

TECH TALENT SHORTAGE IN CANADA

“The Impending Jobs Crisis”



**North of 41
September 2018**

Tech Talent Shortage in Canada

“The Impending Jobs Crisis”

North of 41-Background/Roundtable Discussion

On August 17th, 2018 representatives from North of 41 convened a roundtable discussion related to the impending jobs crisis in Canada’s IT sector. Various tech companies and organizations across Canada participated in this roundtable. Input was also given from academic contributors, namely Northeastern University – Toronto as well as from global organizations such as the Wilson Center and the Brookings Institute.

North of 41 is a tech based organization with over 12,000 members across North America. The core of the organization’s membership base is comprised of tech entrepreneurs whose companies are in the hyper growth (scaling up) phase of their business life-cycle. As part of the organization’s mandate, North of 41 hosts various in person and online events along with other programs including hackathons, roundtable discussions and subject specific training. In addition, North of 41 also organizes annual tech days both at the federal and provincial level as a way to encourage dialogue between tech entrepreneurs, policy makers and politicians.

Executive Summary

The focus of this discussion paper is to provide recommendations for Canada’s policy makers to implement a national jobs strategy specifically targeted towards Canada’s tech sector. The goal of this strategy is for business and government to work together to support current and future tech based employment needs in Canadian companies.

There are two types of talent/employment issues facing Canada’s tech sector which, if not addressed, will leave Canada at a severe disadvantage when it comes to global competitiveness.

The first issue relates to the impending shortfall of qualified talent for the approximately 182,000 tech based jobs which will go unfilled in Canadian companies in the very near future. Solutions to this problem must be formed quickly.

The second related and equally important issue, is centred on the need to grow Canada's executive level skill set, specifically in the tech sector in order to globally scale businesses. These two inter-related issues apply to both large multinational corporations as well as SME's. (Small to Medium Enterprises).

In order to begin to solve the first problem, namely the impending shortfall crisis as it relates to the 182,000 jobs, there are three areas which need to be addressed. The first is our traditional education system – from high school right through post-secondary across the country. How do we, as a country, prepare and graduate students with the skill sets required for today's rapidly changing innovation economy? The second is skills-based immigration and the need to specifically identify, recruit and retain highly skilled immigrants with sought after tech skills. Finally, the third area that needs to be addressed is related to the retraining/reskilling of Canada's workforce. As a nation, we have to identify those individuals in traditional/legacy industries that require training and re-skilling necessary to succeed in the innovation economy. Without a comprehensive and cohesive strategy in this area, it will be virtually impossible to close the 182,000 person shortfall.

As identified earlier, there is a second problem facing Canada's tech sector as it relates to executive level skills enhancement. A substantial investment has taken place in this country in order to help companies in the startup phase. Now, this same investment must take place in the scale up phase, as Canada's IT industry begins to mature. When it comes to the Canadian tech eco-system, it lacks a sizable number of individuals who have the necessary skill set and experience required to scale-up tech related businesses on a global scale.

This unique scale-up skill set exists within founders and company executives who have a track record of successfully exiting companies that they have scaled up. Experience and know-how in the area of commercialization, global operations as well as investor relations are all necessary in

order for companies to scale globally but are currently scarce in the current Canadian tech eco-system. The value of this skill set to the tech industry is significant. It is these individuals who have been through the process of building a successful tech business which creates value for others in the Canadian tech community. These seasoned executives can then leverage their broad experience and personal network to replicate their model of success in future ventures with a similar result. Without a proper national strategy around this issue, the Canadian tech eco-system will be left behind when it comes to building and scaling large corporations on a global scale.

For the Canadian tech sector to flourish and compete globally, it must be led by industry. Human capital is the new resource in the digital economy. Without sufficient skilled IT workers, the tech eco-system will fail to grow and any national innovation strategy will stall. It will take the effort of many stakeholders, including government working in partnership with business in order to execute on any sustainable tech sector jobs plan. The pivotal role that government must play is one where it creates an environment through policy initiatives for innovation and IT employment to thrive, but allow industry to lead the discussion. It is important that this national IT jobs strategy also includes a telecommuting strategy in which to bring tech jobs to areas which have been traditionally left out of the modern day Canadian Tech corridors.

