth Scenario

BC's post-secondary institutions produce approximately **2,200** tech-related graduates each year.



Source: ICTC Econometric Forecasting Model for Employment Growth in BC's Tech Sector (2016)

Labour Supply by Source

According to 2014 graduation records from BC's post-secondary institutions, we estimate the annual graduation of approximately 2,200 students from tech-related programs in engineering, technology and computer science at BC's post secondary institutions.[9] This total is comprised of both Canadian and international students.

Additionally, based on data gathered from LinkedIn, we estimate that within the first year of graduation, an average of 15% of each graduating class elects to work outside of BC. We are unable to determine the number of graduates that opt to work in sectors other than tech, and have not included this factor in our calculation.

> Based on these figures, we estimate that approximately **9,500 tech-related program graduates will stay and work in BC** between 2016 and 2021. This supply of tech graduates will be sufficient to meet the demand of 6,500 new entrants required in the Constrained Growth Scenario.[10]

[9] 2014 graduation records based accounting for graduates from undergraduate programs in Computer Science and Technology & Engineering from the following institutions: UBC (820 grads), BCIT (473 grads), UVic (380 grads), SFU (368 grads), UBC-Okanagan (168 grads), UNBC (43 grads) and TRU (20 grads). The total number of graduates from all above-noted institutions in the aforementioned programs was 2263 in 2014. These particular program classifications were chosen as they formed the closest linkage, in terms of educational requirements, to the 24 tech NOCs that represent the technology component in this forecast. Due to an inability to retrieve reliable data of graduates from undergraduate programs similar to the above at BC's other post-secondary institutions, including BC's colleges and other technical institutions, these results have been omitted. As a result, our estimated graduation rates are conservative, with total graduation rates from all institutions being potentially higher.

[10] The demand of 6,500 new entrants under this scenario is determined based on employment need in 32 key occupations. Therefore, the additional 3,000 workers between 2016-2021 (based on 9,500 graduates) may wind up working in the tech sector under other occupations outside of the 32, and/or in other sectors of the economy.

Immigration data from BC Stats shows the arrival of nearly 31,700 immigrants to BC annually.[11]

Data from the 2000-2015 Labour Force Survey indicates that 3-5% of all immigrants to the province enter tech roles.[12] Using these figures, we estimate that between 950-1,500 immigrants with tech-related skills will be available to enter the BC tech sector on an annual basis.

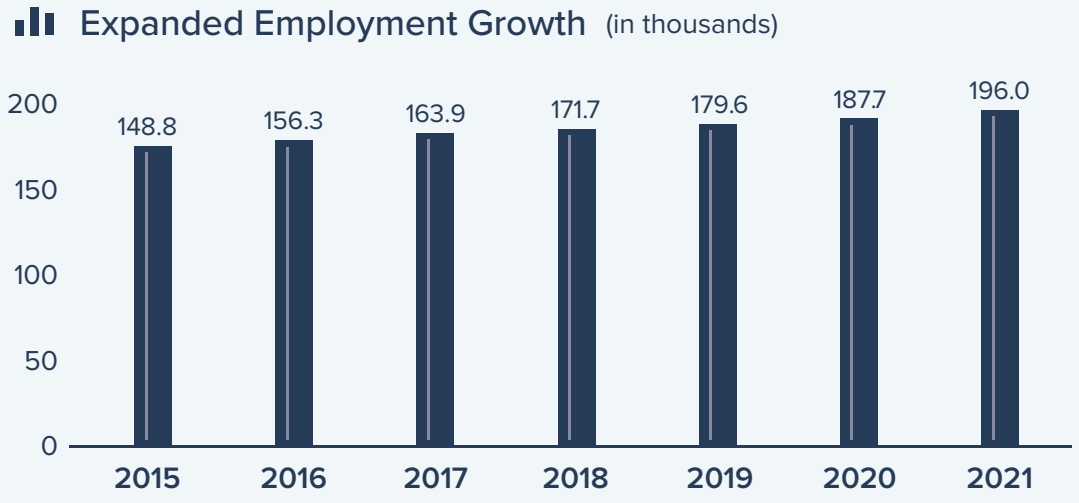
> Based on these figures, we estimate that approximately **4,750-8,000 immigrants will enter the province's tech sector** by 2021. This supply of tech-skilled immigrants will likely be sufficient to meet the demand of 5,000 immigrants determined in the Constrained Growth Scenario.

Data is unavailable to determine the number of job transitioners and members of underrepresented demographic groups that comprise other labour supply, and thus no estimate for this labour source has been made.

2 The Expanded Growth Scenario

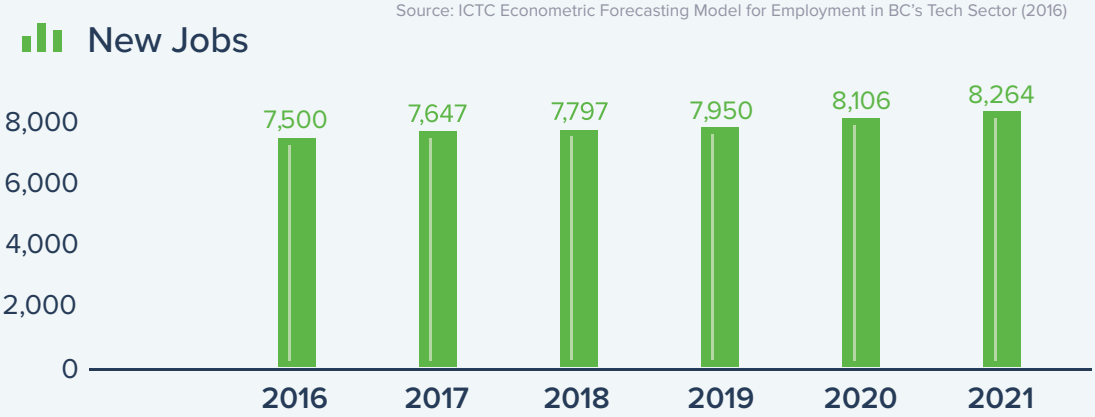
The Expanded Growth Scenario forecasts employment in BC's tech sector if all annual vacancies at BC's tech companies are filled between 2016 and 2021. In this scenario, we calculated a total of 148,800 tech sector jobs in 2015 growing to 196,064 by 2021. Filling 100% of the projected vacancies translates into a tech sector employment growth rate of 4.7% per year.

CHART 10



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

CHART 11



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

[11] In light of the substantial changes made to federal immigration policy in 2014, ICTC has utilized the 2014-2015 immigration record (31,677) - instead of a 5-year average from 2010-2015 - as a benchmark for calculating immigration into the province over the forecast period.

[12] Calculated using the ratio of immigrants employed in tech occupations from LFS 2000-2015 data.

Labour Demand by Source

Using the hiring proportions derived from the Employer Survey, our forecast suggests labour demand from each source as follows:

Approximately **19,000** new entrants

Approximately **13,500** immigrants

Approximately **14,500** other local supply

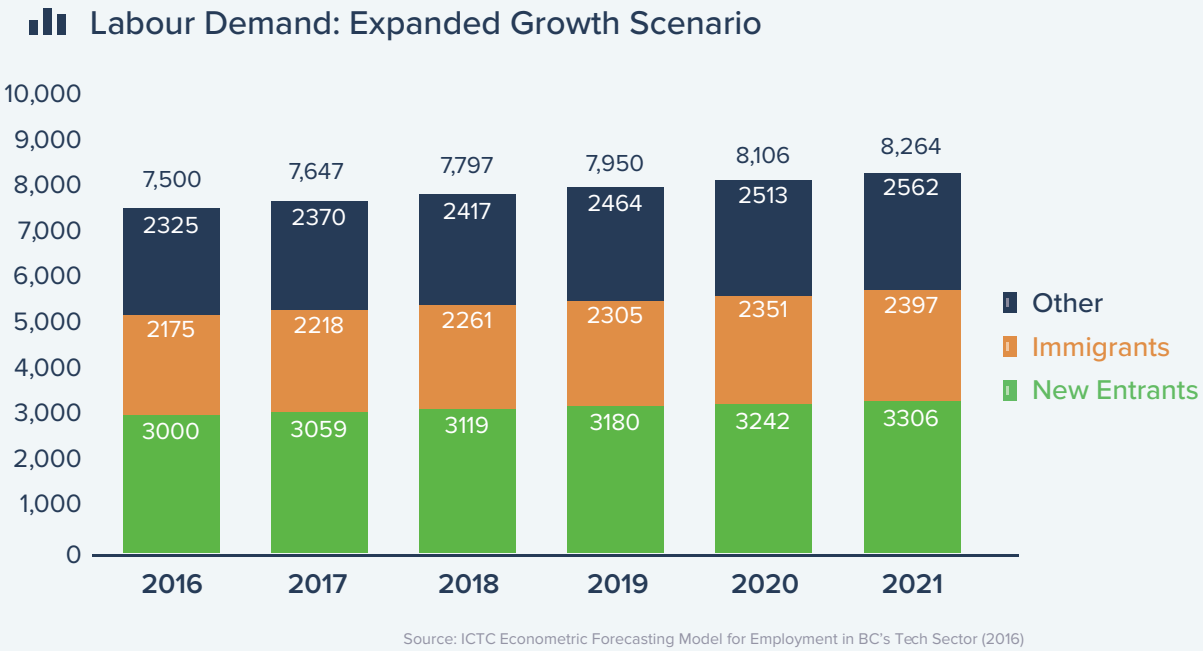
Recall 9,500 tech-related program graduates are estimated to stay and work in BC from 2016 to 2021.

This number will be insufficient to meet the demand of 19,000 new entrants required over 5 years from 2016-2021, to fill all vacancies, assuming hiring proportion by source remains the same.

Recall 4,750-8,000 immigrants with tech-related skills are estimated to enter the province from 2016 to 2021. This number will be insufficient to meet the demand of 13,500 immigrants required to fill all tech-related vacancies, assuming hiring proportion by source remains the same.

Once again, as data is unavailable to determine the number of job transitioners and members of underrepresented demographic groups that comprise the labour supply, no estimate regarding other local supply has been made for this scenario.

CHART 12



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

Understanding the Shortfall *30,500 Vacancies*

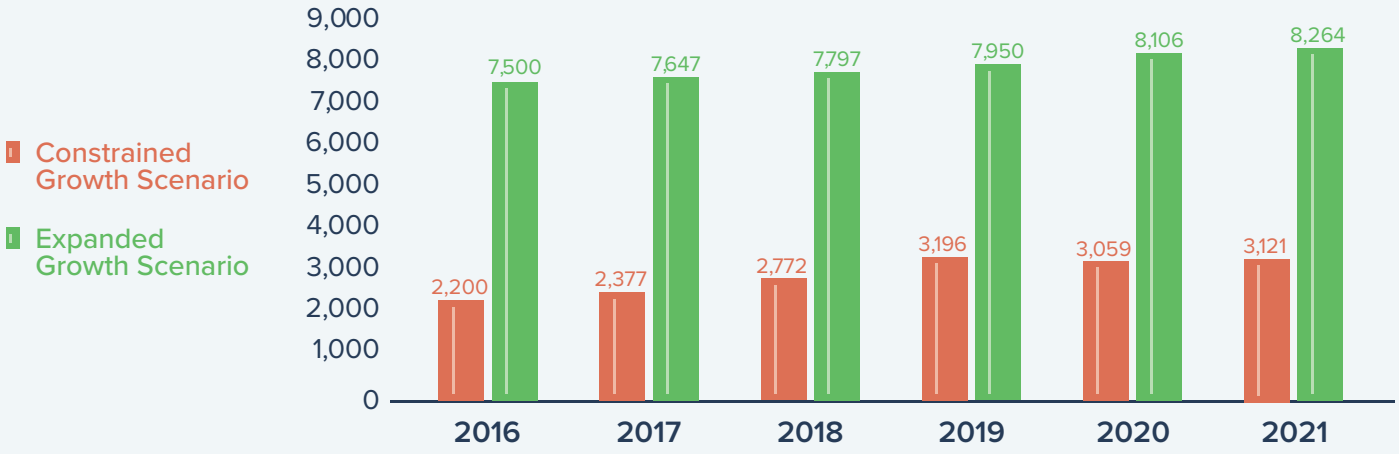
BC's current labour supply conditions, extended over the next five years, leave approximately 30,500 net new job openings vacant under the scenario of expanded growth. There will be a significant deficit in the number of new entrants and immigrants needed to give BC tech companies the talent they need to expand and compete. Chart 16 illustrates the estimated deficit by labour source in each year from 2016 to 2021.

In order to fill the 47,000 jobs in BC's tech sector and to achieve maximum employment growth by 2021, the BC government, post-secondary institutions, and other stakeholders must take active measures to generate or source large amounts of additional talent.

Otherwise, as demonstrated in the Constrained Growth Scenario, approximately 30,500 net new jobs will be left on the table by 2021.

CHART 13

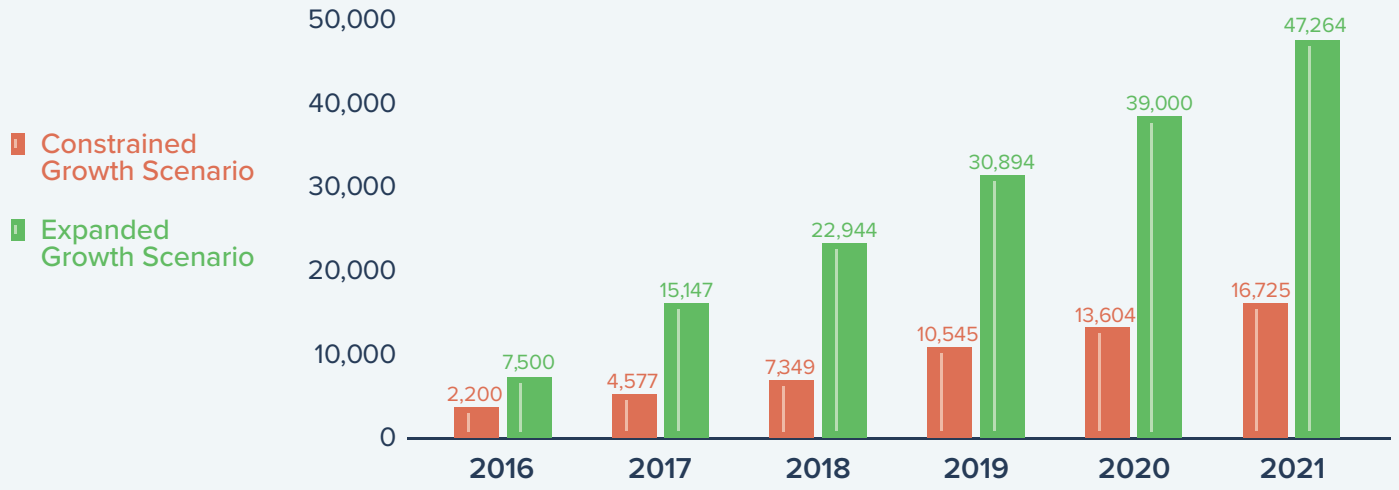
New Jobs Per Year in BC's Tech Sector



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

CHART 14

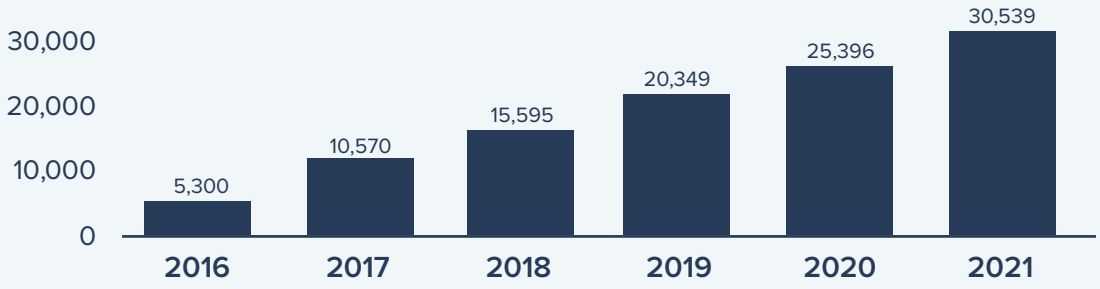
Cumulative New Jobs in BC's Tech Sector



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

CHART 15

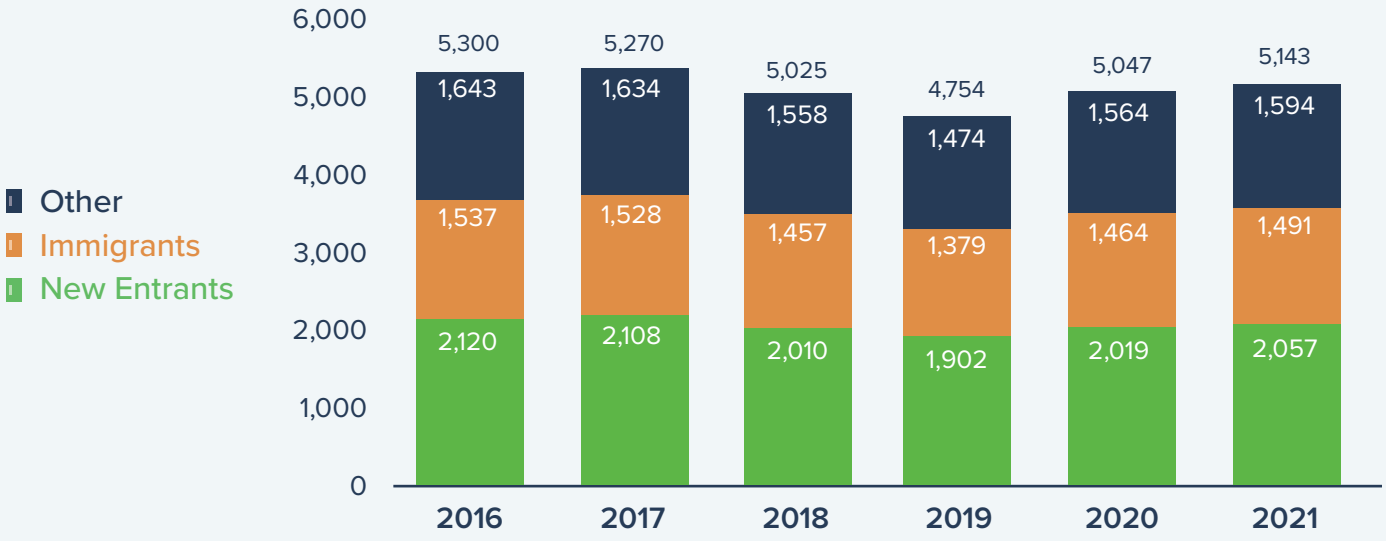
Cumulative Unmet Demand: Job Vacancies



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

CHART 16

Unmet Demand per Year: Labour Force



Source: ICTC Econometric Forecasting Model for Employment in BC's Tech Sector (2016)

Labour Shortfall by National Occupation Code (NOC)

Certain tech occupations are expected to be in highest demand. Based on 32 National Occupational Codes (NOCs) identified as tech-relevant in the Employer Survey, we forecast that the most substantial demand growth will occur across ten NOCs. These ten NOCs combine to represent 61% of the 16,500 vacancies in the Constrained Growth Scenario, and 47,000 vacancies in the Expanded Growth Scenario.

The most in-demand occupations will be technical roles such as software developers, programmers, and web developers, which will be needed at entry, mid, and senior levels. These occupations will be in demand across all five subsectors, with demand most pronounced in the ICT and IDM subsectors.

The following is a breakdown of the forecasted supply deficit for each of the top ten NOCs.

NOC 2171: Information Systems Analysts & Consultants

Approximately 4,000 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include security and quality assurance analysts. Most frequently sourced for entry and mid-level positions, these professionals usually possess a post-secondary education in a technical program. Job requirements usually include a Bachelor degree in Computer Science or, less frequently, a college diploma in a similar technical program.

NOC 2174: Computer Programmers & Interactive Media Developers

More than 2,500 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include programmers, web developers, user experience and user interface designers. Job requirements often include a Bachelor degree in Computer Science, Software Engineering or, less frequently, a college diploma in a technical program. However, employers have also been known to hire candidates with non-tech education backgrounds, including those without post-secondary education, provided relevant technical knowledge and skill can be demonstrated.

NOC 1123 and 6221: Professional Occupations in Advertising, Marketing & Public Relations and Technical Sales Specialists

More than 3,500 job openings will go unfilled between 2016 and 2021 under these occupation codes.

Top roles grouped under these two codes include marketing and public relations specialists, account executives, and sales specialists. Most frequently sourced for entry and mid-level positions, these roles require a strong combination of 'soft' business and communication skills, with less emphasis on technical skills. Employers often source talent with a Bachelor degree in Communications, Marketing, Business, Economics, or Accounting. Employees with degrees in Computer Science or Software Engineering are also known to shift from technical to sales-oriented roles within tech companies.

NOC 2281: Computer Network Technicians

More than 1,460 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include computer technicians, network technicians, and systems technicians. Frequently sourced for entry-and mid-level positions, roles require a Computer Network Technician college certificate.

NOC 5421: Graphic Designers and Illustrators

More than 1,500 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include graphic designers, 3D graphic designers, animators, UX/UI artists, VX artists, and industrial designers. Job requirements usually include a Bachelor degree in Graphic Design, Computer Science, or Animation, a college diploma in Graphic Design or Interactive Media Design, or a certificate in Graphic Design or Interactive Media Design.

NOC 2282: User Support Technicians

More than 1,400 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include network technicians and network analysts. Job requirements usually include a college certificate as a Computer & Engineering Technician, Computer Network Electronics Technician, or Computer Systems Technician.

NOC 0213: Computer and Information Systems Managers

More than 1,400 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include electronic data processing managers and computer systems managers. Job requirements usually include a Bachelor degree in Computer Science, Information Science, Management – Information Systems, or a college diploma in Computer Science.

NOC 2131: Civil Engineers

More than 1,330 job openings will go unfilled between 2016 and 2021 under this occupation code.

