June 3, 2019

Valerie Walker, Co-Chair

Future Skills Council

Skills and Employment Branch

Employment and Social Development Canada

142 Promenade du Portage

Gatineau, QC, J8X 2K3

**RE: UNIVERSITY CONTINUING EDUCATION AND THE FUTURE OF WORK**

Members of the Future Skills Council:

This letter is in response to your invitation for input on how continuing education units in Ontario are positioned to support your mandate in identifying how Canada can best address the emerging and persistent skills gaps through a comprehensive strategy for skills development.

Our organization, the Ontario Council for University Lifelong Learning, represents the continuing education units of Ontario’s public universities. We join you in this steadfast commitment to identifying and implementing the best approaches in bolstering the presence of needed skills in Ontario, and Canada more broadly.

Attached to this letter is an overview of our responses to the eight questions you sent in April. It is our hope that this input adequately demonstrates how continuing education is best positioned to nurture the lifelong learning needs of Ontario citizens with a robust complement of targeted training programs.

If Future Skills would like to meet with the OCULL Executive or consider any of our executive members to sit on any of its advisory councils, OCULL would be honoured.

We look forward to working with the Council in pursuit of ongoing skills development in Ontario.

Kind regards,

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1. **What are the key issues or challenges that we should address with respect to skills development and the future of work?**

**At the crux of filling the emergent and growing skills deficit is a need to: 1) efficiently and effectively upskill and reskill the existing workforce, and 2) immigrate workers with most or all of the requisite skills. Incentives need to be established that will foster linkages between industry, education and government.**

Canada currently suffers from a misalignment of skills development with corresponding needs. Despite having the second highest post-secondary education attainment for 25-34 year olds worldwide, according to the Organization for Economic Cooperation and Development (OECD) (60.9%), employers still report an inability to secure the workers they need. The ManpowerGroup 2018 Talent Shortage Survey reported that 41% of Canadian employers experienced difficulty filling job openings. When looking at skills development being taught in universities, it is important to recognize the multitude of skills that students are must acquire while studying in a certain field or subject area to be able to successfully navigate the world of work: “...discipline-specific knowledge is not the only skill set and not the only kind of learning Ontario’s graduates need. In fact, the data clearly indicates that many graduates will not be working in their field of study”(HEQCO, 2015). Graduates can expect to have several jobs over the span of their careers and even graduates who stay with one employer may find their jobs rapidly evolving. For these workers, non-disciplinary skills matter just as much, and often more so, than discipline-specific skills. For mid-career workers whose jobs may disappear, the key to successful and speedy re-entry into the labour market is a strong foundation of transferable skills that will help them pivot into a new work environment.”[[1]](#footnote-1)

The federal government has shown its commitment to addressing these issues, including its pledge to invest $225 million over 4 years to research the implementation of effective approaches to skills development and its creation of the Express Entry program for skilled immigration into Canada.

In filling this growing void, it is important that the Future Skills Council:

* Identify and map the cross-functional and technical skills essential to employment across all sectors, as well as cross-functional and technical skills that are not generic but specific to industries or occupations
* Determine and measure skills gaps between graduates entering the workforce and labour market needs
* Develop a funding framework for targeted training programs at universities and colleges, including continuing education units, that supports development of agile and responsive programs tied to specific industry needs
* Establish incentives for education and industry organizations to develop and offer accessible and relevant programs that target high priority industries and occupations
* Produce a repository of the successes of the Future Skills Council, universities and colleges, and their partners to disseminate across Canada as examples of effective career-ready education and training.

**Universities**

As the Future Skills Council works towards its policy aims, universities must address persistent issues within their institutions. Namely, universities (and their continuing education units in particular) should continue to:

* Diversify educational activities to ensure that the knowledge that most students acquire in a university education for career-oriented, and not only academically-oriented, objectives
* Engage communities outside of the bounds of the university
* Update programming and curricula yearly in response to advances in technology
* Develop outcomes-based curricula that align themselves with industry and student expectations and needs

**Industry**

Industry partners will also need to be mindful of the changing labour landscape. The Royal Bank of Canada notes, “the cluster data tells us that skills training and open-minded employers can help young, determined Canadians build bridges between seemingly unconnected occupations” (RBC, 2018, p14).

Employers need to be supported to better understand and value:

* Transferable skills and how they translate across jobs on a practical level
* Credentials such as certificates and other micro-credentials as a method for working people to quickly acquire in-demand skills
* Experiential learning experiences as ways for people to acquire and practice workplace skills

**Transferable Skills’ Content for Future-proofing the Canadian Citizenry**

**What are the “non-profession specific” attributes that Canadian employers are seeking in employees?**

A positive attitude, good communication skills, team work, a strong work ethic and interpersonal/customer service abilities were recently cited as the top five soft skills valued by Canadian executives.[[2]](#footnote-2) According to the think tank, Toronto Finance International, the skills needed to “future-proof” workforces as technology continues to evolve, are[[3]](#footnote-3):

|  |  |
| --- | --- |
| **Human Experience Skills***Key Skills:** Emotional Intelligence
* Communication
* Empathy
* Influencing
* Collaboration
* Teamwork
 | **Re-imagination Skills***Key Skills:** Business acumen
* Curiosity
* Creativity
* Critical thinking
* Problem solving
 |
| **Pivoting Skills***Key Skills:** Adaptability
* Coping skills
* Resilience
* Learning agility
* Change leadership
 | **Future Currency Skills- Digital and Data Acumen***Key Skills:** Data acumen
* Digital acumen
 |

In Time’s Money column in 2019, a survey of 8 HR experts identified the attributes they look for in interviewees[[4]](#footnote-4):

* Ability to integrate with future coworkers
* Possession of learning agility
* Ability to work tactically and interpret data
* Team player/servant leader with a low ego
* Willingness to go beyond the job description
* Willingness to build empathetic connections
* Emotionally intelligent

