

# **Attracting Talent to Vancouver's Tech Sector: Policy Options for Future Growth**

by

**Adam V. Keating**

B.A. Hons (Political Studies), Queen's University, 2015

Project Submitted in Partial Fulfillment of the  
Requirements for the Degree of  
Master of Public Policy

in the  
School of Public Policy  
Faculty of Arts and Social Sciences

© **Adam V. Keating 2017**

**SIMON FRASER UNIVERSITY**

**Spring 2017**

All rights reserved.

However, in accordance with the *Copyright Act of Canada*, this work may be reproduced, without authorization, under the conditions for Fair Dealing. Therefore, limited reproduction of this work for the purposes of private study, research, education, satire, parody, criticism, review and news reporting is likely to be in accordance with the law, particularly if cited appropriately.

# Approval

**Name:** Adam V. Keating  
**Degree:** Master of Public Policy  
**Title:** Attracting Talent to Vancouver's Tech Sector: Policy Options for Future Growth

**Examining Committee:** **Chair:** Doug McArthur  
Professor, School of Public Policy, SFU

**Josh Gordon**  
Senior Supervisor  
Assistant Professor

---

**Kora DeBeck**  
Supervisor  
Assistant Professor

---

**J. Rhys Kesselman**  
Internal Examiner  
Professor

---

**Date Defended/Approved:** April 7, 2017

## Ethics Statement



The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

- a. human research ethics approval from the Simon Fraser University Office of Research Ethics

or

- b. advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University

or has conducted the research

- c. as a co-investigator, collaborator, or research assistant in a research project approved in advance.

A copy of the approval letter has been filed with the Theses Office of the University Library at the time of submission of this thesis or project.

The original application for approval and letter of approval are filed with the relevant offices. Inquiries may be directed to those authorities.

Simon Fraser University Library  
Burnaby, British Columbia, Canada

Update Spring 2016

## **Abstract**

In BC's shift toward a knowledge-based economy, growth in the tech sector and the ability of start-ups to evolve into globally competitive companies is vital for BC's future economic viability. Vancouver is a leading centre for tech growth in BC, and an increasing number of firms are doing business in the city. Vancouver is also home to three "tech unicorns" – start-ups valued over \$1B – in Hootsuite, Avigilon, and Slack, all of which have helped legitimize the city's brand as a viable destination to do business. However, the sector faces a dire problem of finding adequate talent supply to fill over 2,000 immediate vacancies and 15,500 vacancies over the next five years in tech, specifically at the executive level. This capstone evaluates policy options using criteria and measures, and recommends changes to Canada's Temporary Foreign Worker Program and immediate action on Vancouver's housing affordability to ultimately increase tech talent supply.

**Keywords:** Tech; talent; Vancouver; policy options; housing affordability; Temporary Foreign Worker Program

## **Acknowledgements**

I would like to thank the faculty at the SFU School of Public Policy for all of the excellent lessons, insights, and knowledge that they have shared with me over the past two years in the MPP program. I would also like to thank my supervisor, Professor Joshua Gordon for your help and guidance in the production of this capstone. I would also like to thank all of the participants that agreed to take part in my study.

Furthermore, I am grateful to my family (Wendy, Vince, Alexander, and Molly) and partner (Anna) for their support of my educational aspirations and for keeping me motivated throughout my capstone. My dad taught me the importance of hard work and dedication, two of the most valuable skills in life and through my educational journey. I continue to work hard and push myself in your memory. A special thanks to my good friend Daniel Barker for keeping me going. You have all helped keep me level headed and reminded me every day what I am working toward. It could not have been done without you all.

# Table of Contents

Approval.....	ii
Ethics Statement.....	iii
Abstract.....	iv
Acknowledgements.....	v
Table of Contents.....	vi
List of Tables.....	ix
List of Figures.....	x
Executive Summary.....	xi
<b>Chapter 1. Introduction.....</b>	<b>1</b>
Policy Problem.....	1
Project Motivation.....	1
Problem Scope.....	2
Study Goals, Description, and Organization.....	2
<b>Chapter 2. Background.....</b>	<b>4</b>
What is Tech and Why Does It Matter?.....	4
What is Tech?.....	4
Why Does Tech Matter?.....	4
Contribution to the Canadian Economy.....	4
Strong Levels of Average Annual Growth.....	5
Economic Impact at the Provincial Level.....	5
Labour Force Trends in BC’s Tech Sector.....	8
British Columbia Trends.....	8
The Policy Problem.....	9
Current Talent Attraction Policy and Programs.....	9
Review of the Literature.....	10
Current Challenges and Options Highlighted in the Literature.....	10
<b>Chapter 3. Methodology.....</b>	<b>14</b>
Jurisdictional Scan.....	14
Stakeholder Interviews.....	14
Policy Analysis Through the Use of Criteria and Measures.....	15
Project Limitations.....	15
<b>Chapter 4. Jurisdictional Scan.....</b>	<b>17</b>
Seattle.....	17
Immigration Policy in the USA.....	18
The Local Education System.....	18
Venture Capital in Seattle.....	20
Toronto.....	21
Immigration Policy in Canada.....	21
The Local Education System.....	23
Venture Capital in Toronto.....	24

<b>Chapter 5. Interview Results .....</b>	<b>25</b>
Overview of Individuals Interviewed .....	26
Overview of Government Official Interviewed .....	26
Overview of Business Organizations and Other Experts Interviewed.....	26
Overview of Tech Companies Interviewed.....	27
Interview Results and Themes .....	27
Challenges Attracting Executive Level Talent .....	27
Cost of Living and Housing Prices may be Hindering Talent Attraction.....	28
Limited Availability of Venture Capital .....	29
Need to Alter TFWP to Meet Needs of Tech.....	30
The Need for Industry Knowledge Within the Civil Service .....	30
The National Occupational Classification (NOC) Codes Do Not Reflect Realities of the Tech Sector.....	31
Need to Focus on Educating Canadians in Tech .....	32
 <b>Chapter 6. Policy Options .....</b>	 <b>34</b>
Supporting BC's new Changes in Education: Coding in Schools.....	34
Policy Option to Support BC's new Changes in Education .....	35
Updating the Temporary Foreign Workers Program .....	35
Policy Option to Update the TFWP .....	36
Improving the SR&ED Program and Access to Venture Capital .....	36
Policy Option for Improving Access to VC.....	36
 <b>Chapter 7. Policy Criteria and Measures .....</b>	 <b>37</b>
Effectiveness.....	38
Administrative Complexity .....	38
Stakeholder Acceptance .....	38
Cost .....	39
Economic Development .....	39
Measuring the Criteria .....	39
Weighing Criteria.....	40
 <b>Chapter 8. Policy Evaluation.....</b>	 <b>42</b>
Changes to Support and Improve Tech Education in BC.....	42
Effectiveness .....	42
Administrative Complexity .....	42
Stakeholder Acceptance.....	43
Cost .....	43
Economic Development.....	43
Additional Challenges for this Option .....	44
Updating the Temporary Foreign Worker Program to Reflect the Needs of Tech .....	45
Effectiveness .....	45
Administrative Complexity .....	46
Stakeholder Acceptance.....	46
Cost .....	46
Economic Development.....	47
Increasing Access to Venture Capital.....	48
Effectiveness .....	48

Administrative Complexity .....	48
Stakeholder Acceptance.....	48
Cost .....	49
Economic Development.....	49
<b>Chapter 9. Policy Analysis and Recommendation .....</b>	<b>51</b>
Effectiveness .....	51
Administrative Complexity .....	52
Stakeholder Acceptance.....	52
Cost and Economic Development.....	53
<b>Chapter 10. Recommendation .....</b>	<b>54</b>
<b>References .....</b>	<b>56</b>
Appendix.....	62
Policies, Programs, and Incentives for Attracting Talent .....	62



## List of Tables

Table 1:	List of Individuals Interviewed.....	25
Table 2:	Summary of Evaluation Criteria.....	37
Table 3:	Measures and Scoring System.....	40
Table 4:	Summary Evaluation for Educational Changes .....	44
Table 5:	Summary Evaluation for TFWP Updates.....	47
Table 6:	Increasing Access to Venture Capital.....	49
Table 7:	Summary of Policy Analysis .....	51

## List of Figures

Figure 1:	Average Annual Growth Comparison Across Sectors (2010-2015) .....	5
Figure 2:	Total Output of ICT Sector by Province (2015) .....	6
Figure 3:	Real GDP Growth for the High Technology and Overall Economy, British Columbia .....	7

## Executive Summary

By 2019, it is expected that there will be strong demand for 182,000 skilled workers in the tech sector across Canada (ICTC, 2016). Tech is a diverse and innovative sector of the Canadian economy and in 2015, constituted a \$741-billion-dollar industry, accounting for 4.4% of Canada's total output. Economic growth in the tech sector has outpaced growth in several sectors of the Canadian economy in recent years, with average annual growth of 2.0% for the last five years (Faisal, 2015).

In recent years Metro Vancouver has emerged as one of Canada's leading hubs for tech. The city offers several advantages for businesses including a skilled labour force, BC's favourable tax policy and incentives for business, and the strategic location of Vancouver, offering direct access to US markets and a time-zone that makes doing business overseas easier than other regions of Canada. Employment in Vancouver's tech sector has increased over the past two decades. In 1990, the tech sector employed roughly 28,000, and by 2014 this number increased to roughly 58,200. Since 2010, approximately 8,000 new jobs have been created in the sector. (Conference Board of Canada, 2016).

However, despite this growth, Vancouver tech firms are facing a significant challenge. Businesses in Vancouver's growing tech sector are having difficulty attracting talent, specifically at the executive level, preventing them from emerging as dominant players internationally and hindering local economic growth. Vancouver tech companies currently need to fill over 2,000 immediate vacancies and over 15,500 vacancies over the next five years as the sector grows (Gibson & Elbe, 2016). The goal of this capstone, is to address this policy problem and seek policy options to help Vancouver tech firms better attract talent to their businesses.

Through a qualitative research approach including a literature review, jurisdictional scan, and expert interviews, this capstone seeks to determine where gaps currently exist in policy and what challenges the tech sector faces as a result of these gaps. Through the creation of criteria and evaluative measures, this capstone conducts a policy analysis to determine the best option to help fill the gaps that currently exist.

Three areas of policy are identified as options to help Vancouver tech firms better attract and retain talent. These include: 1) supporting BC's new plan to implement coding into k-12 education by increasing funding for teacher training in coding and computer science, and encouraging the implementation of mandatory co-op terms for tech-related post-secondary programs; 2) making changes to Canada's Temporary Foreign Worker Program by creating a High-tech Visa office to review tech visa applications, ensuring that the visa application process is more communicative between civil servants and employers, and revising the currently outdated NOCs codes; and 3) having the federal government eliminate the current ownership structure as an eligibility criterion for SR&ED program benefits, in order to remove disincentives for foreign VC investment.

My analysis yields a recommendation that Canada's Temporary Foreign Worker Program be changed to ensure immediate benefit in helping tech firms attract talented workers to their businesses. Over the longer term, I recommend increased educational support. Additionally, the Province of BC, Vancouver, and tech companies must come together to actively tackle Vancouver's housing affordability challenges.

# **Chapter 1. Introduction**

Talented employees spark innovation, create new ideas, and can help a company grow from a new start-up to a multi-national enterprise. A key component of growing and maintaining a successful business is having a talented workforce. In the words of Steve Jobs, “the secret of my success is that we have gone to exceptional lengths to hire the best people in the world” (McFadden, 2014). Whether a company is a multi-national needing to continue operating at full capacity, or a start-up looking to innovate, the people a company hires or does not hire ultimately determines its future success.

## **Policy Problem**

Businesses in Vancouver's growing tech sector are having difficulty attracting talent, specifically at the executive level, preventing them from emerging as dominant players internationally and hindering local economic growth. Throughout this capstone, executive level talent refers to managerial and C-suite type talent, as well as positions that require very high degrees of specialty like software engineers. This problem is not only confined to Vancouver's growing tech hub, but it also impacts tech hubs across Canada. This capstone responds to this problem by undertaking a jurisdictional scan, examining expert insights, and providing an analysis of the optimal policy options to encourage the attraction and retention of executive level talent to Vancouver's tech firms. This study seeks to answer the following question: how can policy be reformulated to enable tech firms in growing hubs like Vancouver to better attract and retain talent at the executive level?

## **Project Motivation**

On June 14, 2016, the honourable Minister of Innovation, Science, and Economic Development, Navdeep Baines announced Canada's focus on innovation through the new Innovation Agenda. The six action areas of the Government of Canada's Innovation Agenda include: promoting an entrepreneurial and creative society; supporting global science excellence; building world-leading clusters and partnerships; growing companies and accelerating clean growth; competing in a digital world; and improving ease of doing

business (Government of Canada News Release, 2016). Research focused on developing policy options that will enable firms to more effectively attract and retain talent is complementary to Canada's Innovation Agenda. Furthermore, this research complements Vancouver's 2016 Corporate Plan goal of attracting and retaining talent in the local workforce (City of Vancouver, 2016). This is one of ten goals put forward in the Corporate Plan.

## **Problem Scope**

According to a report by the Information and Communication Technology Council, more than 100,000 positions in Canada's ICT/tech sector currently need to be filled (ICTC, 2013). Furthermore, by 2019 the sector is expected to have demand for 182,000 skilled workers across Canada (ICTC, 2016). While the problem of attracting talent is a Canada-wide problem, this capstone specifically focuses on the situation facing Vancouver's tech firms. It is hoped that the results of this capstone can later be built upon to help tech firms in other Canadian jurisdictions better attract and retain talent.

## **Study Goals, Description, and Organization**

The goal of this research is to explore policy options to help firms in Vancouver's tech sector attract and retain more executive level talent. The value-added portion of this research will be the analysis of policy options through carefully crafted criteria and measures. The final result of the study will be to recommend a policy option or package of policies best suited to help firms in Vancouver's tech sector attract and retain talented workers.

More specifically, this study contains several objectives. First, it will provide an overview of the current difficulties that tech firms in Vancouver face attracting and retaining talent. This information will largely be collected through the literature and background sections of this paper. Second, a jurisdictional scan will be conducted in order to gain a better understanding of how certain policies and incentives allow different areas to attract talent. Third, expert interviews will be conducted to help understand what policies or programs could help attract talent to Vancouver's tech sector. Specifically, I will talk with

key stakeholders in Vancouver's tech sector, government officials, and business associations. The knowledge gained through expert interviews will uncover the current opportunities and barriers that exist for Vancouver tech firms looking to attract talent and will bolster, strengthen, and shape policy options. Based on the literature review, jurisdictional scan, and expert interviews, I will analyze and weight policy options and recommend the best option or package of policies.

## **Chapter 2. Background**

This section will examine talent attraction and retention in the Canadian and Vancouver contexts. It seeks to explore what tech is and why it matters for the Canadian economy, what the labour force trends are in Canada and Vancouver's tech sector, and what federal, provincial, and municipal policies are currently in place to help firms in the sector attract and retain talent. This will be followed by a review of literature on the subject of tech and talent attraction in Canada as well as the policy options promoted in various literature sources.