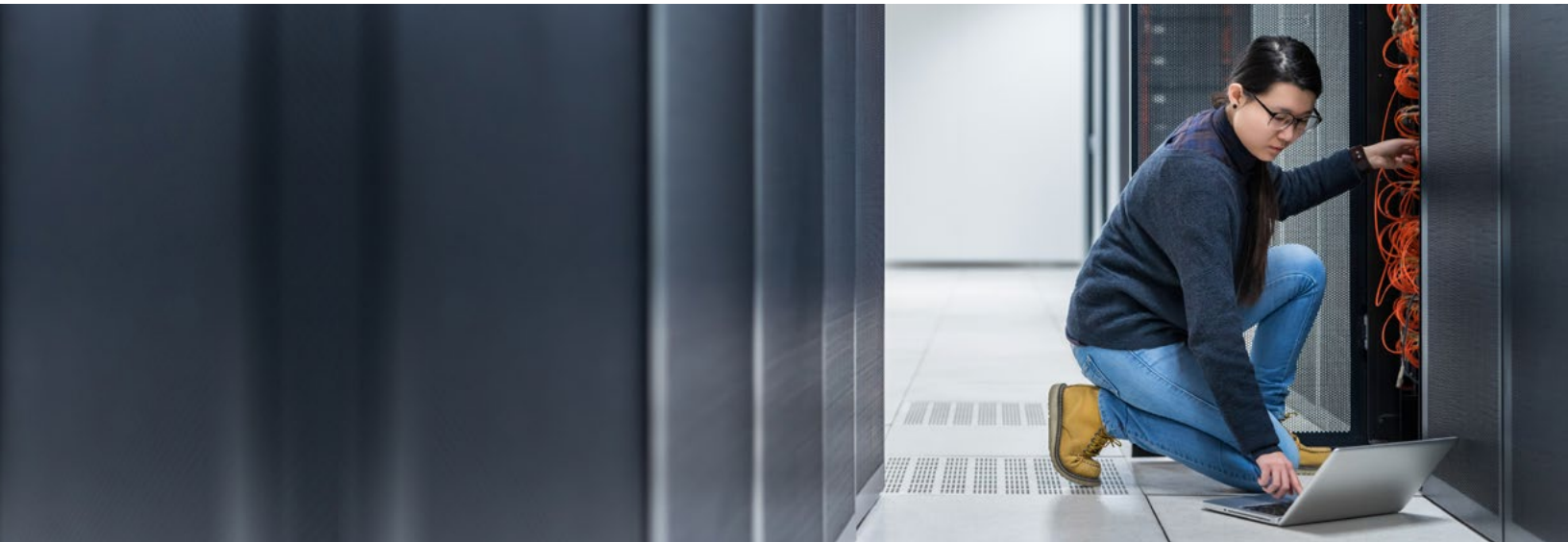
Top roles grouped under this code include civil engineers, structural engineers, project engineers, and engineering consultants. Job requirements usually include a Bachelor degree in Civil Engineering, Mechanical Engineering, or Engineering – General.

NOC 4163: Business Development Officers and Marketing Researchers and Consultants

More than 1,290 job openings will go unfilled between 2016 and 2021 under this occupation code.

Top roles grouped under this code include business development officers, marketing officers, sales executives, account executives, and business developments consultants. Job requirements usually include a Bachelor degree in Finance, Communications, Accounting, or Marketing & Public Relations, or a college diploma in Marketing, Business, Finance, or Accounting.

For a complete analysis of job openings in the Constrained and Expanded Growth Scenarios organized according to the 32 NOCs, please see Appendix I.



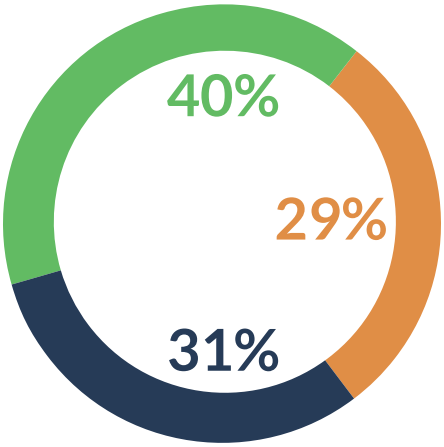
EXAMINING SUPPLY SOURCE CHALLENGES

> [W]ithout access to more senior talent, a significant challenge locally for software developers, it is hard to invest as much as we would like in junior and intermediate talent. We need the experienced software leaders to help grow and mentor younger talent to allow us to scale at speed.
>
> **Sascha Williams**
> COO, Unbounce

In order to understand what steps are necessary to reduce the talent supply deficit today and in the future, we examined each of the three talent sources in detail. This involved examining the proportion of hiring done from each source, and the challenges to talent recruitment, retention, and development existing for each. The challenges explained within this section provide the basis for this report's recommendations.

Hiring Proportions by Talent Source

We found the hiring proportions by talent source are:



New entrants
(new graduates from post-secondary institutions)

Immigrants
(talent sourced from outside of Canada)

Other local talent
(talent sourced from other local supply groups, including underrepresented groups and career transitioners)

NEW ENTRANTS

BC tech companies indicated that 40% of roles sourced are in the new entrant segment. This suggests the need for a considerable and consistent annual supply of graduates from post-secondary programs. The need for new entrants will be most pronounced in the Lifesciences and Cleantech subsectors.

The current supply of annual grads falls short of tech sector demand in the Expanded Growth Scenario. In order to meet the demand for new entrants in the Expanded Growth Scenario, BC will need to produce approximately 2,000 additional post-secondary graduates annually, culminating in a total of nearly 12,500 additional post-secondary graduates by the end of 2021 from tech and non-tech program disciplines.

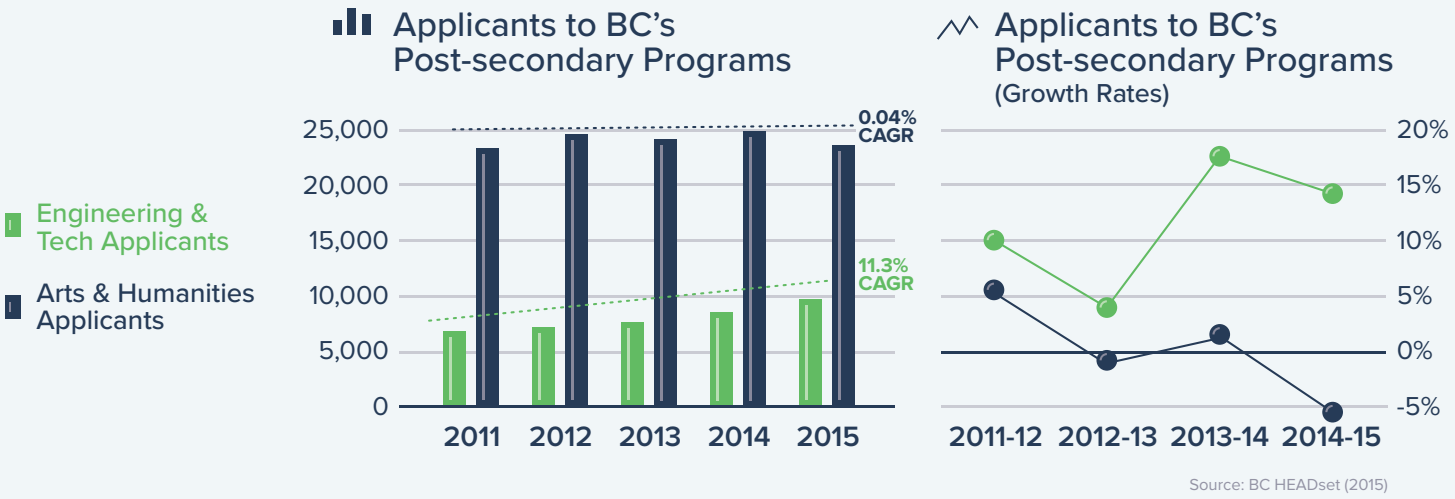
Of the additional 12,500 graduates needed to meet the Expanded Growth Scenario by 2021, roughly 9,500 will come from tech-related programs and 3,000 from non-tech (e.g. business, communications and arts) programs[13].

Please see Appendix I for a complete breakdown of total employment per 24 tech and 8 non-tech NOCs under the Constrained and Expanded Growth Scenarios, and Appendix XI for detailed tables reflecting annual NOC breakdown from 2016-2021.

Enrollment Numbers

Data from BC HEADset, a curated set of BC's higher education institutions data, shows that enrollment in tech-related university programs is not keeping up with applicant interest and sector need. Slightly more than 65% of applicants to Engineering & Tech programs were admitted between 2011 and 2015, while the demand for Engineering & Tech programs, as measured by number of applications, grew at a compound annual growth rate of 11.3%. Contrast this with Arts & Humanities programs, to which over 80% of applicants were admitted over the same time period, while demand grew by only 0.04%. This suggests that the enrollment capacity in Engineering & Tech programs has not been keeping up with interest.[14]

CHART 18



Source: BC HEADset (2015)

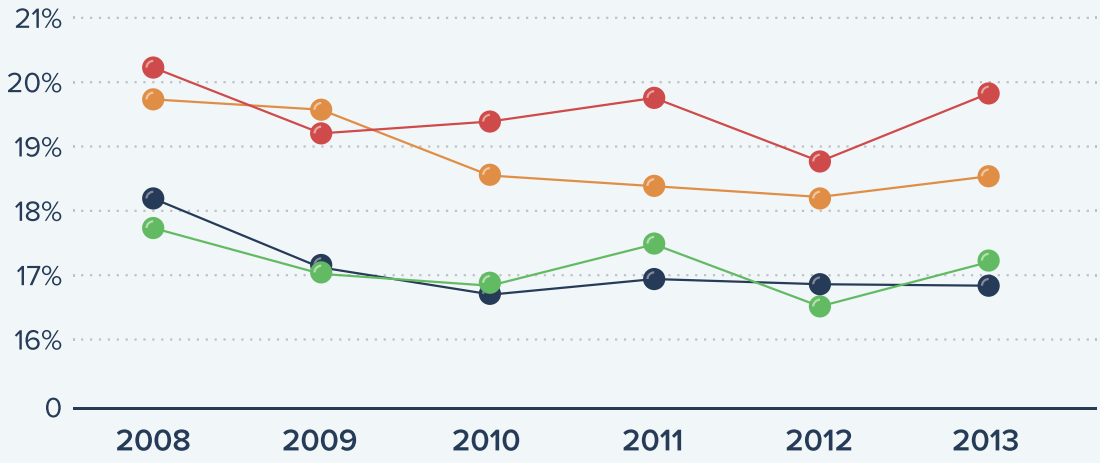
[13] Derived from sourcing unmet demand according to 24 tech-related NOCs and 8 non-tech NOCs.
[14] Based on the assumption that students applying to both programs submit applications to a similar number of schools.

Also, the number of students in tech-related programs in BC is lower per capita than that of Ontario, Québec, and Alberta. In 2013, only 17% of BC undergraduate students were pursuing a tech-related degree. Compare this with 20% in Alberta and 19% in Ontario. At the graduate level, 22% of BC graduate students were pursuing a tech-related degree, compared with 34% in Alberta and 30% in Ontario. At the doctoral level, BC has witnessed a drop of 2.4% in the number of tech-related PhD degrees granted over the past decade.

CHART 19

Total Undergraduates with Technology Degree Specialization

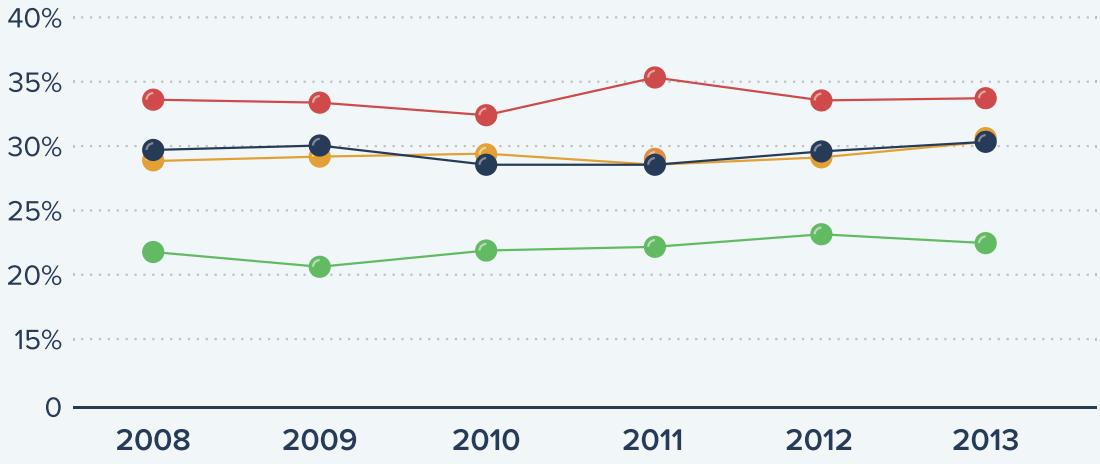
- British Columbia
- Alberta
- Ontario
- Quebec



Source: 2016 BC Technology Report Card

Total Masters Degrees with Technology Specialization

- British Columbia
- Alberta
- Ontario
- Quebec



Source: 2016 BC Technology Report Card

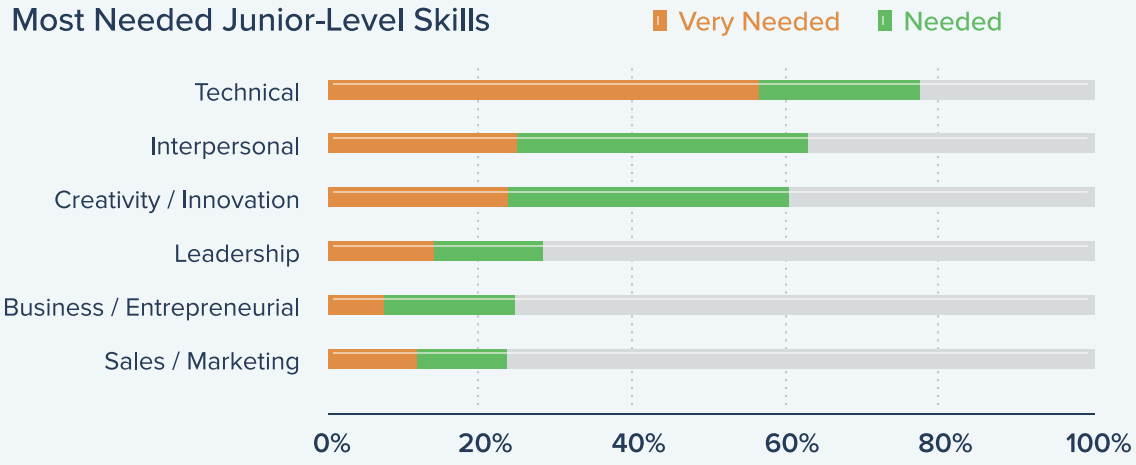
Job Readiness and Skills Development

Graduates must come from the classroom ready with the skills needed by the sector, and to a great degree, they do. BC's tech companies have indicated that new entrants generally performed well in the sector, with 70% of employers ranking the quality of their new grads' technical skills as 'Good' and 'Very good'. This is important, as 78% of companies regard technical skills as 'Most needed' and 'Very needed'. However, during the stakeholder interviews, several companies indicated that the curriculum in many of the post-secondary programs lacked the currency needed to enable new grads to be immediately productive.

Interpersonal skills like communication, literacy, and working with others, considered 'Most needed' and 'Very needed' by 68% of employers, were found to be lacking surprisingly often.

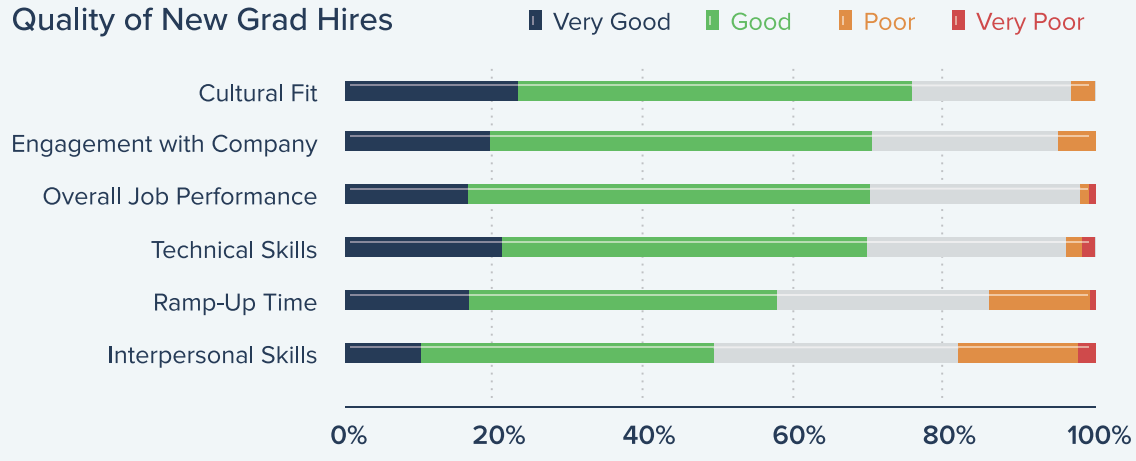
Approximately 15% of BC's tech companies ranked new grads' interpersonal skills as 'Poor' and 'Very poor'. Ramp up time, which also relies on well developed independent learning and communication skills, was seen as 'Poor' and 'Very poor' by 13% of companies surveyed.

CHART 20



Source: BC Tech LMP Employer Survey (2016)

CHART 21



BC Tech LMP Employer Survey (2016)

The top three skills that new grads performed best in were:

1) Cultural fit

2) Engagement

3) Technical skills

Remarkably, the BC Tech LMP Student Survey revealed that 96% of students rated their own interpersonal and communication skills as 'Good' and 'Very good', suggesting a misunderstanding of the performance standard expected by tech sector companies.

Co-op and Experiential Learning

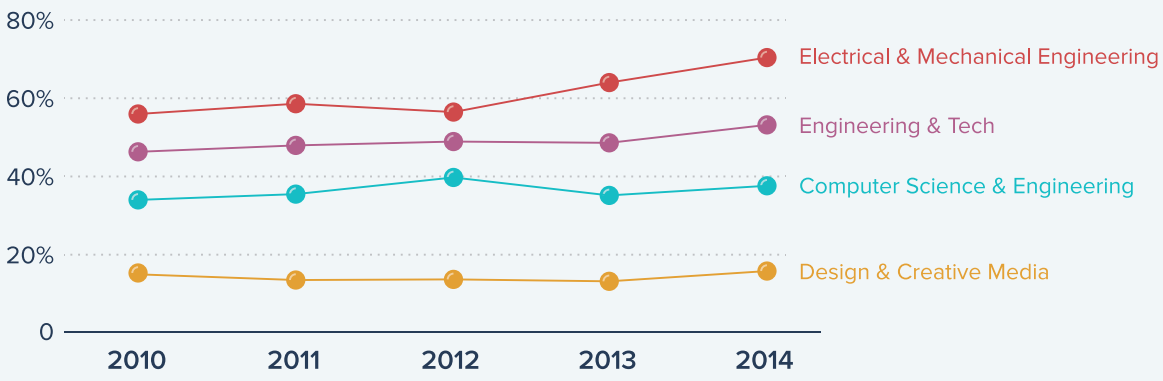
> The demand for technology related co-op work terms is increasing in the province, and there is a genuine need for more collaboration and increased capacity between post-secondary co-op programs and BC technology employers.
>
> **Muriel Klemetski**
> Director – Co-op Education, SFU

Experiential learning is part of a formal program, is connected to academic goals, is directed by a learning institution, and emphasizes experience, and results in domain knowledge and skill development. Post-secondary co-op and practical education programs are examples of experiential learning that allow students to gain experience in a workplace setting that is pertinent to their fields of study. This exposure to the workplace enables students to develop and refine the soft skills that tech sector companies have indicated are important. These programs help to reduce ramp up time and to create a smoother transition from the classroom to the office. Students are also able to transfer this experiential learning back into the classroom, thereby providing a vehicle for ensuring that classroom training remains current with technology trends.

Of the top tech-related university disciplines in BC, only two program areas (Engineering & Tech, and Mechanical & Electrical Engineering) had co-op placements with participation rates of over 50% from 2010 to 2014. In Design & Creative Media programs during 2014, only 17% of students participated in co-op placements.

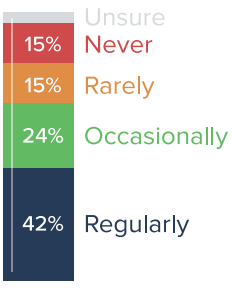
CHART 22

Co-op Participation in STEM Programs at BC's Post-Secondary Institutions



Source: BC HEADset (2015)

Frequency of Hiring Co-op Students

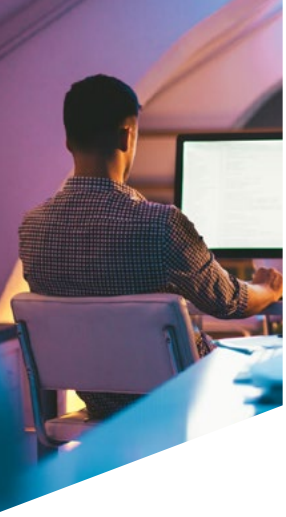


Source: BC Tech LMP Employer Survey (2016)

The success of co-op placements was voiced by co-op directors from 11 post-secondary institutions in BC. These directors indicated that the most effective method by which their graduates secure fulltime employment is through the completion of internships and/or co-op terms during their programs.

Indeed, 62% of students that participated in co-ops secured full-time employment within the first three months of graduation. Co-op directors universally agreed that the more co-op terms their students had, the greater the likelihood of their securing fulltime employment soon after graduation.

Providing students with more co-op opportunities is critical, but cannot be done without commitments from the tech sector to place them in meaningful positions with actual application of their skills. While nearly 70% of BC tech companies hire co-ops, only 42% hire on a regular basis. BC's small tech companies hire students for co-ops less frequently than large companies, in part due to the time and resources required to train co-op participants for what is perceived as only a short duration.



IMMIGRANTS

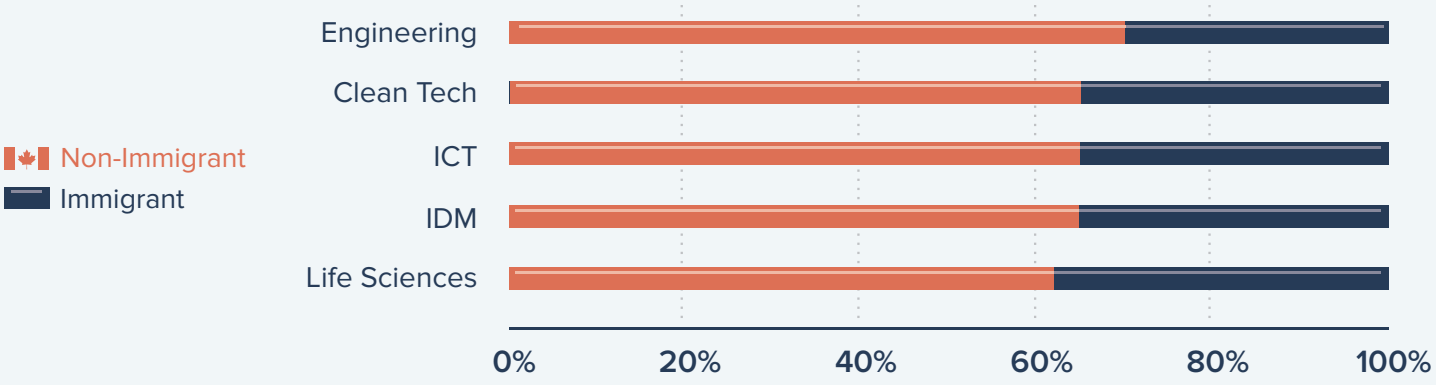
Historically, BC's tech sector has relied on international talent to fill gaps in the local talent pool and meet the needs of industry. Nearly one in three job vacancies at BC's tech companies is filled by an immigrant. These jobs are comprised of about an even split of technical and non-technical roles.