**Transferable and Soft Skills**

Another source sums up the “non-profession specific” soft skills and attributes that Canadian employers are seeking and that they are finding a paucity of Canadians with these capacities. An article in the *Toronto Sun* asserts that it is the responsibility of adults to seek out innovative ways for transferable and soft skills acquisition pathways that lead to gainful employment and well-paid future careers.[[5]](#footnote-5) 70% of employers believe that employees need continuous learning to keep up with the demands of their current jobs and to stay on top of industry’s rapid changes, thus they need to engage in just-in-time learning.[[6]](#footnote-6) To help guide university CE divisions, here is a ‘macro’ view of which “non-profession specific” skills that CE divisions need to teach in every course and program they offer:

1. People skills, emotional intelligence and multi-cultural awareness
2. Be hard-working and demonstrate the belief through action that lifelong learning is absolutely essential.
3. Ensure you are “up to the minute” on issues in the business or sector you are. Demonstrate this by selecting and applying the right technology and making evidence-based decisions at the appropriate level of applied expertise. Access phone apps such as News 360, Flipboard and Zite, in which you input your subjects of interest, and then they feed you the top research articles, statistics and analysis from around the world on a daily basis.
4. Think for yourself and exercise common sense.[[7]](#footnote-7)
5. Critical and creative thinking, global understanding, communication, professional and ethical behaviour.
6. Resilience, perseverance, curiosity and self-control.[[8]](#footnote-8)
7. Communication, collaboration and problem-solving skills.[[9]](#footnote-9)
8. Ability and willingness to go beyond the job description and to keep their hard skills current.[[10]](#footnote-10)
9. Complex problem-solving, cognitive flexibility, teamwork, service orientation, and social intelligence.

The Conference Board of Canada’s Employability Skills 2017 Report[[11]](#footnote-11) lists the following soft skills desired by employers in their Millennials and Gen Z employees:

* Demonstrate Positive Attitudes and Behaviours
* Be Responsible
* Be Adaptable
* Learn Continuously
* Work Ethically
* Work with Others
* Execute Projects to Completion

Career Professionals of Canada identified the following “marketable soft skills for the future”, attributes that workplaces are seeking when hiring:

* Passion
* Continued Learning
* Communication
* Adaptability
* Work Ethic
* Problem Solving
* Willpower
* Networking
* Ambition
* Attitude
* Social Intelligence
* Capacity to manage change in the face of adversity
* Ability to work in a virtual team
* Fluency in 2+ languages[[12]](#footnote-12)

Building on this last list of skills, the furthering of skills in cultural intelligence and cultural humility would help specifically to prepare for a more global market and diverse workforce[[13]](#footnote-13), while creativity is also gaining more and more recognition as a valid skill[[14]](#footnote-14).

And finally, an overarching set of skills which would touch upon the ones listed above are those that allow individuals to navigate career change confidently and successfully. This includes self-awareness, finding and creating opportunities, strategic networking[[15]](#footnote-15).

1. **What important considerations should we address regarding various groups that could be at risk of being left behind? Which groups should we focus on?**

***Universities must do more to support the lifelong learning needs of the current and future workforce. The Skills Council and leadership in university continuing education need to work together to engaging underrepresented groups and their communities.***

University continuing education divisions, concentrating on lifelong learning for in-demand career readiness at all adult life stages, must make it a priority to reach out to populations that they have not focused on before (their central focus has been undergraduate degree students), including adult Canadians of *all ages*, Indigenous persons, persons with disabilities, young mature learners (between the ages of 22-29) who are working professionals and/or recent university and college graduates, displaced mid-career workers, and immigrants to Canada. For example, universities need to offer more relevant programming designed for adult learners who are (or will be) affected by job losses, who require upskilling, who may be in low income jobs and/or in underrepresented populations.

Key recommendations:

* Establish a funding model to support and encourage learners to engage in lifelong learning and ongoing skills development in priority areas
* Provide incentives to institutions to create more
	+ relevant programming in a variety in delivery methods (e.g., online synchronous, online on-demand, face-to-face intensive, blended intensive) and for satellite delivery to reach underserved communities (e.g., northern and remote locations)
	+ learner support services to facilitate access, retention and success by:
		- reducing administrative barriers to access
		- providing resources to support/address mental health and wellness issues
		- creating a welcoming environment for adult learners
* Develop partnerships between government, industry, education and communities to engage underrepresented groups and counter brain drain in smaller communities

**Immigrants**

A renewed focus *is* required for the hiring of Canadian immigrants with high levels of academic and professional attainment. In a recent article in *The Star,* the author writes, “In 2001, newcomers with at least a bachelor’s degree had an unemployment rate 3.85 times higher than that of their Canadian-born peers, but by 2016, this had dropped to only 2.4 times greater, according to the report commissioned by the Toronto Region Immigrant Employment Council (TRIEC).” Alarmingly, the same barriers that have existed for decades for highly educated recent immigrants to Canada persists: “The study also surveyed employers and immigrant employment service providers and found credential recognition, the need for Canadian experience, perceptions about language and communication skills, bias and discrimination have remained the main employment barriers for newcomers.”

Immigrants come here with as high or higher level education and Canadian racialized groups aren’t doing as well as Canadian-born. The gaps are greater now than they were in 1980, demonstrating that inequality has grown and continues to grow as they continue to face barriers to employment. Overall, racialized groups are becoming poorer over time, and today’s young adults won’t do as well as their parents, with immigrants earning far less than they need to succeed in their adoptive country.[[16]](#footnote-16)

**Working adults**

Even the demographics of those seeking postsecondary education (undergraduate, graduate, CE) are shifting. In 2011, 60% of Canada’s 239,000 continuing education part-time adult learners were 25 or older. The National Center for Education Statistics projects that by 2020, 42% of all university students in North America will be 25 years of age or older. More working adults are becoming responsible for actively honing and developing new skills for the new technologies and jobs emerging daily.

**People with Disabilities**

According to Statistics Canada, people with disabilities are significantly under-represented in the Canadian workforce, at 51%.

**Women**

One particular group which universities may focus on and provide professional continuing education for, is women seeking senior management positions. Only 20.5% of women in the GTA in 2014 were senior managers despite women being 51.5% of the population in the GTA. As of 2013, 1 in 5 Canadian workers are aged 55 years and over.