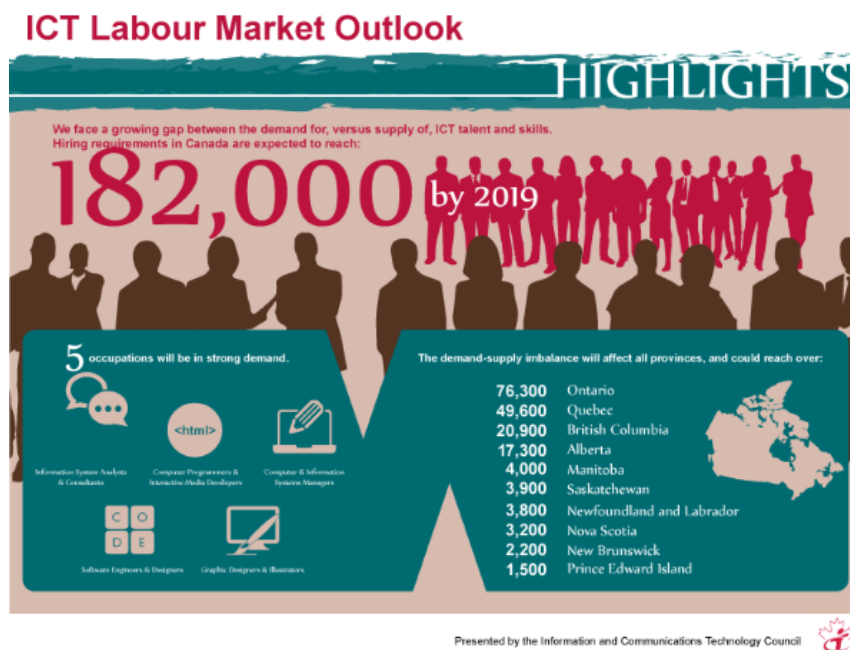
Introduction

The Canadian economy and the overall Canadian tech eco-system are at a crossroads. A convergence of timing and tech advancements are creating economic opportunities that will drive Canada's economic prosperity for generations to come. However, if we as a nation are going to leverage this convergence, then we must act quickly to align human capital with market demands in order to foster growth and innovation. As part of Canada's innovation agenda, a national employment and skills enhancement strategy must be established. Failure to act now will have a detrimental effect on the Canadian economy for years to come.

Problems/Solutions

There is a Tech Talent Shortage in Canada

A report was recently released by the Information and Communications Technology Council (ICTC)¹. In their report, ICTC identifies that Canada is headed for a major technology talent shortage in the next year, due to supply-demand imbalances, skills mismatch and an aging workforce. Indeed, Canada as a whole requires 182,000 people to fill positions for computer related operators, web technicians, software engineers, programmers, artificial intelligent specialists and others by 2019.



Source: the Information and Communications Technology Council

Measures have to be taken now in order to mitigate this risk. This problem is not limited to only multinational corporations or to SME's, it is an industry-wide problem that requires all

¹ ICTC - a labour market intelligence and industry skills standard body funded by the government.

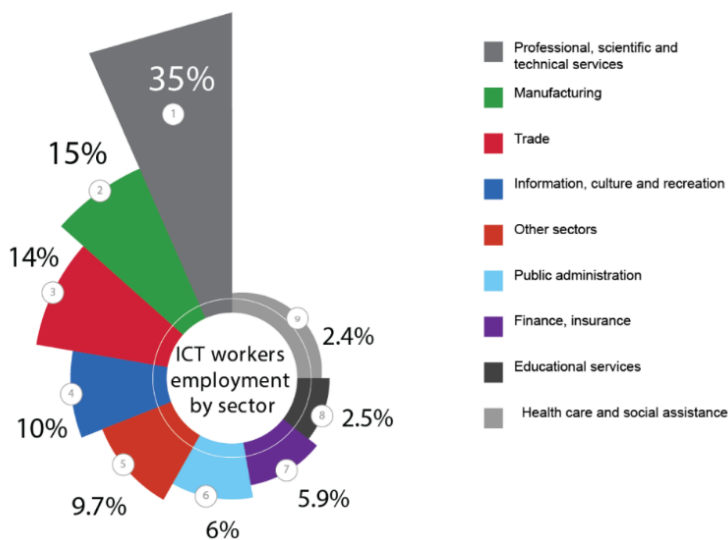
stakeholders to address when it comes to human capital. All businesses require properly trained and motivated workers in order to grow their operations. Without enough properly trained IT workers, projects will not be completed, businesses will not grow and Canada will not be able to compete in the global tech economy.