International talent is most often used to fill roles at the mid and senior levels. Filling these roles with qualified talent is critical for competitiveness and company growth. As the tech sector has grown over the past five years, international talent with the requisite experience has been increasingly sought to fill key roles.

Immigrants are hired the most in the Lifesciences subsector[15], where they are mostly frequently employed at mid and senior levels as biologists, scientific researchers, and scientific technical writers. Immigrants also make up a large portion of the professionals in the IDM, ICT and Cleantech subsectors, filling one in four technical roles.

CHART 23

Immigrants vs Non-Immigrants by Subsector in BC

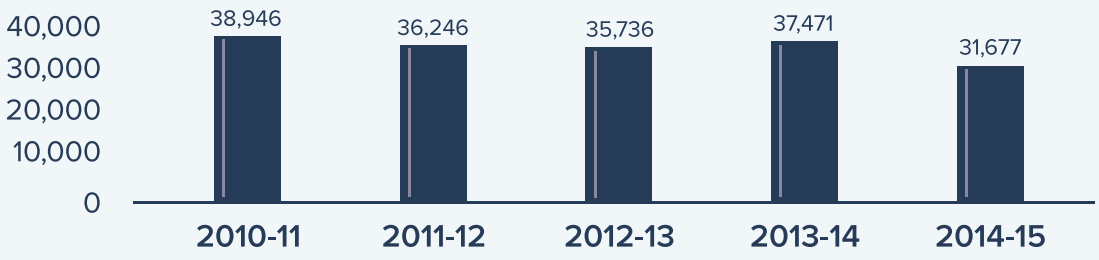


Source: Statistics Canada, Labour Force Survey (July 2016)

Over the last five years, the number of immigrants arriving to BC has trended down, despite the increasing need for qualified foreign talent in BC's tech sector. The current rate of arrival is insufficient to meet the employment demand of the Expanded Growth Scenario. **In order to meet that demand, the BC tech sector would need to source an additional 8,500 immigrants with tech-related skills to the province by 2021.**

CHART 24

Number of Immigrants to BC

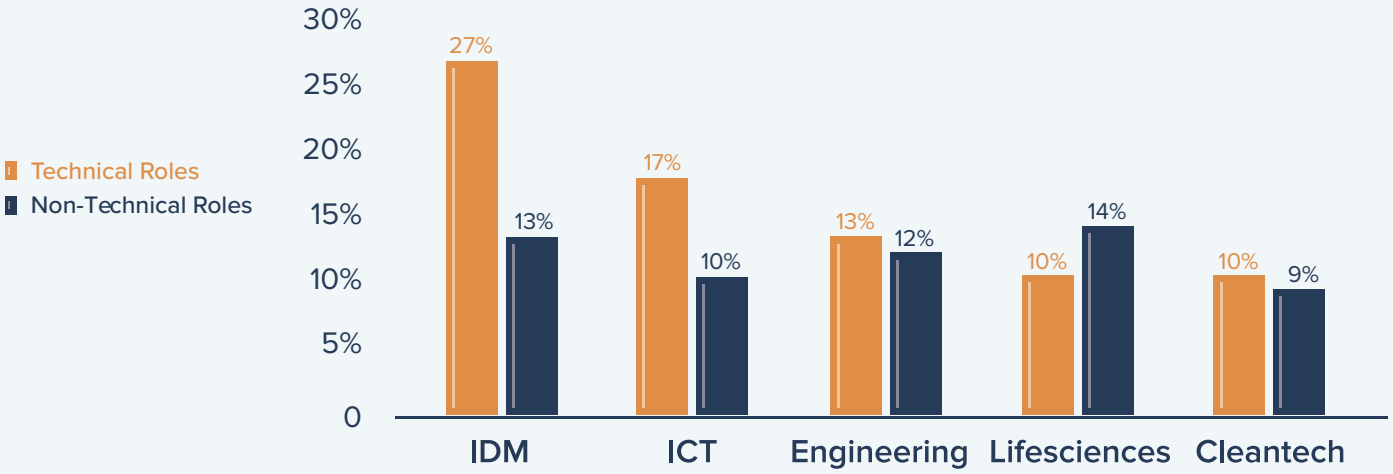


Source: BC Stats, BC Regional District Migration Components (January 2017)

[15] Labour Force Survey, July 2016

CHART 25

Frequency of Sourcing International Talent per Subsector



Source: BC Tech LMP Employer Survey (2016)

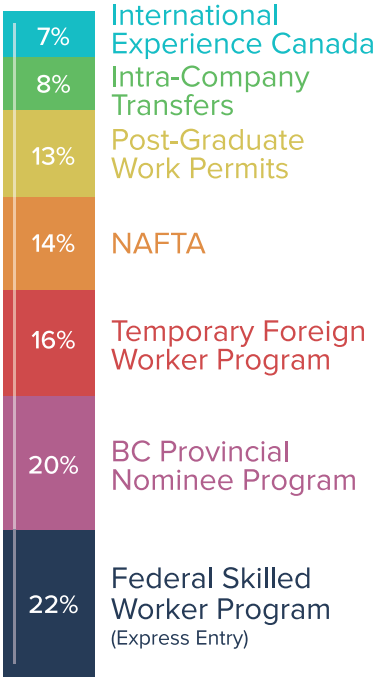
Immigration Channels

There are several pathways employers use when bringing international talent to BC. The top channels used by BC tech employers are Express Entry, the BC Provincial Nomination Program (PNP), and the Temporary Foreign Worker Program (TFWP)[16].

Large companies tend to hire talent from outside of Canada more frequently than small companies do, as the former are better equipped to handle the costs and complexity associated with the process. Small tech companies are often unable to devote the time and financial resources required to fulfill foreign talent pathway requirements.

Changes to Canada's immigration processes made in 2014 have created hurdles for BC tech companies trying to source international talent. These include the requirement to complete a Labour Market Impact Assessment for work permit applications, cumulative duration caps[17], and changes to the points system for qualified applicants. The new application requirements, combined with timelines[18] that range from four months to over a year, have caused confusion and difficulty for those BC tech employers submitting work permit applications. Revisions that streamline immigration pathways would be instrumental in helping BC tech companies source the number of skilled immigrants they require.

Top Immigration Channels in BC's Tech Sector



Source: BC Tech LMP Employer Survey (2016)

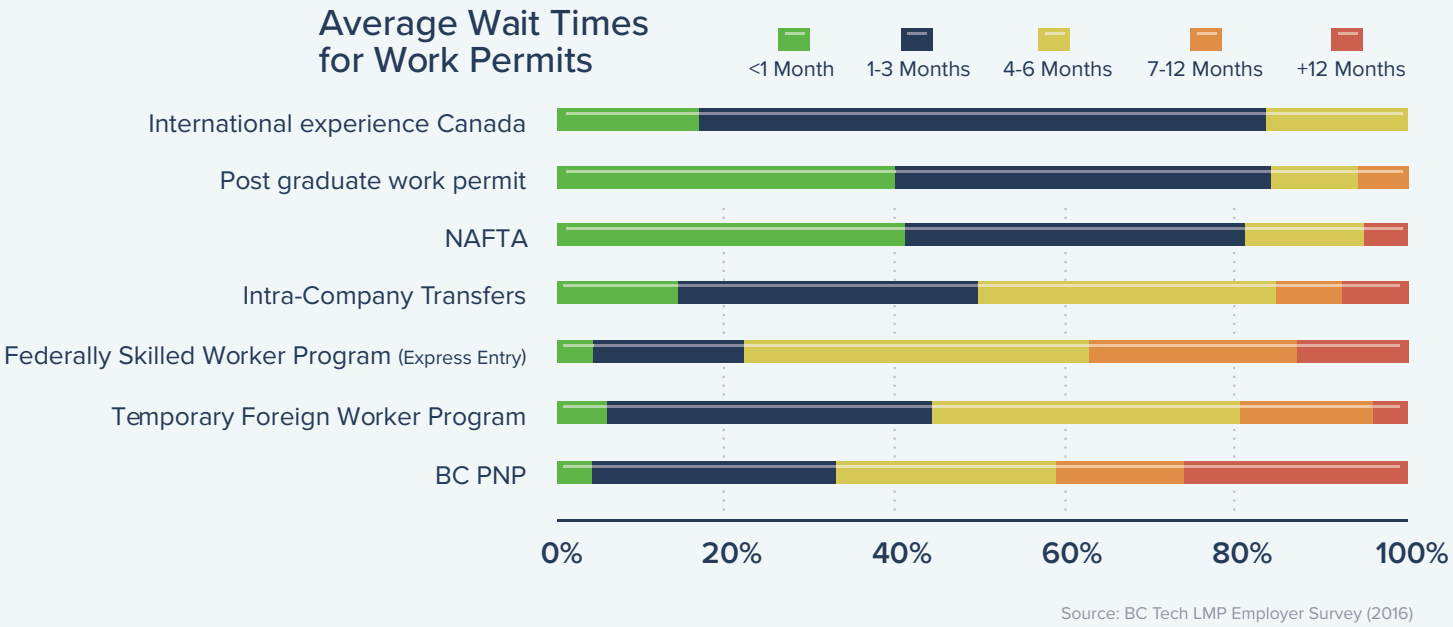
[16] The Temporary Foreign Worker Program was divided into two components in 2014: Temporary Foreign Workers and International Mobility Program, the latter being LMIA exempt. However, as top immigration channels have been derived via survey response, we are unable to determine which component(s) of the TFWP respondents were aware of and/or referencing in their selections.
[17] 4 year limit on the length of time individuals under the Temporary Foreign Work Permit may work in Canada.
[18] Timeline includes the duration of time elapsed from the extension of an offer of employment. to the commencement of work in Canada.

Wait Times and Unclear Instructions

Despite the fact that the ability to quickly source key talent is a top concern for BC's tech employers, the average wait time for work permits is four to six months, and individual cases have taken longer than 12 months.

41% of BC's tech companies have reported waiting over seven months to complete BC PNP, and 35% reported the same for Express Entry.

CHART 26



Source: BC Tech LMP Employer Survey (2016)

A major factor contributing to the lengthy wait times associated with onboarding talent from outside of Canada is the lack of clarity and the inconsistency of application procedures and requirements. Many tech sector employers indicated that work permit application requirements are confusing, and that if they make a mistake in the process, they often have to start all over.

ICTC consulted seven BC-based legal service providers that specialize in immigration law to assess the clarity and consistency of application requirements. The sentiments among these immigration professionals echoed those of BC's tech companies. Approximately 60% of the service providers regarded the application instructions and requirements for top immigration channels such as the Temporary Foreign Worker Program as 'Poor' and 'Very poor'.

According to these legal service providers, the combination of extended timelines, unclear instructions, lack of follow up opportunities, and increased requirements for applications due to the 2014 immigration policy revisions have increased the difficulty of obtaining work permits via BC PNP and TFWP. Taken together, these factors have negatively affected the ability of BC's tech companies to bring international talent into the province.[19]

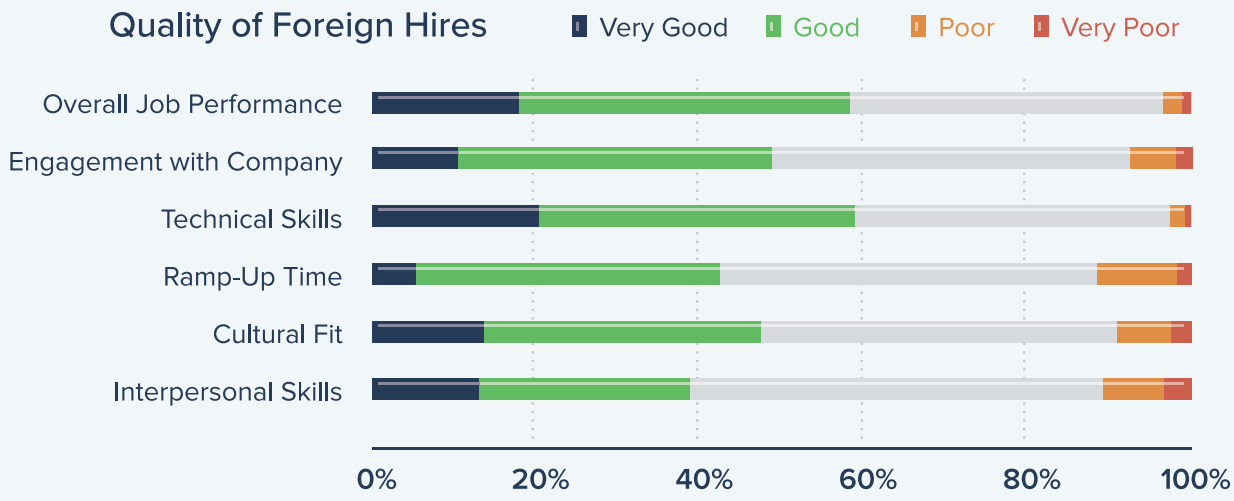
[19] Note that the data presented in this report was collected before the announcement in November 2016 of Federal immigration legislative changes, including the Global Skills work permit, and does not account for the impact the announcement may have made on respondents' sentiments.

Immigration: Job Readiness & Workplace Integration

All candidates, whether sourced locally or internationally, are expected to quickly assume the responsibilities associated with their roles at BC's tech companies.

While immigrants received high ratings for their technical skills and overall job performance from BC tech employers, feedback revealed considerable room for improvement with respect to interpersonal skills, ramp up time, and cultural fit.

CHART 27



Source: BC Tech LMP Employer Survey (2016)

These results may indicate the existence of language and cultural gaps that immigrants encounter when integrating into the Canadian workforce. BC's tech employers would benefit from offering 'soft landing' and integration services, as well as training in interpersonal skills and intercultural communication.

Recruiting and Retaining Talent in BC

The majority of tech companies surveyed indicated that their recruitment efforts would increase in the coming year. As BC's tech sector continues to develop, many employers are struggling to source and retain the key talent needed to grow their businesses. BC's tech sector employers are finding it increasingly difficult to source talent at all experience levels from the local workforce due to a number of challenges.

> To create a vibrant technology ecosystem there is a critical need for additional senior level talent that has pattern recognition of creating world class technology platforms. Top talent with a pattern recognition of what it takes to win is a massive value driver for both the businesses and the ecosystem.
>
> **Jeff Booth**
> President & CEO,
> BuildDirect

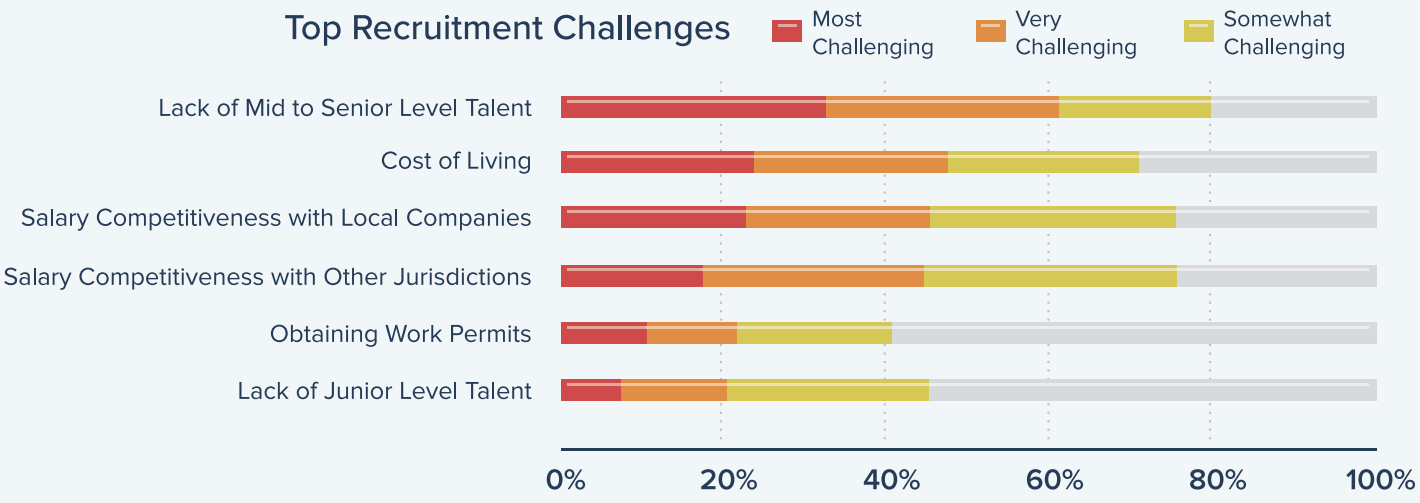
Challenge 1: Lack of Mid and Senior Level Talent

The lack of available mid- and senior level talent was identified as a pressing recruitment challenge for over 60% of BC's tech companies.

While senior level talent makes up only 20% of recruitment efforts, it is by far the most difficult for which to hire. Over half of BC's tech companies indicated challenges hiring at the senior level, whether for technical or non-technical roles. The shortage of senior level talent is most acutely felt among large companies.

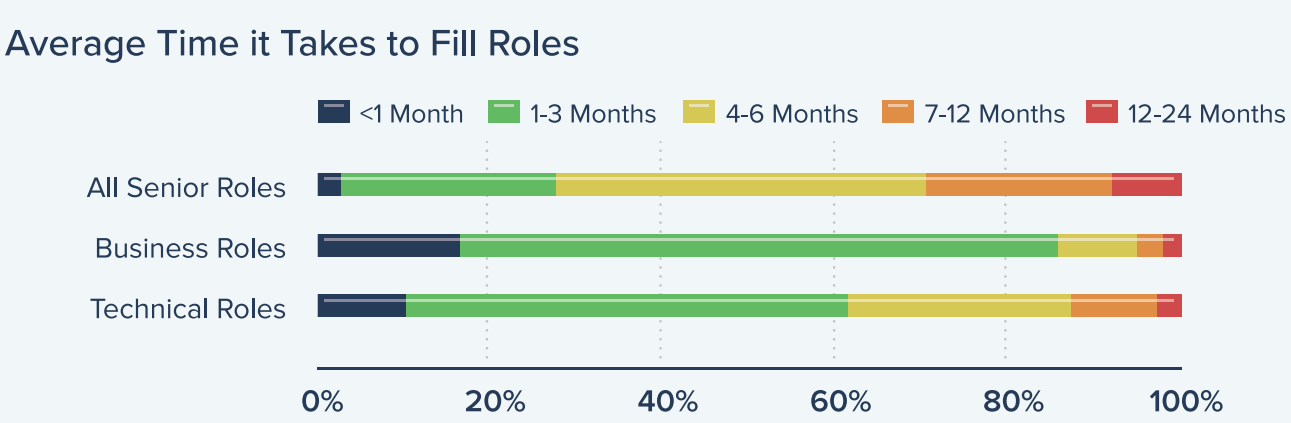
According to responses to the Employer Survey, the average wait time to onboard senior talent, from job offer to work commencement, is four to six months. A fifth of the companies reported recruitment times of seven months or longer.

CHART 28



Source: BC Tech LMP Employer Survey (2016)

CHART 29



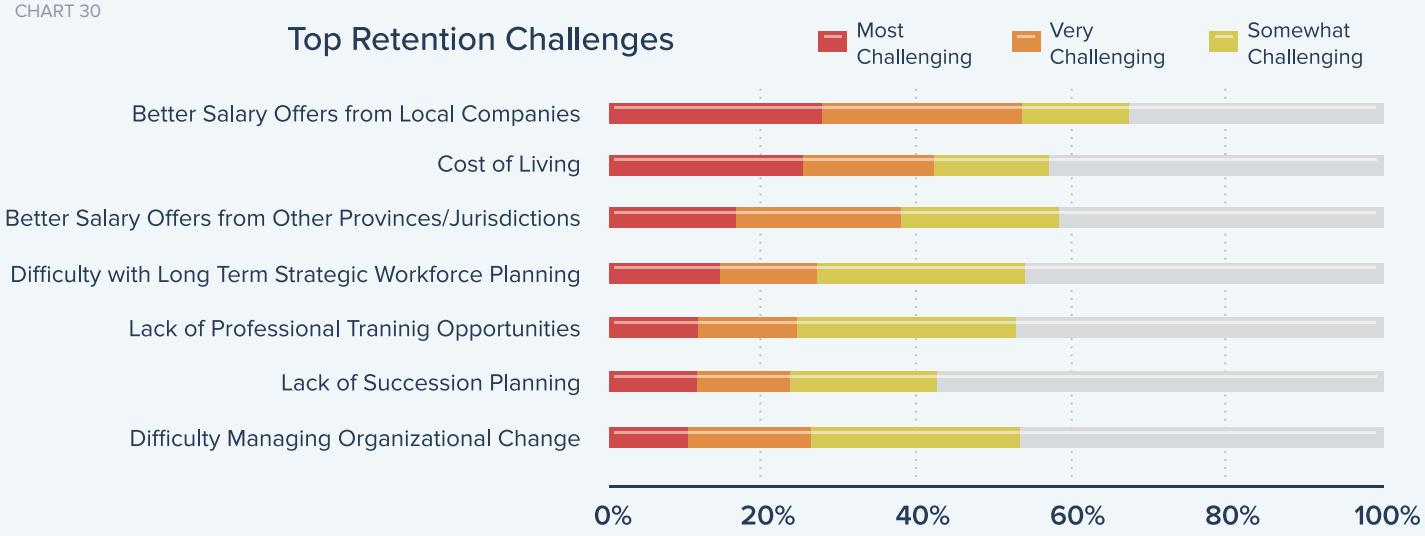
Source: BC Tech LMP Employer Survey (2016)

Challenge 2: Compensation

The Employer Survey revealed that competitive compensation is a crucial recruitment and retention challenge for BC tech sector employers. Based on BC Stats' High Technology Sector Report, wages have increased significantly in the tech sector. Tech wages grew by an annual rate of 5.8% between 2010 and 2014, compared with only 1.8% and 3% annually in Ontario and Quebec's tech sectors respectively. By 2014, tech sector wages were nearly 76% higher than the BC industrial average, which grew at a rate of 2.4% from 2010 to 2014. In 2014, BC's tech sector average weekly wage stood at at $1,580, only behind that of Alberta's tech sector.