### **What is Tech and Why Does It Matter?**

#### **What is Tech?**

Tech or Information and communications technology (ICT) refers to “all technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions” (Techopedia, 2016). While often defined as businesses of IT (Information Technologies) or businesses in tech industries, ICT refers to diverse activities ranging from video game development, computer programming, coding, software engineering, and more, but for the purpose of this study all of these areas will be referred to simply as tech.

#### **Why Does Tech Matter?**

##### ***Contribution to the Canadian Economy***

The tech sector is a diverse and innovative sector of the Canadian economy. In 2015, tech constituted a \$741-billion-dollar industry, accounting for 4.4% of Canada's total output, and given that over half of Canadian individuals employed as tech workers work in sectors outside of tech, the value-added by tech workers across all sectors of the economy is intensifying as new businesses adopt digital technologies (ICTC, 2016). In the first two months of 2015, contributions by the tech sector to the Canadian economy grew by \$500 million (Faisal, 2015). Furthermore, real GDP produced by the ICT sector

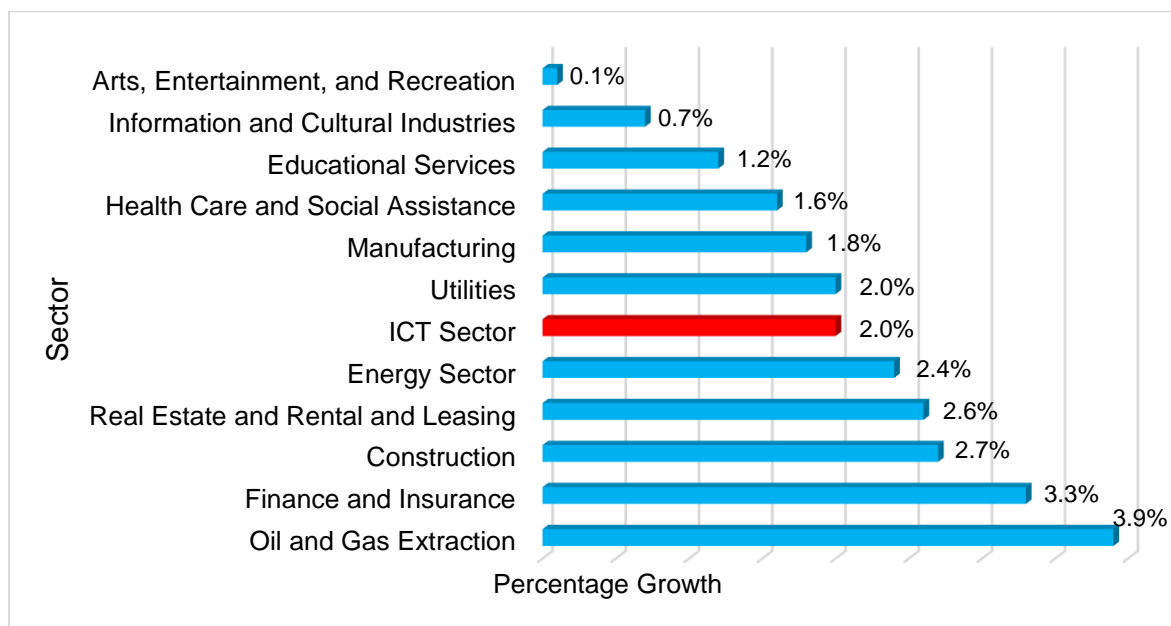


increased by nearly \$2 billion from 2013 to 2014 and forecasts anticipate that the sector's contribution to Canadian GDP will continue to grow in coming years.

### ***Strong Levels of Average Annual Growth***

Economic growth in the tech sector has outpaced growth in several sectors of the Canadian economy in recent years. According to the Information and Communication Technology Council's 2015 Annual Review, average annual GDP growth in ICT has been 2.0% over the last five years – achieved through strong growth in ICT services industries (Faisal, 2015). Figure 1 below highlights the 5-year average growth of the ICT sector in comparison to other prominent Canadian sectors.

**Figure 1: Average Annual Growth Comparison Across Sectors (2010-2015)**

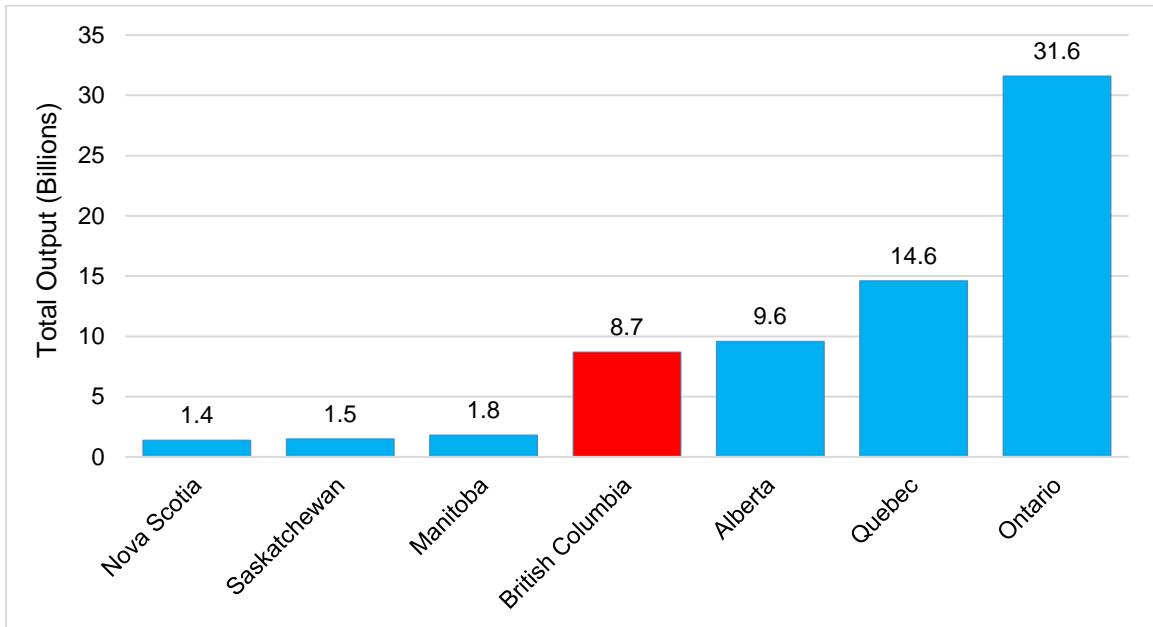


Source: (ICTC; 2016).

### ***Economic Impact at the Provincial Level***

Across all provinces, Ontario is Canada's ICT leader. In 2015, Ontario contributed \$31.6 billion to the total Canadian ICT output (Faisal, 2015). Ontario has three key tech clusters in Ottawa, the Greater Toronto Area, and in the Waterloo Region. Of these, the Waterloo Region produces world-leading technologies (Weeks & Sheridan-Simzer, 2009). Following Ontario, Quebec, Alberta, and British Columbia are also notable contributors to Canadian ICT output. Figure 2 highlights the provincial contribution to the Canadian tech sector.

**Figure 2: Total Output of ICT Sector by Province (2015)**

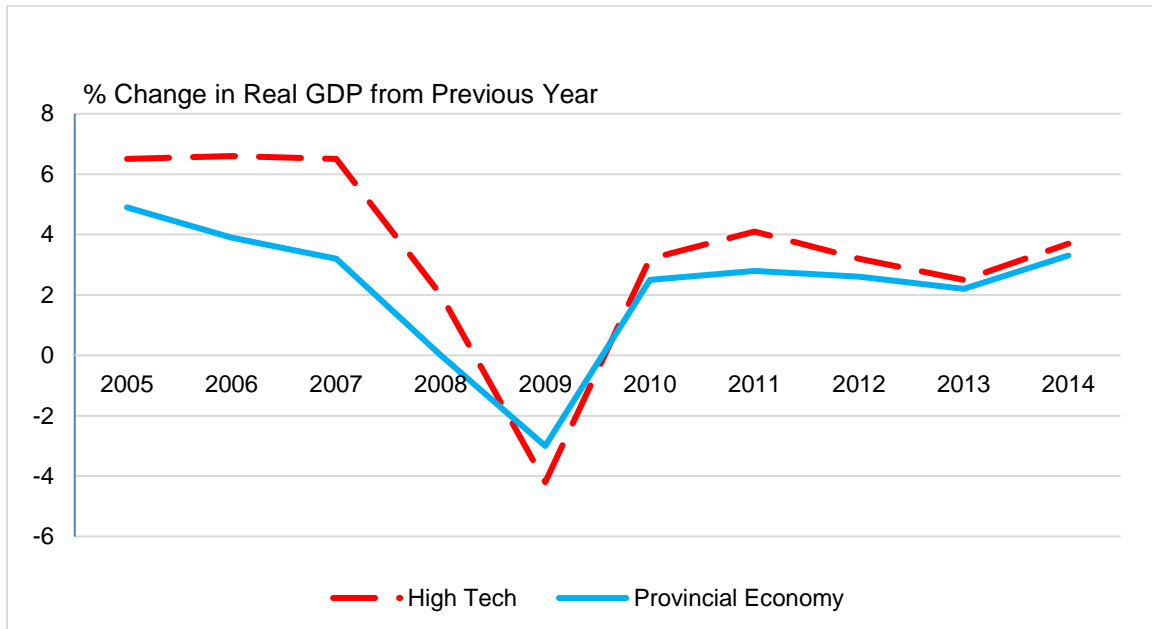


Source: (ICTC, 2016).

As shown in figure 2, British Columbia's tech sector contributed \$8.7 billion in output in 2015. In general, growth in BC's tech sector has outpaced that of the general economy at a modest level, and this has been the case for the past decade with the

exception of 2004 and 2009 (Schrier & Hallin, 2016). Figure 3 highlights how the sector's GDP growth in BC has outpaced overall growth in the provincial economy.

**Figure 3: Real GDP Growth for the High Technology and Overall Economy, British Columbia**



Source: (Schrier & Hallin, 2016)

BC's tech sector GDP grew by 3.3 percent in 2014 with healthy levels of growth in computer and related services (7.4 percent) and telecommunications (1.9 percent). In total, BC's tech sector accounts for approximately 7 percent of the province's GDP (Schrier & Hallin, 2016), contributing similar amounts to the provincial GDP as other important sectors like mining, quarrying, oil and gas extraction, and health care (Bosanac, 2015). Furthermore, the tech sector in BC makes up a notable proportion of total businesses within the BC economy at 5.6% (Statistics Canada, 2016).

The recent emergence of Vancouver as a tech hub in BC has aided high levels of provincial growth in the tech sector. In 2015, American tech icons such as Microsoft and Amazon, which have sought to fill ever-growing needs for engineers and high level talent, expanded their Vancouver offices (Wingfield, 2016). Vancouver's own economy has diversified in recent years with high levels of growth in film and video game production. Vancouver is also home to three tech "unicorns" – a start-up valued at over \$1 billion – in Hootsuite, Avigilon, and Slack, all of which have helped further legitimize the city's brand

as a growing and viable destination for tech companies to do business and promote economic growth (Allen, 2016). From 2009 to 2013 the number of tech businesses grew by 1.9 percent with a total of 6,226 high-tech businesses (Conference Board of Canada, 2016). In 2014, around two-thirds (67%) of BC's tech businesses were located in the Mainland/Southwest Development Region, with the bulk of those situated in Greater Vancouver (Schrier & Hallin, 2016). Overall, BC's tech sector is a driver of economic growth in the province and the Vancouver region plays a key role in the sector. However, more can still be done to ensure that Vancouver emerges as a leading hub for tech innovation and growth in the future. Vancouver is still in the early stages of tech growth and sector development, but there are signals that the sector is growing and with the right policies in place, the city has the potential to become a leading hub of talent and innovation.

## **Labour Force Trends in BC's Tech Sector**

### **British Columbia Trends**

Employment in the tech sector in BC has increased as the industry has grown. In 2014, there was a 2.5 percent increase in tech employment and the number of individuals employed in the sector climbed to 92,700 – the highest level ever recorded in BC and representing 4.6% of BC's total workforce (Schrier & Hallin, 2016). According to data gathered by the Brookfield Institute, employment in BC's tech sector directly and indirectly accounts for 475,254 jobs (Lamb & Seddon, 2016). Beyond this, average wages in the BC tech sector continue to rise, and individuals working in the sector are paid higher salaries than the average wage in BC. The weekly average salary for tech is 75 percent higher than the average wage in BC, with tech employees earning roughly \$1,590 per week (Duffy, 2017).

Employment in Vancouver's tech sector has followed similar trends to that of BC more broadly. In 1990, the tech sector employed roughly 28,000, and by 2014 this number increased to roughly 58,200. Furthermore, in 2014, 4.5 percent of people employed in the Vancouver region worked in the tech sector, up from 3.7 percent in 1987. Since 2010, approximately 8,000 new jobs have been created in the sector. (Conference Board of Canada, 2016).

The growth of tech firms in Vancouver can be attributed to several advantages of the region. According to a BC Ministry of International Trade report, high tech companies are attracted to Vancouver because of the City's skilled-labour force, BC's favourable tax policy and incentives for businesses, and the strategic location of Vancouver, offering direct access to US markets and a time-zone that makes doing business overseas easier than other regions in Canada (MOIT, 2016). Furthermore, doing business in Vancouver is attractive for firms due to the growing availability and relatively low cost of commercial space in the downtown area compared to competing cities abroad. With a recent surge in construction—millions of square feet are being added over 2015 and 2016 and compared to tech hubs in San Francisco offering office rents at US\$114 per square foot, Vancouver's average of US\$54.50 per square foot is relatively inexpensive (Conference Board of Canada, 2016).

## **The Policy Problem**

Despite the steady growth of the BC tech sector and rise in employment, an important problem is posing challenges to both small start-up companies and well-established corporations in the industry. As it stands, the domestic supply of tech graduates and workers is insufficient to meet future demand and this problem will only get worse over time (ICTC, 2016). Vancouver tech companies currently face a dire problem of finding workers with the right skillsets and talent for their business needs and currently need to fill over 2,000 immediate vacancies and over 15,500 vacancies over the next five years as the sector grows (Gibson & Elbe, 2016). More specifically, businesses in Vancouver's tech sector are having difficulty attracting and retaining executive level talent, preventing them from emerging as dominant players internationally and hindering local economic growth.

## **Current Talent Attraction Policy and Programs**

A full table of current policies and programs in place at the federal, provincial, and municipal levels to attract talent and help grow the Canadian tech sector can be found in Table 1A of the Appendix of this capstone. The table is not exhaustive but serves to illustrate some of the major programs currently in place. Some of the notable programs

included in the table include the Temporary Foreign Worker Program, which allows Canadian employers to hire foreign nationals to fill temporary labour and skill shortages when qualified Canadian citizens or permanent residents are not available (Government of Canada, 2015) as well as the BC Tech fund, which is a \$100-million venture capital fund aimed at stimulating growth in the fast-moving tech sector, creating jobs and strengthening the economy. This fund is part of the BC Tech Strategy (BC Gov News, 2015). While the table shows that there are many policies in place to help scale-up the tech sector and help companies better attract capital and talent, tech companies in Vancouver still have difficulty finding enough skilled talent at the executive level.