1. **What regional or geographic considerations should we address?**

The largest job market growth in the future will be in Southern Ontario and Quebec. For STEM upskilling, needs are in specific cities going forward. The Canadian cities with the highest concentration of technology workers to date are: “Toronto with 238,000, Montréal with 140,000, Vancouver with 82,000, Ottawa with 69,000 and Calgary with 63,000.” In the last 5 years, 2 cities saw the largest increase in tech workers: “Between 2006 and 2016, Toronto and Montréal saw the largest absolute increase in the number of tech workers, with the cities adding 53,000 and 33,000 tech workers over the 10-year period, respectively.” As the increase in tech workers takes hold in Montréal, housing prices in the downtown core are rising.

Smaller cities are suffering ‘brain drain’ as their younger populations migrate for economic reasons to large urban areas. These small communities include:

* areas with high unemployment, business closures
* areas designated as being regenerated
* locations where access to resources are limited or makes it difficult to attend programming

The Future Skills Council should:

* Provide funding frameworks for online, career-ready, educational offerings to serve these communities
* Develop partnerships between government, industry, education and communities to engage underrepresented groups and counter brain drain in smaller communities
1. **What emerging models, practices, innovations, or new approaches to skills development should we be aware of when setting priorities?**

***Future Skills Council should be aware of the importance of experiential learning as a cornerstone to high-quality adult education. Upskilling and reskilling of adult learners should be done with efficient use of contact time in mind.***

Through the last decade, different types of programming have emerged with a propensity towards practice-based and experiential learning, including:

* Intensive simulations of work-related and authentic learning (e.g., hack-a-thons, start-up venture weekends, bootcamps)
* Simulated field trips using virtual reality to expensive, dangerous, or impossible-to-access locations (e.g., Louvre, underground mine, human blood stream)
* Using artificial intelligence and natural language processing for interactive language learning
* Using AI for language learning, simulating a counselling appointment, etc.
* Badging as a way to for a learners skills developed through various means, has not been adopted widespread because employers lack an easy way to assess them

A central tenet of any overarching strategy on Canadian skills development should therefore be to provide experiential education and programming opportunities that are also stackable with a series of entry and exit points along the learning trajectory, with each exit point resulting in a credential. These various points of entry and exit reflects the reality of adult learners who have a multitude of professional and personal obligations, and provide the flexibility for them to upgrade, enhance, and/or develop new skills as time permits. However, in considering expansion of experiential learning opportunities, it is important to recognize that it takes more resources to design and deliver programming with external partners (which translates into higher costs to the institution), and that institutions will be dependent on the capacity of external partners. Additionally, over the last five years, several emerging models, practices, and innovations to skills development have been tried and tested but are not ready for widespread adoption. For example, virtual reality and AI simulations as teaching tools show great promise, but they are still very expensive to adopt and use effectively within the educational sector. Other educational technology tools are also expensive but increasingly necessary (e.g., learning management systems, instructor chatbots, AI-supported grading).

**Skills that need to be developed between now and 2040**

With technology now increasing at an exponential rate, demands on curriculum relevance and currency are equally growing. It has become incumbent on continuing education units in niche, technology areas to build and upgrade curriculum on a semesterly basis. Here are a few examples of the type of emerging programming that is needed to meet demands not yet formalized:

* **Software developers and computer programmers**

Software developers and computer programmers are in higher demand than doctors. They are paid an average of $90,060 USD, with the top 10% earning $138,880 USD, according to the latest stats available from the U.S. Labour Department. In addition, the Bureau of Labour Statistics predicts there will be nearly 140,000 in the U.S. and 100,000 in Canada, ‘brand-new’ software development jobs created before 2022. Universities in Canada such as Ryerson and universities in the US such as Northeastern University are offering “coding bootcamps”, and other immersive programs to close the skills gap and labour market shortages in this field.

There is a new acronym that accompanies the STEM acronym: SMAC (Social, Mobile, Analytics and Cloud). Javascript has reigned king as the most desired programming language needed by employers for a number of years. Python, however, is on the rise and, particularly for those who want to work as big data analysts. In addition, a major skill set needed is enabling end-to-end encryption (E2E) across apps such as Instagram, Messenger and WhatsApp. This high-level skill is in demand with all IT employers. Machine learning and cybersecurity repeatedly are referenced for having the largest labour market shortages and higher salaries.

[[17]](#footnote-17)



*Figure: The trend of Stack Overflow questions about each language per year indicative of the use of each of the tagged languages. Note the rise of Python.[[18]](#footnote-18)*

* **Data scientists**

Data scientists are in huge demand thanks to the big data trend, including in upper New York State and Southern Ontario which, combined, will need to fill 181,000 data analytics positions in 2018 alone and five times (5x) that many positions requiring related skills in data management and data query output interpretation.[[19]](#footnote-19)

The fastest growing skill shortages in Southern Ontario and the Northeast of the United States are currently:

* Data Management
* Forecasting
* Predictive Analytics[[20]](#footnote-20)
* Big Data for data-driven analytical decision-making
* **Business translators**

“We estimate there could be demand for approximately 2 million to 4 million business translators in the United States alone over the next decade. Given the roughly 9.5 million US graduates in business and in the STEM fields of science, technology, engineering, and mathematics expected over the same period, nearly 20 to 40% of these graduates would need to go into business translator roles to meet demand. Today that figure is only about 10%. To reduce this mismatch, wages may have to increase, or more companies will need to implement their own training programs.”

***The Age of Analytics: Competing In a Data-driven World,* McKinsey Global Institute[[21]](#footnote-21)**

* **Data analytics/Artificial intelligence**

Job titles predicted for 2030 will combine data analytics and artificial intelligence, such as:

* DevOps Tools Engineer
* AI Wrangler
* AI Communicator
* AI Product Manager
* AI Architecture
* Machine Learning Engineer
* Data Engineer
* **Citizen data scientists**

There is a new term for professionals across organizations and sectors whose main job responsibilities do not center on being a specialized data analytics expert but for whom employing technical data analytics skill sets is part of their job performance responsibilities:

“Teaching analytics to your non-quantitative students prepares them for the nearly one million citizen data science roles we’ve found. The term “citizen data scientists**”** refers to professionals whose primary job function falls outside specialized data analysis, but who use data analytics in their work”.