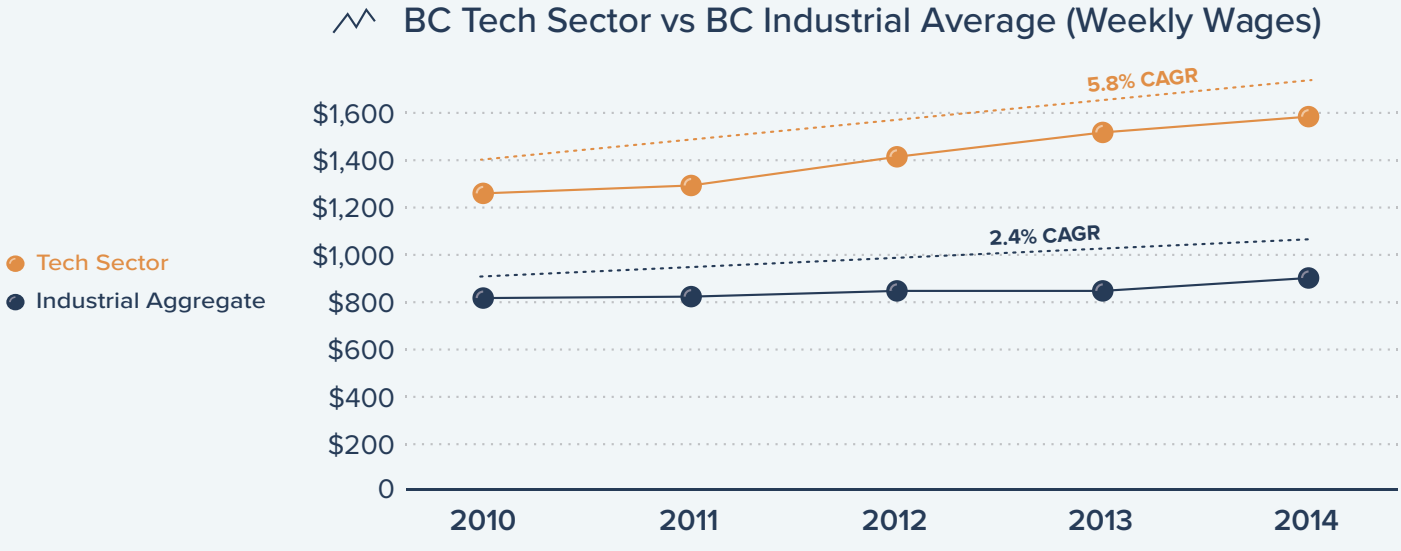
The substantial growth in wages suggests increasing competition for tech talent in the province. The wage competition is felt the most in the Engineering Services sector and the Mainland region. The recent arrival of several new multinational companies, while good for the development of the sector, have contributed to the increase in compensation rates.

CHART 30



Source: BC Tech LMP Employer Survey (2016)

CHART 31

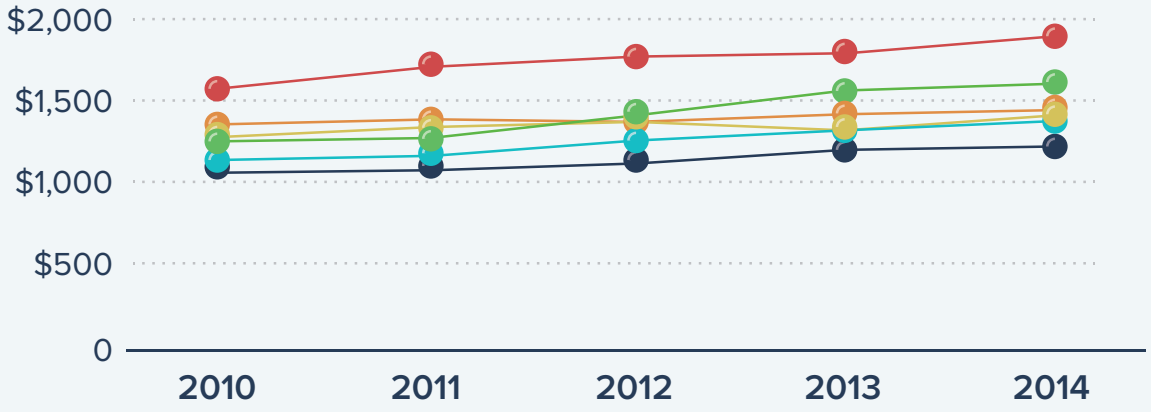


Source: BC Stats, High Technology Report (2015)

CHART 32

Tech Sector Weekly Wages by Province

- British Columbia
- Alberta
- Saskatchewan
- Manitoba
- Ontario
- Quebec



Source: BC Stats, High Technology Report (2015)

Challenge 3: Salary competition from other jurisdictions

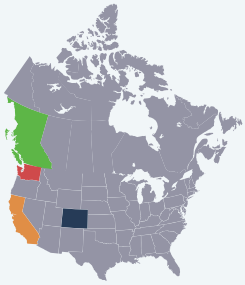
BC's proximity to major tech centers such as Seattle and Silicon Valley, each with significantly higher average weekly wages than BC, has contributed to rapidly rising local salaries.

Even though wage rates in BC have been increasing, there is a significant gap between wages in BC's tech sector and those in other tech-heavy jurisdictions such as California, Washington, and Colorado.

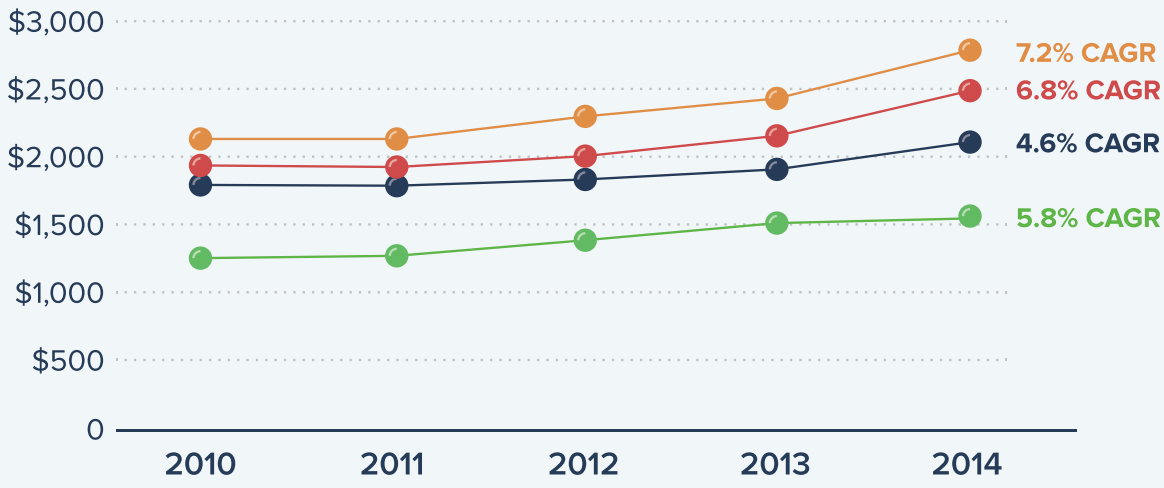
The 2014 average weekly tech wage in California was $2,778, followed by $2,507 in Washington and $2,152 in Colorado – all substantially higher than the average of $1,580 in BC. With compensation becoming of increasing importance in attracting and retaining talent, the competition with other jurisdictions is exacerbating an already challenging talent situation in the province.

CHART 33

Average Weekly Tech Wages by Jurisdiction



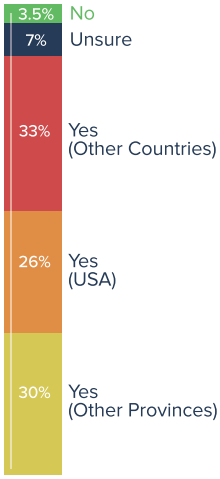
- British Columbia
- Washington
- California
- Colorado



Source: BC Stats, High Technology Report (2015)

CHART 34

"Would you consider leaving BC for employment opportunities?"



Source: BC Tech Student Survey (2016)

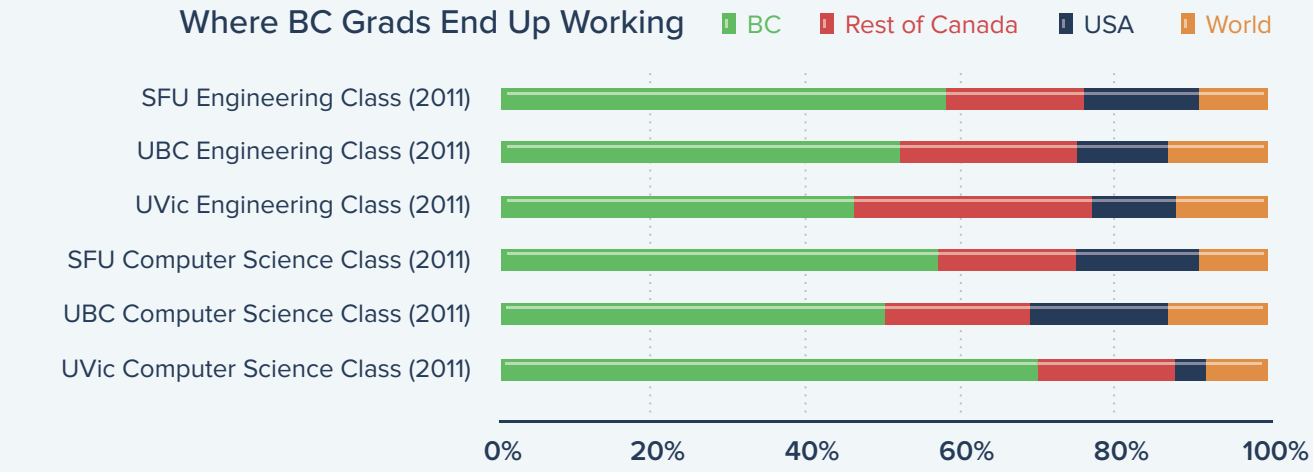
Challenge 4: Tech Talent Brain Drain

Over 90% of BC's students indicated in the BC Tech Student Survey that they would consider leaving the province for a job opportunity, with half of those respondents indicating that they would be willing to leave Canada altogether.

After analyzing the 2011 graduating technology and engineering cohorts from UBC, SFU, and UVIC, we found that approximately 30-50% of each graduating class was working outside of BC or outside of Canada altogether. This coincides with Employer Survey results that suggest the highest retention challenges among mid and senior level employees.

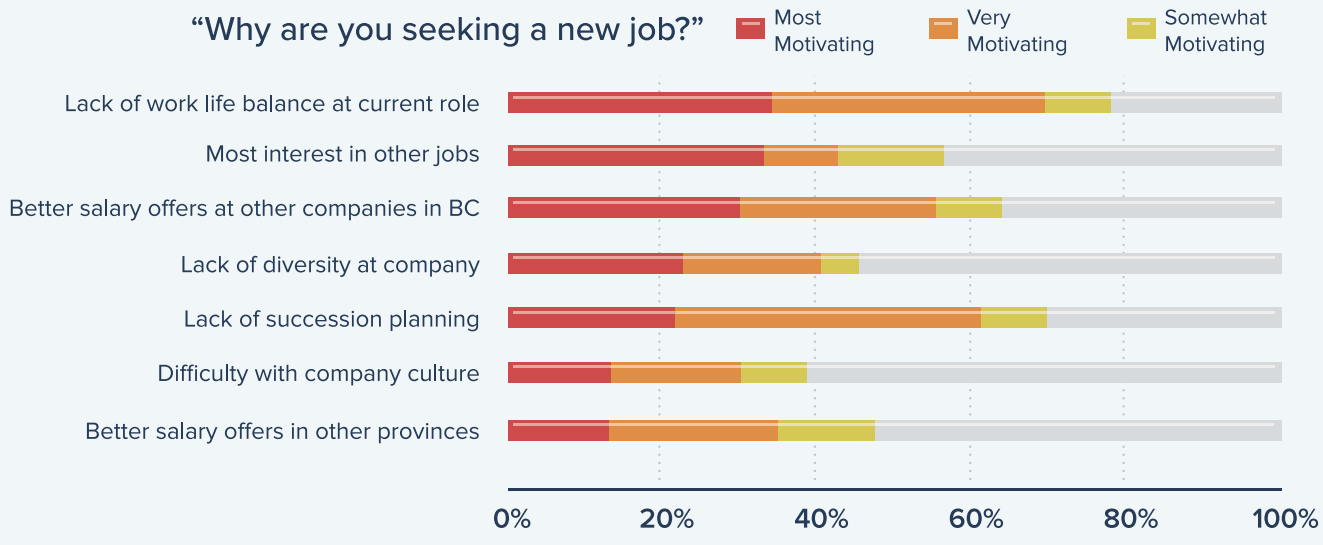
In the BC Tech LMP Job Seekers Survey, nearly 35% indicated that 'Better salary offers in other provinces' was the 'Most motivating' or a 'Very motivating' reason to seek a new job. These findings highlight the importance of developing strategies to retain tech talent in BC. With BC's constrained talent supply and forecasted talent shortage, the province can ill afford to lose the talent it already has.

CHART 35



Source: ICTC LinkedIn Query (2016)

CHART 36



Source: BC Tech Job Seeker Survey (2016)

CAREER TRANSITIONERS AND UNDERREPRESENTED GROUPS

BC will need to invest in sourcing additional tech talent from local supply. In order to reduce the talent shortfall, career transitioners – individuals upgrading their skills in order to transition to the tech sector from other industries – and underrepresented demographic groups must be supported.

Career Transitioners

Career transitioners are individuals who wish to transfer to the tech sector from other sectors. A focus on retraining, upgrading, and upskilling initiatives for local talent can help the BC tech sector expand its available talent pool.

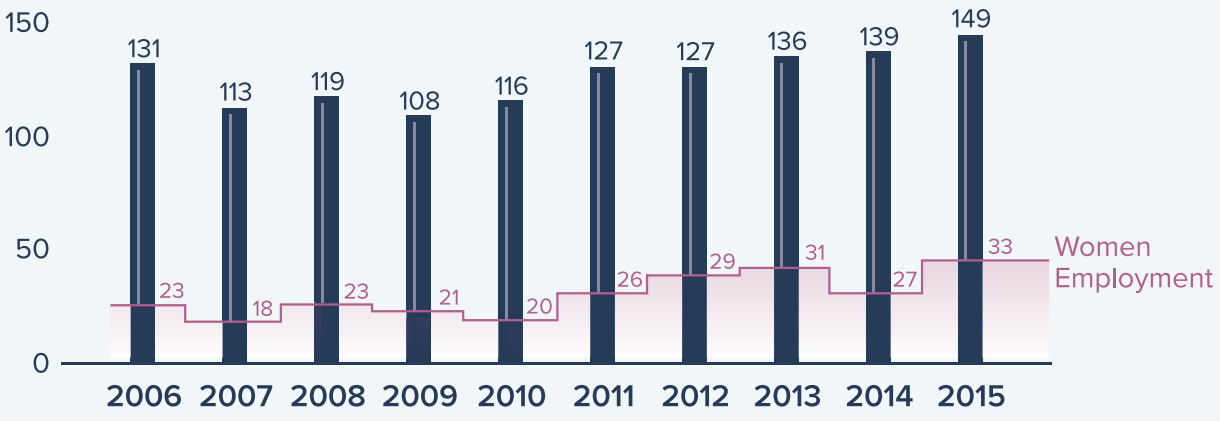
Underrepresented Groups

Women represent 45% of the Canadian labour force, and yet represented only 15-20% of BC's technology labour market in 2015. This representation is also significantly lower than the Canadian average which sees women comprising 25% of the Canadian tech labour market. Based on census data, First Nations aged 18 to 65 represented 2.5% of the population in BC[21], yet according to responses from BC's tech employers, First Nations comprised less than 1% of the workforce, as did individuals with disabilities. While data regarding individuals with disabilities engaged in the labour force is currently not available at the provincial level, according to a national survey completed by Employment and Social Development Canada (ESDC), there were a total of 2,338,200 individuals in Canada who reported some level of disability, 19% of whom were seeking employment and indicated that their disability did not prevent them from working.[22]

This data indicates that there is an opportunity to further engage these groups in tech careers. Engaging these demographic groups, especially at an early age when career planning is done, could expand the tech labour supply, and help to mitigate the impending talent shortage. As an added benefit to companies sourcing from these groups, diverse and inclusive organizations have been found to be more productive, competitive, and innovative.[23]

CHART 37

BC Technology Employment (in thousands)



Source: ICTC Historical Trends for Employment in BC's Tech Sector - Women (2016)

[21] National Household Survey, 2011, Aboriginal Population.
[22] Adele Furrie Consulting (2015). Potential Workers with Disabilities: Who are they and what is their work experience?
[23] ICTC. (2016). Digital Talent Road to 2020 and Beyond: A National Strategy to Develop Canada's Talent in a Global Digital Economy.

CALL TO ACTION

It is clear that there is a growing talent shortfall, and that if no policy changes are made to increase each source of labour supply, nearly 30,500 job openings will go unfilled by 2021. The lost opportunity is not limited to growth in the employment rate, but also to the untold economic benefits and multiplier effects that a combined 30,500 highly skilled tech workers could produce. The tech sector requires deliberate and immediate action by stakeholders to avoid this shortfall.

> We need to get creative about how we meet the growing demand for top-notch tech talent. At SAP, by hiring talent on the autism spectrum, we're focusing on a differently abled, underemployed and highly skilled population to bring the very best to our teams.
>
> **Kirsten Sutton**
> VP & Managing Director, SAP Labs Canada

Drawing on the data and analysis in this report, we have formulated the following recommendations for addressing the BC tech sector's talent shortage and the challenges to each supply source. All stakeholders, including companies, industry associations and councils, government at every level, educators, and individual citizens have a role to play in addressing this shortfall.

Stakeholders must:

Increase the capacity of post-secondary programs to produce additional graduates each year in tech-relevant programs as well as non-tech (e.g. business, communications and arts) programs.

Increase the supply of immigration and foreign workers for senior level and specialized roles.

Increase investment in retraining initiatives, enabling the transition of local non-tech and underrepresented groups of workers to the tech sector.

Increase investment and significantly expand co-op and experiential learning opportunities for all post-secondary and K-12 tech programs. These programs should include components that develop students' interpersonal, communication, and team working skills.

Increase investment in pre- and post-arrival skills development programs for foreign talent.

These programs should focus on providing mentorship and training in management, leadership, business development, communication and other interpersonal skills.

Addressing the talent shortage and demand-supply imbalance is critical for meeting the business needs of BC's tech sector and ensuring continued and sustainable growth in the next five years.

ACKNOWLEDGEMENTS

The BC Tech Association would like to acknowledge the contributions of its partners, the Information & Communications Technology Council of Canada (ICTC) and the Vancouver Economic Commission (VEC) in the creation and development of this report. The BC Tech Association would also like acknowledge the financial support of the Labour Market Partnerships Program at the Ministry of Jobs, Tourism and Skills Training of BC.

Additionally, we would like to thank the following organizations and individuals for their participation and continued support throughout the various stages of this report. Due to the many participants involved in various activities throughout this report, we may have missed a few below. We apologize in advance for any unintentional omissions and sincerely appreciate everyone's assistance and participation in the development of this report.

Accelerate Okanagan

AccelRX

The Accountability Council for Cooperative Education (ACCE)

The Association of Consulting Engineers of BC (ACECBC)

The Association of Technologists & Technicians of BC (ASTTBC)

BC Business Council (BCBC)

BC Cleantech CEO Alliance

BC Co-op Directors

The BC Innovation Council (BCIC)

BCIT Student Association

BCjobs.ca

Blank Slate Partners

Brainstation

Brookfield Institute

Centre for Drug Research and Development (CDRD)

ChatterHigh

Creative BC

The Delphi Group

Dentons LLP

DigiBC

The Ministry of Advanced Education (AVED)

The Ministry of Jobs, Tourism & Skills Training of BC (JTST)

The Ministry of Technology, Innovation and Citizens' Services

Nanaimo Economic Development

New Ventures BC

The Premier's Technology Council

PricewaterhouseCoopers LLP

Red Academy

The Research Universities Council of BC (RUCBC)

Richmond Centre for Disability

She Built That

Society for Canadian Women in Science & Technology (SCWIST)

#Startland

Startup Prince George

Subsector Advisory Groups Members

S.U.C.C.E.S.S

Think Relocation Consulting

University of Victoria Student Society

DIVERSEcity Community Resource Centre

eGurus Technology Tutors

Employment and Social Development Canada (ESDC)

Ernst & Young LLP

Fasken Martineau DuMoulin

First Nations Technology Council

Foresight CAC

Genome BC

HR Tech Group

Immigrant Employment Council of BC (IECBC)

Immigration, Refugees and Citizenship Canada (IRCC)

Immigrant Services Society of BC (ISSBC)

The Industry Training Authority of BC

Innovation Central Society

Innovation Island Tech Association

Ladies Learning Code

Launch Academy

Life Sciences BC

Creative BLife Sciences Institute of UBC

Lighthouse Labs

Kootenay Association of Science & Technology (KAST)

McCrea Immigration Law

Venture Labs

VIATEC

Wavefront

Women in Science & Engineering at UBC Okanagan

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2. BC Tech Labour Market Partnership – Co-op Directors Survey
3. BC Tech Labour Market Partnership – Student Survey
4. BC Tech Labour Market Partnership – Demographic Groups Survey
5. BC Tech Labour Market Partnership – Job Seeker Survey
6. BC Tech Labour Market Partnership – Immigration Support Organizations Survey
7. BC Tech Labour Market Partnership – Immigration Legal Services Providers Survey
8. BC Tech Labour Market Partnership – Workforce Development Organizations Survey
9. BC Tech Labour Market Partnership – HR/Recruitment Firm Survey
10. BC Tech Labour Market Partnership – Subsector Associations Survey
11. BC Tech Labour Market Partnership – Regional Association Survey

This is complemented by:
Five-Subsector Advisory Committee Meetings
Five-Workforce Development Committee Meetings
27 Key Informant Interviews

Secondary Data

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2. BC Stats, "Profile of British Columbia High Technology Sector – 2015 Edition" http://www.bcstats.gov.bc.ca/StatisticsBySubject/BusinessIndustry/HighTechnology.aspx (September 2016)

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APPENDICES

I 32 NOCs – Forecasting Employment: Constrained Growth, Expanded Growth, Unmet Demand

II Sector Definitions Using the North American Industry Classification Codes

III Forecast Methodology

IV Limitations of Research

V Research Assumptions

VI Notable Differences: The BC LMP Forecast, BC LMO Forecast for Science & Technology Occupations, BC Stats High Technology Sector Report

VII Mapping Tech NAICS to Tech NOCS

VIII BC PNP Nominations 2012 to 2015 – For 21 of 32 NOCs

IX 32 NOCs Forecast – Job Titles, Education, Experience Level & Subsectors

X BC Tech LMP Employer Survey - Summary Data

XI Detailed Tables: NOC Breakdown per Year: Constrained Growth, Expanded Growth & Unmet Demand

I. 32 NOCs – Forecasting Employment: Constrained Growth, Expanded Growth, Unmet Demand

NOC	Tech or Non-Tech	Constrained Growth (New jobs by 2021)	Expanded Growth (New jobs by 2021)	Unmet Demand (Unfilled jobs by 2021)
2171 Information systems analysts & consultants	Tech	2,129	6,018	3,888
2174 Computer programmers and interactive media developers	Tech	1,430	4,041	2,611
2281 Computer network technicians	Tech	908	2,565	1,658

NOC	Tech or Non-Tech	Constrained Growth (New jobs by 2021)	Expanded Growth (New jobs by 2021)	Unmet Demand (Unfilled jobs by 2021)
5241 Graphic designers and illustrators	Tech	800	2,262	1,462
0213 Computer and information systems managers	Tech	768	2,170	1,402
2282 User support technicians	Tech	775	2,190	1,415
2131 Civil engineers	Tech	730	2,063	1,333
2132 Mechanical engineers	Tech	683	1,930	1,247
2241 Electrical and electronics engineering technologists and technicians	Tech	655	1,850	1,195
2242 Electronic service technicians (household and business equipment)	Tech	648	1,830	1,183
2133 Electrical and electronics engineers	Tech	614	1,737	1,122
2173 Software engineers and designers	Tech	541	1,530	988
2147 Computer engineers (except software engineers and designers)	Tech	372	1,050	679
2175 Web designers and developers	Tech	330	932	602
2172 Database analysts and data administrators	Tech	216	612	395
0131 Telecommunication carriers managers	Tech	191	540	349
5225 Audio and video recording technicians	Tech	182	514	332
2134 Chemical engineers	Tech	165	467	302
0512 Managers - publishing, motion pictures, broadcasting and performing arts	Tech	156	441	285
2221 Biological technologists and technicians	Tech	150	423	273
5226 Other technical and coordinating occupations in motion pictures, broadcasting and the performing arts	Tech	127	359	232
2243 Industrial instrument technicians and mechanics	Tech	119	336	217
2283 Information systems testing technicians	Tech	105	296	191
5224 Broadcast technicians	Tech	43	121	78
1123 Professional occupations in advertising, marketing and public relations	Non-tech	1,075	3,038	1,963
6221 Technical sales specialists - wholesale trade	Non-tech	946	2,674	1,728
4163 Business development officers and marketing researchers and consultants	Non-tech	709	2,004	1,295
5121 Authors and writers	Non-tech	353	998	645
5122 Editors	Non-tech	253	715	462

NOC	Tech or Non-Tech	Constrained Growth (New jobs by 2021)	Expanded Growth (New jobs by 2021)	Unmet Demand (Unfilled jobs by 2021)
5125 Translators, terminologists and interpreters	Non-tech	245	691	447
0113 Purchasing managers	Non-tech	216	610	394
5227 Support occupations in motion pictures, broadcasting, photography and the performing arts	Non-tech	91	257	166
Total Tech		**12,873**	**36,277**	**23,439**
Total Non-Tech		**3,888**	**10,987**	**7,100**
Total Tech and Non-Tech		**16,725**	**47,264**	**30,539**

II. Sector Definitions Using the North American Industry Classification Codes

For purposes of this report, we have categorized the following subsectors as comprising the main elements of BC's tech sector: Information and Communications Technology (ICT), Life-sciences (LS), Interactive and Digital Media (IDM), Cleantech (CT) and Engineering Services. While ICTC's employment forecast looks at tech employment across the whole economy, the above subsectors were defined using the following North American Industry Classification codes (NAIC). NAICs represent a standardized industry classification system used across Canada, US, and Mexico.