Human capital in a tech business is described as “the skill set” of workers within the tech ecosystem. Innovation must occur to sustain and nurture employment for all Canadians, and the skill sets of workers must align with the skill requirements of the jobs that the tech industry needs. Where a disconnect exists, innovation will be impeded. It’s important that our current human capital strategy evolves to reflect current and emerging market needs.

Historically, Canada has always placed a large emphasis on the development of its (natural) resources. Technology must be viewed through a similar lens because technology is the resource of the future; a digital resource. For an innovation strategy to be adopted across the country, it must first be encouraged through traditional education, lifelong industry aligned training, as well as a robust skills-based immigration strategy. It must include attraction, education, and retention if it is to be implemented properly, and the end result can be the fulfillment of hundreds of thousands of well-paying IT jobs which will provide wealth and prosperity for generations to come.

“If Canada does not address the talent and skills gap, it could cost the economy billions of dollars in lost productivity, tax revenues, and gross domestic product,” the report states.

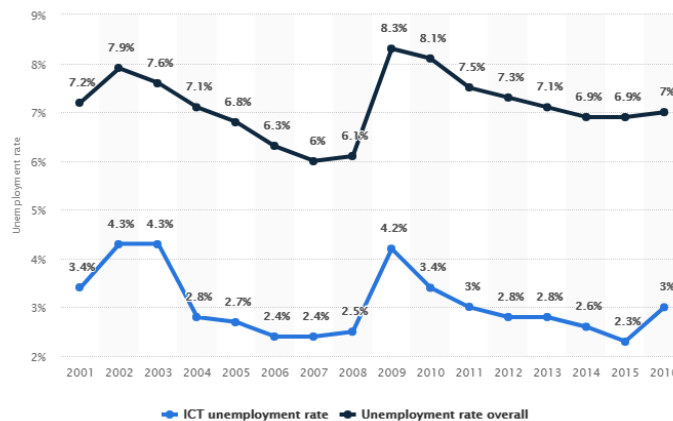
Figure 7: ICT Employment Across Sectors



Source: ICTC, Statistics Canada Labour Force Survey

UNEMPLOYMENT RATE IN TECH SECTOR

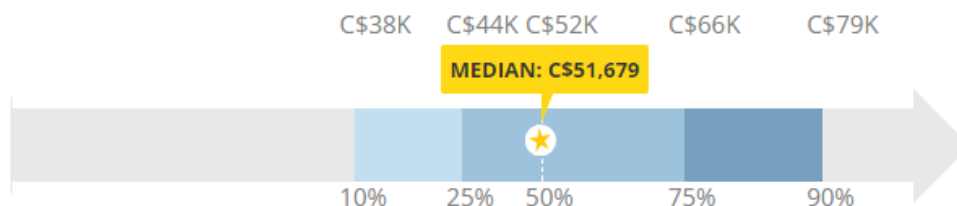
The graph below compiled by Statistica shows the unemployment rate of the information and communications technology (ICT) sector in Canada from 2001 to 2016. In 2016, Canada's tech sector had an unemployment rate of 3%, which is 4% lower than the overall unemployment rate in Canada. That same trend continues today.



Source: © Statista 2018

ARE WAGE RATES A PROBLEM FOR ATTRACTING TALENT IN THE IT SECTOR?

In Canada, using a typical Computer Programmer as an example; an individual in this position earns an average salary of \$52,000 Cdn per year. While it may vary by city, IT salaries are above the national average when it compared to other professions.



Source: PayScale Human Capital

One can see that tech job openings from a wage perspective should not have difficulty attracting applicants, if in fact the applicants are available. This data confirms that wage rates are not the reason why the IT sector is facing a 182,000 person deficit in the upcoming years.

WHAT DO IT EMPLOYERS LOOK FOR WHEN HIRING?