## **Review of the Literature**

### **Current Challenges and Options Highlighted in the Literature**

Several key challenges arise in the literature regarding talent attraction to BC tech firms. According to a 2016 report by the BC Tech Association (BCTA), a growing imbalance in talent supply versus demand has led to a slowed growth rate in BC's tech sector (BC Tech Association, 2016). While the demand for labour has remained high due to an increasing number of multinational firms moving to Vancouver and the growth of local tech firms, there have been widening constraints on talent supply. The BCTA's data indicate a labour supply issue as growth in wages has outpaced growth in jobs since 2008. The BCTA points to several reasons for this shortage. First, although BC produces talent each year through numerous tech programs and internationally acclaimed schools, on a per capita basis, the number of students graduating from these programs is lower than in larger provinces such as Ontario, Quebec, and Alberta (BC Tech Association, 2016). Additionally, BC falls behind other OECD countries in terms of the number of technical doctoral degrees granted per capita. In 2014, BC's post-secondary institutions produced approximately 2,200 graduates from tech-related programs (BC Tech Association). According to the BCTA, the rapid expansion of the BC tech sector will result in demand for more than 47,000 additional workers by 2021 but based on current talent availability graduating within BC, only 16,500 of these vacancies will be able to be filled (BC Tech Association, 2017).

Another area posing a challenge for Vancouver tech firms attracting talent is the current visa process for bringing in high-skilled labour from other countries. According to the BCTA, the amount of time that it takes to process work permits for talented workers is often so long (sometimes more than 6 months) that the process becomes a deterrent both for the candidate and the business (BC Tech Association, 2016). A report by the Information and Communications Technology Council (ICTC) also points to Canada's current immigration rules as a challenge for tech firms looking to import talented workers that they cannot find domestically. According to the ICTC, employers in high-demand sectors experience difficulties and delays in getting visas for high-skilled digital talent to come to Canada, both temporarily and permanently (ICIT, 2016). Additionally, the ICTC notes that companies in new and emerging technology sectors experience challenges securing talent because there are few or no National Occupational Classification (NOC) codes to match to particular tech jobs. The NOC coding system has been unable to keep up with the changing nature of the tech sector. The Vancouver Economic Commission has also noted that the necessity for employers to attain Labour Market Impact Assessments (LMIA) to hire temporary foreign workers has increased the processing time and difficulty of attracting foreign talent, and the current \$1,000 cost of filing LMIA may even be burdensome on some growing tech firms (Gibson & Elbe, 2016). The result of these challenges is that talented foreign candidates are overlooked and demand for talented workers at home increases.

In response to these sorts of challenges, countries like New Zealand and Australia have designed immigration policies that encourage and effectively attract talent. In 2015 the United Kingdom launched a new expedited visa process specifically designed to attract highly skilled tech talent (ICIT, 2016). Furthermore, on January 1, 2015 the Government of Canada launched the Express Entry immigration program which expedites the processing time for permanent resident applications to six months and is more demand-driven to meet labour market needs (ICIT, 2016). However, despite the recent enhancements of the program, there is evidence that more improvements are still necessary to ensure that the immigration system is efficient in attracting global tech talent. Nevertheless, companies still find Canada's immigration policies favourable compared to those of the United States. In a *New York Times* interview on the company's decision to expand its Vancouver office, Microsoft's President noted Canada's favourable immigration policies as an important factor in the decision to invest in the office expansion project

(Wingfield, 2016). Moving forward, it has been highlighted that Canada's favourable immigration policies are a benefit that Vancouver tech firms can leverage, especially given the recent discussion of changes to the U.S. H-1B visa program (Elahi, 2017).

Another obstacle for Vancouver tech firms looking to attract talent is the high cost of housing. The benchmark price for a detached home in Metro Vancouver was roughly \$1.48 million Canadian dollars in December 2016 (REBGV, 2016). This compares to \$1.15 million USD in the San Francisco metropolitan area (over \$1.5 million CDN), \$609,000 in Seattle (over \$810,000 CDN), and approximately \$775,000 CDN in Toronto (Zillow, 2017). What heightens the challenge of high costs of housing in Vancouver is that wages in the city are much lower than in other tech hubs in the US. In some cases, an individual working in Canada can make \$20,000 to \$30,000 less for doing the same job that they would in an American city. The average weekly wage for tech employees in California was \$2,778, followed by \$2,507 in Washington and \$2,152 in Colorado – all of which are significantly higher than the average weekly wage of \$1,580 in BC (BC Tech Association, 2017). The reason for this discrepancy in wages has much to do with the size of the firms located in Vancouver compared to US tech hubs. Many of the firms in Vancouver are smaller firms that are still growing. They are unable to compete with the high wages of international firms due to their smaller size. Beyond this fact however, many industry representatives argue that housing costs are a non-issue. Dennis Pilarinos, CEO of Buddybuild, a Vancouver maker of developer tools for mobile apps and former employee at both Microsoft and Amazon in Vancouver, says that housing affordability is less a problem for younger tech workers willing to rent smaller apartments, condos, or live with roommates. Where the big problem arises is when a company is looking to hire a senior executive living with a family. These individuals more often want detached homes, not apartments, and this is where housing costs weaken the city's draw of talent (Wingfield, 2016).

Lastly, Canada's venture capital pool remains small relative to international competitors, and this has been highlighted as a challenge for tech firms looking to grow and bring in talented workers. According to the BCTA, BC does have a fairly healthy local angel network, and access to capital has been increased in recent years due to major investors coming from areas such as Silicon Valley (BC Tech Association, 2016). Programs including the federal government's 2013 Venture Capital Action Plan, deploying



\$400 million in new capital, and BC's \$100-million technology and innovation venture fund help finance first-round funding for new and emerging tech firms. Furthermore, BC has increased the amount of capital investments in recent years from both domestic and foreign sources (BC Tech Association, 2016). However, relative to other thriving tech hubs including those on the US Pacific Coast, BC's venture capital pools are small. In particular, it is difficult for tech firms to attract stage-two capital financing, making it challenging for small tech firms to grow and draw new talent. The BC Technology Industry Association (BCTIA) also highlights three key issues regarding access to venture capital in the province, arguing that: 1) "industry and Government need to help companies get 'investment ready' and better attract foreign investors"; 2) "policies that penalize companies for accepting foreign investment must be reviewed and unnecessary barriers to foreign investment in Canadian Venture Funds removed"; and 3) "foreign venture capital investment needs to be encouraged through co-investment programs similar to the BC Renaissance Fund" (BCTIA, 2014).

Overall, by implementing innovative policy solutions and taking advantage of Canada's welcoming immigration system, Vancouver, and other tech hubs in Canada, can be put in better positions for growth and future success.

## **Chapter 3. Methodology**

The methodology for this study involves a jurisdictional scan and semi-structured interviews with subject-matter experts, government officials, business associations, and individuals from tech firms.

### **Jurisdictional Scan**

The jurisdictional scan component of this study used existing literature, studies, and reports exploring the strategies, policies, and programs that have been implemented in other tech hubs to attract talent and how well those strategies have worked. This study specifically focused on North American jurisdictions, including Seattle and Toronto to gain insights on how their policies influenced the attractiveness of those regions for talented employees. Information gathered from the jurisdictional scans helped inform policy options for best strategies to attract talent to Vancouver tech firms.

The data collected for the jurisdictional scans was primarily collected through online search engines and articles attained through the university library as well as information posted on government webpages, company websites, and webpages of non-governmental organizations.

### **Stakeholder Interviews**

Interviews were conducted with individuals who were experts on subjects relevant to this capstone. The pooling size of interviews included 8 participants. The interviewees were drawn from three pools: one group consisted of representatives from tech firms in Vancouver; the second group consisted of government officials; and the third group consisted of Vancouver business associations/others. Participants were interviewed according to their professional role in their respective organization and obtained permission from their organization to share information.

Interview data helped to strengthen my understanding of the challenges tech firms in Vancouver face in attracting talent. Additionally, interview data was used when

evaluating and analyzing policy options. Before candidates were interviewed, a preliminary set of policy options were developed so that interview participants could weigh-in on the benefits and deficiencies of each option.

Potential interviewees were identified through publicly available information and contacts made through my previous work experience at Western Economic Diversification Canada. Participants were contacted via email with a description of the project and asked if they would be willing to be interviewed. Once a potential candidate indicated their willingness to participate in the study, they were provided with a consent form. All interviews were conducted in person or via telephone. The target length of interviews was between one-half and one hour. Furthermore, a semi-structured interview format was used in order to gain a fuller understanding of discussion topics and to encourage open dialogue with participants. In order to ensure that ethics provisions were followed, participants were given the option to have their name and organization name remain anonymous.

## **Policy Analysis Through the Use of Criteria and Measures**

A specific set of criteria and measures were designed to analyze policy options for achieving the goal of helping Vancouver's tech sector to better attract executive level talent. The main societal objective used for the development of criteria was the overall effectiveness of the policy in both the short and long term in helping tech firms attract talent. For a full list of the criteria and measures used see Chapter 6.

## **Project Limitations**

It is important to identify the limitations of this research. One of the major areas impacting the ability of tech firms in Vancouver to attract highly skilled talent is the cost of housing. This problem was identified early in the study, but it was purposefully set aside for the following reason. The intent of this capstone was not to look at policy options for housing affordability in Vancouver, but rather to hear from the tech sector about the challenges that they face and to recommend practical and impactful policy solutions moving forward. It is recognized that solving Vancouver's housing price challenges would have massive impacts on the ability of tech firms to attract talented workers, but for the

purpose of this project, it was beyond the scope. However, moving forward it will be necessary for the tech sector to work closely with the City of Vancouver to tackle affordability issues and advocate for policy change. Several promising policy options have been created by policy experts and researchers in the field including policies such as a speculation tax, increased construction of housing units, increased density and inclusionary zoning, and the shift toward a progressive property tax. With these potential changes and the recommendations made in this capstone, it is hoped that Vancouver tech firms will have an increased ability to attract highly-skilled digital talent moving forward.

It is also important to note that information is limited and some of the policy options reviewed in this capstone have not been done in other jurisdictions. This makes measuring their effectiveness difficult. As with any policy that the government seeks to implement, conducting pilot programs of the policy options would help significantly strengthen the analysis and comparison of policy options. While this capstone was unable to implement pilot programs, future research may be able to follow this approach to produce a more rigorous analysis of policy options.

## **Chapter 4. Jurisdictional Scan**

Government and industry-led programs and policy have a large influence on the success of a regional economy and the growth of a particular sector. This section will examine the successes and failures of talent attraction policies in various jurisdictions. The jurisdictional scan helps reveal insights into which policies being used outside the Vancouver context have been successful in attracting talent to those regions. For this capstone, the scope of the jurisdictional scan has been narrowed based on literature findings of the best talent attraction policy options. The jurisdictional scanning process focuses on three key areas of policy including: immigration policy; education policy; and the role of venture capital in talent attraction. It is important to note however, that there are many factors that make certain regions attractive to talented workers that cannot be ignored. Some of the factors noted in the literature include: quality of life (University of Twente, n.d); employment opportunities; learning opportunities within the workplace; a developed clustering of like-businesses in the region; the presence and quality of local universities (Miguélez & Moreno, 2013); community safety, and so on. While the natural beauty or high quality of life in a particular region may contribute to an individual's decision to seek employment in a certain destination, this capstone will focus on drivers of attractiveness that can be manipulated more easily through policy changes.

### **Seattle**

According to CBRE's 2016 Tech Talent Scorecard, Seattle sits third in North America in terms of tech talent attraction (CBRE, 2016). The city is home to several large tech giants including Microsoft, Amazon, Facebook, and Expedia, among others. These anchor companies have helped the city attract talented workers and have led to impressive tech clustering, spin-off corporations, and growth in recent years. This has been foundational to Seattle's ability to attract talent as global competition increases, but how do factors such as immigration, education, and venture capital play into Seattle's ability to attract talented workers within the tech sector?

## **Immigration Policy in the USA**

The major immigration program used by tech employers in the United States when attracting talented workers to their companies is the H-1B visa program. This program enables U.S. employers to recruit foreign workers in specialty occupations for a short period of time. A “specialty occupation” is defined as requiring theoretical or practical application of a body of highly specialized knowledge in fields including but not limited to biotechnology, chemistry, architecture, engineering, medicine, and requiring the attainment of a bachelor’s degree or equivalent educational minimum (US Citizenship and Immigration Services, 2016). Tech companies in Seattle have relied on the H-1B visa program to attract specialized talent from overseas and to fill gaps in highly demanded positions. Microsoft asserts Washington State has 25,000 unfilled jobs as a direct result of the skills gap, and they expect that this talent deficit will double in 2017 (Washington Compact. (n.d.)). Employers in the Seattle-Tacoma-Bellevue metro area have filed an average of 9,633 H-1B visa requests annually, ranking 10th nationally in total applications (Bhatt, 2012). Several large tech companies have relied heavily on the program but this has come with criticisms over not hiring local talent. For example, Seattle-based Amazon sponsored 1,693 foreign employees through the H-1B visa program with an average salary of \$116,000 USD in 2016 (2016 H-1B Visa Report, 2016). While critics of the H-1B visa program note that companies use the program to bring in lower-paid workers, tech companies have argued that the skills they are bringing in are in high demand and beneficial to the local economy. Tech companies have argued that highly talented foreign employees bring valuable knowledge and skills to U.S. companies that are essential in order to compete in the global market. When surveyed, 52 percent of tech companies said that each employee sponsored through the H-1B program creates one or more complementary job, while 22 percent said that each hire creates at least ten jobs. (Jayapal & Curry, 2009). Overall, the H-1B visa program has enabled tech companies in the Seattle area to fill gaps in highly skilled talent, helping companies draw on diverse ideas from across the world and grow businesses internationally.

## **The Local Education System**

Another attribute of Seattle’s success in growing as a global tech hub and attracting highly specialized talent, is the City’s close proximity to, and quality of, world-renowned educational institutions such as the University of Washington, Seattle

University, Seattle Pacific University, and others. According to Richard Florida, head of the Martin Prosperity Institute at the Rotman School of Management at the University of Toronto, universities play an important role in attracting talent, developing technology, and ensuring tolerance in economic development (Florida, Gates, Knudsen, & Stolarick. 2006). According to Florida, educational institutions serve three important roles in economic development. First, as major beneficiaries of Research & Development funding from both private and public sources, and as vital sources of knowledge and spin-off companies, educational institutions are often leaders in technological innovation. Next, universities directly attract faculty members, researchers, and talented students, while also indirectly drawing other highly educated, talented, and entrepreneurial people and firms to locate nearby, in order to draw upon the universities' many resources (Florida, Gates, Knudsen, & Stolarick. 2006). Lastly, the educational facilities help mold regional environments to be open to new ideas by attracting students and faculty from diverse racial and ethnic backgrounds, economic statuses, and worldviews, which generates places where talented people are able to encourage open thought, new ideas, and experimentation.