Information and Communications Technology

Information & Communications Technology (ICT), one of the central pillars of the BC tech sector, was originally defined by the Economic Co-operation for Development (OECD) as being comprised of industries primarily engaged in producing goods or services, or supplying technologies used to process, transmit or receive information. Deepening our understanding of the subsector's functional framework, throughout our initial research and consultations with leaders in the industry, we have identified the following North American Industry Classification (NAIC) codes as relevant.

ICT NAICS:

NAICS Code	Industry group
3333	Commercial & Service Industry Mach. Manuf.
3341	Computer & Peripheral Equip. Manuf.
3342	Communications Equip. Manuf.
3343	Audio & Video Equip. Manuf.
3344	Semiconductor & Other Electronic Component Manuf.
3345	Navigational, Medical & Control Instruments Manuf.
4173	Computer & Comm. Equip. & Supplies Wholesale distribution
5112	Software Publishers

5171	Wired Telecommunications Carrier
5172	Wireless Telecommunications Carrier (except satellite)
5174	Satellite Telecommunications
5179	Other Telecommunications
5182	Data Processing, Hosting, and Related Services
5415	Computer Systems Design & Related Serv.
8112	Electronic & Precision Equip. Repair & Maintenance
5191	Other Information Services
7115	Independent Artists, Writers & Performers
5121	Motion Picture & Video Industries
3346	Manufacturing & Reproducing Magnetic & Optical Media
5415	Computer System Design & Related Services

Lifesciences

Lifesciences spans the areas of pharmaceuticals, medical devices, research and testing platforms. Containing elements that cross multiple industry verticals including healthcare and technology, Lifesciences is one of the more inherently difficult subsectors to define on its own. Throughout our research, we have identified the following North American Industry Classification (NAIC) codes, functioning to provide a deeper understanding of the occupational framework spanning Lifesciences companies in BC's tech sector.

Lifesciences NAICS:

NAICS Code	Industry group
3251	Basic chemical manufacturing
3254	Pharmaceutical and medicine manufacturing
3345	Navigational, measuring, medical and control instruments manuf.
3391	Medical equipment and supplies manufacturing
5413	Architectural, engineering and related services
5417	Scientific Research & Development Services
5416	Management, Scientific & Technical Consulting Services
6215	Medical & Diagnostic Laboratories

Interactive and Digital Media

Interactive Digital Media represents a cross-category mix of companies that comprise elements of entertainment and design as well as collaboration among multiple users for the purposes of entertainment, information or education. Commonly delivered through the Internet, mobile networks media storage devices or gaming consoles, the most essential components of IDM are entities creating user experience and designing applications, allowing for distribution of the aforementioned content. Throughout our research, we have identified the following North American Industry Classification (NAIC) codes that correspond with the functionality and framework of the IDM subsector.

IDM NAICS:

NAICS Code	Industry group
3342	Communications equipment manufacturing
5112	Software publishers
5121	Motion picture and video industries
5152	Pay and specialty television
5191	Other information services
5415	Computer systems design and related services
5415	Computer System Design & Related Services
5416	Management, Scientific & Technical Consulting
5112	Software Publishers
5182	Data Processing, Hosting & Related Services

Cleantech

Clean technology or cleantech, crossing multiple industry channels and vocational lines, is primarily defined as industries providing power generation, energy efficiencies, transportation and industrial process that generate green benefits to society and the economy. Throughout our research, we have identified the following North American Industry Classification (NAIC) codes to further elaborate on the functional scope of the subsector.

Cleantech NAICS:

NAICS Code	Industry group
2211	Electric power generation, transmission and distribution
2212	Natural gas distribution
2213	Water, sewage and other systems
2131	Support activities for mining, and oil and gas extraction
5621	Waste collection
5622	Waste treatment and disposal
5629	Remediation and other waste management services
2371	Utility System Construction
3359	Other Electrical Equipment & Component Manufacturing
3344	Semiconductor & Other Electronic Component Manufacturing
3345	Navigational, Measuring, Medical & Control Instruments Manuf.
3333	Commercial & Service Industry Machinery Manufacturing
3251	Basic chemical manufacturing
3323	Architectural and structural manufacturing
3334	Ventilation, heating, air-conditioning and commercial refrigeration equipment manufacturing
3336	Engine, turbine and power transmission equipment manufacturing
3342	Communications equipment manufacturing
3353	Electrical equipment manufacturing
3359	Other electrical equipment and component manufacturing
5413	Architectural, engineering and related services
5415	Computer systems design and related services
5416	Management, scientific and technical consulting services
5417	Scientific research & development services

Engineering Services

The Engineering Services subsector includes companies that provide IT, engineering, design and environmental services to the government, industrial and enterprise markets. Under the definition of Statistics Canada, the engineering subsector is identified as industries primarily engaged in applying the principles of engineering in the design, development and utilization of machines, materials, instruments, structures, processes and systems. Additionally, the definition of the subsector encompasses organizations involved in the provision of advice, feasibility studies, the preparation of plans and designs, the provision of technical services and the inspection and evaluation of projects and related services. Noting this, we have identified the following North American Industry Classification (NAIC) codes, working to provide a more robust understanding of the subsector's functionality.

Engineering NAICS:

NAICS Code	Industry group
3333	Commercial and service industry machinery manufacturing
5413	Architectural, engineering and related services
5416	Management, scientific and technical consulting services
5417	Scientific research and development services
2211	Electric Power Generation, Transmission & Distribution
2212	Natural Gas Distribution
2371	Utility System Construction
4831	Deep Sea, Coastal & Great Lakes Water Transportation
5112	Software Publishers
5414	Specialized Design Services
5621	Waste Collection
5622	Waste Treatment & Disposal
6115	Technical & Trade Schools
8111	Automotive Repair & Maintenance
8112	Electronic & Precision Repair & Maintenance
2213	Water, Sewage & Other Systems
2379	Other Heavy & Civil Engineering Construction
3353	Electrical Equipment Manufacturing
3351	Electric Lighting Manufacturing
4832	Inland Water Transportation
5121	Motion Picture & Video Industries
5414	Specialized Design Services
5416	Magnetic, Scientific & Technical Consulting Services
5629	Remediation & Water Waste Management Services
8113	Commercial & Industrial Machinery & Equipment (except Automotive & Electronic) Repair & Maintenance
2361	Residential Building Construction
5151	Radio & Television Broadcasting
5152	Pay & Specialty Television
5417	Scientific Research & Development Services
5415	Computer Systems Design & Related Services
2362	Non-residential Building Construction
2373	Highway, Street & Bridge Construction

4851	Urban Transit Systems
5171	Wired Telecommunications Carriers
5172	Wired Telecommunications Carriers (except satellite)
5419	Other Professional, Scientific & Technical Services
4852	Interurban & Rural Bus Transportation
5174	Satellite Telecommunications
5179	Other Telecommunications
5182	Data Processing, Hosting & Related Services
5191	Other Information Services

III. Forecast Methodology

For the purposes of forecasting BC's employment growth rate and employment level in the tech sector from 2016-2021, an autoregressive (AR) modelling and average growth rate forecast method has been employed. In statistics, an AR model is a representation of a type of random process, describing certain time-varying processes in nature, economics, etc. In this study, the autoregressive model specifies that the demand of high technology occupations depends linearly on its own previous values extracted from a list of economic indicators affecting employment levels. For this model, 26 variables were used, centered on various factors such as employment and GDP. The data points used in the development of this forecasting model, creating two different projections, for 2016 to 2021 are data from the 2000-2015 Labour Force Survey (LFS), and the 2011 National Household Survey (NHS) data. Data from the BC Tech LMP Employer Survey regarding their expected hiring requirements was also utilized to help predict the future number of vacancies as part of the forecasted demand.

Using the total rate of job vacancies derived from results of the BC Tech LMP Employer Survey and complemented with data from the Labour Force Survey and the National Household Survey, ICTC forecasted the level of expected labour demand in BC's technology sector from 2016-2021 across 32 NOCs. With medium and large companies playing major roles in driving labour demand, ICTC found that 37% of job vacancies are generated by medium-sized technology companies and 36% by large-sized companies[16]. For the purposes of clarity, ICTC defined job vacancies in the following way:

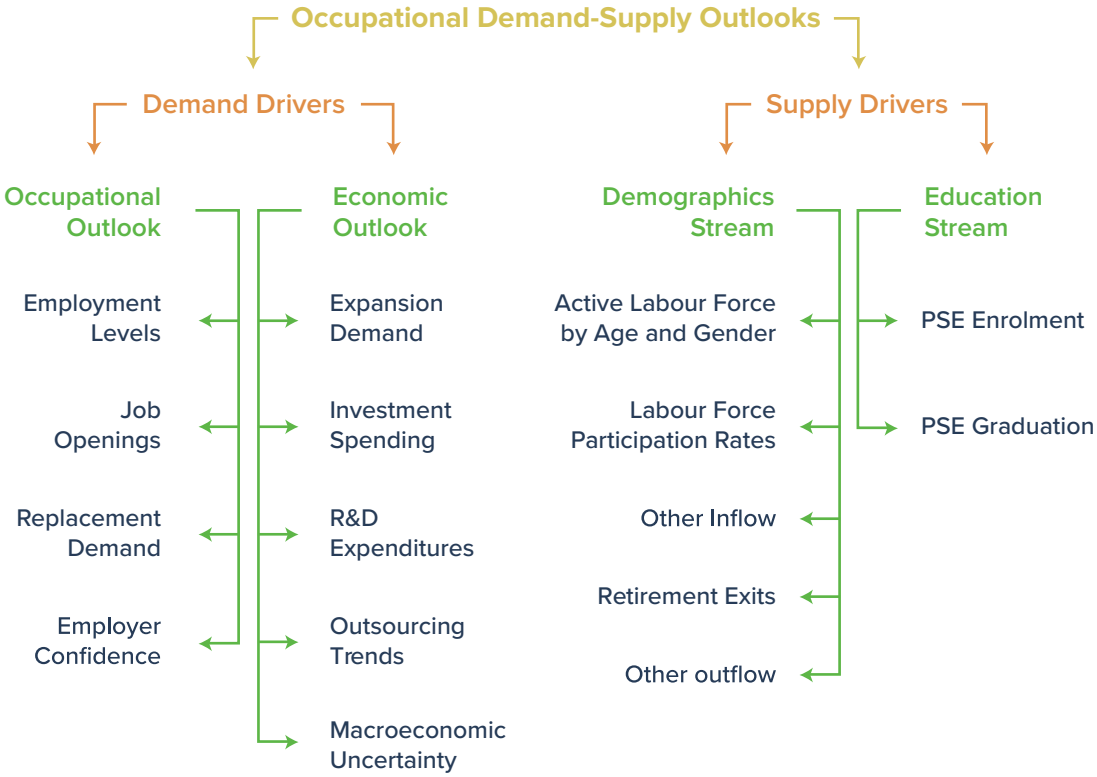
It is vacant on the first day of the month or will become vacant during the month;

There are tasks to be carried out during the month for the job in question; and

The employer is actively seeking a worker outside the organization to fill the job.

Using historical growth trends coupled with our quantitative and qualitative primary research, ICTC forecasted two scenarios to highlight the opportunities for tech employment in BC, based on constrained and expanded labour supply. For further purposes of clarity, ICTC has also outlined supply and demand drivers, impacting the growth of BC's tech sector under both scenarios, characterized in the following way:

[16] BC LMP Employer Survey (June-2016) Question 2 and Question 15
[17] Statistics Canada, Job Vacancy Wage Survey definition



It is important to note that the methodology does not account for the proportion of jobs created as a result of market expansion vs. replacement need for individuals exiting the workforce.

IV. Limitations of Research

There are several limitations of research identified in this over-arching cross-sector report, however, through our extensive research, analysis and working group validation, we have attempted to mitigate these issues where possible.

First, a key limitation is the insufficient data available to confidently forecast employment levels for underrepresented groups such as women, First Nations and people with disabilities. While we have attempted to gather basic data for these groups, the acquisition of consistent historical baseline employment data is difficult to obtain for some, namely First Nations and people with disabilities and overall, is too unreliable to publish. In order to supplement the lack of data, we have collected primary data about the representation rate of these groups through the BC Tech Employer survey. Unfortunately, this data is also insufficient for forecasting as we have no historical baseline, sample size bordered on statistically irrelevant and categorizations for each demographic group are subject to overlap.

Additionally, while we had created and disseminated surveys to job seekers and career transitioners, the response rates we received were too low to be considered statistically relevant, with very few responses speaking specifically to transitioners into tech. As such, while other local talent will be a key supply source in meeting BC's expanded growth scenario, we are currently unable to provide realistic data on average rates of individuals transitioning into tech on an annual basis, or data on how many individuals from underrepresented groups would be interested or capable of transitioning into tech.

Second, another significant limitation of the research surrounds the risks and uncertainties regarding post-secondary tech graduates. Firstly, due to availability of data and consistency with our 32 NOCs representing top jobs within the next 5 years, we have only considered the most recently-available graduation rates from BC's post-secondary institutions in Computer

Science, Technology and Engineering[18]. Moreover, we are unable to account for whether or not post-secondary institutions have the capital and infrastructure to accommodate the expansion of STEM programs. This report did not directly address this issue and more research and analysis would need to be undertaken to understand the situation better. Secondly, we are unable to account for the number of graduates who enter STEM programs but do not graduate, as well as the number of students who graduate from STEM programs but decide to work in other fields or other sectors of the economy. Third, with insufficient evidence, it is difficult to accurately account for leakage of graduates who then leave BC to work in other jurisdictions – we have done so to the best of our ability through the provision of estimates based on data collected from LinkedIn, showcasing the location of workers within their first year of graduation. As a result, it is reasonable to assume that in the expanded growth forecast, roughly 15% of graduates may leave BC within their first year of graduation[19], meaning that our estimate of additional graduates needed per year may be significantly conservative. Lastly, although outreach efforts were conducted, we were unable to secure accurate and reliable graduation records directly from BC's colleges per program, essential to the ability of the report to speak to graduation rates from colleges. As such, the report is limited to providing current (i.e. from 2014) graduation records from BC's universities via BC HEADset and BCIT, with the understanding that graduation rates from said institutions may be subject to change during the 5-year period from 2016-2021.

Third, while the Labour Force Survey is a great indicator of the current state of the Canadian labour market, the sample size of the LFS can be problematic in conducting analysis in smaller regions (i.e. provinces, etc.) and data begins to be suppressed. Whereas, while dated (2011), the National Household Survey is a total count, reliable at the provincial level and data is not suppressed. We have mitigated this limitation by incorporating primary data into the forecasting model and using the National Household Survey to fill any gaps where possible.

In relation to immigration, we are unable to accurately account for the total number of immigrants with tech backgrounds that enter BC on an annual basis. Using LFS and NHS data providing immigrant counts per year, we have been able to estimate that 3-5% of all immigrants entering the province in a given year become employed in tech roles. Of course, this is subject to survey sampling and data inconsistencies in LFS as well as potentially outdated data in NHS. Moreover, we are unable to accurately state how many immigrants enter BC under tech backgrounds, per immigration channel on a given year.

While we have forecasted employment growth according to two scenarios: constrained and expanded growth, we do not currently possess reliable data to properly account for potential leakage of workers or companies to other jurisdictions during the 5-year period, under either scenario. Additionally, we are unable to accurately express future employment need, resultant of replacement of current workers that will exit the workforce during the forecast period. Lastly, we are unable to directly compare historical and forecasted overall employment levels between this report and the BC Stats High Technology 2015 Profile or the BC LMO Forecast for Science & Technology Occupations. This limitation is due to differences in scope and methodology between the reports. For example, this report looks at tech jobs across the entire BC economy whereas the BC Stats High Technology report looks at all types of jobs, but only within a specific grouping of NAICS. Additionally, the number of NOCs used for tech jobs in this report is different in scope than what is used in the BC LMO Forecast for Science & Technology Occupations – 32 vs. 61 – creating differences in scope and slight variations in the overall employment numbers.

[18] Extracted from 2014 graduation records from: UBC, UBC Okanagan, SFU, UNBC, TRU, UVic and BCIT.
[19] Current leakage levels measured through LinkedIn data assessing the location of Engineering & Computer Science graduates from BC's universities within their first year of graduation.

V. Research Assumptions

Throughout the course of our research, we have made the following assumptions where data was either unavailable, incomplete or inappropriate for the purposes of our 5-year employment forecast in BC's tech sector:

1. Based on the most recently-available figures for graduates from BC's undergraduate programs in Computer Science, Tech and Engineering at BC's universities and BCIT, we are assuming that the current rate of graduates from such programs is sufficient to meet the needs of the constrained growth scenario, growing at an annual rate of 1.8%.

2. Faced with the inability to project accurate increases or decreases in the supply of post-secondary graduates, immigrants and other local talent supply, we are assuming that the distribution of labour supply from these three groups will remain constant.

3. Throughout our forecasts, we are assuming that vacancies reflect actual new jobs and as such, in theory it is possible to have no new vacancies in (a) given year(s).

4. With the inability to accurately assess what "type" (i.e. age, educational background, demographic background, etc.) of supply will fill key jobs, we are assuming that none of the incremental supply will retire during the forecast period.

5. We are assuming that the percentage of new graduates leaving BC within their first year of graduation will remain consistent at 15%. Therefore, it is possible that our forecast projecting a need for 2,000 additional graduates per year is a conservative estimate.

VI. Notable Differences: The BC LMP Forecast, BC LMO Forecast for Science & Technology Occupations, BC Stats High Technology Sector Report

While comparable to the BC LMO Forecast for Science & Technology Occupations for 2016-2025 and the BC Stats High Technology Sector Report for 2004-2014, ICTC's employment forecast under the BC LMP differ in the following ways:

Using 32 NOCs derived directly from primary data received through the BC Tech LMP Employer Survey, BC Tech LMP Legal Services Provider Survey, as well as subsector advisory committees, ICTC's forecast projects two growth scenarios for total net new tech employment across the whole economy from 2016-2021. Moreover, ICTC provides an in-depth analysis of both supply conditions and demand requirements within the 3 most-utilized supply pipelines: new entrants (post-secondary graduates), immigrants and other local supply; as well as excess demand under each NOC code by 2021.

This presents a notable difference to the BC LMO Forecast for Technology and Science Occupations which provides one scenario of overall employment growth across the whole economy from 2015-2025, using 61 NOCs categorizing tech, science and some manufacturing occupations. Unlike our forecast, the BC LMO Forecast indicates the portion of jobs that will be generated due to expansion and replacement. The BC LMO Forecast also provides demand by 2025 under each NOC, although for total employment.

Notable differences are also evident between the ICTC two-scenario employment growth forecast and the BC Stats' historical account of employment in the High Technology Sector account from 2004-2014. Aside from providing only a historical perspective, BC Stats tracks all employment (i.e. tech employees, economists, janitors, etc.) in the "tech sector" which is defined by companies that fall under 40 6-digit industry specific NAICS codes. These codes, used to categorize company operations, represent a combination of manufacturing and service industries. As a result, the historical perspective provided by BC Stats is not indicative of employment across the whole BC economy, but rather only total employment under certain industry groupings from 2004-2014.

VII. Mapping Tech NAICS to Tech NOCS

The five technology subsectors– Information & Communications Technology (ICT), Interactive & Digital Media (IDM), Lifesciences (LS), Cleantech (CT), and Engineering Services (ES) – are defined by specific subsets of the North American Industry Classification System (NAICS) for the economic sector they represent. At the same time, the five technology sub-sectors are also represented by the National Occupational Classification (NOC) codes that enable the measurement of the labour force in each sector.

NAICS codes represent a system that defines the operating functionality of a given industry, while NOC codes represent the functionality of specific roles within the overall industry framework. Simply put, NAICS codes define what companies do, whereas NOC codes define what workers do.

Here, we have adopted the hierarchical structure of NAICS codes composed of sectors (two-digit codes), subsectors (three-digit codes) and industry groups (four-digit codes), followed by extensive secondary and primary research, including the use of subsector advisory meetings, all aimed at identifying which NAICS are most reflective of each of the five technology subsectors.

Following this, we have identified the top NOC codes, also gathered from key secondary and primary research, including subsector advisory meetings, the BC Tech LMP Employer Survey and the BC Tech Immigration Legal Services Providers Survey, for the purpose of understanding which NOC codes are not only most often utilized, but most and least reflective of current-day top tech occupations. The relevant NAICS were then mapped to key NOC codes in each subsector, identifying inconsistencies between the description of top occupations in the tech sector and the currently-available NOC codes used by BC's tech companies when recruiting international talent.