As organizations rely more heavily on data analysis to make decisions, jobs beyond the information and technology fields increasingly require data analysis. For example, marketing managers now must both conduct marketing campaigns and assess those campaigns’ performance using analytics. Employers seek professionals across occupations who combine mastery of role-specific skills with competency in data analytics.

Analysis of “citizen data scientist” job postings reveals employers exhibit high demand across diverse occupations and industries. Employers seek professionals with data analytics skills in occupations with primary job functions far removed from data analytics, including medical and health services managers and public relations specialists. In fact, the top four industries for citizen data scientists account for only 59% of job postings, with the rest spread over other industries.”[[22]](#footnote-22)

**Note:** This is a good explanation of the differences between Data Science, Big Data and Data Analytics. The chart also contains more information about educational level and salaries.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data Science** | **Data Analytics** | **Big Data** |
| **Skills required** | BusinessData miningMachine learningAnalytical | ProgrammingStatisticalMathematicalMachine learningCommunicationData visualization | AnalyticalMathematicalStatisticalBusinessComputerData visualization |
| **Average Salary in the US()** | [$117,345](https://www.glassdoor.com/Salaries/us-data-scientist-salary-SRCH_IL.0%2C2_IN1_KO3%2C17.htm) | [$67,377](https://www.glassdoor.com/Salaries/us-data-analyst-salary-SRCH_IL.0%2C2_IN1_KO3%2C15.htm) | [$116, 591](https://www.glassdoor.com/Salaries/big-data-engineer-salary-SRCH_KO0%2C17.htm) |
| **Qualification** | SAS and/or R;Python, C/C++, R, Pearl, SAS, Java, SQL | SQL, Python, Matlab, R, [SAS](https://mindmajix.com/advanced-sas-tutorial), and Excel | Database development and management; some programming helps but not required |
| **Education background** | Master Degree, PhD | Bachelors in math, statistics, computer science, and/or something else closely related | Bachelors in math, statistics, computer science, information management, finance, and/or economics |

**[[23]](#footnote-23)**

Jeff Caitlin, from the Forbes Technology Council, cites The Quant Crunch report, which concludes that demand for data science employees “is expected to rise 28% by 2020”.[[24]](#footnote-24) Canadian Business magazine recently cited “data professional” as the fastest-growing job category in Canada.[[25]](#footnote-25) Computer World magazine asserts that with developments such as the Internet of Things (IoT) and streaming data, all senior and mid-management roles will incorporate some aspects of big data analytics and the development of algorithms into job roles and performance review assessments.[[26]](#footnote-26)



*Figure: Big Data Market Size Revenue Forecast Worldwide from 2011 to 2027.[[27]](#footnote-27)*

Among other job titles found in job ads, here are some of the most popular: Data Scientist, Big Data Visualizer, Big Data Research Analyst, Big Data Engineer, Big Data Architect and Big Data Analyst.[[28]](#footnote-28)

85% of Fortune 500 companies have a big data initiative underway or in the works, particularly in predictive analytics with respect to IT, products and services, telecommunications, financial modeling, health care and pharmaceutical research, marketing and advertising.[[29]](#footnote-29) Companies across the tech, FinTech, entertainment, and medical sectors are keen to monetize new products and services informed by the trends that the analysis of “big data” could help them uncover. McKinsey Global Institute suggests that by 2018 the U.S. alone could face a shortage of up to 190,000 data scientists.[[30]](#footnote-30) These data analysts are needed across all sectors and industries, monitoring and forecasting client behaviour trends, future products and services, as well as collecting and analyzing data on their companies’ current products or services.[[31]](#footnote-31) And increasingly, employers are “more global, modular and flexible scheduling-wise” and are focusing on a potential employee’s data analytic competencies rather than relying on his or her formal degree or previous work experience.[[32]](#footnote-32) A data scientist helps private sector companies and governments munch through massive amounts of information — like tweets, news articles and sales stats — to find business, economic and demographic insights, to provide the opportunity to forecast and to bring about predictive analysis and evidence-based decision-making. A Data Scientist in Canada earns $83,800 on average and $122,090 on the high end. Pay for this job will increase as demand skyrockets. The Babson Survey Research Group predicts a dramatic 24.5% growth for this job category by 2022.[[33]](#footnote-33) The McKinsey Global Institute estimates that by 2018 there will be 4 million big data related positions in existence in North America.[[34]](#footnote-34)

Encouragingly, Goldie Blumenstyk of the Chronicle of Higher Education cites a worldwide analysis of nearly a million job postings, which are arguably complementary to university liberal arts graduates’ set of critical acuity and problem-solving skills. Blumenstyk contends that liberal arts university graduates need only to acquire proficiency in skills such as Data Analysis, Computer Programming and Management.[[35]](#footnote-35)

* **Artificial Intelligence**

“The Massachusetts Institute of Technology is spending $1 billion on a new college devoted to artificial intelligence, said Steve Lohr in *The New York Times*”.[[36]](#footnote-36)

Artificial Intelligence/Machine Learning Enterprise Applications’ market will reach $31.2 billion by 2025; what is fueling this meteoric rise is as follows: artificial intelligence and machine learning can run countless “what if experiments”, thus helping C-suites to test and fine tune their human judgment in resolving various technical, financial, cultural, moral and ethical issues for different scenarios, products and services. One such application is Magic Leap, that, once released in 2019, is poised to revolutionize the AI/Machine Learning/VR/AR industry which is only in its infancy.[[37]](#footnote-37)

In the Canadian Chamber of Commerce’s report, Data for Good: The $32 Billion Boost, the authors highlight that in the next 5 years, there will be more advancement in artificial intelligence than in the previous thirty years combined: “Countries that promote data’s availability and use for societal good and economic development will lead the fourth industrial revolution and give their citizens a better quality of life. To seize this opportunity, people and businesses need to be able to share their data with one another.”[[38]](#footnote-38)