Across Washington State, colleges and universities are working hard to meet the market's appetite for people trained in computer science and high skilled digital degrees. Seattle has one of the most well-educated populations in the United States, with more than 50 percent of the population holding a bachelor's degree or higher (Cornwell, 2017). Approximately 25 percent of Washington high schools offer Advanced Placement (AP) computer science classes, and nearly 2,000 students wrote AP exams in computer science in 2015 (Cornwell, 2017). As legislators have witnessed the growing demand for technical skills in education, changes were implemented in 2016 to have Washington schools adopt computer science standards based on the ones developed by the national Computer Science Teachers Association (Cornwell, 2017). The new standards will introduce fundamental computer science concepts to all students and encourage schools to offer more high-level computer science courses and rigorous course content. Additionally, post-secondary institutions are creating new programs and related majors, increasing hiring of professors, and constructing new buildings to grow programs and technology related departments (Long, 2016). At the University of Washington, student interest in taking introductory computer-science courses has soared and in 2015, 3,000 students were enrolled in the first of two computer-science introductory courses - hundreds more than were signed up in 2014 (Long, 2016). Growing demand for high-tech

skillsets has led universities to work more closely with local businesses and tech firms as well as invest millions of dollars to expand their teaching capabilities in these fields. For example, the Central Washington University has made an investment of \$64.5 million to build a space to host programs in computer science, mathematics, and information technology. Furthermore, The University of Washington's Computer Science & Engineering program is consistently considered one of the top 10 Computer Science programs in the United States enrolling nearly 40,000 students across its three campuses (Seckinger, 2014).

Beyond these investments, Washington State post-secondary institutions actively help grow technology businesses in the State and draw talent from other regions. The University of Washington is among the top three universities in the United States for technology start-ups; in 2016 it launched 21 start-up companies (University of Washington, 2016). The University of Washington's Seattle campus had a combined direct and indirect economic impact of \$6.0 billion USD, an employment impact of 38,241 jobs, and a government revenue impact of \$272.5 million on the City of Seattle in 2014 (University of Washington, 2014). Overall, educational institutions in Washington State, and particularly those clustered around the Seattle area, have spurred economic growth, innovation, and talent attraction.

## **Venture Capital in Seattle**

The amount of venture capital (VC) investment in an area brings more than just financial backing to a company looking to grow. Ferrary and Granovetter (2009) explore the ways in which VC investments in Silicon Valley have helped grow the area's tech cluster and strengthen innovation, talent attraction, and competitiveness. They argue that VC investment in a company sends positive signals to other agents, and this makes the company more attractive with more people wanting to connect with it. Furthermore, they argue that venture capitalists bring entrepreneurial knowledge, expertise, and most importantly contacts to a company. Venture capitalists are able to nurture close ties with an industry and have the ability to help growing firms recruit talent more easily and find the right talent for the specific positions needing to be filled. Seattle was ranked as the 6th largest VC ecosystem in the United States in 2015, and since 2010 \$8.5 billion has been invested in Seattle-based companies in over 1,717 deals (No Author, 2016). This



level of VC investment has made the city a hotbed for attracting talent, and this can be seen in the recent growth of Seattle's tech industry and talent pool.

## **Toronto**

According to CBRE's 2016 Canadian Tech Talent Scorecard, Toronto sits in first position in Canada in terms of tech talent attraction (CBRE, 2016). In the past five years, tech employment in Toronto has grown by 35.6% and as of 2015, nearly 180,000 tech jobs existed in Toronto. Toronto's tech employment contains 25% of Canada's total tech talent base and the city is home to several large tech companies and development offices. Amazon currently houses a development office in Toronto, and other companies continue to grow in the city including IBM, eBay, PayPal, Kijiji, Ubisoft, and others.

## **Immigration Policy in Canada**

Canada relies on several immigration programs to draw foreign talent to the country each year, but the Express Entry program and the Temporary Foreign Worker Program are used most heavily by businesses in the tech sector to bring in high-skilled labour. Canada's Express Entry program is designed to select skilled workers for immigration to Canada and is used to manage applications for permanent residence under the following federal economic immigration programs: The Federal Skilled Worker Program; the Federal Skilled Trades Program, and' the Canadian Experience Class (Government of Canada, 2016). The goal of the program is to connect employers with talented employees quicker than traditional immigration procedures. Under the Program, applicants submit a profile into a pool, as well as the Canada Job Bank where employers are able to review the job bank and provide job offers to candidates. Once a candidate has an approved job offer, they are able to formally apply for permanent residence in Canada through an expedited process (Liwanag, 2015). As of January 3, 2016, 21,562 candidates in the Express Entry Program were invited to apply for permanent residence, and 9,739 admissions were approved (Government of Canada, 2016). Alberta (7,996), Ontario (7,348), and British Columbia (4,384) were the provinces with the most applications to the Program. Four of the ten top occupations accepted to the Express Entry Program were in the tech sector including computer engineers, computer programmers and interactive media developers, graphic designers and illustrators, and information

systems analysts and consultants (Government of Canada, 2016). Unfortunately, data on the number of Express Entry applicants working in Toronto's tech sector was unavailable at the time of writing this report.

The high-skilled workers stream of the Temporary Foreign Worker Program (TFWP) is another immigration program used by Canadian tech companies to attract necessary foreign labour. The TFWP allows Canadian employers to hire foreign nationals to fill temporary labour and skill shortages when qualified Canadian citizens or permanent residents are not available, pending an employer submitting a Labour Market Impact Assessment (LMIA) for certain occupations (Government of Canada, 2015). In 2016, according to Immigration, Refugees, and Citizenship Canada, a total of 15,871 high-skilled individuals were granted work permits under the TFWP (Government of Canada Dataset, 2016). Companies in the tech sector claim that having reliable and ready access to qualified foreign skilled labour through the TFWP is necessary for their growth and success. However, several major complaints against the program have arisen from within the tech community. There is already evidence suggesting that the number of temporary foreign workers being accepted to work in Canada has decreased and this reduction may not be limited to low-skilled workers (The Canadian Chamber of Commerce, 2016). Between 2013 and 2014 there was a 40 percent drop in the number of high-skilled permit holders and a 45 percent drop in positive LMIA's which are necessary to hold a legal work permit (The Canadian Chamber of Commerce, 2016). Employers in high-demand sectors experienced challenges and delays getting visas for high-skilled (whether permanent or temporary) digital talent and companies in emerging tech sectors are having complications securing talent because there are few or no National Occupational Classification (NOC) codes to match to these newly created jobs. Consequently, these jobs and the potential foreign candidates applying to them get overlooked, and the demand for labour those specialized areas continues to grow. These challenges hinder a company's ability to be competitive in attracting highly educated digital talent when it is not available in Canada (ICTC, 2016). Overall, while the Express Entry Program and the TFWP have enabled tech companies in Canada to help fill gaps in highly skilled talent, several key challenges still exist.

## The Local Education System

A key aspect of attracting top tech firms to an area is high educational attainment (minimum university undergraduate degree). In Canada, all of the top markets for tech talent attraction had an educational attainment level above the Canadian average of 28 percent. In Toronto, 38.6% of the City's population report having high levels of educational attainment – this compares to 36.3 percent of the population with high educational attainment in Vancouver (CBRE, 2016). Toronto is home to world-class educational facilities and there are many post-secondary institutions close to the Greater Toronto Area that help improve the local talent base. Among the top universities in the area are the University of Toronto, York University, the University of Waterloo (located just over one hour from Toronto), McMaster University, the University of Guelph, Ryerson University, and Humber College Institute of Technology & Advanced Learning. The University of Toronto consistently ranks as the top Canadian research university and according to the *Macleans* university ranking, the University of Toronto is Canada's top computer science university followed by the University of Waterloo (Macleans, 2015). The World Economic Forum ranked the University of Toronto's computer science program the seventh best in North America and eleventh in the world, surpassing rivals such as UCLA, Hong Kong University of Science and Technology, and the University of Tokyo (Province of Ontario, 2016). The University of Toronto also boasts a strong draw on international talent, attracting more graduate students than any other university in Canada. In 2012-2013, 14 percent of the University of Toronto's graduate students came from abroad (University of Toronto, 2013). U of T is also well connected with Toronto's local tech industry and has been able to commercialize student ideas and create spin-off companies. In 2012, the U of T began a new \$210-million partnership with the tech industry through the Southern Ontario Computing Innovation Platform. The partnership established a supercomputing network and was created with the support of IBM and both the federal and provincial governments (University of Toronto, 2013). Furthermore, the University works with the MaRS Discovery District and MaRS Innovation to share resources and expertise to leverage the commercial potential of U of T student and faculty innovations. To date, several tech start-ups have come out of these programs including Whirlscape, Snowbush IP, Sysomos, DNN Research, and others (University of Toronto, 2013). Overall, U of T and surrounding universities have bolstered the talent pool in the GTA and have led to increased tech clustering and local innovation.

## Venture Capital in Toronto

As noted above, VC investment in an area brings financial resources, entrepreneurial knowledge, and important contacts to a company and sends positive signals to other agents that a company is likely to succeed. The resulting impact of VC investment is that a company can gain close ties with an industry and have the ability to recruit talent more easily and find the right talent for specific positions. (Ferrary & Granovetter, 2009). Toronto is currently ranked 12<sup>th</sup> in the world in terms of VC investment in high-tech start-ups. According to data collected by Thomson Reuters to track worldwide VC investments in tech, Toronto drew \$626 million in high-tech VC investment in 2012 (Florida, 2016). While VC investment is relatively strong in Toronto, there remain problems with VC in Canada as a whole. The VC pool in Canada is still small, which has resulted in the need to access larger rounds of funds from overseas. However, Canadian regulations make attracting VC from abroad difficult. The main challenges are policies that penalize companies in accepting foreign investment and other barriers to foreign investment (BCTIA, 2014). One example arises with the government's successful Scientific Research and Experimental Development (SR&ED) tax credit program. Companies that attract foreign investment can be penalized by losing their Canadian Controlled Private Corporation (CCPC) status, which affects their benefit structure for SR&ED credits (BCTIA, 2014). Overall, this leaves some companies to choose between attaining higher SR&ED benefits or foreign capital investment.

## Chapter 5. Interview Results

A main source of primary data for this capstone consisted of interviews with government officials, business associations, and tech firms in Vancouver. Table 1 lists the interviewees and their affiliations. Analysis of the results of these interviews is provided through a thematic approach. I will give a brief overview of the interviewees' responses to my questions and describe some of the themes that were drawn out of interviews. Not all of the responses to my questions are included in this section. Rather, the most relevant responses are provided. For this capstone, comments are not attributed to individual interviewees but are generalized into each category.

**Table 1: List of Individuals Interviewed**

Category	Name	Organization	Position
Government	Anonymous	Western Economic Diversification Canada (WD)	High Level Senior Official
Business Organizations and other experts	Jason Tse	HQ Vancouver	Director, Business Development
	Dan Baxter	BC Chamber of Commerce	Director of Policy Development, Government & Stakeholder Relations
	Anonymous	University of Toronto	Professor
Tech Firms	Anonymous	Large tech company in Vancouver	Talent Acquisition
	Sam Chandola	V2 Games	CEO
	Anonymous	Medium size tech company in Vancouver	Head of People and Culture
	Anonymous	Mino Monsters Games	N/A

## **Overview of Individuals Interviewed**

### **Overview of Government Official Interviewed**

One high-level senior official from Western Economic Diversification Canada (WD) in Vancouver was interviewed to gain a government perspective on the policy problem that this capstone is addressing. WD works to diversify the western economy while improving the lives of western Canadians. The aim of WD is to focus on business development, innovation and community development (Western Economic Diversification Canada, 2017). WD falls under the ministry of Innovation Science and Economic Development and reports to Minister Navdeep Baines. The government official interviewed at WD has extensive knowledge of federal policy as well as the business community in Vancouver. Additionally, this interviewee helped provide insights on what policies would be most feasible and would align well with the federal governments' new Innovation Agenda.

### **Overview of Business Organizations and Other Experts Interviewed**

Business associations and other experts in the field of technology provided key insights into the challenges and opportunities that Vancouver's tech companies face. Two of the business associations interviewed (HQ Vancouver and the BC Chamber of Commerce) work closely with Vancouver tech firms and have knowledge of the Vancouver business community. HQ Vancouver is a private-public partnership sponsored by the Federal and Provincial governments through WD and the BC Business Council. The mandate of HQ Vancouver is to attract more company headquarters to Vancouver, with a focus placed on attracting international companies. To date, HQ Vancouver has attracted over a dozen companies to Vancouver and a good portion of those businesses have been in the tech sector. Conversely, the BC Chamber of Commerce represents over 125 Chamber of Commerce and Boards of Trade across British Columbia and works closely with over 36,000 businesses in the province. The BC Chamber has extensive knowledge of businesses and sectors in BC and Vancouver and helped illuminate broad themes and concerns from within Vancouver's tech cluster.

Beyond these two business organizations, an interview was also conducted with a professor at the University of Toronto specializing in clusters, innovation systems, and knowledge-creation.

## **Overview of Tech Companies Interviewed**

Interviews with individuals employed at Vancouver tech firms provided first-hand data regarding the challenges that firms face attracting talent and how certain government policies impact their ability to attract talent. Interviews from one large, one medium, and one small tech company were completed. The participant from a large tech firm works specifically on talent acquisition at a large company in Vancouver and had extensive experience working in talent recruitment at other tech firms in Vancouver. Furthermore, this company has a large international presence and the interviewee could provide insight into the challenges that large firms face in attracting talented workers. Sam Chandola, CEO of Vancouver's V2 Games, was the second individual interviewed representing a small tech company. He was able to provide insights on the challenges that a smaller company faces in attracting talent. An anonymous participant from a medium sized tech firm in Vancouver was able to give perspectives from a firm looking to scale-up. Additionally, I interviewed a participant who had relocated their tech company from San Francisco to Montreal. This individual provided perspectives on the benefits of operating in Canada and the challenges that Canadian tech companies face in attracting VC and bringing in TFWs relative to firms operating in the United States.

## **Interview Results and Themes**

### **Challenges Attracting Executive Level Talent**

My first area of questions asked interviewees about the current ability of Vancouver tech firms to attract highly-skilled workers. Across the board, all interview participants agreed that businesses have difficulty attracting talented workers to positions that require highly-skilled and specialized labour, particularly software engineers and individuals in executive positions. The senior level official from WD noted that they have heard from executives, industry associations, and investors that gaps in talent are a concern in the tech sector and that it is overwhelmingly difficult for firms to attract individuals at the "C-

Suite” level. Participants highlighted an example of how the Vancouver tech company Avigilon allowed an individual that the company was headhunting to work remotely full-time so that the company could assure that that they could bring a talented individual onto their team to fill an executive position. Participants interviewed from Vancouver tech firms also noted challenges attracting top-level talent. Sam Chandola, CEO of V2 Games, noted that while he has not faced the difficulty of attracting executive level talent because his company has not yet grown to the point where it needs staff at that level, he anticipates that it will definitely be a problem for him in the near future. Furthermore, tech sector interviewees shared experiences from their peers in the sector, echoing similar challenges trying to bring executives to Vancouver. Interviewees noted various reasons why it is difficult for Vancouver tech companies to attract talent as well as why people look to relocate to Vancouver from other tech hubs. These results are explored below.