The greatest inconsistencies we have seen are among Cleantech companies, where the available NOCs are largely attributable to traditional engineering occupations (2131, civil engineers, being often utilized), with little room for further classification of green technology occupations such as environmental engineers, biomedical engineers, green transport engineers, agricultural scientists, or any combination of traditional engineering with elements of green technological enhancement. Additionally, inconsistencies between available NOC codes were also evident in ICT and IDM, where key occupations include cloud computing engineers, data security analysts (the closest NOC code being 2172, Data analytics, which does not cover cloud technologies or network security), user experience developers (the closest NOC code being 2173, Software Engineers, which does not necessarily encompass aspects of user interface modeling) and visual effects artists (the closest NOC code being 2174, Computer Programmers & Interactive Media Developers).

A more detailed understanding of inconsistencies as well as congruencies between top NAICS and NOC codes per each subsector is provided in the chart below:

Information and Communications Technology

NAICS CODE	NOC CODE
3333 – Commercial & Service Industry Machinery Manufacturing: Focusing on establishments primarily engaged in manufacturing machinery for use in commercial and service industries	2232 – Mechanical Engineering Technologists & Technicians: Provide technical support and services. May work independently in mechanical engineering fields such as the design, development, maintenance and testing of machines, components, tools, heating and ventilating systems, power generation and power conversion plants, manufacturing plants and equipment. They are employed by consulting engineering, manufacturing and processing companies, institutions and government departments.

NAICS CODE	NOC CODE
	2132 – Mechanical Engineers: Research, design and develop machinery and systems for heating, ventilating and air conditioning, power generation, transportation, processing and manufacturing. They also perform duties related to the evaluation, installation, operation and maintenance of mechanical systems. Mechanical engineers are employed by consulting firms, by power-generating utilities companies, and in a wide range of manufacturing, processing and transportation industries, or they may be self-employed.

Reason for Mapping: NAICS 3333, representing companies that are engaged in machinery manufacturing is best mapped to NOC 2232, representing technologists & technicians that are primarily engaged in the development, testing and maintenance of machines. NOC 2132 is also allocable to NAICS 3333, as it represents engineering occupations which also design and develop machinery. Moreover, these NOCS are representative of engineers and technicians operating within ICT companies which are part of the service industry in BC.
Inconsistencies: While NAICS 3333 is intended to represent establishments focused on a machinery manufacturing (which do not tend to encompass the functionality of the majority of ICT companies), ICT jobs represented by NOCs 2232 and 2132 include mechanical engineering technicians, and mechanical engineers. The NOCs available to describe these roles are largely reflective of the requirements of these roles. As such, we have found few inconsistencies evident in this mapping.

NAICS CODE	NOC CODE
3341 – Computer & Peripheral Equipment Manufacturing: Comprises establishments primarily engaged in manufacturing computers and computer peripheral equipment. Including: digital computers or essential components designed for use with computers (i.e. keyboards, storage devices, printers, etc.).	2141 – Industrial and Manufacturing Engineers: Conduct studies, and develop and supervise programs to achieve the best use of equipment, human resources, technology, materials and procedures to enhance efficiency and productivity.

Reason for Mapping: NAICS 3341, primarily comprising companies that manufacture computers or computer parts was mapped to NOC 2141, representing engineers that manufacture materials that enhance productivity.
Inconsistencies: The majority of ICT companies do not manufacture computers themselves, but may manufacture parts of peripheral services (including apps) that are intended to be used with computers. NAIC 3341 is best aligned with companies that create apps meant to be used on computers, although possesses a gap as it only addresses companies that create physical products, rather than software applications. NOC 2141 is best aligned with NAIC 3341, representing manufacturing engineers, focusing on the development of efficiency-enhancing services rather than the manual manufacturing of physical products.

3342- Communications Equipment Manufacturing: Establishments primarily engaged in manufacturing equipment used to move signals electronically over wires or through the air, such as telephone apparatus, radio and television broadcast equipment, and satellite communications equipment.	9523: Electronics Assemblers, Fabricators, Inspectors & Testers: Assemble and fabricate electronic equipment, parts and components. Electronics inspectors and testers inspect and test electronic and electromechanical assemblies, subassemblies, parts and components to ensure conformance to prescribed standards. They are employed in electronics manufacturing plants. 2244: Aircraft instrument, electrical and avionics mechanics, technicians and inspectors: Mechanics and technicians who install, adjust, repair and overhaul aircraft instrument, electrical or avionics systems on aircraft. This unit group also includes avionics inspectors who inspect instrument, electrical and avionics systems following assembly, modification, repair or overhaul. Workers in this unit group are employed by aircraft manufacturing, maintenance, repair and overhaul establishments and by airlines and other aircraft operators.

Reason for Mapping: 3342 represents ICT companies that manufacture appliances intended to be used with technical software – for example, companies that manufacture roaming SIM cards, carrying signals electronically, through wire or air. This was mapped to 9523, representing occupations like circuit board assemblers and testers and 2244, representing aircraft electricians and technicians, who test and repair physical products manufactured by 3342 companies.
Inconsistencies: While some ICT companies create physical products (i.e. roaming chips), the majority do not create equipment, but rather intangible software. Moreover, 9523 and 2244 specify that those workers are employed by manufacturing plants, airlines or aircraft operators, which is not necessarily always the case.

NAICS CODE	NOC CODE
4173 – Computer & Communications Equipment & Supplies Wholesale Distribution: Comprises establishments primarily engaged in wholesaling new and used computers, computer peripherals and pre-packaged computer software.	6221 – Technical sales specialist, wholesale trade: Sell a range of technical goods and services, such as scientific, agricultural and industrial products, electricity, telecommunications services and computer services, to governments and to commercial and industrial establishments in domestic and international localities. They are employed by establishments that produce or provide technical goods and services, such as pharmaceutical companies, industrial equipment manufacturing companies, grain elevators, computer services firms, engineering firms and hydroelectric companies, or they may be self-employed technical sales specialists/agents who contract their services to other companies.

Reason for Mapping: 4173 is used to reflect ICT companies that have advanced to the stage of selling their products, both physical and intangible, such as software. “Pre-packaged” software is problematic in that the majority of software produced by ICT companies today are not physically delivered, but rather downloadable online. 4173 is mapped to 6221, representing sales specialists that sell said computer services produced by 4173 companies.
Inconsistencies: The majority of ICT companies do not create physically-administrable software packages, but rather offer these packages for download online. Moreover, while 6221 indicates that these specialists can be employed in computer companies, the rage of products that said specialists can sell is not exhaustive enough, leaving out current-day products that provide network/data security, augmented reality, gaming or technical applications for traditional industries (i.e. healthcare, business, etc.). Moreover, 6221 focuses only on the actual selling portion of such roles, but does not include sales specialists who work on business development strategy, rather than actual day-to-day sales.

NAICS CODE	NOC CODE
5112 – Software Publishers: Comprises establishments primarily engaged in publishing computer software, usually for multiple clients and generally referred to as packaged software. These establishments carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation and providing support services to software purchasers. They may design and publish, or publish only.	2173: Software Engineers/designers: Research, design, evaluate, integrate and maintain software applications, technical environments, operating systems, embedded software, information warehouses and telecommunications software.

Reason for Mapping: 5112 is representative of the large majority of ICT companies, focusing on designing and/or publishing software and software packages. This NAIC has been linked to 2173, representing top occupations such as software developers and software engineers, comprising a large portion of occupations within the ICT subsector.
Inconsistencies: 5112 notes that ICT companies in this category assist in installing and provide support services to software publishers, however, where ICT companies may provide support services on an ad hoc basis, they do not necessarily assist in installing the product. Rather, products are most frequently downloaded online by the user and installed directly by the user’s computer and/or device. 2173 is representative of top occupations in 5112 companies such as software engineers, however is not inclusive of software engineers that work on user experience applications, network security, data warehousing or cloud computing applications.

NAICS CODE	NOC CODE
Satellite Telecommunications: Comprises establishments primarily engaged in providing mobile and fixed telecommunications services over satellite network facilities operated by them or by distributing the services of other satellite network operators.	2174: Computer programmers and interactive media developers: Write, modify, integrate and test computer code for microcomputer and mainframe software applications, data processing applications, operating systems-level software and communications software. Interactive media developers write, modify, integrate and test computer code for Internet applications, computer-based training software, computer games, film, video and other interactive media.

Reason for Mapping: 5174, representing ICT companies that provide satellite telecommunications (i.e. cell phone networks, etc.) services has been mapped to 2174, where individuals employed in such companies provide the coding and testing necessary to provide these products.
Inconsistencies: While some services offered via the internet is receivable through satellite, 5174 does not also include telecommunications services which are derived via fiber optics and cable. Moreover, 2174 only encompasses employees writing and testing code for internet or computer applications (including games, film and software) but does not include web developers and programmers who write and test code for applications that are used on phones, tablets or other devices.

NAICS CODE	NOC CODE
5191 – Other information Services: Establishments, not classified to any other industry, primarily engaged in providing other information services. The main components are news syndicates, libraries and archives, Internet publishing and broadcasting, and web search portals.	1123: Professional occupations in advertising, marketing & public relations: Includes specialists in advertising, marketing and public relations who analyses, develop and implement communication and promotion strategies and information programs, analyses advertising needs and develop appropriate advertising and marketing plans, publicize activities and events, and maintain media relations on behalf of businesses, governments and other organizations, and for performers, athletes, writers and other talented individuals.

Reason for Mapping: 5191 encompasses ICT companies that provide information & communications services, but are not expressly classifiable in other industries – i.e. online newspapers, blogs, social media etc. This has been mapped to 1123, representing top jobs such as information service coordinators, providing advertising and/or sales services within an online platform.
Inconsistencies: 5191 companies are not expressly reliant only on marketing and advertising specialists as highlighted in 1123. Moreover 1123 occupations focus on advertising via media relations, however most social media websites focus on advertising via social networks and community platforms, rather than traditional media outlets.

NAICS CODE	NOC CODE
5415 – Computer System Design & Related Service: Establishments primarily engaged in providing expertise in the field of information technologies through one or more activities, such as writing, modifying, testing and supporting software to meet the needs of a particular customer, including the creation of Internet home pages; planning and designing computer systems that integrate hardware, software and communication technologies; on-site management and operation of clients' computer and data processing facilities; providing advice in the field of information technologies; and other professional and technical computer-related services.	2147: Computer/network systems engineers: Research, plan, design, develop, modify, evaluate and integrate computer and telecommunications hardware and related equipment, and information and communication system networks including mainframe systems, local and wide area networks, fiber-optic networks, wireless communication networks, intranets, the Internet and other data communications systems. 2174: Computer programmers & interactive media developers: Write, modify, integrate and test computer code for microcomputer and mainframe software applications, data processing applications, operating systems-level software and communications software. Interactive media developers write, modify, integrate and test computer code for Internet applications, computer-based training software, computer games, film, video and other interactive media.

Reason for Mapping: 5415 is an all-inclusive code, attributable to the majority of ICT companies operating in one or more capacities, including consulting firms and sole proprietors. 5415 is linked to 2147 and 2174, representing workers engaged in coding and development of software or services that 5415 companies can provide to clients.
Inconsistencies: 5415 companies, in providing consulting services, may rely on project management and/or business development staff or tech consultants who are more focused on providing strategy and industry-specific advice, rather than the development of software and media.

NAICS CODE	NOC CODE
5182: Data Processing, Hosting & Related Services: This industry group comprises establishments primarily engaged in providing the infrastructure for data processing, hosting (web hosting & video streaming), and related services.	2172: Data analytics/database architects/administrators: Design, develop and administer data management solutions using database management software. Data administrators develop and implement data administration policy, standards and models.

Reason for Mapping: 5182, including companies providing online web hosting and streaming capabilities is mapped to 2172, representing workers with the ability to use software for hosting or database management purposes.
Inconsistencies: 5182 is not reflective of companies who are engaged in hosting via cloud technology (i.e. not web hosting or data streaming). Moreover, 2172 excludes top occupations like web designers and developers, which are often utilized to create cloud-based applications in companies that fall under 5182.

Interactive and Digital Media

NAICS CODE	NOC CODE
3342: Communications equipment manufacturing: Establishments primarily engaged in manufacturing equipment used to move signals electronically over wires or through the air, such as telephone apparatus, radio and television broadcast equipment, and satellite communications equipment.	2233: Industrial engineering & manufacturing technologists & technicians: Provide technical support and services in the development of production methods, facilities and systems, and the planning, estimating, measuring and scheduling of work.

Reason for Mapping: 5415 is an all-inclusive code, attributable to the majority of ICT companies operating in one or more c3342 represents IDM companies that manufacture equipment used in radio and television broadcasting. This has been mapped to 2233, representing top occupations providing secondary services in the IDM sector, such as communications technologists and electrical engineering technicians.
Inconsistencies: The majority of IDM companies do not necessarily manufacture equipment used in radio and TV broadcasting, but use and/or enhance that equipment. Additionally, 3342 does not include equipment used for film, gaming or visual effects – all major components of the IDM subsector. 2233 is widely encompassing of occupations providing technical and support services assisting the development and planning of work within the IDM subsector, such as technologists.

NAICS CODE	NOC CODE
5121: Motion Picture & Video Industries: Establishments primarily engaged in producing and/or distributing motion pictures, videos, television programs or commercials; exhibiting motion pictures or providing post-production and related services.	5131: Producers, directors, choreographers and related occupations: Producers, directors, choreographers and others who oversee and control the technical and artistic aspects of film, television, radio, dance and theatre productions. 5227: Support occupations in motion pictures, broadcasting, photography and performing arts: Workers who perform support duties related to broadcasting and to the production of motion pictures and the performing arts.

Reason for Mapping: 5121 represents IDM companies that provide entertainment services, including film, tv and video. This has been mapped to support occupations like artists and cyber choreographers, represented by 5231 and 5227.
Inconsistencies: 5121 denotes establishments providing broadcasting and distribution services for video, although videos are no longer being produced. Additionally, 5121 does not mention the production of videos/films for DVD or online streaming. 5131 and 5227 are largely widely encompassing of support services for 5121 companies, but do not specifically mention special effects designers and producers, a central component of most film and tv programs today.

NAICS CODE	NOC CODE
5415: Computer System Design & Related Services: Establishments primarily engaged in providing expertise in the field of information technologies through one or more activities, such as writing, modifying, testing and supporting software to meet the needs of a particular customer, including the creation of Internet home pages; planning and designing computer systems that integrate hardware, software and communication technologies; on-site management and operation of clients' computer and data processing facilities; providing advice in the field of information technologies; and other professional and technical computer-related services.	2174: Computer programmers and interactive media developers: Computer programmers write, modify, integrate and test computer code for microcomputer and mainframe software applications, data processing applications, operating systems-level software and communications software. Interactive media developers write, modify, integrate and test computer code for Internet applications, computer-based training software, computer games, film, video and other interactive media.

Reason for Mapping: See ICT subsector.
Inconsistencies: 5415 does not reflect IDM companies, including motion picture and entertainment that provide visual effects services. Moreover 2174 does not embody media developers that are not specifically engaged in coding of computer software, but are prevalent within the IDM subsector, such as: storyboard artists, VFX designers, lighting technicians, animators, etc.

Lifesciences

NAICS CODE	NOC CODE
3251: Basic chemical manufacturing: Comprises establishments primarily engaged in manufacturing chemicals, using basic processes such as thermal cracking and distillation.	2134: Chemical engineers: Research, design, and develop chemical processes and equipment, oversee the operation and maintenance of industrial chemical, plastics, pharmaceutical, resource, pulp and paper, and food processing plants and perform duties related to chemical quality control, environmental protection and biochemical or biotechnical engineering.

Reason for Mapping: 3251, representing establishments engaged in chemical manufacturing activities, which are prevalent in the Lifesciences subsector, namely for companies that are pharma-based. 3251 was mapped to 2134, chemical engineers.
Inconsistencies: 3251 and 2134 do not adequately represent both companies and workers who cross chemical and biological spheres, such as biochemical engineers.

NAICS CODE	NOC CODE
5417: Scientific Research & Development Services: Establishments primarily engaged in conducting original investigation, undertaken on a systematic basis to gain new knowledge (research), and in the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes (experimental development).	2221: Biological technologists & technicians: Provide technical support and services to scientists, engineers and other professionals working in fields such as agriculture, resource management, environmental protection, plant and animal biology, microbiology, cell and molecular biology and health sciences, or may work independently in these fields. 2121: Biologists & related services: Conduct basic and applied research to extend knowledge of living organisms, to manage natural resources, and to develop new practices and products related to medicine and agriculture.

Reason for Mapping: 5417 companies are well represented by the Lifesciences subsector in BC, comprising elements of scientific research and early-stage development. The majority of Lifesciences companies are small and micro, focused on initial research activities and product development. 5417 was mapped to 2221, including technicians providing support services to an array of companies (including biological, agricultural, health sciences). 5417 was also mapped to 2121, representing workers conducting research on biological organisms.
Inconsistencies: The mapping of 5417 to 2221 and 2121 is among the most consistent, across all subsectors. 5417 includes research that lends to the creation of improved practices or processing, leaving room for technological advancement within such companies. 2221 acts as the technical element of biological and health sciences research, combining scientific aspects of early stage development with technological advancements.

NAICS CODE	NOC CODE
6215: Medical & Diagnostic Laboratories: Establishments primarily engaged in providing analytic or diagnostic services. These services are generally provided to the medical profession, or to the patient on referral from a health practitioner.	2221: Biologists & related services: Conduct basic and applied research to extend knowledge of living organisms, to manage natural resources, and to develop new practices and products related to medicine and agriculture.

Reason for Mapping: 6215 encompasses Lifesciences companies operating in early-stage research, such as biological and medical labs. 6215 was mapped to 2221, relating to lab researchers and scientific examiners.
Inconsistencies: 6251 and 2221 offer few inconsistencies between company functions and occupational structure. However, 6251 does not include biotech labs that combine analytical services with biological attributes, improved with technological advancements.

Engineering Services

NAICS CODE	NOC CODE
5416: Management, scientific & technical consulting services: Comprises establishments primarily engaged in providing expert advice and assistance to other organizations on management, environmental, scientific and technical issues.	0212: Architecture & science managers: Plan, organize, direct, control and evaluate the activities of an architecture, landscape architecture, scientific or statistical department, service or firm. 2112: Chemists: Conduct research and analysis in support of industrial operations, product and process development, quality control, environmental control, medical diagnosis and treatment, biotechnology, nanotechnology and other applications. They also conduct theoretical, experimental and applied research into basic chemical and biochemical processes to create or synthesize new products and processes.

Reason for Mapping: 5416 represents engineering companies that provide consulting services to other organizations. 5416 has been mapped to 0212, managers in architecture and science managers providing high-level consulting services of an engineering nature. 2112 represents top occupations including biochemical research scientists, focusing on providing research services in the biological and chemical fields.
Inconsistencies: N/A.

NAICS CODE	NOC CODE
2211: Electrical Power Generation, Transmission & Distribution: Establishments primarily engaged in the generation of bulk electric power, transmission from generating facilities to distribution centers, and/or distribution to end users.	2241: Electrical & electronics engineering technologists & technicians: Provide technical support and services in the design, development, testing, production and operation of electrical and electronic equipment and systems.

Reason for Mapping: 2211 represents engineering companies engaged in electric power transmission and 2241 has been mapped this NAIC code, representing workers who provide technical support services in a variety of areas, including design, development and testing of electrical systems.
Inconsistencies: N/A.

NAICS CODE	NOC CODE
2212: Natural gas distribution: Establishments primarily engaged in the distribution of natural or synthetic gas to the ultimate consumers through a system of mains.	2231: Civil engineering technologists & technicians: Provide technical support and services to scientists, engineers and other professionals, or may work independently in fields such as structural engineering, municipal engineering, construction design and supervision, highways and transportation engineering, water resources engineering, geotechnical engineering and environmental protection.

Reason for Mapping: Reason for mapping: 2212 has been mapped to 2231, representing technologists & technicians working with water resources, geotechnical engineering & environmental protection, matching top occupations including soil technologists & civil engineering technologists.
Inconsistencies: 2212 does not represent engineering companies that are producing natural gas and natural gas products, instead representing only companies who are distributing such products. Moreover, 2231 does not specifically highlight technologists & technicians that work on producing products and/or innovations related to natural gas.

NAICS CODE	NOC CODE
5414: Specialized design services: Comprises establishments primarily engaged in providing specialized design services, except architectural, engineering and computer systems design.	2231: Civil engineering technologists & technicians: Provide technical support and services to scientists, engineers and other professionals, or may work independently in fields such as structural engineering, municipal engineering, construction design and supervision, highways and transportation engineering, water resources engineering, geotechnical engineering and environmental protection.

Reason for Mapping: 5414 represents companies that are engaged in providing structural and civil engineering services and 2231, civil engineering technologists & technicians has been mapped to it. 2231 represents top occupations including bridge design technicians and civil engineering technologists & technicians that provide structural and engineering services, but are not architects or engineers.
Inconsistencies: N/A

NAICS CODE	NOC CODE
5629: Remediation & water waste management services: Establishments, not classified to any other industry group, primarily engaged in waste management activities, such as the remediation and clean-up of contaminated sites, the operation of material recovery facilities, and the cleaning of septic tanks.	2131: Civil engineers: Plan, design, develop and manage projects for the construction or repair of buildings, earth structures, powerhouses, roads, airports, railways, rapid transit facilities, bridges, tunnels, canals, dams, ports and coastal installations and systems related to highway and transportation services, water distribution and sanitation. Civil engineers may also specialize in foundation analysis, building and structural inspection, surveying, geomatics and municipal planning. 2231: Civil engineering technologists & technicians: Provide technical support and services to scientists, engineers and other professionals, or may work independently in fields such as structural engineering, municipal engineering, construction design and supervision, highways and transportation engineering, water resources engineering, geotechnical engineering and environmental protection.

Reason for Mapping: 5629 represents engineering companies that are engaged in providing remediation services to waste and water management challenges. 2131 and 2231 have been mapped to this code, representing workers – both engineers and technologists & technicians – with backgrounds in water resources engineering, geotechnical engineering and environmental protection, associated with top occupations including: construction engineer, municipal engineer, hydraulics engineer.
Inconsistencies: 5629 does not encompass companies that are engaged in water treatment and waste management, as proactive measures for societal improvement, i.e. desalination services, waste recycling services, water purification, etc.

NAICS CODE	NOC CODE
5415: Computer Systems Design & Related Services: Establishments primarily engaged in providing expertise in the field of information technologies through one or more activities, such as writing, modifying, testing and supporting software to meet the needs of a particular customer, including the creation of Internet home pages; planning and designing computer systems that integrate hardware, software and communication technologies; on-site management and operation of clients' computer and data processing facilities; providing advice in the field of information technologies; and other professional and technical computer-related services.	2147: Computer engineers (except software engineers & designers): Research, plan, design, develop, modify, evaluate and integrate computer and telecommunications hardware and related equipment, and information and communication system networks including mainframe systems, local and wide area networks, fibre-optic networks, wireless communication networks, intranets, the Internet and other data communications systems. 2281: Computer network technicians: Establish, operate, maintain and co-ordinate the use of local and wide area networks (LANs and WANs), mainframe networks, hardware, software and related computer equipment. They set up and maintain Internet and intranet Web sites and Web-server hardware and software, and monitor and optimize network connectivity and performance. 2283: Information systems testing technicians: Execute test plans to evaluate the performance of software applications and information and telecommunications systems.