When hiring, IT employers are looking for individuals with a technical background and specific coding skills. The seven most in demand programming languages today include Java, Python, JavaScript, C++, C#, PHP and Perl.² Technology is changing so rapidly that no one knows exactly what will be the next cutting edge technology of the future. For this reason, recruiters are also looking for individuals with a combination of technical and soft skills who can adapt to changing technologies. The fundamentals of computer science and the ability to apply them is a prerequisite for hiring. Furthermore, it is also important for a computer programmer to be team focused, be a problem solver and work collaboratively with others.

As an example, in the Canadian cyber-security industry, there is a tremendous need for qualified individuals, especially those with skills in network and data security. Companies are having a retention issue because employees are continually being poached by other firms for a higher wage. From a planning/strategic point of view, this is problematic on many fronts.

Today, cyber security companies, just like most tech companies are limited in their growth mainly because of a lack of quality talent. Again, it's a problem that stretches from the large multinational corporations all the way down to SME's. As a result, any efforts to fill the Canadian tech talent gap must include all stakeholders in this discussion.

² www.codingdojo.com/blog/7most-indemand-programming-languages-of-2018/

Recommendations:

How do we create a national strategy in the area of IT job placement, growth and retention? The government can support this cause by

- A) Enhancing and creating better alignment with provincial governments in the area of post-secondary education. This is necessary as a means in which to guarantee that the graduates of Canadian educational institutions have the proper skills required for jobs today and into the future.
- B) Maintaining a robust immigration strategy focused on the needs of the IT sector.
- C) Embarking on a nationwide retraining and reskilling strategy to incentivize and provide workers in declining industries with training and support for jobs in the new digital economy.
- D) Providing attractive tax incentives for companies to continually enhance the skill set of their workforce as part of a “life-long” learning process and include founders and executives, not just new hires.
- E) Telecommuting/Remote Working - Government can encourage participation in the tech sector outside of the “major tech corridors” by creating the necessary set of digital infrastructure investments which will facilitate the progression of better engagement. For instance, building, maintaining, and improving communication networks including enhanced internet connectivity should be a priority in non-tech corridors. Furthermore, financial incentives should be established for participation in the tech economy in such non-traditional tech geographic areas. These efforts may also encourage people to remain located in these non-tech corridors and could even incentivize individuals to relocate to these areas from the increasingly expensive major tech corridors.

Education

When looking at individuals who have graduated from our various academic institutions, there seems to be a disconnect between the skill sets of the graduates and the requirements of IT job openings. This must change. Industry and government have to focus on providing skills to graduates which will be able to continually be enhanced over the lifetime of employment, in essence, lifelong learning. Legislation, tax policy and other incentives must be centred on a new results-based dynamic.

Education and retention of individuals to fit the new economy must be central to government policy. Although education falls under the accountability of the provincial government, it is important for all stakeholders including federal and municipal governments to be at the table for this discussion. This approach must be fully integrated; starting from education beginning in elementary school and leading right up to the CEO level. Knowledge is the new gold and a resource that needs to be tapped into at an early stage. Higher education achievement tends to be a predictable indicator of future success. Our economic prosperity depends on this, therefore it's crucial that government spending is efficiently placed in key sectors that will spur opportunities, innovation, jobs, and ultimately economic growth.

Canada's academic institutions have a world renowned reputation for providing high quality education to students and as a result thousands of international students enroll in our academic institutions annually. From 2008 to 2016, the number of international long-term students in Canada increased by 229% - from 178,227 to 408,176. Trends show that this growth is continuing to accelerate.³ The percentage of foreign students in Canada's best engineering university programs is increasing simultaneously.⁴ It should be noted that the total value of overall spending by international students increased from \$6.5B in 2008 to \$15.5B in 2016.⁵

³ <http://www.international.gc.ca/education/report-rapport/impact-2017/sec-5.aspx?lang=eng>

⁴ UW & UofT Engineering Department Admission Statistics U Waterloo: 18% of undergrads; 49% graduate programs, U Toronto: 27%-28% of undergrads; 33% at graduate level

⁵ <http://www.international.gc.ca/education/report-rapport/impact-2017/sec-5.aspx?lang=eng>

Once these foreign students graduate, many return to their home countries. The data shows that even though foreign student enrollment in Canadian universities and colleges is increasing, the data also shows that graduating foreign students staying and working in Canada 10 years after their study visa was issued peaked around 27% and is no longer increasing.⁶ In order for Canada to address the crisis for talent at home, we as a country need to increase the number of students who become citizens in Canada upon successfully completing their degrees. Policies should be adjusted that will allow these students to become permanent residents and work in areas which are in high demand in Canada's IT sector.