### **Cost of Living and Housing Prices may be Hindering Talent Attraction**

One of the top reasons noted by interview participants for the difficulty of attracting talented workers was the cost of living in Vancouver. Interviewees from business associations, the government, and tech firms all noted that housing prices were a factor in hindering the ability of firms to attract executive level talent – especially when a potential candidate must relocate their entire family to Vancouver. V2 Games CEO noted that he has heard from his peers and other tech firms in Vancouver that the housing market is one of the biggest challenges for companies trying to bring talent from overseas. Compensation at Vancouver tech firms is much lower than in many US hubs and many people looking to be recruited to Vancouver can expect a big hit in pay when they arrive. There were, however, responses across most interview participants that while housing prices are a barrier to talent attraction, it is often an overblown issue. An anonymous participant in talent acquisition at one of Vancouver’s large tech firms noted that the cost of housing in many US tech hubs like San Francisco, Los Angeles, and Silicon Valley are comparable or more expensive than in Vancouver, and companies in Canada are able to leverage cost savings from the Canadian healthcare system when recruiting talent from the US. This participant noted that many times they have expressed to candidates in Seattle and Los Angeles looking to transfer to the company’s Vancouver office that they could save between \$15,000 and \$20,000 in healthcare expenses per year and this has created more willingness to accept lower compensation packages in Canada. A participant



from a Montreal tech firm noted that they specifically relocated their business from San Francisco to Canada due to lower costs of living and taxes in Canada. Furthermore, the participant from the BC Chamber of Commerce articulated that while housing prices in Vancouver are high, there has not been any indication that prices are hurting the ability of tech firms to grow but instead, businesses in tech are still growing and setting up in Vancouver. Beyond Vancouver's expensive housing market, it was noted that Vancouver does have several advantages that can be capitalized on including: a favourable tax environment compared to American cities, comprehensive health care, safe communities, and favourable immigration policies for both foreign students studying in Canada and individuals looking to work in Canada temporarily.

### **Limited Availability of Venture Capital**

Another challenge raised by interview participants was that tech firms in Vancouver have greater difficulty acquiring VC investments at the early stage and this limits their ability to bring in talent down the line. Sam Chandola from V2 Games noted that it is "definitely" a challenge for companies in Vancouver to gain access to early stage Venture Capital. Some of the reasons participants highlighted for this limited access to VC included the relatively few VC firms in Vancouver relative to their US counterparts, less risk appetite in Vancouver's business community, and that many local investors are not educated in the tech sector. One of the policy suggestions mentioned by an anonymous representative from a large Vancouver tech firm when asked if there were any areas that government should focus on to help facilitate talent attraction and growth in the tech sector was increased access to VC, particularly foreign VC and not penalizing firms from accessing foreign capital. Tech firms noted that a company is much better connected when they have VC on their side. One of the key benefits of attaining VC was having access to a wider network of talent and larger organizations as a company grows. "VCs know other VCs that have invested in successful companies and this tends to open up doors" and "VC gives you access to the rolodex" noted an anonymous participant. Overall, VC access was one of the areas revealed through interviews as needing improvement. Having increased VC access not only means greater financial support for a company, but also increased access to talent networks, partnerships, and future support. Given that Canada has limited VC and that the appetite to provide VC in Vancouver is relatively low, seeking out foreign VC seems to be an alternative for many companies.

## **Need to Alter TFWP to Meet Needs of Tech**

Another theme that arose through the interview process was the importance of the Temporary Foreign Worker Program (TFWP) in attracting highly skilled labour to Vancouver's tech sector, but that the current program needs many changes. The senior level executive from WD noted that there is an important role for the TFWP in Canada for the attraction of highly-skilled talent in the tech sector. One participant noted that while policy needs to be focusing on educating Canadians to encourage local hiring, there is a talent gap that temporary foreign workers (TFWs) help to fill. Nearly all interview participants contended that when a company is able to bring in one highly-skilled TFW to work on a certain project, this can create spin-offs such as additional local jobs. "We are able to preserve 80% of Canadian jobs by bringing in 20% foreign talent" for particular projects in the tech sector, noted one participant. In general, it was argued that by enabling tech companies to access highly skilled foreign talent, Canadian jobs are preserved. However, interview participants noted several key areas of the TFWP that could be changed to help increase the ability of companies in the tech sector to attract talent.

## **The Need for Industry Knowledge Within the Civil Service**

A key area highlighted as important for improving the TFWP was having civil servants with an understanding of how the tech sector works in processing TFW visa applications. Most of the tech companies interviewed argued that having some sort of separate division within the civil service with knowledge of the tech sector to review and process TFW visa applications would be beneficial. In particular, tech companies felt that this would dramatically reduce processing times of visa applications – an area that has been a challenge for many companies. "The biggest challenge is that a few months in tech [to process a visa application] is a long time in tech," noted one participant. "Having people who just understand [tech] is going to make a massive difference". Another participant noted that "once you have proven you have had a posting up for four to six weeks, if the government could have a team that could approve an application [TFW visa] within five to ten days... that would be a huge advantage for us. We have had cases where candidates were in limbo for six to eight months." Another participant noted that the interaction between companies and civil servants reviewing TFW visa applications needs to be more "communicative" and that a designated high-tech visa office would be beneficial in this regard. Overall, the consensus arising from all the tech companies interviewed was that

the current process is opaque. Many find it necessary to hire a lawyer to ensure that a visa application is filled in correctly because there is little to no communication with visa processing officials. This gap has made applications time consuming and unclear for many tech companies.

## **The National Occupational Classification (NOC) Codes Do Not Reflect Realities of the Tech Sector**

Participants from WD, the BC Chamber of Commerce, and three of the four tech companies interviewed raised the same concerns that the NOCs system is out of touch with the realities of the tech sector. When a company submits a Labour Market Impact Assessment (LMIA) as part of the process of bringing in a TFW, a company must first post the job on a Canada-wide hiring board to ensure that Canadian candidates are not being overlooked in the hiring process. All jobs on the Canada-wide posting board are classified and sorted by occupation and type by use of the NOCs system. The idea behind the NOCs system is that a company can classify a job under a particular code and candidates with those designated skillsets and with experience within that occupation will be able to find and apply for the job more easily. Unfortunately, given that the tech sector is rapidly changing and skillsets are constantly evolving, the NOCs system has not been able to keep up. One participant noted that the NOCs system was “inflexible and out of date.” To overcome this, an interviewee suggested a “tech sector carve-out of some kind, in which a LMIA would be assessed by staff with actual knowledge of the tech sector.” Another participant noted that they have heard from several business members that the NOCs system does not work and that it is a “blunt instrument”. It was noted that there is potential for none of the predefined NOCs codes to include the skillsets that some businesses are looking to attain. Tech companies also expressed that NOCs are out of “touch with reality”. One tech company when referring to NOCs said, “a big problem is the NOC codes, they are just completely off... you still have programming languages on there that are not even running anymore... So having a specific immigration team and someone on that team who knows about tech and recent languages and where the future of tech is [would be important]”. Another noted that “it is extremely challenging to try to fit tech jobs which are extremely flexible and changing all the time into specific job [NOCs] categories. It might work for other industries, but for tech I don’t think that the NOC system is actually working”.

## **Need to Focus on Educating Canadians in Tech**

The final theme that arose throughout the interviews was the importance of supporting educational changes that encourage improved tech education. Interview participants from both HQ Vancouver and the BC Chamber of Commerce noted the importance of increased tech education in BC. One participant argued that gaps in tech talent could be filled if BC's educational system were able to develop senior level talent locally. It was argued that, "we need an educational system that teaches students the skillsets they need to fill positions when they become available" and "training starts at a young age and impacts the ecosystem down the line." Another participant said that the "province's new focus on coding is smart" but that coding education is not the "be all and end all to fill the talent gap" because BC schools are still unable to produce enough grads in tech than are expected to be necessary over the next decade. The senior level government representative from WD stressed the long-term importance of an educational system that is able to produce students that are adaptable and technically skilled. One of the reasons this individual said Sony Image Works decided to relocate to Vancouver was because of the quality of students that BC universities and colleges were producing, specifically those with the latest skillsets. This participant warned against Canada relying too much on TFWs to fill skills gaps in the future and said that the education system is where change should be made. An interesting suggestion was the implementation of entrepreneurial education into the BC curriculum. According to the government official, studies have shown that students coming out of these programs score particularly well in areas like tolerance to ambiguity, readiness to fail, stress management, and willingness to seek out advice – all indicators of that people will be more resilient, flexible, and adaptable when they enter the workforce. Responses from interviewees representing tech firms seemed to indicate that these skillsets are important. One respondent said that what BC needs is an "education system that gets people in touch with entrepreneurship, either in terms of mock projects or real projects". This same respondent said that "at the end of the day, what you really want, especially at the executive level is not to have people act like employees, but to have people that are trained up as entrepreneurs and thinking about how to create value". The participant from U of T noted that an area where the University of Waterloo has been very successful has been in its co-op programs. The result of the University of Waterloo's co-op programs has been numerous university spin-offs and knowledge spillovers. Participants from the tech sector noted that graduates coming out

of tech programs are often well trained and more in tune with the realities of the industry. They noted that strong co-op programs would be important in building a strong talent base into the future.

The results of the interviews and findings in the literature have substantially shaped the policy options presented in the upcoming section. Additionally, the results drawn from the interview process highlight many of the challenges that Vancouver tech firms face when they are looking to attract talented workers to their organizations.

## **Chapter 6. Policy Options**

Based on information arising in the literature and through expert interviews, three policy options have been identified to help Vancouver tech firms better attract talented workers, particularly at the executive level. These policy options include supporting BC's new K-12 educational changes in computer coding, changes to the federal Temporary Foreign Workers Program, and changes to the SR&ED tax credit regarding foreign Venture Capital investments in Canadian businesses. These options are explored below.

### **Supporting BC's new Changes in Education: Coding in Schools**

As noted in the literature, a strong education system not only produces talented future citizens, but it also helps attract talent from other regions and creates a more adaptable and flexible labour force. As noted by Richard Florida, strong educational institutions serve three important roles in economic development. They are major beneficiaries of Research & Development funding and vital sources of knowledge and spin-off companies that help increase technological innovation. They directly attract faculty members, researchers, and talented students, while also indirectly drawing other highly talented and entrepreneurial people and firms to locate their businesses nearby. Lastly, educational facilities help mold regional environments to be open to new ideas by attracting students and faculty from diverse racial and ethnic backgrounds, worldviews, and national origins. These factors ultimately help generate places where talented people are able to encourage open thought, new ideas, and experimentation (Florida, Gates, Knudsen, Stolarick, 2006).

As technology continues to evolve and computers become increasingly important in the function of daily society, the education system must adapt and evolve. In January 2016, the BC government unveiled plans to introduce computer coding into the school curriculum for all BC students. The plan will ensure that every kindergarden to grade 12 student has the opportunity to learn the basics of coding and computer technology (Silcoff, 2016). The new curriculum will be introduced over three years and will feature new standards for mathematics and sciences as well as a new "applied design, skills and technologies" (ADST) element to strengthen students' abilities to problem solve and think

critically. The plan has been highly praised by Canadian tech entrepreneurs. However, elements of the educational system could be improved to help BC and Vancouver tech companies compete more effectively, grow local talent, and grow economically.

## **Policy Option to Support BC's new Changes in Education**

The first policy option focuses on growing local talent to fill Vancouver's tech talent gap. The option includes a two pronged focus: one to complement the new K-12 curriculum changes being introduced by the BC government, and the second to ensure that students graduating from post-secondary institutions with degrees in technology possess the skills companies are looking for straight out of school. This policy option is drawn from the BC Tech Association 4-Point Plan for growing BC's tech ecosystem, released in October 2016.

- 1) Supporting BC's educational system with improvements including:
  - Financial investments to prepare and train school teachers and the creation of partnerships with industry to leverage tech experts to help build curricula and continually update curricula as technology changes.
  - Revamping of post-secondary co-op programs to increase experiential learning in tech related programs. Co-op placements should be made mandatory for tech relevant programs and the number of co-op terms should be extended for students.

## **Updating the Temporary Foreign Workers Program**

For many executive-level positions that require highly specialized talent, it is often difficult for tech firms to hire local workers with the exact requisite skillset. As coding languages are constantly changing and certain areas of the world specialize in narrow areas of technology, the ability of a company to hire a highly-skilled foreign worker on a temporary basis, or one of a handful of workers worldwide with a particular skillset, is essential for company growth and innovation. Canada's current Temporary Foreign Worker Program must be updated to reflect the realities of the tech sector.

## **Policy Option to Update the TFWP**

- 1) Create a High-Skilled Tech Visa Office for temporary workers coming to Canada working in the tech sector and have public servants trained and able to understand the needs of the technology sector. With a division of public servants specifically focused on processing tech visas, processing times will be reduced for companies looking to bring in high-demand temporary workers and they will not lose out on talented workers.
- 2) Re-evaluate the National Occupational Classification codes so that they reflect the requirements and ongoing changes in skills requirements for particular jobs in the tech sector.
- 3) In cases where an employer is required to have a LMIA to hire a TFW, ensure that employers are able to discuss applications openly with government agents in order to make the application process more communicative, flexible, and transparent.

## **Improving the SR&ED Program and Access to Venture Capital**

Access to Venture Capital is often necessary for a company to grow and attract talent. As noted in earlier sections of this capstone, Venture Capitalists are able to nurture close ties with an industry and have the ability to help growing firms recruit talent more easily and find the right talent for a specific position. In Canada, the SR&ED program is a valuable and useful tax credit for many growing companies, but it disincentivizes firms from seeking out foreign Venture Capital investment because of the possibility of losing their Canadian Controlled Private Corporation (CCPC) status resulting in changes to the benefit structure that they receive from SR&ED. As it currently stands, if a company loses its Canadian Controlled Private Corporation status their benefit level goes from 35% to 20%. This policy creates a challenge for Canadian tech companies and may force some to choose between attaining Venture Capital funding that helps them attract talent to their business or maintaining their SR&ED tax benefit status.

## **Policy Option for Improving Access to VC**

- 1) As recommended by the BC Tech Association, the federal government should eliminate ownership structure as a criterion to determine SR&ED program benefits. This has the benefit of removing disincentives to attracting foreign VC investment.