An Oxford University study in 2015 estimated that nearly half of the North American workforce is at risk of automation by 2025.[[39]](#footnote-39) McKinsey Global Institute predicts that by 2030, 800 million workers will lose their jobs to automation and robotics (one-fifth of the global workforce) and that an additional one-third of the global workforce will need to retrain if they want to keep their current jobs. The authors assert that increasingly employees will interact with machines in the workplace. Key findings of the paper are: “Demand for technological skills, including coding and programming, will rise by 55% by 2030. Competition for high-skill workers will increase. […] Companies say that high-skill workers are most likely to be hired and re-trained, and to see rising wages. 20% of companies in the U.S and 5 European countries say that 20% of their executive team lack sufficient knowledge to lead adoption of automation and artificial intelligence. “1 in 3 firms are concerned that lacking the skills they need for automation and adoption will hurt their future financial performance.”[[40]](#footnote-40)

Coupled with the labour market shortage of individuals who are equipped to be **big data analysts**, the advent of artificial intelligence and the automation/robotization of many existing jobs before 2030 worldwide means that big data analysts will be managing artificially intelligent machines such as IBM Watson in the near future and the big data analyst’s biggest contributions will be in making judgments about data rather than creating knowledge.[[41]](#footnote-41) A recent McKinsey Global Institute reports’ findings which indicate that half of employment activities (jobs) will be automated, with the sectors hardest hit being physical work in manufacturing, food services, transportation, warehousing and retail. However, the report contends that across other sectors and their occupations, only about 5% of activities can be entirely automated, freeing up employees to spend about 25% of their time not on activities that machines can do, but on analyzing data and report findings to engage in informed decision-making.[[42]](#footnote-42)

For an excellent list of public data sources applicable to “machine learning, artificial intelligence, blockchains and predictive analytics” please refer to the Forbes article, Big Data And AI: 30 Amazing (And Free) Public Data Sources For 2018.[[43]](#footnote-43)

The University of Manitoba, and other Canadian universities, are already developing and offering Artificial Intelligence programs through their continuing education divisions. Purdue University is going one-step further, in its initiative to embed data science education in its courses, degrees, physical spaces and industry collaborations, no matter what field the student is studying.[[44]](#footnote-44) The head of the computer science department, Sunil Prabhakar, elaborates: "Data science is applicable to every major and each student attending Purdue, and we intend on fulfilling the expectation that Purdue graduates are ably prepared with the analytical skills they will need in the data job market".[[45]](#footnote-45)

* **Cyber, Information and Data Security and Privacy**

Deep labour market shortages exist in every sector and in every jurisdiction in this professional expertise area. According to NBC News, “Employers in the United States, and countries worldwide, face a critical shortage of professionals trained in protecting corporate and government computer networks and systems from cyber attack. As these attacks grow more frequent and sophisticated, jobs in information security are expected to skyrocket. The Bureau of Labor Statistics predicts that jobs for cyber security analysts in the U.S. will grow 28% by 2026. Currently, there are 285,681 unfilled jobs available in cybersecurity, according to CyberSeek, a website that tracks the cybersecurity job market. Globally, research indicates there will be a shortage of 1.8 million cybersecurity professionals by 2022.”[[46]](#footnote-46) Total compensation for those jobs can reach $200,000 USD or more, meaning even relatively junior cyber professionals in the industry can make more than top officials at the National Security Agency in the U.S. Canada’s EY Cybersecurity Inc. employs 18,000 in Canada and internationally.[[47]](#footnote-47) Some senior officials say that the outflow in part reflects a cultural shift in which Millennials are not inclined to stay in one workplace for an entire career. And it also stems from a disproportionate number of retirements of people who entered the agency in the 1980s during a hiring boom.

Other former NSA personnel who have left or retired recently expressed confidence that the NSA would weather the storm. “Yes, people will leave, but there are things you can do there that you can’t do anywhere else. It’s for God and country,” said Daniel Ennis, who oversaw the agency’s threat operations centre before retiring in 2015 after 33 years. He now leads advanced cyber threat intelligence for BlueteamGlobal, a private cybersecurity firm.[[48]](#footnote-48)

Spending on information security professionals grew 8% in 2015, with 10% of all IT security being supplied via the cloud by 2015, to reach in aggregate $77 billion being spent yearly on IT security worldwide.[[49]](#footnote-49) (Ryerson University has a CE certificate programs in Data Analytics, Big Data and Predictive Analytics and in Computer Security and Digital Forensics.)

* **Architectural technologists**

(Universities experienced enrolment growth in architecture technology, computer engineering and related data analytic open source apps and technologies.[[50]](#footnote-50))

* **Technology professionals, engineering and sector-specific technologists and technicians**

Jeff Rubin, former CIBC chief economist asserts “technical and health field jobs will go begging through to 2013 and beyond.”[[51]](#footnote-51)16,000 are needed annually in Canada to fill vacant positions. By 2020, with replacement demands for retiring baby boomer engineering professionals skyrocketing, 95,000 job openings will be the dominant force driving labour market requirements and recruiting. However, currently and until 2020, there is an all time high of young Canadian engineering graduates seeking work as engineers but who have an acute shortage of practical, engineering skills and no work experience. Employers are digging in their heels, committed only to hiring experienced and specialized engineers as they are determined not to be saddled with training costs.[[52]](#footnote-52) What will give?

Advanced technology sectors are demanding increasing numbers of professionals (e.g., AI-Data Analytics, Machine-Human Interaction Specialists, Robotics, FinTech, Prediction and Trending Analysis).[[53]](#footnote-53)

For instance, skill sets obtained for the present and future applications of robotics are in high demand due to the automation/robotization of swaths of jobs that currently exist and the rapid application of artificial intelligence, machine learning and neural networks: “A lot of companies are investing in robotics’ applications, so universities need to make sure that we offer courses students need to have a competitive edge when they graduate.[[54]](#footnote-54)

(Note: Ryerson University has CE certificates in Robotics & Embedded Systems and in Data Analysis, Big Data and Predictive Analytics).