Reason for Mapping: While 5415 represents software companies specifically, more often found in the ICT subsector, 5415 also represents Engineering companies with a focus on creating and testing engineering-related software and/or comprise, in large part, of software-development services. 2147, 2281 and 2283 have been mapped to 5415, matching top occupations including: backend developers, LAN technicians, application testers and software testers.
Inconsistencies: N/A

NAICS CODE	NOC CODE
4851: Urban transit systems: Establishments primarily engaged in operating local and suburban mass passenger transit systems. Such transportation may involve the use of one or more modes of transport including light rail, subways and streetcars, as well as buses.	2231: Civil engineering technologists & technicians: Provide technical support and services to scientists, engineers and other professionals, or may work independently in fields such as structural engineering, municipal engineering, construction design and supervision, highways and transportation engineering, water resources engineering, geotechnical engineering and environmental protection. 2131: Civil engineers: Plan, design, develop and manage projects for the construction or repair of buildings, earth structures, powerhouses, roads, airports, railways, rapid transit facilities, bridges, tunnels, canals, dams, ports and coastal installations and systems related to highway and transportation services, water distribution and sanitation.

Reason for Mapping: 4851 represents engineering companies that assist in operating local mass transit systems. 2231 and 2131 are mapped to 4851, representing civil engineering and technologists that provide technical services towards the maintenance and improvement of mass transit.
Inconsistencies: 4851 only represents engineering companies that operate available mass transit systems, not necessarily companies that provide consulting and/or structural services for transit systems/companies for the purpose of design and technological improvement.

Cleantech

NAICS CODE	NOC CODE
2211: Electric power generation, transmission & distribution: Establishments primarily engaged in the generation of bulk electric power, transmission from generating facilities to distribution centres, and/or distribution to end users.	2131: Civil engineering: Plan, design, develop and manage projects for the construction or repair of buildings, earth structures, powerhouses, roads, airports, railways, rapid transit facilities, bridges, tunnels, canals, dams, ports and coastal installations and systems related to highway and transportation services, water distribution and sanitation. Civil engineers may also specialize in foundation analysis, building and structural inspection, surveying, geomatics and municipal planning. 2133: Electrical and electronics engineering: Design, plan, research, evaluate and test electrical and electronic equipment and systems.

Reason for Mapping: 2211 represent – typically engineering – companies that are engaged in the provision and distribution of electrical power generation. 2131 and 2133 have been mapped to 2211, matching top occupations including: test engineers, electrical engineers, design engineers, control systems engineers.
Inconsistencies: N/A

NAICS CODE	NOC CODE
2131: Support activities for mining and oil & gas extraction: Establishments primarily engaged in providing support services, on a contract or fee basis, for the mining and quarrying of minerals and for the extraction of oil and gas. Establishments engaged in the exploration for minerals, other than oil or gas, are included. Exploration includes traditional prospecting methods, such as taking ore samples and making geological observations at prospective sites.	2131: Civil engineers: Plan, design, develop and manage projects for the construction or repair of buildings, earth structures, powerhouses, roads, airports, railways, rapid transit facilities, bridges, tunnels, canals, dams, ports and coastal installations and systems related to highway and transportation services, water distribution and sanitation. Civil engineers may also specialize in foundation analysis, building and structural inspection, surveying, geomatics and municipal planning.

Reason for Mapping: 2131 represents companies engaged in traditional oil and gas extraction and mining. This has been mapped to 2131, representing occupations such as environmental engineers, geomatics engineers, and geodetic engineers.
Inconsistencies: 2131 does not represent prevalent but relatively new oil extraction methods, including hydraulic fracking. Moreover, 2131 does not include engineers that are engaged in environmentally-sustainable practices, which are often the basis of occupations like environmental and geomatics engineers.

NAICS CODE	NOC CODE
5622: Waste treatment & disposal: Establishments primarily engaged in operating land fill sites, incinerators, or other treatment or disposal facilities for non-hazardous or hazardous waste. Establishments that integrate the collection, treatment and disposal of waste are also included.	2131: Civil engineers: See above.

Reason for Mapping: 5622 represents cleantech companies that provide waste treatment services and has been mapped to 2131, civil engineers, matching construction engineers, environmental engineers.
Inconsistencies: 2131 does not necessarily encompass occupations such as environmental engineers, providing waste treatment and innovation services. Moreover, 5622 does not represent companies who provide innovative services to waste treatment and disposal challenges.

NAICS CODE	NOC CODE
3344: Semiconductor & Other Electronic Component Manufacturing: Establishments primarily engaged in manufacturing semiconductors and other electronic components.	2133: Electrical & electronics engineering: Design, plan, research, evaluate and test electrical and electronic equipment and systems.

Reason for Mapping: 3344 represents cleantech companies engaged in semiconductor manufacturing and manufacturing, which has been mapped to 2133 representing engineers who design electrical and electronic equipment, matching occupations like planning engineers and control engineers.
Inconsistencies: 3344 represents companies that manufacture semiconductors and electrical equipment, though not necessarily companies that undergo research and development services for the use of semiconductors.

NAICS CODE	NOC CODE
3345: Navigational, measuring, medical & control instruments manufacturing: Establishments primarily engaged in manufacturing navigational, measuring, medical and controlling devices.	2148: Other professional engineers, n.e.c.: Agricultural and bio-resource engineers, biomedical engineers, engineering physicists and engineering scientists, marine and naval engineers, textile engineers and other specialized engineering occupations which are not classified elsewhere.

Reason for Mapping: 3345 has been mapped to 2148, matching top occupations including agricultural engineers, bio-resource engineers, biomedical engineers and engineering physicists.
Inconsistencies: 3345 only represents companies manufacturing medical & navigational devices, not necessarily companies creating biotechnical innovations and/or developments using engineering technical skills.

NAICS CODE	NOC CODE
5416: Management, scientific & technical services consulting: Establishments primarily engaged in providing expert advice and assistance to other organizations on management, environmental, scientific and technical issues.	0212: Architecture & science managers: Plan, organize, direct, control and evaluate the activities of an architecture, landscape architecture, scientific or statistical department, service or firm.

Reason for Mapping: 5416, representing cleantech companies providing scientific, environmental and technical consulting services and has been mapped to 0212, representing workers who, though planning, and evaluation, provide consulting services with specialization in scientific and architectural development. 0212 matches top occupations in 5416 companies including, research and development managers.
Inconsistencies: N/A

NAICS CODE

5417: Scientific research & development services: Primarily engaged in conducting original investigation, undertaken on a systematic basis to gain new knowledge (research), and in the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes (experimental development).

NOC CODE

2112: Chemists: Conduct research and analysis in support of industrial operations, product and process development, quality control, environmental control, medical diagnosis and treatment, biotechnology, nanotechnology and other applications. They also conduct theoretical, experimental and applied research into basic chemical and biochemical processes to create or synthesize new products and processes.

Reason for Mapping: 5417, representing companies engaged primarily in early-stage scientific research has been mapped to 2112, chemists matching top occupation profiles including research scientists and biochemists.
Inconsistencies: 2112 comprises a necessary element of chemical-related research activities and does not include cleantech researchers with a basis in physics, statistical analysis, psychology and/or social sciences.

VIII. BC PNP Nominations 2012 to 2015 for 21 of 32 NOCs

NOC	GROUP	2012	2013	2014	2015	TOTAL
2131	Engineering	81	35	18	17	**151**
2132	Engineering	52	14	14	16	**96**
2134	Engineering	2	1	3	0	**6**
2241	Engineering	41	7	5	10	**63**
2282	Engineering	11	12	16	23	**62**
2283	Engineering	2	3	5	7	**17**
2133	ICT	53	23	9	26	**111**
0213	ICT	17	23	15	12	**67**
2171	ICT	36	30	20	29	**115**
2173	ICT	46	39	39	60	**184**
2174	ICT	66	40	39	57	**202**
2175	ICT	22	21	16	27	**86**
6221	ICT	22	21	16	27	**86**
2281	ICT	63	11	8	21	**103**
4163	ICT	25	13	17	26	**81**
5227	IDM	1	1	1	2	**5**
5241	IDM	40	28	30	42	**140**
2221	Lifesciences	4	3	8	12	**27**
5121	Lifesciences	4	3	8	12	**27**
5226	Other	1	3	5	2	**11**
2172	ICT	8	7	3	14	**32**
TOTAL		**597**	**338**	**295**	442	**1,672**

IX. 32 NOCs Forecast – Job Titles, Education, Experience Level & Subsectors

Tech Jobs

NOC	TECH or NONTECH	JOB TITLES	EDUCATION	EXPERIENCE LEVEL	SUBSECTORS
2171 Information systems analysts & consultants	Tech	Security System Engineer, Business Systems Analyst, Technical Support Analyst, .Net Developer, Database Administrator	University: Bachelor degree in Computer Science, Software Engineering (4 years); College: Diploma in Computer Science, Software Development (2-3 years); Other: Certificate in Web Development (3-12 months)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2174 Computer programmers and interactive media developers	Tech	Programmer, Software developer, Front End Developer, Back End Developer, Data Analyst, UI Designer, Web Developer	University: Bachelor degree in Computer Science, Software Engineering (4 years); College: Diploma in Computer Science, Software Development (2-3 years); Other: Certificate in Web Development (3-12 months); No PSE	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2281 Computer network technicians	Tech	Network technician, Q&A Analyst, Network Analyst	College: Computer & Engineering Technician certificate, Computer Network Electronics Technician certificate, Computer Systems Technician certificate (1 year)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
5241 Graphic designers and illustrators	Tech	Graphic Designers, 3D Graphic Designer, Animator, UX & UI Artist Designer, VFX artist, industrial designers	University: Bachelor degree in Graphic Design, Interactive Media, Animation (4 years); College: Diploma in Graphic Design, Interactive Media Design (2-3 years); Certificate: Interactive Media Design, Graphic Design (3 – 12 months)	Entry to mid	ICT, IDM

0213 Computer and information systems managers	Tech	Electronic Data Processing Manager, Computer Systems Manager	University: Bachelor degree in Computer Science, Information Science, Management Information Systems (4 years); College: Diploma in Computer Science	Mid and senior	ICT, IDM, Engineering, Lifesciences, Cleantech
2282 User support technicians	Tech	Network technician, Q&A Analyst, Network Analyst	College: Certificate in Computer & Engineering Technician, Computer Network Electronics Technician Computer Systems Technician (1 year)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2131 Civil engineers	Tech	Civil Engineer, Structural Engineer, Project Engineer, Engineering Consultant	University: Bachelor degree in Civil Engineering, Mechanical Engineering, Engineering – General (4 years)	Entry to mid	Engineering, Cleantech
2132 Mechanical engineers	Tech	Mechanical Engineer, Project Engineer, Design Engineer	University: Bachelor in Mechanical Engineering, BA in Engineering – General (4 years)	Entry to mid	Engineering, Cleantech
2241 Electrical and electronics engineering technologists and technicians	Tech	Electrical Technician, Semiconductor Technician, Controls Technician	College: certificate in Electrical Technician/ Technologist (1 year)	Entry to mid	Engineering, Cleantech
2242 Electronic service technicians (household and business equipment)	Tech	Electrical Service Technician, Service Technician, Repair Technician	College: certificate in Electrical Technician/ Technologist (1 year)	Entry to mid	Engineering, Cleantech
2133 Electrical and electronics engineers	Tech	Electrical Engineer, Electronics Engineer, Embedded Electronics Engineer, Component Engineer, Design Engineer	University: Bachelor in Electrical Engineering, Mechanical Engineering, Engineering – General (4 years)	Entry to mid	Engineering, Cleantech

2173 Software engineers and designers	Tech	Software Engineer, Software developer, UX Designer, Graphic Designer, Design Engineer, Interface Designer, Cloud developer	University: Bachelor in Computer Science, Software Engineering (4 years)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2147 Computer engineers (except software engineers and designers)	Tech	Computer Engineer, UI Programmer, Full stack developer	University: Bachelor in Computer Science, Software Engineering, Interactive Design (4 years)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2175 Web designers and developers	Tech	Web developer, Web designer, Digital designer, Front end digital designer	University: Bachelor in Computer Science, Software Engineering, Design (4 years); College: diploma in Computer Science, Design (1-3 years); Other: certificate in web development (3-12 months)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
2172 Database analysts and data administrators	Tech	Database Administrator, Data Analyst, Basis Administrator	University: Bachelor in Computer Science, Software Engineering (4 years); College: diploma in Computer Science (2-3 years); Other: certificate in web development, iOS development (3-12 months)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
0131 Telecommunication carriers managers	Tech	Telecoms Manager, Communications Manager	University: Bachelor in Communications, Marketing (4 years); College: diploma in Communications, Marketing, Public Relations (2-3 years)	Mid and senior	ICT, IDM, Engineering, Lifesciences, Cleantech

5225 Audio and video recording technicians	Tech	Audio/video technicians, film technician	College: certificate in Broadcasting technologist/Technician (1 year)	Entry to mid	IDM
2134 Chemical engineers	Tech	Chemical Engineer, Research Engineer, Environmental Engineer, Natural Gas Engineer, Process Engineer	University: Bachelor in Chemical Engineering, Engineering – General (4 years)	Entry to mid	Engineering, Cleantech, Lifesciences
0512 Managers - publishing, motion pictures, broadcasting and performing arts	Tech	Studio Manager, Studio Director, Account Executive, Executive Producer	University: Bachelor in Film, Motion Picture Arts, Design (4 years); College: diploma in Digital Media (2-3 years)	Mid and senior	IDM
2221 Biological technologists and technicians	Tech	Biological technician, Lab Technician, Research Technician	College: certificate in Biological Technician/ Technologist (1 year)	Entry to mid	Engineering, Cleantech
5226 Other technical and coordinating occupations in motion pictures, broadcasting and the performing arts	Tech	Lighting Assistant, Audio/Video assistant, producer	University: Bachelor in Film, Motion Picture Arts (4 years); College: diploma in Digital Media (1-3 years	Mid and senior	IDM
2243 Industrial instrument echnicians and mechanics	Tech	Industrial Technician, Industrial Mechanic	College: certificate in Industrial Technologist/technician (1 year)	Mid and senior	Engineering, Cleantech
2283 Information systems testing technicians	Tech	Information & Logistics Support Technician, Building Systems Technician, Alarm Technician	College: certificate in Electrical Technician/ Technologist (1 year)	Mid and senior	ICT, IDM, Engineering, Lifesciences, Cleantech
5224 Broadcast technicians	Tech	Broadcast technician, Audio/visual technician	College: diploma in Broadcasting technologist/Technician (1 year)	Mid and senior	IDM

Non-Tech Jobs

NOC	TECH or NONTECH	JOB TITLES	EDUCATION	EXPERIENCE LEVEL	SUBSECTORS
1123 Professional occupations in advertising, marketing and public relations	Non-tech	Account Executive, Public Relations Officer, Marketing Officer	University: Bachelor degree in Marketing, Public Relations, Communications , Business (4 years); College: Diploma in Business, Communications, Marketing (2-3 years); Other: Certificate in Marketing, Communications (1 year)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
6221 Technical sales specialists - wholesale trade	Non-tech	Sales Specialist, Sales, Technical Product Specialist, Product & Marketing Specialist, Business Development Specialist	University: Bachelor degree in Business Administration, Economics, Communications, Accounting (4 years); College: Diploma in Business, Accounting, Communications & Sales (2-3 years)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
4163 Business development officers and marketing researchers and consultants	Non-tech	Business development officer, Marketing officer, Sales executive, Account Executive, Business development consultant	University: Bachelor in Business, Finance, Communications, Accounting, Marketing & Public Relations (4 years); College: diploma in Marketing, Business, Finance, Accounting (2-3 years)	Entry to mid	ICT, IDM, Engineering, Lifesciences, Cleantech
5121 Authors and writers	Non-tech	Technical writer, Scientific Writer	University: Bachelor in English, BA in Technical Writing (4 years); College: diploma/ certificate in technical writing (1-2 years)	Entry to mid	Engineering, Lifesciences
5122 Editors	Non-tech	Technical Manual Editor, Content Editor	University: Bachelor in English, BA in Technical Writing (4 years); College: diploma/ certificate in technical writing (1-2 years)	Entry to mid	Engineering, Lifesciences

5125 Translators, terminologists and interpreters	Non-tech	Technical Translator	University: Bachelor in Translation & Interpreting; combination BA of Language Arts (4 years)	Entry to mid	Lifesciences
0113 Purchasing managers	Non-tech	Purchasing Manager, Procurement Manager	University: Bachelor in Finance, Economics, Business, Accounting (4 years); College: Diploma in Finance/ Accounting, Business (2-3 years)	Mid and senior	ICT, IDM, Engineering, Lifesciences, Cleantech
5227 Support occupations in motion pictures, broadcasting, photography and the performing arts	Non-tech	Marketing Assistant, Event Coordinator, PR Assistant	Varies depending on support role	Entry to mid	IDM

X. BC Tech LMP Employer Survey - Summary Data

1. What is your company's primary area of focus?If your company has multiple areas of focus, please check all that apply.

Answer Options	Response Percent	Response Count
Information and Communications Technology	34.6%	111
Interactive and Digital Media	17.4%	56
Engineering Services	43.3%	139
Life Sciences	7.8%	25
Clean Technology	10.6%	34
Other (please specify)		131

Answered Question 321 Skipped Question 105

2. What is your company size?

Answer Options	Response Percent	Response Count
Micro (Less than 10 employees)	28.9%	121
Small (Between 10 and 49 employees)	21.1%	88
Medium (Between 50 and 499 employees)	31.3%	131
Large (500 employees or more)	18.7%	78

Answered Question 418 Skipped Question 8

3. In which region are the majority of your company employees located?

Answer Options	Response Percent	Response Count
Vancouver Island/Coast (e.g Victoria, Nanaimo)	19.0%	74
Mainland/Southwest (e.g.Greater Vancouver, Chilliwack, Hope)	63.0%	245
Thompson/Okanagan (e.g. Kamloops, Kelowna)	8.0%	31
Kootenay (e.g. Golden, Nelson, Gastlegar, Cranbrook)	4.4%	17
Cariboo (e.g. Lillooet, Williams Lake, Prince George)	1.8%	7
North Coast and Nechako (e.g. Prince Rupert, Kitimat, Smithers)	1.5%	6
Northeast (e.g. Fort St. John, Dawson Creek)	2.3%	9
Other (please specify)		48

Answered Question 418 Skipped Question 8

4. What has been your company's revenue growth in the past year?
Please check the appropriate range and note the exact number if available.

Answer Options	Response Percent	Response Count
Less than 5%	23.0%	93
5 to 10%	16.1%	65
11 to 20%	11.1%	45
21 to 50%	8.4%	34
More than 50%	10.6%	43
Don't know	30.7%	124
Please specify exact number, if available:		37

Answered Question 404 Skipped Question 22

5. What has been your company's revenue growth in the past 3 years?
Please check the appropriate range and note the exact number if available.

Answer Options	Response Percent	Response Count
Less than 5%	14.6%	59
5 to 10%	17.1%	69
11 to 20%	12.7%	51
21 to 50%	9.9%	40
More than 50%	13.6%	55
Don't know	32.0%	129
Please specify exact number, if available:		31

Answered Question 403 Skipped Question 23

6. What do you project will be the annual growth in revenue for your company in the coming year?
Please check the appropriate range and note the exact number if available.

Answer Options	Response Percent	Response Count
Less than 5%	15.1%	61
5 to 10%	23.3%	94
11 to 20%	10.4%	42
21 to 50%	8.4%	34
More than 50%	12.2%	49
Don't know	30.5%	123
Please specify exact number, if available:		23

Answered Question 403 Skipped Question 23

7. How many employees in total does your company employ in BC?

Answer Options	Response Percent
	250

Answered Question 250 Skipped Question 176

8. How many employees of your company in BC are employed under the following roles:
Please indicate the exact number if available, or an approximate value.

Answer Options	Response Average	Response Total	Response Count
Technical roles (e.g software programmers, engineers, technologists)	71.09	17,276	243
Business roles (e.g sales, marketing, business development)	23.56	5,325	226
All other roles (e.g admin, HR)	27.25	5,750	211

Answered Question 250 Skipped Question 176

9. How many employees joined your company's BC operations in the past 12 months:
Please indicate the exact number if available, or an approximate value.

Answer Options	Response Average	Response Total	Response Count
Technical roles	12.83	2,952	230
Business roles	3.43	610	178
All other roles	4.30	713	166

Answered Question 238 Skipped Question 188

10. Of the employees who joined your company's BC operations in the past 12 months, what were the top/most common job titles they held? Please list as many job titles as possible next to each category.

Answer Options	Response Average	Response Total	Response Count
Technical roles - job titles (e.g user interface analyst, software engineer, etc.)	12.83	2,952	230
Business roles - job titles (e,g business development manager, sales manager, etc.)	3.43	610	178
All other roles - job titles (e.g. administrative assistant, human resources manager, etc.)	4.30	713	166

Answered Question 224 Skipped Question 202

11. Of the occupations that were filled with internationally-sourced talent, please list the top NOC codes that were used in the work permit application process.

Answer Options	Response Percent
	85

Answered Question 85 Skipped Question 341

12. How many employees have exited your company's BC operations in the past 12 months? Please indicate the exact number if available, or an approximate value.

Answer Options	Response Average	Response Total	Response Count
Technical roles	7.39	1,501	203
Business roles	3.20	532	166
All other roles	3.21	485	151

Answered Question 214 Skipped Question 212

13. Do you anticipate the rate of employment (i.e number of new hires needed) in your company to change in the next 12 months?

Answer Options	Increase	Stay the same	Decrease	Rating Average	Response Count
Technical roles	155	72	14	1.41	241
Business roles	103	120	10	1.60	233
All other roles	74	129	15	1.73	218

Answered Question 244 Skipped Question 182

14. If you anticipate an increase in the rate of employment (i.e need for new hires) during the next 12 months, please identify the top/most common roles that they will be employed under. Please list as many job titles as possible.

Answer Options	Response Percent
	168

Answered Question 168 Skipped Question 258

15. How many employees are you currently looking to hire for your BC operations? Please indicate the exact number if available, or an approximate value.

Answer Options	Response Average	Response Total	Response Count
Technical roles	5.28	924	175
Business roles	2.15	318	148
All other roles	2.13	275	129

Answered Question 180 Skipped Question 246

16. What is your supply channel for hiring technical roles? (i.e e.g software programmers, engineers, technologists)? Please check all that apply.

Answer Options	Response Percent	Response Count
Directly from post-secondary institutions	68.8%	128
From other tech companies in BC	73.1%	136
From other cities in BC	52.2%	97
From other provinces	52.2%	97
From USA	23.7%	44
From overseas/foreign talent	29.0%	54
Other (please specify)	17.7%	33

Answered Question 186 Skipped Question 240

17. What is your supply channel for hiring NON-technical roles? (i.e business development, communications, marketing, accounting, administration etc.) Please check all that apply.