## Chapter 7. Policy Criteria and Measures

Matrix tables are a tool commonly used in public policy analysis to facilitate and make transparent how each policy option performs relative to each objective. In this report, each policy option was ranked against each objective on a scale of Low (1 point), Medium (2 points), and High (3 points), where High is always the most desirable ranking. Scores are summed to help facilitate the analysis process and derive recommendations, but other considerations are also made in the evaluation process as to which option is ultimately recommended. It is important to note however that the policy options in this capstone are not mutually exclusive and some of them may even be complementary. This is important when reviewing the results of this capstone. The reasoning for ranking options and conducting the policy analysis in this project is to find which options would be most effective to immediately help firms fill talent gaps. However, all options can potentially help in this area. Additionally, options do not only focus on one level of government. Some options are provincial changes and some are aimed at the federal government. The options that are directed toward the federal government not only impact tech talent attraction in Vancouver, but also other areas of Canada.

The following table (Table 2) lists the objectives and evaluation criteria used in this report. Objectives may naturally overlap.

**Table 2: Summary of Evaluation Criteria**

Government Management Objectives	
Objective	Evaluation Criteria
Effectiveness	Does the policy increase the ability of Vancouver tech firms to attract and retain talented workers?
	Does the policy provide long-term effectiveness in drawing talented labour to Vancouver?
Administrative Complexity	Is the policy simple to implement? Is there minimal change to the current administrative process?
Stakeholder Acceptance	Does the policy have support from the public?
Cost	What is the expected cost of the option to government relative to other policy options?
Societal Objectives	
Objective	Evaluation Criteria
Economic Development	Does the policy help grow the number of businesses in Vancouver's tech sector and help companies scale up?

I will first describe each of the above criteria in depth and then explain how each will be measured in the policy analysis.

## **Effectiveness**

This criterion aims to evaluate how well each policy option is able to increase the ability of Vancouver tech firms to attract talented workers in both the short term and in the long term. The policy problem of this Capstone is that Vancouver tech firms have difficulty attracting highly-skilled workers to their organizations, consequently limiting their ability to expand operations and grow their business.

In order to measure how each policy option compares to the other options, I will make educated hypotheses about the likely effectiveness of each strategy. These hypotheses are based on existing literature and expert interviews.

## **Administrative Complexity**

The administrative complexity of each policy option is important to consider in the policy analysis process. The ease or difficulty of implementing each policy option is important to determine the likelihood and feasibility of implementation and future sustainability of the policy option. Administrative complexity will be measured by determining whether multiple levels of government are involved to implement an option or whether there are complicated staffing requirements involved in implementation. If a policy option involves complex staffing and multiple levels of government to implement, it will be more complex to implement.

## **Stakeholder Acceptance**

Stakeholder acceptance is an important element to consider when conducting a policy analysis because a policy that has more broad acceptance is more likely to be implemented and maintained. In my analysis, I will be measuring public acceptance. I chose not to measure industry acceptance because the options put forward have all been advocated for by the industry.

When available, public opinion polling is used to assess public acceptance of policy options. When this information is unavailable, I make educated predictions based on literature, media releases, and stakeholder acceptance of similar issues.

## **Cost**

Measuring the cost of each policy option to government is difficult because costing data is not currently available for the policy options being put forward. To measure cost in this analysis, rough estimates will be used to capture the likely total cost of the policy based on interviews, similar programs, and expectations.

## **Economic Development**

Economic development is another important criterion in this capstone. It is important to ensure that the recommended policy option not only helps firms attract talented workers but also helps bring new tech firms to Vancouver and strengthens the ability of tech firms currently operating in Vancouver to scale up and grow. This is distinct from the effectiveness criteria above because it is not focused on talent attraction but rather business attraction. This criterion will be measured based on expert interviews, existing literature, and on predicted expectations.

## **Measuring the Criteria**

Policy options will be measured through qualitative assessment where a scoring system will be used to evaluate how well each option fulfills the criteria set out above. Scores will be totalled out of a possible 18 points. A colour coding system will also be used for ease of visually identifying scores. A high 3 score will be coloured green, medium 2 score yellow, and low 1 score will be coloured red. The measures and scoring system is explained in Table 3 below.

## Weighing Criteria

In this capstone, the key objective of the policy being recommended is to increase the ability of Vancouver tech firms to better attract talented workers. Therefore, effectiveness is weighed most heavily in the analysis of the policy options. This is done by weighing both short- and long-term effectiveness of each policy option proposed. In doing this, the overall effectiveness criterion is given double the weight of other criteria.

**Table 3: Measures and Scoring System**

Objective	Evaluation Criteria	Measure	Scoring
Effectiveness	Does the policy increase the ability of Vancouver tech firms to attract and retain talented workers immediately?	Educated predictions based on existing literature, existing case studies, and expert interviews	High (3) Direct link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
			Medium (2) Moderate link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
			Low (1) No direct link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
	Does the policy provide long-term effectiveness in drawing talented labour to Vancouver?	Educated predictions based on existing literature, existing case studies, and expert interviews.	High (3) The policy is likely to be effective in the long-term.
			Medium (2) It is unclear whether the policy will be effective in the long-term.
			Low (1) The policy will likely not be effective in the long-term.
Administrative Complexity			High (3) Only one level of government is involved in implementation and there are no changes in current staffing requirements.

	Is the policy simple to implement? Is there minimal change to the current administrative process?	Number of departments and levels of government involved in administering the option as well as expected staffing requirements.	<p>Medium (2) Only one level of government is involved in implementation and staffing requirements are moderately complex.</p> <p>Low (1) Multiple levels of government are involved in the implementation of the option and complicated staffing requirements are necessary.</p>
Stakeholder Acceptance	Does the policy have support from the public?	Public opinion polling, educated predictions based on literature, media releases and acceptance of similar programs.	<p>High (3) High levels of support from the public.</p> <p>Medium (2) Moderate or unclear support from the public</p> <p>Low (1) Low levels support from the public.</p>
Cost	What is the expected cost of the program relative to other policy options?	Qualitative assessment and rough estimates based on interviews, similar programs, and expectations.	<p>High (3) Low costing option</p> <p>Medium (2) Moderate cost to implement this option.</p> <p>Low (1) High costing option to implement.</p>
Economic Development	Does the policy help grow the number of businesses in Vancouver's tech sector and help bigger companies scale up?	Educated predictions based on expert interviews, existing literature, and jurisdictional comparisons.	<p>High (3) It is likely that this option will help the number of tech firms grow in Vancouver or help existing firms scale-up</p> <p>Medium (2) It is uncertain whether this option will help the number of tech firms grow in Vancouver or help existing firms scale-up.</p> <p>Low (1) It is likely that this option will not help the number of tech firms grow in Vancouver or help existing firms scale-up.</p>

## **Chapter 8. Policy Evaluation**

Policy options be analyzed using the criteria and measurement system outlined in Chapter 7. The rationale for my analysis of each policy option is explained below, and a final recommendation and overall comparison of the options is made in Chapter 9.

### **Changes to Support and Improve Tech Education in BC**

The policy option to bring forward changes to help support and improve tech education in BC receives a score of 13 out of 18. The summary evaluation for this option can be found in Table 4 below.

#### **Effectiveness**

In terms of effectiveness, this option receives a medium score of 2 because there is only a moderate link between educational changes and the ability of Vancouver tech firms to attract highly-skilled and talented workers immediately. While educational changes are very likely to increase future and long-term ability of tech firms to have access to talented workers, this will take time. As a result of this time delay, it is expected that educational support and changes will be effective over the long term. For this reason, this option scores a high score of 3 for long-term effectiveness. One of the main points stressed in the interview with the Federal government representative was the long-term effectiveness of educational changes in strengthening access to talent. With more highly skilled and work-ready students graduating from co-op programs and industry placements, it is expected that they will be more capable of filling top-level positions right out of school. This has been the case with Waterloo students graduating out of tech co-op programs, and in cities like Seattle where schools continuously funnel new talent into the market.

#### **Administrative Complexity**

Ensuring that teachers are trained to properly teach K-12 coding, and altering and extending the duration of co-op programs is expected to be moderately complex. For this reason, this option receives a medium score of 2 on administrative complexity. Educational institutions will largely make their changes without government assistance

and the expansion of post-secondary co-op placement programs will be left to post-secondary institutions to grapple with. The area of greatest complexity comes from the required teacher training which will result in additional staffing and coordination across school systems to bring training to teachers.

## **Stakeholder Acceptance**

In January 2016, the BC government unveiled plans to introduce computer coding into the school curriculum for all K-12 BC students. Generally speaking, this plan has received support from not only the tech industry (as heard through interviews) but also from the general public. Several countries worldwide - Estonia, Singapore, Britain - are implementing computer-learning programs into their school systems (Gardiner, 2014) and there is a need for Canada to stay ahead of the technology curve. However, one of the key concerns from critics of the program is the lack of resources being directed toward program implementation and teacher training (Burgmann, 2016). This policy option deals directly with those concerns and also provides a further boost for post-secondary learning and ongoing curriculum review.

## **Cost**

The changes recommended in this policy option are expected to be quite costly to implement and maintain over the long-term. Teachers must go through an initial training process and additional long-term training as technology and curriculum changes. Additionally, given the continuous evolving nature of technology, it is reasonably assumed that if BC wants to keep the educational curricula up to date, program reviews, changes, and teacher training will have to be done on an ongoing basis. For these reasons, this option receives a low score of 1 for cost.

## **Economic Development**

This option receives a medium score of 2 in terms of economic development because it is uncertain whether this option would help the number of tech-firms in Vancouver grow, or help existing firms scale up. Anecdotal evidence from interviews with tech firms suggest that this option would create a more talent-rich workforce in Vancouver

which in the long-term could result in an increasing number of tech firms deciding to relocate to Vancouver. Additionally, jurisdictional evidence from Seattle shows that tech hubs in areas close to post-secondary institutions producing tech and digital talent grads produce many university spin-off businesses and start-ups. As the senior level executive from WD noted in an interview, one of the main reasons Sony Image Works decided to relocate to Vancouver was because of the local talent in the area flowing out of local educational institutions.

### **Additional Challenges for this Option**

An additional challenge to consider with this option is the potential that individuals being trained in BC schools will leave BC to work elsewhere and no local benefits will be accrued. According to the BC Tech Student Survey, over 90 percent of students said that they would consider leaving the province for a jobs opportunity and more than half of those respondents indicated their interest in leaving Canada for work (BC Tech Association, 2017). Furthermore, the BC Tech Association has found that among individuals who graduated from technology and engineering programs from UBC, SFU, and UVIC in 2011, between 30 and 50 percent of graduated students moved outside of BC or Canada to work (BC Tech Association, 2017). A challenge moving forward will be to keep BC students in BC to avoid a tech talent brain drain. A potentially interesting solution to this problem could follow recent proposals made in New York State to give students free tuition only if they stay in the area to work afterwards (Campanile, 2017). While this may not be feasible under current circumstances, it shows that there are ways to incentivize individuals to remain in an area to work after they complete their education.

**Table 4: Summary Evaluation for Educational Changes**

<b>Objective</b>	<b>Evaluation Criteria</b>	<b>Scoring</b>
Effectiveness	Does the policy increase the ability of Vancouver tech firms to attract and retain talented workers immediately?	Medium (2) Moderate link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
	Does the policy provide long-term effectiveness in drawing talented labour to Vancouver?	High (3) The policy is likely to be effective in the long-term.



Administrative Complexity	Is the policy simple to implement? Is there minimal change to the current administrative process?	Medium (2) Only one level of government is involved in implementation and staffing requirements are moderately complex.
Stakeholder Acceptance	Does the policy have support from the public?	High (3) High levels of support from the public.
Cost	What is the expected cost of the program relative to other policy options?	Low (1) High costing option to implement.
Economic Development	Does the policy help grow the number of businesses in Vancouver's tech sector and help bigger companies scale up?	Medium (2) It is uncertain whether this option will help the number of tech firms grow in Vancouver or help existing firms scale-up.
<b>Total / 18</b>		<b>13</b>

## Updating the Temporary Foreign Worker Program to Reflect the Needs of Tech

Making the proposed changes to the Temporary Foreign Worker Program scores 14 out of 18 possible points. The evaluation of this option is summarized in Table 5 below.

### Effectiveness

Making the proposed alterations to the TFWP is expected to effectively enable Vancouver tech firms to increase their ability to access highly-skilled and talented workers in the short and long-run. Therefore, this option receives a high score of 3 on both effectiveness criteria. With the creation of a High-Tech Visa Office employed by trained civil servants with knowledge in how tech works and current industry needs, as well as a revised NOCs codes system that reflects realities in the tech sector, it is expected that visa applications will be approved more quickly and Canadian businesses will have an advantage over American competitors in their ability to attract talent. Furthermore, by creating an office that is specifically focused on processing high-tech visa applications and where lines of communication between tech-firms and civil servants are more transparent, it is likely that fewer TFW applications will mistakenly be rejected based on employer filing error. Interviews with tech companies in Vancouver support the effectiveness of this option, and similar programs have been implemented with success in other jurisdictions, including the United Kingdom (UK Trade & Investment, 2015).

## **Administrative Complexity**

This option receives a medium score of 2 on administrative complexity. The option would require only changes at the federal level, and the creation of a visa office with civil servants trained and knowledgeable in tech is not expected to be complex. Similar High-Tech Visa offices have been created in several countries including the UK with positive results (UK Trade & Investment, 2015).

The largest degree of complexity for this option comes from the necessary re-evaluation of the NOCs system. This process is expected to be moderately complex as per the interview with the senior level executive at Western Economic Diversification Canada. There will need to be some sort of system that can evolve with technology changes that will be more complex than the current system.

## **Stakeholder Acceptance**

This option fares poorly on the criteria of stakeholder acceptance. In general, more Canadians are opposed (38%) to the TFWP than are in favour (30%) (Angus Reid, 2014). Furthermore, according to an Angus Reid public opinion poll, only 20% of the public in BC were in favour of the TFWP, while 52% were opposed (Angus Reid, 2014). For these reasons, this policy option receives a low score of 1 based on the stakeholder acceptance criteria.

## **Cost**

It is expected that the cost of legislating the creation of a new visa office, re-evaluating the NOCs codes, and training civil servants to understand to nuances of the tech industry are moderate. This option receives a score of 2 on the cost criterion. It is expected that civil servants in this new tech office will have to undergo ongoing training in order to understand potential changes within the industry that may significantly impact visa applications and the skillsets that employers are seeking. For these reasons, it is expected that the cost of running the new visa office will increase compared to the current model because of reduced processing times and increased open communication between civil servants and employers submitting visa applications.

## Economic Development

This option scores well on the economic development criterion, receiving a score of 3. If it is easier for a company to attract a highly-skilled worker, it is then possible for a company to build a team around that individual in Canada. The resulting impact is the creation of economic spin-offs around this individual and increased economic development. Through this process, there will also be an increase of local human capital. This will likely encourage more companies operate in Vancouver and relocate to the city like Sony Image Works did. Several of the interviewees asserted that by allowing companies to bring in foreign workers, a team of Canadian workers can be built around them and that this process often leads to downstream business spin-offs.