By 2020, there will be a shortage of:

* Machine Learning and Artificial Intelligence Engineers
* Augmented Reality and Virtual Reality Developers
* Robot Developers.[[55]](#footnote-55)
* Healthcare-related jobs (including midwives and physiotherapists)
* Energy-related jobs[[56]](#footnote-56)
* Professionals in the natural resource sectors[[57]](#footnote-57)

In a CareerCast list of the ‘Best Jobs’ for Millennials, 8 out of 10 are related to STEM.

Ranked in Order by Forbes (Susan Adams, Forbes, 6/17/2015):

1. Data Scientist (GlassDoor job search url, indicates big data will transform HR and recruiting.[[58]](#footnote-58))
2. Advertising Account Executive
3. Software Engineer
4. Physical Therapist
5. Computer Systems Analyst (also cited by <http://www.businessinsider.com/best-jobs-for-millennials-2015-6?op=1>)
6. Civil Engineer
7. Statistician
8. Financial Planner
9. Market Research Analyst
10. Social Media Manager

Money.cnn.com[[59]](#footnote-59) cited in early 2017 the following top 10 jobs with median salary and the growth rate:

1. Mobile Applications Developer $97,100 19%
2. Risk Management Director $131,000 7%
3. Landman $93,600 7%
4. Product Analyst $74,900 19%
5. Information Assurance Analyst $98,900 18%
6. Quality Assurance Coordinator (RN) $69,000 16%
7. Clinical Applications Specialist $77,000 21%
8. Hospital Administrator $120,000 17%
9. Database Analyst $70,100 11%
10. Finance & Administration Director $97,300 7%

**How have Universities responded thus far to these emerging trends?**

The following Ivy-league universities responding with accessible, free programming so that workers can “self-learn in areas of labour market shortages, particularly in the STEM fields”[[60]](#footnote-60)

* Columbia University
* Princeton University
* Brown University
* Yale University
* University of Pennsylvania
* MIT
* Harvard University
* Cornell University
* Dartmouth University

At the 4th Skills and Post-Secondary Education 2016 Summit, the Director of HR for RBC Bank, asserted that they have no qualified candidates when searching worldwide for talent who exist to fill their positions as Agile Scrum Leaders, Agile Development Coaches, Digital User Experience Directors and Digital Pioneers (Problem-Solvers for large companies). In addition, here are the top, most popular courses and specializations on Coursera[[61]](#footnote-61) from select American universities:

**Most Popular Courses of 2016 on Coursera**

1. [Learning How to Learn: Powerful mental tools to help you master tough subjects](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Flearning-how-to-learn&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Learning+How+to+Learn%3A+Powerful+mental+tools+to+help+you+master+tough+subjects&index=3&md5=90ac0b9446363f8fb20885a08c3d5b1c) - University of California, San Diego
2. [Machine](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fmachine-learning&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Machine&index=4&md5=cca75be658355fe158d49203d9bf809e) [Learning](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fmachine-learning&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Learning&index=5&md5=f66b83b3659f7bc528217f22f9b42b6f) - Stanford University
3. [Programming for Everybody (Getting Started with Python)](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fpython&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Programming+for+Everybody+%28Getting+Started+with+Python%29&index=6&md5=52ef042e550bf975461648a2852d0389) - University of Michigan
4. [R Programming](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fr-programming&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=R+Programming&index=7&md5=38241441dcfd6d69973f94dbb9b6e725) - Johns Hopkins University
5. [Speak English Professionally: In Person, Online & On the Phone](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fspeak-english-professionally&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Speak+English+Professionally%3A+In+Person%2C+Online+%26+On+the+Phone&index=8&md5=1cbec72f30440aba1a6ed3646f4c6355) - Georgia Institute of Technology
6. [Grammar and Punctuation](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fgrammar-punctuation&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Grammar+and+Punctuation&index=9&md5=1e3e0a7c3bbe7a4de42b48321a525bda) - University of California, Irvine
7. [Seeing Through Photographs](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fphotography&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Seeing+Through+Photographs&index=10&md5=a76af097f81c168528690225ef04386f) - The Museum of Modern Art
8. [The Data Scientist’s Toolbox](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fdata-scientists-tools&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=The+Data+Scientist%27s+Toolbox&index=11&md5=902b75bc9ac52812e0723cbee4341d15) - Johns Hopkins University
9. [Buddhism and Modern Psychology](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fscience-of-meditation&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Buddhism+and+Modern+Psychology&index=12&md5=a87125da40cfc9754a9b67feb8c2f91e) - Princeton University
10. [Mastering Data Analysis in Excel](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fanalytics-excel&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Mastering+Data+Analysis+in+Excel&index=13&md5=77bf55c744a33ee480964b5d941581c0) - Duke University

**Most Popular Specializations**

1. [Data Science](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fjhu-data-science&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Data+Science&index=14&md5=bafbabc55d340b5060a8de73f8fab474) - Johns Hopkins University
2. [Python for Everybody](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fpython&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Python+for+Everybody&index=15&md5=9c14fc0745fcbfe155581781299479bf) - Duke University
3. [Excel to MySQL: Analytic Techniques for Business](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fexcel-mysql&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Excel+to+MySQL%3A+Analytic+Techniques+for+Business&index=16&md5=0be62bf35e4287903756401201dc770d) - Duke University
4. [Business Foundations](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fwharton-business-foundations&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Business+Foundations&index=17&md5=9f0c3d016ae63c59c269b637826bee0c) - University of Pennsylvania
5. [Academic English: Writing](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Facademic-english&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Academic+English%3A+Writing&index=18&md5=6c71a9a25fa47ab591f8cfc1d7b3462d) - University of California, Irvine
6. [Career Success](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fcareer-success&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Career+Success&index=19&md5=a2d73ac50aa4942a79e486de164f21ca) - University of California, Irvine
7. [Business Analytics](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fbusiness-analytics&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Business+Analytics&index=20&md5=fa56d75b2e19b3682d75023d942b359d) - University of Pennsylvania
8. [Improve Your English Communication Skills](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fimprove-english&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Improve+Your+English+Communication+Skills&index=21&md5=7dc46c3b79ac9f0faf3bd71f2e91b8e9) - Georgia Institute of Technology
9. [Big Data](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fbig-data&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Big+Data&index=22&md5=269dd9ac04dd41ed08ac2298f61cb9cf) - University of California, San Diego
10. [Digital Marketing](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fdigital-marketing&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Digital+Marketing&index=23&md5=eeb0dce6dfd4c21c867f6b99eff4979d) - University of Illinois at Urbana-Champaign