Recommendations:

1. Need a better utilization and alignment of resources at all levels of government together with industry stakeholders as it relates to education.
2. Real time tracking of international students and their outcomes in order to build a data driven strategy. It should track the success of students and their economic impact upon graduation with their eventual path to citizenship.
3. Ensure that education, government and industry collaborate to define education and talent goals (industry led). It's important to ensure there are programs and training available that meet the needs of current and future learners, including giving those individuals choices of where to study and how to study.
4. Bring all educational institutions to the table in a collaborative manner to uncover pain points and implement solutions focused on emerging talent. These institutions should also include new entrants and global universities, not just traditional education providers.

⁶ <https://www150.statcan.gc.ca/n1/pub/75-006-x/2015001/article/14299-eng.htm>

Retraining

As innovation is embraced throughout the nation, demand for higher skilled workers tends to result in higher levels of specialized education and with it, higher national salaries to reward these efforts. As salaries rise, so to do contributions to taxes, which ultimately plays in a cyclical manner and enables further governmental support.

Human capital is in high demand vis-a-vis the tech industry. It is what drives the entire tech ecosystem, similar to how mineral exploration drives the mining industry. You can't have one without the other. Currently, there is a mismatch of skill sets and job requirements that Canada has not experienced since the industrial revolution.

Individuals who fail to embrace this new reality will be left behind as was witnessed first-hand after the 2008 recession and global economic crisis. Despite the rhetoric from certain parts of the world, there is no turning back the clock. As a result, there is a need to have proper retraining/reskilling programs in place in a continuous way that creates a pipeline of talent and proactively addresses Canada's future talent needs.

Programs in school that are designed for people reskilling and e-skilling must be focused and be able to be completed in a short time frame (6 month duration); in essence micro credentialing. Some forward thinking universities believe in bite sized learning with stackable credentials, thereby giving the learner/student, the choice of how to learn.

An example of this can be found in the course offering at Northeastern University-Toronto. The focus on these micro degrees must be integrated with learning in real world settings. Furthermore, learning should also be accessible outside the classroom to those who need to upgrade their education while working. Employment within the innovation economy will depend largely upon one's adaptability, willingness to continuously learn and their adherence to trends.

For a comprehensive retraining strategy, one need not look any further than the **Coding for Veterans** program.⁷ This program identifies those individuals who are discharging from Canada's military and have an interest in a post military career in Canada's Tech sector. **Coding for Veterans** is an **industry-led**, agile and results-based program that provides military veterans with the technical skills required to succeed in the IT industry. For successful graduates of the program, they will have good paying, high quality jobs in the IT sector which will give them opportunities for the foreseeable future.

Employment has shifted from traditional industries to the tech industries and new fields like artificial intelligence are starting to emerge. The government and academic institutions must look at education through the lens of life-long learning where retraining/reskilling and upgrading of education are continuously being pursued.

Recommendations:

1. Government must additionally incentivize retraining through the use of “super” tax credits to individuals and companies who invest in themselves or in their employees’ further education and training. Just as government tax policy encourages companies to upgrade an organization’s equipment through tax credits, a similar emphasis must be placed on work related education and skills training. The use and impact of these credits must be tracked.
2. Government should partner with organizations that are tackling this problem internally, such as RBC’s Upskill program <https://stg.fs-dev.ca/> and leverage these learnings to inform programs delivered through education partners who can deliver training at scale.

Immigration

Canada is a country comprised of immigrants. It has been this way since confederation and continues up until today. Immigration has been a viable policy option the current government has

⁷ Coding for Veterans www.codingforveterans.com

taken to addressing the shortage of highly-skilled and experienced technical talent. Currently, the government has established the Global Skills Strategy which aims to support Canadian employers by providing access to a faster and more predictable immigration process for attracting and retaining global talent.

Under this strategy, the Global Talent Stream pilot was created, which allows employers to recruit individuals from abroad, and fast track their visa application process in order to begin working in the Canadian IT industry. This fast tracked immigration process reduces the processing times to 10 business days for the employer, compared to the traditional, multi-month application process. Despite being initially a 2-year pilot, this program has been accessed by over 10,000 individuals in the past 18 months. All of these individuals who have been hired are now actively contributing to the Canadian economy.