Answer Options	Response Percent	Response Count
Directly from post-secondary institutions	45.7%	80
From other tech companies in BC	66.9%	117
From other cities in BC	45.7%	80
From other provinces	38.3%	67
From USA	16.0%	28
From overseas/foreign talent	12.6%	22
Other (please specify)	19.4%	34

Answered Question 175 Skipped Question 251

18. In technical roles, what are the categories of experience you are hiring for most frequently? Please rate each category on a scale of 1 to 3 with 1=highest frequency and 3=lowest frequency

Answer Options	1	2	3	Response Percent	Response Count
Entry level (0-3 years)	71	51	51	1.88	168
Mid career level (3-10 years)	71	89	17	1.69	169
Senior level (10 years and above)	37	55	78	2.24	168

Answered Question 175 Skipped Question 251

19. In which categories of experience are you finding it most difficult to hire ? Please rate each category on a scale of 1 to 4, with 1= most difficulty and 3 = least difficulty

Answer Options	1	2	3	Response Percent	Response Count
Entry level (0-3 years)	26	25	117	2.54	168
Mid career level (3-10 years)	60	92	17	1.75	169
Senior level (10 years and above)	98	45	25	1.57	168

Answered Question 179 Skipped Question 247

20. How long does it usually take to fill a vacancy in a technical, non technical and senior role in your company? Please check the appropriate box for each.

Answer Options	<1 month	1-3 months	4-6 months	7-12 months	13-24 months	Response Percent	Response Count
Technical roles	20	90	52	13	6	2.06	181
Non-technical roles	49	98	14	5	3	1.79	169
All senior roles	2	46	67	35	14	2.46	164

Answered Question 183 Skipped Question 243

21. Of technical, non technical and senior roles, please provide feedback on salary/wage changes during the last 12 months if any. Please check the appropriate box for each.

Answer Options	Salaries increased	Salaries stayed the same	Salaries decreased	Not Applicable	Response Percent	Response Count
Technical roles	96	65	10	6	1.58	177
Non-technical roles	68	90	8	7	1.73	173
All senior roles	72	74	7	15	1.79	168

Answered Question 178 Skipped Question 248

22. If you reported salary increase(s) /decrease(s) above, please specify the range of increase(s) or decrease(s) below. Please note % of increase(s)/decrease(s) next to each applicable category.

Answer Options	Response Percent	Response Count
Technical roles	94.2%	97
Non-technical roles	77.7%	80
All senior roles	76.7%	79

Answered Question 103 Skipped Question 323

23. How would you rate the quality of new grad hires your company made in the last 12 months?

Answer Options	Very poor	Poor	Fair	Good	Very good	Response Percent	Response Count
Technical/hard skills	4	8	35	72	35	3.82	154
Interpersonal/communication/soft skills	9	13	53	61	15	3.40	151
Overall job performance	3	4	34	85	23	3.81	149
Ramp up time	3	16	47	63	22	3.56	151
Engagement with the company	1	11	31	76	32	3.84	151
Cultural fit with the company	2	6	31	73	39	3.93	151

Answered Question 154 Skipped Question 272

24. How would you rate the quality of foreign hires your company made in the last 12 months?

Answer Options	Very Poor	Poor	Fair	Good	Very good	Response Percent	Response Count
Technical/hard skills	2	4	19	45	25	3.92	95
Interpersonal/communication/soft skills	5	8	36	32	14	3.44	95
Overall job performance	3	3	21	49	19	3.82	95
Ramp up time	4	10	25	43	13	3.54	95
Engagement with the company	3	6	23	45	18	3.73	95
Cultural fit with the company	4	7	25	39	19	3.66	94

Answered Question 96 Skipped Question 330

24. How would you rate the quality of foreign hires your company made in the last 12 months?

Answer Options	1	2	3	4	5	6	Response Percent	Response Count
Technical/Hard skills	95	35	20	7	5	6	1.87	168
Interpersonal/Communications/Soft skills	44	58	34	15	8	3	2.35	162
Business/Entrepreneurial skills	15	28	51	31	16	19	3.39	160
Creativity/Innovation skills	38	60	33	16	9	6	2.48	162
Leadership/Management skills	21	24	46	31	24	17	3.39	163
Sales/Marketing skills	20	17	34	29	23	38	3.82	161

Answered Question 169 Skipped Question 257

26. If you selected "Technical/Hard skills above, please specify the type of skills you are referring to (i.e coding skills, big data analysis skills, etc.)

Answer Options	Response Percent
	137

Answered Question 137 Skipped Question 289

27. Based on the quality of hires in all roles, what senior-level skills are most needed for your company to succeed today? Rank rate each on a scale of 1 to 6, with 1=most needed and 6=least needed.

Answer Options	1	2	3	4	5	6	Response Percent	Response Count
Technical/Hard skills	70	30	25	10	12	14	2.42	161
Interpersonal/Communications/Soft skills	68	50	18	13	6	6	2.11	161
Business/Entrepreneurial skills	53	43	28	19	8	10	2.48	161
Creativity/Innovation skills	45	53	19	17	12	13	2.60	159
Leadership/Management skills	81	44	14	12	5	7	2.00	163
Sales/Marketing skills	38	36	31	18	14	24	3.04	161

Answered Question 166 Skipped Question 260

28. How many technical role vacancies were cancelled due to a lack of a suitable local candidates in the last 12 months:

Answer Options	Response Percent
	155

Answered Question 153 Skipped Question 273

29. How many non-technical (including business) role vacancies were cancelled due to a lack of a suitable local candidates in the last 12 months:

Answer Options	Response Percent
	155

Answered Question 155 Skipped Question 271

30. What are the top challenges in acquiring the right talent for your company? Please rate each category on a scale of 1 to 6, with 1=most challenging and 6= least challenging.

Answer Options	1	2	3	4	5	6	7	Response Percent	Response Count
Better salary offers in other local companies	46	39	23	22	12	8	12	2.92	162
Better salary offers in other provinces/juris.	27	33	32	20	15	10	20	3.46	157
Lack of training or professional dev't opportunities	17	21	42	26	25	9	17	3.74	157
Difficulty managing org & operational change	16	28	37	32	18	14	12	3.62	157
Lack of succession planning	17	22	28	28	25	17	21	3.99	158
Difficulty strategically planning workforce for long term	20	24	36	24	25	18	8	3.62	155
Cost of living (e.g housing affordability)	35	30	22	19	14	17	20	3.50	157
Other (please specify)									11

Answered Question 165 Skipped Question 261

32. Which of the following skill related challenges is your company facing right now? Please select all that apply.

Answer Options	Response Percent	Response Count
Attracting and acquiring skilled employees (skills shortages)	61.7%	103
Retaining skilled employees (brain drain)	30.5%	51
Finding employees with the right/specific technology skills or experience	77.8%	130
Finding employees with both technical and business skills	47.9%	80
Training employees for new technology skills	24.0%	40
Training employees for leadership roles	32.9%	55
Other (please specify)	3.6%	6

Answered Question 167 Skipped Question 259

33. In your company's experience during the last 12 months, has it become easier or harder to find and hire suitable candidates?

Answer Options	Response Percent	Response Count
Harder	37.4%	67
Stayed the same	44.7%	80
Easier	10.1%	18
Not Applicable (N/A)	6.1%	11
Other (please specify)	1.7%	3

Answered Question 179 Skipped Question 247

34. In your company's experience during the last 12 months, has it become easier or harder to find and hire suitable candidates from other Canadian provinces, outside of BC?

Answer Options	Response Percent	Response Count
Harder	14.8%	26
Stayed the same	40.9%	72
Easier	11.4%	20
Not Applicable (N/A)	29.5%	52
Other (please specify)	3.4%	6

Answered Question 176 Skipped Question 250

35. In your company's experience during the last 12 months, has it become easier or harder to find and hire suitable candidates from outside of Canada?

Answer Options	Response Percent	Response Count
Harder	21.0%	37
Stayed the same	26.7%	47
Easier	4.0%	7
Not Applicable (N/A)	46.0%	81
Other (please specify)	2.3%	4

Answered Question 176 Skipped Question 250

36. How often do you hire co-op students?

Answer Options	Response Percent	Response Count
Regularly	42.1%	75
Occasionally	24.2%	43
Rarely	15.2%	27
Never	14.6%	26
Unsure/Don't know	3.9%	7

Answered Question 178 Skipped Question 248

37. How many students have you placed through a formal co-op program in the last 12 months and to date? Please state exact number, if available.

Answer Options	Response Percent	Response Count
Placed in the last 12 months	99.3%	143
Placed do date	82.6%	119

Answered Question 144 Skipped Question 282

38. Does your company currently outsource any of its technical/IT and ICT services from overseas sources?

Answer Options	Response Percent	Response Count
Yes	10.1%	18
No	79.3%	142
Don't know	5.0%	9
If yes, please specify	5.6%	10

Answered Question 179 Skipped Question 247

39. What percentage of your workforce is comprised of the following demographic groups? Please indicate % of each. Due to cross-categorization, the total may exceed 100%

Answer Options	Response Percent	Response Count
Women	94.0%	158
Individuals aged 25 or younger	89.3%	150
First Nations	86.9%	146
Individuals with disabilities	86.3%	145
Temporary foreign workers	86.9%	146
Sponsored PR immigrants	85.1%	143
Individuals aged 65 or older	84.5%	142
Dont know	12.5%	21

Answered Question 168 Skipped Question 258

40. Of individuals aged 65 or older, what percentage have expressed interest in retiring within the next 12 months?

Answer Options	Response Percent	Response Count
0-5%	33.6%	41
6-10%	2.5%	3
11 to 20%	3.3%	4
21 to 50%	6.6%	8
More than 50%	10.7%	13
Don't know	43.4%	53

Answered Question 122 Skipped Question 304

41. Does your company currently have a policy in place to increase the diversity of the workplace?

Answer Options	Response Percent	Response Count
Yes, we have a diversity policy in place	21.4%	37
No, but we are considering one	17.3%	30
No	53.2%	92
Don't know	8.1%	14
Please describe what you are doing to increase your workplace diversity:		34

Answered Question 173 Skipped Question 253

42. When hiring internationally-sourced talent, does your company tend to do so under temporary, permanent or dual-intent channels? Please check the most frequently used channel(s).

Answer Options	Response Percent	Response Count
Temporary (e.g. TFWP, NAFTA, Intra-company transfer	13.9%	23
Permanent (e.g. BC Nominee Program, Express Entry)	19.4%	32
Dual-intent (e.g TWFP while applying for Permanent Residency)	15.8%	26
Unsure/Don't know	17.6%	29
Not Applicable	51.5%	85

Answered Question 165 Skipped Question 261

43. Which immigration channel(s) does your company use to hire talent from overseas or retain non-Canadian workers? Please select all that apply.

Answer Options	Response Percent	Response Count
BC Nominee Program (PNP)	19.3%	32
Temporary Foreign Workers Program (TWFP)	14.5%	24
Federal Skilled Worker Program/Canadian Experience Class (Express Entry)	21.1%	35
Intra-company transfers (L-1)	7.8%	13
NAFTA or other free trade agreements (TN visa)	13.3%	22
Post Graduate Work Permit Program	12.7%	21
International Experience Canada	6.6%	11
Not Applicable	48.8%	81
Unsure/Don't know	18.7%	31
Other (please specify)	4.2%	7

Answered Question 166 Skipped Question 260

44. Please indicate the average response wait times for work permit approvals, under each immigration channel used by your company. Please check the appropriate category for each channel.

Answer Options	<1 month	1-3 months	4-6 months	7-12 months	12+ months	N/A	Response Percent	Response Count
BC Nominee Program (PNP)	1	10	9	5	9	66	5.09	100
Temporary Foreign Workers Program (TWFP)	2	12	11	5	1	71	5.00	102
Federally Skilled Worker Program/Canadian Experience Class (Express Entry)	1	8	13	8	4	67	5.05	101
Intra-company Transfer (L-1)	2	5	5	1	1	78	5.48	92
NAFTA or other free trade agreement (TN)	9	9	3	0	1	75	5.06	97
Post Graduate Work Permit Program	8	9	2	1	0	77	5.13	97
International Experience Canada	2	7	2	0	0	81	5.52	92

Answered Question 109 Skipped Question 317

45. Please provide some common/most significant challenges relating to each of the immigration streams your company has used to secure internationally-sourced talent.

Answer Options	Response Percent	Response Count
BC Nominee Program (PNP)	35.2%	25
Temporary Foreign Workers Program (TWFP)	25.4%	18
Federally Skilled Worker Program/Canadian Experience Class (Express Entry)	32.4%	23
Intra-company Transfer (L-1)	14.1%	10
NAFTA or other free trade agreement (TN)	15.5%	11
Post Graduate Work Permit Program	12.7%	9
International Experience Canada	11.3%	8
Other (please specify)	8.5%	6
Not Applicable	45.1%	32

Answered Question 71 Skipped Question 355

46. Do you have temporary foreign workers who are hitting the cumulative duration (4 year cap) period and are having to leave the country or stop working?

Answer Options	Response Percent	Response Count
Yes	7.8%	12
No	39.9%	61
Not Applicable	52.3%	80
If yes, please provide the number of staff that hit/will hit the cap this year.		6

Answered Question 153 Skipped Question 273

47. As a response to vacancies going unfilled due to difficulty bringing in foreign talent via your company's most frequently used immigration channel, did your company ever decide to relocate or start a branch elsewhere?

Answer Options	Response Percent	Response Count
Yes	12.7%	19
No	39.3%	59
Not Applicable	48.0%	72
If yes, please provide the number of staff that hit/will hit the cap this year.		17

Answered Question 150 Skipped Question 276

48. Please provide additional comments about your company's talent needs:

Answer Options	Response Percent
	38

Answered Question 38 Skipped Question 388

XI - Detailed Tables – NOC Breakdown Per Year: Constrained Growth, Expanded Growth & Unmet Demand

Scenario 1: Constrained Growth

YEAR	2016	2017	2018	2019	2020	2021	TOTAL 2016-21
VACANCIES PER YEAR	2,200	2,377	2,772	3,196	3,059	3,121	
NOC - TECH JOBS							
2171 Information systems analysts & consultants	280	303	353	406	389	398	2,129
2174 Computer programmers & interactive media developers	188	203	237	274	261	267	1,430
2281 Computer network technicians	119	129	150	173	167	170	908
5241 Graphic designers & illustrators	105	114	133	153	146	149	800
0213 Computer & information systems managers	101	109	127	147	140	144	768
2282 User support technicians	102	111	128	149	143	142	775
2131 Civil engineers	96	104	121	140	134	135	730
2132 Mechanical engineers	90	97	113	131	125	127	683
2241 Electrical & electronics engineering technologists & technicians	86	93	108	125	120	123	655
2242 Electronic service technicians (household business equipment)	85	92	107	124	118	122	648
2133 Electrical & electronics engineers	81	87	102	117	112	115	614
2173 Software engineers & designers	71	77	90	103	99	101	541
2147 Computer engineers (except software engineers & designers)	49	53	62	71	68	69	372
2175 Web designers & developers	43	47	55	63	60	62	330
2172 Database analysts & data administrators	28	31	36	41	40	40	216
0131 Telecommunication carriers managers	25	27	32	36	35	36	191
5225 Audio & video recording technicians	24	26	30	35	33	34	182
2134 Chemical engineers	22	23	27	32	30	31	165
0512 Managers - publishing, motion pictures, broadcasting & performing arts	21	22	26	30	28	29	156
2221 Biological technologists & technicians	20	21	25	29	27	28	150
5226 Other technical and coordinating occupations in motion pictures, broadcasting & the performing arts	17	18	21	24	23	24	127
2243 Industrial instrument technicians & mechanics	16	17	20	23	21	22	119
2283 Information systems testing technicians	14	15	17	20	19	20	105
5224 Broadcast technicians	6	6	7	8	8	8	43
NOC - NON-TECH JOBS							
1123 Professional occupations in advertising, marketing & public relations	141	153	178	205	197	201	1,075
6221 Technical sales specialists	124	134	157	181	173	177	946
4163 Business development officers & marketing researchers & consultants	93	101	118	136	130	131	709
5121 Authors & writers	46	50	59	67	64	67	353
5122 Editors	33	36	42	48	46	48	253

5125 Translators, terminologists & interpreters	32	35	41	47	44	46	245
0113 Purchasing managers	28	31	36	41	39	41	216
5227 Support occupations in motion pictures, broadcasting, photography & the performing arts	12	13	15	17	17	17	91

TOTAL CONSTRAINED GROWTH **16725**

Scenario 2: Expanded Growth

YEAR	2016	2017	2018	2019	2020	2021	TOTAL 2016-21
VACANCIES PER YEAR	7,500	7,647	7,797	7,950	8,106	8,264	
NOC - TECH JOBS							
2171 Information systems analysts & consultants	955	973	993	1,013	1,032	1,052	6,018
2174 Computer programmers & interactive media developers	641	654	667	680	693	706	4,041
2281 Computer network technicians	407	415	423	431	440	449	2,565
5241 Graphic designers & illustrators	359	366	373	380	388	396	2,262
0213 Computer & information systems managers	344	351	358	365	372	380	2,170
2282 User support technicians	348	354	361	368	376	383	2,190
2131 Civil engineers	327	334	340	347	354	361	2,063
2132 Mechanical engineers	306	312	318	325	332	337	1,930
2241 Electrical & electronics engineering technologists & technicians	293	299	305	311	319	323	1,850
2242 Electronic service technicians (household business equipment)	290	296	302	308	314	320	1,830
2133 Electrical & electronics engineers	276	281	286	292	298	304	1,737
2173 Software engineers & designers	243	248	252	257	262	268	1,530
2147 Computer engineers (except software engineers & designers)	167	170	173	177	180	183	1,050
2175 Web designers & developers	148	151	153	157	160	163	932
2172 Database analysts & data administrators	97	99	101	103	105	107	612
0131 Telecommunication carriers managers	86	87	89	91	93	94	540
5225 Audio & video recording technicians	82	83	85	86	88	90	514
2134 Chemical engineers	73	76	77	78	80	83	467
0512 Managers - publishing, motion pictures, broadcasting & performing arts	70	71	73	74	76	77	441
2221 Biological technologists & technicians	67	68	70	71	73	74	423
5226 Other technical and coordinating occupations in motion pictures, broadcasting & the performing arts	57	58	59	60	62	63	359
2243 Industrial instrument technicians & mechanics	53	54	55	56	58	60	336
2283 Information systems testing technicians	46	48	49	50	51	52	296
5224 Broadcast technicians	19	20	20	20	21	21	121

NOC - NON-TECH JOBS	2016	2017	2018	2019	2020	2021	TOTAL 2016-21
1123 Professional occupations in advertising, marketing & public relations	482	492	501	511	521	531	3,038
6221 Technical sales specialists	424	433	441	450	459	467	2,674
4163 Business development officers & marketing researchers & consultants	318	324	331	337	344	350	2,004
5121 Authors & writers	158	161	165	168	171	175	998
5122 Editors	113	116	118	120	123	125	715
5125 Translators, terminologists & interpreters	110	112	114	116	119	120	691
0113 Purchasing managers	96	98	101	103	105	107	610
5227 Support occupations in motion pictures, broadcasting, photography & the performing arts	41	42	42	43	44	45	257
TOTAL EXPANDED GROWTH							**47,264**

Unmet Demand

YEAR	2016	2017	2018	2019	2020	2021	TOTAL 2016-21
VACANCIES PER YEAR	5,300	5,270	5,025	4,754	5,047	5,143	
NOC - TECH JOBS							
2171 Information systems analysts & consultants	674	671	640	605	643	655	3,888
2174 Computer programmers & interactive media developers	453	450	430	406	432	440	2,611
2281 Computer network technicians	288	286	273	258	274	279	1,658
5241 Graphic designers & illustrators	254	252	240	228	242	246	1,462
0213 Computer & information systems managers	243	242	231	218	232	236	1,402
2282 User support technicians	246	244	233	220	234	238	1,415
2131 Civil engineers	231	230	219	208	220	225	1,333
2132 Mechanical engineers	216	215	205	194	206	211	1,247
2241 Electrical & electronics engineering technologists & technicians	207	206	197	186	198	201	1,195
2242 Electronic service technicians (household business equipment)	205	204	195	184	195	200	1,183
2133 Electrical & electronics engineers	195	194	185	175	185	188	1,122
2173 Software engineers & designers	172	171	163	154	162	166	988
2147 Computer engineers (except software engineers & designers)	118	117	112	106	112	114	679
2175 Web designers & developers	105	103	99	94	100	101	602
2172 Database analysts & data administrators	69	68	65	62	65	66	395
0131 Telecommunication carriers managers	61	60	57	54	58	59	349
5225 Audio & video recording technicians	58	57	54	52	55	56	332
2134 Chemical engineers	50	51	50	50	50	51	302
0512 Managers - publishing, motion pictures, broadcasting & performing arts	49	49	47	44	47	49	285
2221 Biological technologists & technicians	47	47	45	43	45	46	273
5226 Other technical and coordinating occupations in motion pictures, broadcasting & the performing arts	40	40	38	36	38	40	232
2243 Industrial instrument technicians & mechanics	38	37	35	34	36	37	217
2283 Information systems testing technicians	33	33	31	30	32	32	191
5224 Broadcast technicians	14	13	13	12	13	13	78

NOC - NON-TECH JOBS	2016	2017	2018	2019	2020	2021	TOTAL 2016-21
1123 Professional occupations in advertising, marketing & public relations	341	339	323	306	324	330	1,963
6221 Technical sales specialists	300	298	284	269	286	291	1,728
4163 Business development officers & marketing researchers & consultants	225	223	213	202	214	218	1,295
5121 Authors & writers	112	111	106	100	107	109	645
5122 Editors	80	80	76	72	76	78	462
5125 Translators, terminologists & interpreters	78	77	74	70	73	75	447
0113 Purchasing managers	68	68	65	61	65	67	394
5227 Support occupations in motion pictures, broadcasting, photography & the performing arts	29	29	27	26	27	28	166
TOTAL EXPANDED GROWTH							**30,539**

Inspired by the Tech Community, Inspiring the Tech Community.

The BC Tech Association is guided by our mission to make BC the best place to grow a tech company. For more than 20 years, BC Tech (formerly the BCTIA) has been providing opportunities for the tech industry to collaborate, learn, and grow together. We are dedicated to connecting companies, developing talent, sharing stories, and advocating on behalf of tech companies to keep our sector thriving.

Since our founding in 1993, the tech sector has quintupled to $26 billion in revenue. In that time, we have played a privileged role in supporting the growth of the tech community that now includes over 9,000 companies, employing more than 90,000 people, and that has been one of the strongest contributors to BC's economic growth over the past decade.

We serve as a platform to grow the tech ecosystem, building programs and initiatives that uphold our core values:
Be of Service, Succeed Together, Pay it Forward.

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Funding provided through the Canada-British Columbia Labour Market Development Agreement.

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