The Conference Board of Canada undertook a data run for Canada during the time period September 1, 2013 - September 30, 2015, focusing on full-time permanent jobs. During this timeframe, Canadian employers advertised over 1.6 million jobs. The vast majority of high-income, hard and soft skill full-time jobs, across all sectors, including vocationally oriented disciplines such as business, finance, health care, Information Analytics and Communications Technology (ICT), were in:

* Structured query language (data analytics)
* Numeracy
* Creative Judgment
* Technical Output and Support
* Problem-solving
* Detail-oriented, evidence-based analysis
* Critical Thinking
* Computational thinking – Ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning.
* Sensemaking – Ability to determine the deeper meaning of what is being expressed.
* Novel and Adaptive thinking – Proficiency in thinking and finding solutions and responses beyond those that are role- or rule-based.
* Transdisciplinarity – Literacy in and ability to understand concepts across multiple disciplines
* Cognitive load management – Ability to discriminate and filter information for importance and to understand how to maximize cognitive functioning using a variety of tools and techniques.
* *Empathy with colleagues and clients, going the extra mile, taking initiative.[[62]](#footnote-62)*

In addition, to hold jobs related to Artificial Intelligence (AI) the skills required include coding, algorithmic understanding, math, teamwork and critical thinking.[[63]](#footnote-63)

To corroborate the need for judgment and decision-making, in its cross-country research project, RBC indicates that a key finding: “virtually all job openings will place significant importance on judgment and decision making and more than two-thirds will value an ability to manage people and resources.”[[64]](#footnote-64)

1. **What time frame(s) should the Council consider when developing strategies to better prepare Canadians for the future of work (e.g., 5 years from now, 10, 15)?**

***The Council should establish principles that can be applied perennially to Canada’s overarching strategy on skills development and lifelong learning.***

It is important that the Future Skills Council has room to adapt to changes in Canada’s economic and labour landscape. As such, OCULL believes that the Future Skills Council should begin by establishing 10-year goals, which will be satisfied through 5-year action plans and annual reviews. We encourage the Future Skills council to consult real-time data in order to respond to the key drivers of change: technology, environment, economy, and policies in Canada and the world.

In the next 5 years, students who will be graduating or have recently graduated should have had access to experiential learning opportunities throughout their university or college careers. For the recently graduated, these opportunities should be available within continuing education programs

In the next 10-15 years, universities, colleges, continuing education departments, employers and the government should all be working together to provide agile programming to prepare adult learners for employment.

1. **What should be the top three priorities of the Future Skills initiative to help prepare Canadians and Canada for the future of work? Why?**

*The top three priorities of Future Skills should be to:*

**Priority #1:**

Make university continuing education education units and their activities as one of the top priorities on universities’ agendas or risk failing to serve an increasing number of at-risk citizens. This means making university continuing education units central to universities’ missions and execution of their missions.

Move university continuing education activities to the centre of the university’s revenue generation goals. Continuing education is a revenue generator for universities in the Post-Secondary Education (PSE) funding landscape where Canada’s provinces, on average, only take on 57% of the cost of funding undergraduate and graduate programs (PSE), compared to the average OECD country, which takes on 68% of the cost for PSE.[[65]](#footnote-65)

The way in which university leaders conceive of “university continuing education units (CE)” is out of step with both the needs of learners and the Canadian economy, where those learners will work. Former UBC President Stephen Toope states, “post-secondary graduates need to be job ready”, which corroborates the Boston Consulting Group’s assertion that university CE curriculum must focus on the economic returns of education for adults.[[66]](#footnote-66) It behooves all universities to become leaders in identifying emerging needs in the economy and in developing non-degree CE programs that prepare adults for these in-demand jobs.

A published CIBC report: Canadian Employment Quality Index (March, 2015) highlights disturbing employment trends, making it critically important that university CE providers have the resources and concrete, ongoing university leadership support to prepare today’s workers for gainful employment:

“Looking into the distribution of full-time vs. part-time jobs, the number of part-time jobs has risen much faster than the number of full-time jobs since the 1980s (note: full-time paid-employment jobs are on average of higher quality than part-time and self-employment jobs). **Over the year ending January 2015, the job creation gap between low and high-paying jobs has widened** with the number of low-paying full-time paid positions rising twice as fast as the number of high-paying jobs”.[[67]](#footnote-67)

University continuing education (CE) must be dramatically repositioned to respond to an entirely new reality that requires closing labour market shortage gaps with continuing professional development targeting preparation for ‘hot’ full-time jobs with benefits. CEO Hery G. ‘Hand’ Jackson emphasizes that employers must take responsibility for the skills gap by reinvesting in the workforce through strategic training programs.[[68]](#footnote-68) In 2016, former President Obama agreed with him by initiating a workforce development program partnering employers with universities and focusing on coding, manufacturing, agribusiness, public health, transportation and computer design.[[69]](#footnote-69) The Conference Board of Canada has estimated that Ontario faces a looming shortage of 1 million workers who are highly technically skilled and university educated by 2020.[[70]](#footnote-70) This new reality must address the very real reduction of university funding through cuts in government subsidies by reposition university continuing education units as a university priority.[[71]](#footnote-71)

**Priority #2:**

The Future Skills Council should make college and university continuing education units a priority in the implementation of its mandate across Canada. Critical to this objective will be reinventing college and university processes whereby CE divisions provide an “on demand”, ongoing enrolment system for learning and offer fully in class, “DIY”/MakerSpace learning certificates, accelerated in-person “Fast Tracks” and university-level credentialed programs that have mass popularity.[[72]](#footnote-72) The development of a comprehensive framework that guides funding and delivery of targeted training programs between education and industry must be facilitated by the Future Skills Council. In Canada, we have yet to see, in colleges or universities, a post-degree strategy of delivering rapid-response, advanced skills’ training. Full-time enrolment in Ontario’s postsecondary system has grown by more than 170,000 students since 2013 – more than any comparable period in the province’s history. [[73]](#footnote-73) Schools like Harvard University are endorsing the alternative educational methods such as Fast Tracks and Bootcamps as professional training for continuing education students that complements academic performance together with future workplace performance.[[74]](#footnote-74) Such alternative learning options provide opportunities for universities to bolster recruitment and increase enrolment and revenue. There is no time like the present.