A unique feature of the Global Talent Stream pilot is the Labour Market Benefits Plan, whereby when a company applies to bring foreigners through the fast-tracked program, they must also commit to providing skills training and mentorship to support the local Canadian tech ecosystem. This support can come in a number of ways including, training, education, and networking opportunities aimed to build a fundamental understanding of behaviours, culture, and skills for success in the tech sector. This support can also be directed to existing programs to help Canadians and permanent residents to have the necessary tech-focused skills to eventually graduate and gain jobs in Canada's IT sector.

Even though this program is showing positive results, more can be done. Germaine to these additional efforts is the need for integration, relocation, and future upskilling of these immigrants upon their arrival. The importance of this measure lies in the many cultural and behavioural differences which persist across the tech ecosystem. Success in this regard requires building diversity and inclusion initiatives within Canadian tech companies to drive the efforts of technical innovation, and inclusive growth for the economy. Furthermore, providing companies and potential employees with an additional streamlined support network can assist the transition of new immigrants with the assistance of Canadians and permanent residents who have been through this process before.

This existing gap in the Global Talent Stream policy measure has led the tech industry to bear the brunt of the efforts themselves. An example of this can be found in the Toronto based Global Skills Hub ⁸ which helps Canadian companies find, select, hire, and then settle global talent, bridging both gaps found within traditional technical recruitment and in the immigration workflow. In order for the government to demonstrate its full commitment to supporting the Canadian tech ecosystem through its immigration policies, more work will need to be done to address challenges from end to end.

Recommendations:

1. As a way to quickly fill the knowledge base requirements of Canadian companies and accelerate innovation, priority must continue to be given towards efforts to simplify the process for those seeking to immigrate. Once specific tech verticals within the tech ecosystem have been identified as areas in need of support, then it is important for our immigration policy to support this pursuit.
2. Create a better nationwide narrative for immigrants. Focus on best practices and have a network in which individuals can turn to for support and integration with Canadians and permanent residents.
3. Establish a level of support for scale-up, cultural mentoring and learning that leverages and extends beyond the start-up efforts of the past decade to prepare Canadians for success in the new results oriented innovation economy.
4. Look to successful private sector tech firms and organizations like Global Skills Hub <http://globalskills.io/> for a front-line understanding on challenges and successes in hiring talent from abroad. Essential knowledge for government to improve the immigration process and what specific skills are required already exists within these companies.

⁸ <http://www.globalskills.io/>

The Need for Enhanced Skill Development at the Executive Level

It is widely accepted that the Canadian economy with innovation at its core foundation will in turn provide well paying, high quality jobs. It will also help bolster the overall knowledge base of its citizens because in order to truly grow and nurture a competitive economy, the education and knowledge base of its work force must be high.

For the past few years, Canada has focused on supporting startup businesses and their founders. By most accounts, this has been successful as companies have been created from entrepreneurs at numerous tech accelerators and incubators across Canada. The current challenge entrepreneurs and companies face is how to scale out their companies. Canada lacks talent that has experience as to how to scale companies. As a country, we need to create a bridge between new entrepreneurs who are just starting out and those business leaders who have experience in scaling out businesses. Often, this talent is found outside of Canada because Canadian entrepreneurs have gone abroad in their career pursuits. As a result, many Canadian expats in the tech sector have developed the skill set to help companies grow and scale, but reside outside of Canada. The reason for this exodus is a direct result of opportunities that were not available in Canada to grow a tech business on a global scale. As support for our tech eco-system grows, that narrative is changing.

Recommendations:

1. There is a need for mentoring, specifically in the area of teaching entrepreneurs how to scale up their companies. This is required because in order for Canadian companies to compete on a global scale, they must be of sufficient size, otherwise, they cannot compete. It is time to shift a significant portion of funding and incentives from startup incubators and accelerators towards the organizations that support scale up efforts with result measures established and tracked. Furthermore, it is important to bring industry to the table as customers are necessary to scale. Industry should be at the table to help pick the winners and should be leading the discussion, not just government.

2. Provide financial/tax incentives in order for companies to target individuals who have previously left Canada to return and be hired at fast growth companies who require this skill set.