**Table 5: Summary Evaluation for TFWP Updates**

Objective	Evaluation Criteria	Scoring
Effectiveness	Does the policy increase the ability of Vancouver tech firms to attract and retain talented workers immediately?	High (3) Direct link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
	Does the policy provide long-term effectiveness in drawing talented labour to Vancouver?	High (3) The policy is likely to be effective in the long-term.
Administrative Complexity	Is the policy simple to implement? Is there minimal change to the current administrative process?	Medium (2) Only one level of government is involved in implementation and staffing requirements are moderately complex.
Stakeholder Acceptance	Does the policy have support from the public?	Low (1) Low support from the public
Cost	What is the expected cost of the program relative to other policy options?	Medium (2) Moderate cost to implement this option.
Economic Development	Does the policy help grow the number of businesses in Vancouver's tech sector and help bigger companies scale up?	High (3) It is likely that this option will help the number of tech firms grow in Vancouver or help existing firms scale-up
<b>Total / 18</b>		<b>14</b>

## **Increasing Access to Venture Capital**

This policy option receives a score of 13 out of 18 possible points. The evaluations of this option can be found in the Table 6 summary below.

### **Effectiveness**

This policy option does not fare particularly well on either effectiveness criterion. There is only a moderate link between increasing the ability of a firm to gain access to Venture Capital and the increased ability of a firm to attract talented workers. As noted in the interviews, access to VC does open up a large network of people that a tech firm can work with when developing their product. However, unlike the TFWP policy option, this option does not help directly link tech firms to talent, but rather provides the means to access later talent. Furthermore, over the long term it is unlikely that this option would be able to help significantly fill current talent gap on its own.

### **Administrative Complexity**

Generally speaking, this option would be simple to implement as it would only require a technical change to the current program. For this reason, this option receives a high score of 3 points.

### **Stakeholder Acceptance**

It is uncertain whether this policy option would have public acceptance and for this reason this policy option receives only the medium score of 2. It is also expected that the general public would be slightly opposed to this option if they were made aware of it and what the SR&ED program involves. Since this policy option would enable foreign owned companies that operate in Canada to qualify for equal SR&ED benefits, there may be public backlash against the government funding of foreign companies operating in Canada. There is no public polling on this however, so this is an uncertain prediction.

## Cost

In terms of cost, making changes to the SR&ED program would not cost the government large sums of money to implement but it would moderately increase tax expenditure. The SR&ED program is delivered through the tax system and not through budgetary appropriations. As a result, there is no predetermined budget for the SR&ED program. Instead, funding depends on the value of tax credits earned by the companies in Canada (Government of Canada, 2008). For these reasons, the cost of the program is not expected to increase significantly.

## Economic Development

While the current SR&ED program does help start-up companies grow and expand operations, it is uncertain whether the proposed changes made through this option would have a significant influence on overall economic growth in the industry. It is likely that this option will benefit many tech start-ups in the region, especially those looking to gain access to foreign Venture Capital that might have previously been at risk of losing their CCPC status under the current regulations. However, tech companies in Vancouver that do not meet the requirements of the SR&ED program (larger companies for example or companies that are not actively pursuing research and development projects) would see none of the benefits that this policy change would bring. Overall, while this option would be beneficial for tech companies in Vancouver, it would only be beneficial for a select grouping of firms in the area and could potentially have no influence on the remaining firms.

**Table 6: Increasing Access to Venture Capital**

Objective	Evaluation Criteria	Scoring
Effectiveness	Does the policy increase the ability of Vancouver tech firms to attract and retain talented workers immediately?	Medium (2) Moderate link between the option and the increased ability of Vancouver tech firms to attract highly-skilled and talented workers.
	Does the policy provide long-term effectiveness in drawing talented labour to Vancouver?	Low (1) The policy will likely not be effective in the long-term.

Administrative Complexity	Is the policy simple to implement? Is there minimal change to the current administrative process?	High (3) Only one level of government is involved in implementation and there are no changes in current staffing requirements.
Stakeholder Acceptance	Does the policy have support from the public?	Medium (2) Moderate or unclear support from the public
Cost	What is the expected cost of the program relative to other policy options?	High (3) Low cost to implement this option.
Economic Development	Does the policy help grow the number of businesses in Vancouver's tech sector and help bigger companies scale up?	Medium (2) It is uncertain whether this option will help the number of tech firms grow in Vancouver or help existing firms scale-up.
<b>Total / 18</b>		<b>13</b>

## Chapter 9. Policy Analysis and Recommendation

All three of the policy options proposed in this capstone score well on the given criteria and measures as can be seen in the Table 7 summary below.

**Table 7: Summary of Policy Analysis**

Objective	Option 1: Educational Support	Option 2: Updating the TFWP	Option 3: Increasing Access to VC
Effectiveness	Medium (2)	High (3)	Medium (2)
	High (3)	High (3)	Low (1)
Administrative Complexity	Medium (2)	Medium (2)	High (3)
Stakeholder Acceptance	High (3)	Low (1)	Medium (2)
Cost	Low (1)	Medium (2)	High (3)
Economic Development	Medium (2)	High (3)	Medium (2)
<b>Total / 18</b>	<b>13</b>	<b>14</b>	<b>13</b>

Overall, the option of making changes to the Temporary Foreign Worker Program scores the best with 14 points, but the two other policy options are not far behind with 13 points each.

### Effectiveness

As was noted in Chapter 7, effectiveness is the most important criterion in this evaluation because it is important to ensure that the option put forward in this project is successful in helping tech firms in Vancouver attract experienced talent. Based on the effectiveness criteria alone, the option of updating the TFWP scored best with full scores on both measures, followed by Educational Support receiving a 5/6 and increasing access to VC with 3/6.

## **Administrative Complexity**

In terms of administrative complexity, the option to make changes to the SR&ED program as a way of increasing access to VC received the high score of 3. Both other options received only moderate scores because they are more administratively complex to implement. However, in order to best address the current talent gap in Vancouver tech firms and to help companies more easily attract talent, it is arguably necessary to implement options that may be more administratively complex because of their overall impact on helping solve the policy problem. Therefore, the moderate scores received by both the TFWP option and the Education option are not a large issue.

## **Stakeholder Acceptance**

The public acceptance of a policy options oftentimes plays a crucial role in whether a policy is implemented. For many policies, if the changes that they make are not salient to the public, there will be very little backlash to the option. This is likely the case for Option 3, since few Canadians actually understand or care about the nuances of SR&ED tax credits. However, given that precise public opinion data was not available for this option, it receives only a medium score of 2. Changes to the education system on the other hand, is highly salient and public opinion matters. This option received a high score of 3 for the following reasons: 1) there was little to no public backlash when the BC government announced changes to K-12 curriculum that would implement coding into schools in January 2016, and 2) countries around the world have already taken the lead on implementing coding into the education system and the results have largely been positive. Public acceptance for making updates to the TFWP however are very important in assessing the feasibility of this option. As public opinion data shows, there is strong opposition for the TFWP and this has been a very salient issue in the past five years. In the case where the federal government would want to make these updates it would be necessary to have clear messaging around what changes the policy would make, and exactly why they are being made. If the government were to bring to the attention of the public that there is a massive gap in tech talent in the country that current graduates cannot fill, this option could potentially be feasible to implement without suffering significant electoral support.



## **Cost and Economic Development**

The option that is the most costly to implement and continually renew is enhanced educational support, receiving a 1 out of 3 points. This is followed by changes to the TFWP receiving 2 points and changes to the SR&ED program receiving 3 points. While cost is important to consider when choosing a policy option, it is also necessary to consider to long-term economic gains that could be achieved relative to the cost. It is likely that while Option 3 scores best on cost, making changes to the educational system will create more long-term economic growth and development in Canada. Making changes to the TFWP scores well on this criterion because it is likely that talent from other countries will eventually create their own businesses and spur spin-off growth, like was seen in Silicon Valley with the founders of PayPal.

## Chapter 10. Recommendation

The top recommendation of this analysis is to update the TFWP in ways that would directly help Vancouver tech firms attract highly-skilled talent at the executive level. This option would entail the creation of a new High-Skilled Tech Visa Office, having civil servants in the new High-Skilled Tech Visa Office work more closely with tech employers during visa processing. This option would also include revising NOCs codes to reflect realities in the tech industry.

The key concern heard from tech companies in Vancouver was that they struggled to recruit top-level talent to their firms. While many factors contribute to this challenge such as lower compensation packages compared to US counterparts and the high costs of living and expensive housing market, tech firms, business associations, and government officials all highlighted aspects of the TFWP that were feasible changes that the government could implement.

As several interview participants noted, if a tech firm is able to bring in the world's best programmers from overseas for a particular project, that company will be able to support the Canadian economy and Canadian jobs by building up a team around those talented individuals. This option does not give jobs to foreign workers over domestic workers but rather serves to alleviate the current bottlenecks that companies face in finding talent that may not exist in Canada. Without the ability of a firm to easily draw in that foreign talent, the company would be encouraged to locate their work elsewhere, where talent attraction is easier and where government policies are more favourable. This would lead to fewer Canadian jobs and growth in the tech industry in Vancouver. As it currently stands, it is essential to promote the growth of Vancouver's tech sector and the ability of firms to attract high-level talent. Making changes to the TFWP offers the best immediate results in this regard. Due to these reasons, implementing these changes to the TFWP are recommended to ensure the ability of firms to bring in the talent that they need.

However, over the long term it is necessary that British Columbia update and support computer-based learning through increased funding for teacher training and through the implementation of mandatory post-secondary co-op programs in tech related

degrees. This will ensure that that Canadian children are prepared for a digital future and can grow to fill jobs in the high-tech sector. That is why it is also important that the government implement option 1 as a longer-term plan of supporting and improving BC's new coding curriculum. This will enable the province to grow the future base of talent, and ensure the longevity and adaptiveness of the local workforce.

## References

- About the BC PNP. (2016). Retrieved from <https://www.welcomebc.ca/Immigrate-to-B-C/B-C-Provincial-Nominee-Program/About-the-BC-PNP>
- Allen, C. (2016, April 22). With Vancouver becoming a tech Mecca, should you look at a career in coding? Retrieved October 12, 2016, from <http://www.cknw.com/2016/04/22/with-vancouver-becoming-a-tech-mecca-should-you-look-at-a-career-in-coding>
- Angus Reid. (2014, May 30). *Temporary Foreign Worker program: fine for older Canadians, bigger problem for young & unemployed* (Rep.). Retrieved <http://angusreidglobal.com/wp-content/uploads/2014/05/2014.05.104-Temporary-Foreign-Worker-Program.pdf>
- BC Tech Association. (2016). BC Tech Innovation Hub. Retrieved from <http://www.wearebctech.com/thehub>
- BC Tech Association. (2016, October). 2016 BC Technology Report Card. Retrieved from <http://wearebctech.com/advocacy/publications/publication/industry-reports/2016-kpmg-bc-tech-report-card>
- BC Tech Association. (2016). *A 4-Point Plan for Growth: Scaling up BC's Technology Ecosystem* (Rep.). Retrieved <http://www.wearebctech.com/advocacy/publications/publication/industry-reports/2016-bc-tech-4-point-plan>
- BCTIA. (2014, April 04). Archived — BCTIA: Growing the ICT Industry in Canada. Retrieved from <https://www.ic.gc.ca/eic/site/028.nsf/eng/00401.html>
- Bhatt, S. (2012, July 19). Seattle ranks high in skilled foreign workers on H-1B visas. Retrieved from <http://www.seattletimes.com/business/seattle-ranks-high-in-skilled-foreign-workers-on-h-1b-visas/>
- Bosanac, A. (2015, June 24). B.C.'s tech sector is booming-but its workers are underpaid. Retrieved February 28, 2017, from <http://www.canadianbusiness.com/innovation/bc-tech-sector-pay-stats-2015/>
- British Columbia. (2016). *The #BCTECH Strategy 2016*. Retrieved from [https://bctechstrategy.gov.bc.ca/app/uploads/sites/10/2016/10/BCTech\\_Strategy.pdf](https://bctechstrategy.gov.bc.ca/app/uploads/sites/10/2016/10/BCTech_Strategy.pdf)
- Burgmann, T. (2016, January 19). New curriculum offers B.C. students coding basics. Retrieved from <http://globalnews.ca/news/2461248/new-curriculum-offers-b-c-students-coding-basics/>
- CBRE. (2016). *2016 Scoring Canadian Tech Talent* (Rep.). Retrieved from [https://www.edco.on.ca/resources/Documents/2016\\_Tech\\_Talent\\_Canada\\_Final\\_English.pdf](https://www.edco.on.ca/resources/Documents/2016_Tech_Talent_Canada_Final_English.pdf)

- CBRE. (2016). *2016 Scoring Tech Talent* (Rep.). Retrieved from <http://www.cbre.us/research/2016-U-S-Reports/Pages/2016-Scoring-Tech-Talent.aspx>
- City of Vancouver. (2016). 2016 Corporate Business Plan. Retrieved from <http://vancouver.ca/files/cov/corporate-business-plan.pdf>
- Conference Board of Canada (2016). *Greater Vancouver Economic Scorecard 2016* (Rep.). Retrieved <https://www.boardoftrade.com/scorecard2016/files/Full%20Report%20-%20Greater%20Vancouver%20Economic%20Scorecard%202016.pdf>
- Cornwell, P. (2017, January 18). Programming for all: Washington adopts new set of computer-science standards. Retrieved from <http://www.seattletimes.com/education-lab/programming-for-all-washington-adopts-new-set-of-computer-science-standards/>
- Elahi, A. (2017, February 01). What is an H-1B visa, and why are tech companies worried about them? Retrieved from <http://www.chicagotribune.com/bluesky/originals/ct-why-tech-concerned-changes-h1b-visa-bsi-20170201-story.html>
- Faisal, S. (2015). *Digital Economy Annual Review 2015* (Rep.). Retrieved <http://www.ictc-ctic.ca/wp-content/uploads/2015/06/Annual-Review-2015-ENGLISH.pdf>
- Ferrary, M., & Granovetter, M. (2009). The role of venture capital firms in Silicon Valley's complex innovation network. *Economy and Society*, 38(2), 326-359. doi:10.1080/03085140902786827
- Florida, R. (2016, January 26). The Global Cities Where Tech Venture Capital Is Concentrated. Retrieved from <https://www.theatlantic.com/technology/archive/2016/01/global-startup-cities-venture-capital/429255/>
- Florida, R., Gates, G., Knudsen, B., & Stolarick, K. (2006). *The University and the Creative Economy* (Working paper). Retrieved from <http://creativeclass.com/rfcgdb/articles/the%20university%20and%20the%20creative%20economy.pdf>
- Gardiner, B. (2014, March 23). Adding Coding to the Curriculum. Retrieved from <https://www.nytimes.com/2014/03/24/world/europe/adding-coding-to-the-curriculum.html>
- Gibson, K., & Elbe, S. (n.d.). *Parliamentary Review for Temporary Foreign Worker Program*. Address presented at Standing Committee on Human Resources, Skills and Social Development and the Status of People with Disabilities. Retrieved from <http://www.parl.gc.ca/Content/HOC/Committee/421/HUMA/Brief/BR8378035/br-external/VancouverEconomicCommission-e.pdf>