How does NAFTA fit into this equation? (Trade and border agreements)

Canada's national jobs strategy needs fair and modernized trade and borders agreements to help achieve an increased level of economic prosperity. Agreements such as the NAFTA and other cross-border agreements help to protect and promote the movement of the goods, services, ideas and people needed to optimize the digital economy.

From a tech sector perspective, the greatest deficiency in the current trade and border agreements is the pre-occupation with declining industries and failure to focus on creating an enabling environment for Canada's future knowledge economy.

Specifically, we need to ensure that cross-border agreements reward innovation through modernized intellectual property rules, and remove barriers to cross-border trade in digital services as well as the physical inputs that support the innovation economy. And, perhaps most importantly, to ensure that tech sector professionals can move easily across borders as entrepreneurs and service providers.

Recommendations:

1. **Digital Visitor Visas:** Presently, business visitors (B-1 visitors) may cross the U.S. border for short-term travel relating to sales calls, meetings, training, emergency repairs, and after-sales service. Unfortunately, inconsistent treatment of those travelling to raise venture capital, discuss digital products and services, collaborate on projects, provide training and installation on digital products is a concern. Customs and immigration officials utilize interpretative guidance in field manuals and other areas that does not account for the modern day movements of digital business

visitors and the ever-changing job descriptions. It is imperative that job classifications be updated every 18-24 months rather than every 10 years to better reflect the changing digital economy.

2. **NAFTA Visas:** The non-immigrant temporary movement provisions of the NAFTA allow professionals to accept paid employment in another NAFTA country for a time-limited period (called TN Visas in the US and NAFTA work permits in Canada.) Unfortunately, the list of professions eligible for these permits is hopelessly out of date and does not include most tech sector jobs. It is essential that Canada continue to advocate for the expansion of the TN jobs list, despite resistance from the U.S., in order to efficiently deploy tech sector skills when and where they are needed throughout North America.

3. **Free Movement of Data:** Following the precedent set in the Trans-Pacific Partnership, the NAFTA and other agreements must endeavour to limit data localization and other instruments of national protection only to those demonstrably linked to national security. Similarly, instruments such as cultural protections should not be used as disguised barriers to tech sector growth and investment.

4. **IP Protections:** Intellectual property protections in the NAFTA and other trade agreements must protect ownership while not tying the hands of service providers or creating a chilling effect for new platforms and creative endeavours.

Conclusion

Where to go from here? Currently, with the ever-changing dynamics in the global economy, the Canadian economy must grow and flourish. It has been said that tech is the great equalizer. Canada's tech industry is currently in a tremendous growth cycle. Tech companies are developing new technology at an increasing rate. In addition, it should be noted that traditional companies, like banks and insurance companies, are becoming and behaving more like technology companies as customer expectations continue to expect as much.

It is imperative that as a nation we embrace innovation as the catalyst for economic and job growth along with overall prosperity. Decisions made by both government and industry must focus on the strategy of having a ready supply of talent in which to fuel the growth of the tech sector. In order to be world leaders in the area of technology, as Canadians we must all work towards this common goal of an inclusive policy approach.

If we are going to make a meaningful impact on addressing these challenges then an effective collaboration towards a common goal is essential. Private firms understand the challenges most acutely, and many have developed strategies that can enhance public initiatives. Education and community organizations have the ability to deliver training and support at scale, and government is the lynchpin that can pull it all together through improvements to policy and funding of coordinated efforts supporting a national strategy.

It is hoped that the recommendations presented in this paper and advocated for by tech industry stakeholders, will contribute to the discussion on Canada's IT Jobs Policy moving forward. Government cannot do this alone and neither can industry. It will only take shape if stakeholders work together towards this common goal, thereby encouraging the Canadian economy to grow and prosper for years to come.

This paper was written and supported by members of the tech organization **North of 41.org** and the **Wilson Center Canada Institute**. We would like to specifically acknowledge: Samuel Wu, Yousuf Khatib, Stacey Wallin, Shadi Yazdan, Sheetal Nanda, RJ Juneau, Joe Marra, Richard Switzer, Emilie Cushman, Aliza Lakhani, Pat Shaw, Laura Dawson, Tim Leshan, Shamira Madhany and Jeff Musson