- Government of BC. (2017, February 21). Tax Rates & Business Limits. Retrieved from <http://www2.gov.bc.ca/gov/content/taxes/income-taxes/corporate/tax-rates>
- Government of Canada. (2016, November 19). How Express Entry works. Retrieved from <http://www.cic.gc.ca/english/express-entry/>
- Government of Canada. (2015, February 19). Fact Sheet — Temporary Foreign Worker Program. Retrieved September 29, 2016, from <http://www.cic.gc.ca/english/resources/publications/employers/temp-foreign-worker-program.asp>
- Government of Canada. (2016, May 24). Express Entry Year-End Report 2015. Retrieved from <http://www.cic.gc.ca/english/resources/reports/ee-year-end-2015.asp>
- Government of Canada. (2008). Do Your Research and Development in Canada... It Pays Off. Retrieved from <http://samssa.ca/files/sred.pdf>
- Government of Canada Dataset. (2016). Temporary Foreign Worker Program work permit holders by program dataset. Retrieved from [http://open.canada.ca/data/en/dataset/67fd1fae-4950-4018-a491-62e60cbd6974?\\_ga=1.230879775.1837023280.1487112289](http://open.canada.ca/data/en/dataset/67fd1fae-4950-4018-a491-62e60cbd6974?_ga=1.230879775.1837023280.1487112289)
- Government of Canada News Release. (2016). Canada News Centre - Building an inclusive and innovative Canada. Retrieved from <http://news.gc.ca/web/article-en.do?nid=1084439>
- ICTC (2016). *Digital Talent: Road to 2020 and Beyond* (Working paper). Retrieved [http://www.ictc-ctic.ca/wp-content/uploads/2016/03/ICTC\\_DigitalTalent2020\\_ENGLISH\\_FINAL\\_March2016.pdf](http://www.ictc-ctic.ca/wp-content/uploads/2016/03/ICTC_DigitalTalent2020_ENGLISH_FINAL_March2016.pdf)
- ICTC. (2013, October). *Skills shortage a reality for Canada's ICT Sector – ITAC and ICTC* [Press release]. Retrieved from <http://www.ictc-ctic.ca/skills-shortage-a-reality-for-canadas-ict-sector-itac-and-ictc/>
- Jayapal , P., & Curry, S. (2009). *Building Washington's Future: Immigrant Workers' Contributions to Our State's Economy* (Rep.). Retrieved [http://www.weareoneamerica.org/sites/default/files/Immigrant\\_Contributions\\_to\\_Our\\_State\\_Economy.pdf](http://www.weareoneamerica.org/sites/default/files/Immigrant_Contributions_to_Our_State_Economy.pdf)
- Lamb, C., & Seddon, M. (2016, July). *The State of Canada's Tech Sector , 2016* (Publication). Retrieved <http://brookfieldinstitute.ca/wp-content/uploads/2016/07/The-State-of-Canadas-Tech-Sector-2016-V2.pdf>
- Launch Academy. (2016). Our Story. Retrieved from <http://www.launchacademy.ca/story/>
- Liwanag, R. (2015, October 1). Canada's Express Entry program for skilled immigrants showing growing pains. Retrieved from <http://business.financialpost.com/news/economy/canadas-express-entry-program-for-skilled-immigrants-showing-growing-pains>.

- Long, K. (2016, April 23). Demand for computer science forces Washington colleges to ramp up. Retrieved from <http://www.seattletimes.com/seattle-news/education/with-surge-in-computer-science-majors-state-colleges-struggle-to-keep-pace/>
- Macleans. (2015, November 05). University rankings: Canada's top 10 universities for computer science. Retrieved from <http://www.macleans.ca/education/top-10-computer-science-universities/>
- McFadden, K. (2014, January 15). Insightful Hiring Quotes from 9 Business Experts & Leaders. Retrieved from <http://smartbusinesstrends.com/insightful-hiring-quotes-lessons-9-business-experts-leaders>
- Miguélez, E., & Moreno, R. (2013). What Attracts Knowledge Workers? The Role Of Space And Social Networks. *Journal of Regional Science*, 54(1), 33-60. doi:10.1111/jors.12069
- Morneau, W. F. (2016, March 22). *Growing the Middle Class: Budget 2016*. Retrieved from <http://www.budget.gc.ca/2016/docs/plan/budget2016-en.pdf>
- No Author. (2016). Ministry of International Trade (MOIT) *British Columbia Canada: Tech Companies Grow Here* (Rep.). Retrieved <http://www.britishcolumbia.ca/TradeBCPortal/media/Marketing/bc-ict-wireless-mit.pdf>
- No Author. (2016). Is the West Coast the Best Coast for VC investments? Since 2010, VCs have invested 53% of total capital into Pacific Coast companies. Retrieved from <http://pitchbook.com/media/press-releases/is-the-west-coast-the-best-coast-for-vc-investments-since-2010-vcs-have-invested-53-of-total-capital-into-pacific-coast-companies>
- Orton, T. (2015, December 21). Downtown Eastside tech hub preps for November 2016 launch. Retrieved from <https://www.biv.com/article/2015/12/downtown-eastside-tech-hub-november-dtes-vancouver/>
- Province of Ontario. (2016, September 12). Ontario universities home to two of the best computer sciences schools in the world. Retrieved from <http://www.investinontario.com/spotlights/ontario-universities-home-two-best-computer-sciences-schools-world>
- REBGV. (2016, December). Monthly Statistical Reports. Retrieved from <http://www.rebgv.org/monthly-reports?month=December&year=2016>
- Schrier, D., & Hallin, L. G. (2016, June). *Profile of the British Columbia Technology Sector: 2015 Edition* (BC STATS).
- Seattle, WA: 2016 H1B Visa Report (Work City). (2016). Retrieved from <http://www.myvisajobs.com/Seattle-WA-2016WC.htm>

- Seckinger, A. (2014, August 15). Why Seattle Is Not Like Silicon Valley. Retrieved from <https://techcrunch.com/2014/08/15/why-seattle-is-not-like-silicon-valley/>
- Silcoff, S. (2016, January 18). B.C. to add computer coding to school curriculum. Retrieved from <http://www.theglobeandmail.com/technology/bc-government-adds-computer-coding-to-school-curriculum/article28234097/>
- Statistics Canada. (2016). Table 379-0028. Retrieved February 28, 2017, from <http://www5.statcan.gc.ca/cansim/a26>
- Statistics Canada. (2016). Table 551-0006. Retrieved October 22, 2016, from <http://www5.statcan.gc.ca/cansim/a26>
- Statistics Canada. (2013, May 21). Variant of NAICS 2012 - Information and communication technology (ICT) sector. Retrieved November 14, 2016, from [http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getCET\\_Page&VD=128313&Item=130001](http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getCET_Page&VD=128313&Item=130001)
- Sulzenko, A. (2016, June). *Canada's Innovation Conundrum: Five Years after the Jenkins Report* (Rep.). Retrieved <http://irpp.org/wp-content/uploads/2016/06/report-2016-06-09.pdf>
- Vancouver Economic Commission. (2016). The Province and B.C.'s technology industry join forces to meet labour needs. Retrieved from <http://www.vancouvereconomic.com/blog/media/the-province-and-b-c-s-technology-industry-join-forces-to-meet-labour-needs/>
- Vancouver Economic Commission (2011). *The Vancouver Economic Action Strategy: An Economic Development Plan for the City* (Tech.). Retrieved <http://vancouver.ca/files/cov/vancouver-economic-plan.pdf>
- Technology Innovation and Citizens' Services. (2015, December 08). BC Gov News. Retrieved from <https://news.gov.bc.ca/releases/2015MTICS0033-001951>
- Techopedia, (2016). What is Information and Communications Technology (ICT)? – Definition from Techopedia. Retrieved January 28, 2017, from <https://www.techopedia.com/definition/24152/information-and-communications-technology-ict>
- The Canadian Chamber of Commerce. (2016, January). *Immigration for a Competitive Canada: Why Highly Skilled International Talent is at Risk* (Rep.). Retrieved <http://www.chamber.ca/media/blog/160114-immigration-for-a-competitive-canada/>
- UK Trade & Investment. (2015). Tech City UK unveils Tech Nation Visa Scheme. Retrieved from <https://www.gov.uk/government/news/tech-city-uk-unveils-tech-nation-visa-scheme>
- University of Toronto. (2013). *Economic Impact Report 2013* (Rep.). Retrieved from <http://universityrelations.utoronto.ca/gicr/files/2013/07/economic-impact-2013.pdf>



- University of Twente . (n.d.). *Do You Know What Talent Likes About Your Region?*  
Retrieved from [http://www.brain-flow.eu/export/sites/brainflow/downloads/SPFactSheets/QOL\\_factsheet\\_final\\_verdana.pdf](http://www.brain-flow.eu/export/sites/brainflow/downloads/SPFactSheets/QOL_factsheet_final_verdana.pdf)
- University of Washington. (2016). *Facts FY 2016* [Brochure]. Retrieved from [http://www.washington.edu/research/.SITEPARTS/.documents/orFactsheet\\_2016.pdf](http://www.washington.edu/research/.SITEPARTS/.documents/orFactsheet_2016.pdf)
- University of Washington. (2014, December). *2014 Economic and Community Impact Report of the University of Washington* (Rep.). Retrieved <http://www.washington.edu/externalaffairs/files/2015/01/14-Economic-Impact-Report.pdf>
- US Citizenship and Immigration Services. (2016). Understanding H-1B Requirements. Retrieved from <https://www.uscis.gov/eir/visa-guide/h-1b-specialty-occupation/understanding-h-1b-requirements>
- Washington Compact. (n.d.). *Economic Benefits of Comprehensive Immigration Reform* (Issue brief). Retrieved from <https://www.seattle.gov/Documents/Departments/ImmigrantAndRefugeeCommission/CI R%20Economic%20Benefits.pdf>
- Weeks, C., & Sheridan-Simzer, A. (2009, October 20). Ontario ICT sector profile: Beyond 'dot coms' *ISED Headlines*. Retrieved from <https://www.ic.gc.ca/eic/site/ich-epi.nsf/eng/02042.html>
- Welcome BC. (2016). BC Provincial Nominee Program. Retrieved from <https://www.welcomebc.ca/Immigrate-to-B-C/B-C-Provincial-Nominee-Program>
- Western Economic Diversification Canada. (2017). Welcome to the Western Economic Diversification Canada website. Retrieved from <https://www.wd-deo.gc.ca/eng/home.asp>
- Wingfield, N. (2016, October 02). Next Big Tech Corridor? Between Seattle and Vancouver, Planners Hope. Retrieved October 15, 2016, from <https://www.nytimes.com/2016/10/03/technology/next-big-tech-corridor-between-seattle-and-vancouver-planners-hope.html>
- Zillow, I. (2017). San Francisco CA Home Prices & Home Values. Retrieved from <http://www.zillow.com/san-francisco-ca/home-values/>

# Appendix

## Policies, Programs, and Incentives for Attracting Talent

Table 1A

Level of Government	Policy, Program, or Incentive Name	Description
Federal	Express Entry Program	Canada's Express Entry is a new selection system for Canadian immigration, designed to select skilled workers for immigration to Canada. (Government of Canada, 2016). The goal of the program is to connect employers with talented employees quicker than traditional immigration procedures and expatriate permanent residence applications.
Federal	Innovation Agenda	<p>The new Liberal Government has committed to investing in Canadian innovation to ensure growth and international recognition. Under the new Innovation Agenda, the following initiatives will help attract talent to Canadian tech firms.</p> <ol style="list-style-type: none"> <li>1) Strengthening innovation networks and clusters — \$800 million in funding over four years, starting with \$150 million in 2017-18, to catalyze private sector dynamism, generate greater value from public investments in innovation and enable the pursuit of ambitious initiatives that bring a critical mass of stakeholders together to connect their ideas to the marketplace (Sulzenko, 2016).</li> <li>2) Helping high-impact firms scale up — \$50 million in 2016-17 to assist firms in accessing coordinated services tailored to their needs at crucial transition points from key government organizations, with a target of 1,000 firms in the first few years (Sulzenko, 2016).</li> </ol>
Federal	Temporary Foreign Worker Program	The Temporary Foreign Worker Program (TFWP) allows Canadian employers to hire foreign nationals to fill temporary labour and skill shortages when qualified Canadian citizens or permanent residents are not available. (Government of Canada, 2015)
Federal	Post-Secondary Industry Partnership and Cooperative Placement Initiative	The goal of this initiative is to support partnerships between employers and post-secondary institutions to better align what is taught with the needs of employers [including] new co-op placements and work-integrated learning opportunities for young Canadians (Morneau, 2016).

Provincial	Low Corporate Tax Rates	BC has one of the lowest corporate tax rates in Canada and this helps attract tech firms and talent to the region. The General Corporate Income Tax Rate in BC is 11.0% (26% total when combined with the federal corporate tax rate) and the Small Business Income Tax Rate is 2.5% (Government of BC, 2017)
Provincial	Sector Labour Market Partnership Program	Led by the BC Technology Association (BCTA) and the Vancouver Economic Commission (VEC), this \$600,000 project will help government understand the current and future labour needs in the BC tech sector. As part of the project, partners are developing a labour market strategy which will result in recommendations on deepening the talent-pool of BC tech jobs (Vancouver Economic Commission, 2016).
Provincial	K-12 Curriculum Changes in BC Tech Strategy	As defined in the BC Tech Strategy, K-12 curricular changes will focus on math, sciences, creativity, and other subjects to develop the fundamental skills needed for careers in technology. (British Columbia, 2016).
Provincial	BC Innovation Council's BC Tech Co-op Grants Program	The BC Tech Co-op Grants program provides business and skills training to students and talent to technology companies. (British Columbia, 2016).
Provincial	Labour Market Partnerships Program	The technology sector will be supported in the creation of customized labour market information, strategies, and tools that address current labour market demands and talent gaps (British Columbia, 2016).
Provincial	BC Provincial Nominee Program	The BC Provincial Nominee Program offers an economic immigration pathway for in demand foreign workers and experienced entrepreneurs who can contribute economically to BC (Welcome BC, 2016).
Provincial	BC Tech Fund	\$100-million venture capital fund aimed at stimulating growth in the fast-moving tech sector, creating jobs and strengthening the economy. This fund is part of the BC Tech Strategy (BC Gov News, 2015).
Municipal	Launch Academy	Launch Academy is a start-up accelerator in Vancouver founded in 2012. To date, Launch Academy has raised over 85 million and created over 750 jobs for the economy (Launch Academy, 2016).
Municipal	Vancouver Technology and Social Innovation Centre	The of the new Technology and Social Innovation Centre is to draw digital tech startups, clean-tech companies, tech accelerators, non-profits, and micro-enterprises to Vancouver. To date, the city has spent \$1.1 million upgrading the building, while the Vancity Community Foundation earmarked another \$1.5 million for the project in 2013. (Orton, 2015).
Municipal	BC Tech Innovation Hub	The BC Tech Innovation Hub is a 26,000 square foot acceleration space dedicated to helping tech companies in Vancouver grow. The Hub offers various resources to help companies grow revenue and scale up faster. (BC Tech Association, 2016).