However, due to a demographic shift post-2000, where fewer post-Millennials, known as Generation Z have been born, data from the National Student Clearinghouse Research Center (NSCRC) show that overall postsecondary enrolments in North America dropped by 1.9% in spring 2015, dipping below 18.6 million students. The decline was most pronounced among adults aged 24 and older.[[75]](#footnote-75) To counter the decline over the next decade in the North American (and Ontario) university undergraduate population, due to this demographic shift, universities should move to flexible, fast track, accelerated delivery. This has already resulted in an increase in the number of North American adults enrolled in at least one fast track course or one flipped classroom course for the ninth straight year.[[76]](#footnote-76)

The move to serve young workers struggling to obtain gainful employment must also include the delivery of accelerated, experiential coaching on gaining technological competencies and interpersonal skills, as corroborated in a recent US survey.[[77]](#footnote-77) In fact, to respond to the mass retiring off of the late Baby Boomers in the next 10 years, accelerated learning and continuing education experiences for young Canadians and career changers will yield positive results rapidly and ensure that the emerging labour force taking over from the Baby Boomers is qualified and skilled, and is also a workforce that may enjoy continual expansion and renewal of their expertise as required.[[78]](#footnote-78)

And the good news is, for those who argue that adults do not learn as well in accelerated, Fast Track, intensive CE offerings, conclusions from a recent study were that there is no significant difference in adult learners’ final CE course marks (including marks earned on total assignments completed) between a compressed, accelerated program online or in person course option and a regular 13-week online or in-class option; therefore, positing that adult learners ***have*** the capacity to do just as well in compressed courses, which brings about an “immersive, training effect by which learning is well-retained in long-term memory.”[[79]](#footnote-79) Furthermore, using a very large database, Austin and Gustafson in 2006 found that adult learners achieved *higher* course marks and those marks reflect greater learning, as the researchers have shown by a series of competency tests following the completion of summer condensed and accelerated courses.[[80]](#footnote-80)

**Offering accelerated, condensed, Fast Track classes 2 to 4 months long, revising curriculum as the industry needs change and making these offerings open admission, boosts high job-placement rates and graduates’ salaries.[[81]](#footnote-81)**

In renewing university CE delivery modalities to meet the needs of a busy citizenry, Canadian universities, as continuing education providers, would be wise take a page out of the state of Kentucky’s university system with 68 campuses**. Learners can, by open admission, start one of their online, accelerated courses 365 days a year, which as a result, boosts the bottom line while providing learner flexibility and augmented accessibility**.[[82]](#footnote-82)

**Priority #3:**

How will Canada go about future-proofing its citizens? The Future Skills Council should make college and university continuing education units central to teaching Canadian adult learners (currently marginalized by government policies) to become the adaptable workers needed for tomorrow’s economy – workers who have future-forward skills sets. University continuing education non-degree initiatives that deliver on the career-ready expansion of capabilities and practical implementation of applied skills[[83]](#footnote-83) for every life cycle of Canada’s adult citizenry must be at the front and center of all Canadian universities’ missions and priorities. If this does not happen, **we will face a world in which there will be a lot of people without jobs and simultaneously an even larger number of jobs without people.** “Without effective action, we face a future with large numbers of unskilled workers looking for jobs that require skills they do not possess, and a large number of jobs that will go unfilled.” (Miner, 2010) We must commit universities to being drivers and ‘change agents’ to bring about a thriving Canadian citizenry and a prosperous economy and country for all. If this does not happen, Canada will not be successful in retaining our cultural, social, economic, scientific, technological and labour force advantages in our highly and globally competitive world. Finally, our collective, future economic prosperity relies on continuous, hands-on opportunities for interdisciplinary growth and development. **Nothing less than the future of Canada is at stake.**

1. **Is there anything else we should think about or be aware of as we do this work?**

***We recommend that the Future Skills Council forms regional advisory groups that include members of the OCULL, CAUCE and other university continuing education associations in Canada.***

1. **Can you suggest any publications, data or research that we should review?**
2. We recommend that Future Skills becomes a member of the **Educational Advisory Board (EAB)**, a major think tank on higher education in the US. (<https://www.eab.com/>)

We also recommend that Future Skills purchases seats of **Burning Glass** which provides information about job postings and the associated skill sets listed for new employees. This information is granular by region in Canada and timespan and updates frequently. (<https://www.burning-glass.com/>) StatsCan currently uses Burning Glass.

1. Here is a list of data which has helped inform parts of our submission:
2. On March 22, 2016, the federal Liberal government released its first budget. Investing in a clean energy economy, the budget’s “Green New Deal” is expected to create 1 million climate jobs.[[84]](#footnote-84)
3. In a CareerCast list of the ‘Best Jobs’ for Millennials, eight out of ten are related to STEM. Ranked in Order by Forbes (Susan Adams, Forbes, 6/17/2015):
4. Data Scientist (GlassDoor job search url, indicates big data will transform HR and recruiting.[[85]](#footnote-85))
5. Advertising Account Executive
6. Software Engineer
7. Physical Therapist
8. Computer Systems Analyst (also cited by http://www.businessinsider.com/best-jobs-for-millennials-2015-6?op=1)
9. Civil Engineer
10. Statistician
11. Financial Planner
12. Market Research Analyst
13. Social Media Manager

 **c)** Money.cnn.com[[86]](#footnote-86) cited in early 2017 the following top 10 jobs with median salary and the growth rate:

1. Mobile Applications Developer $97,100 19%
2. Risk Management Director $131,000 7%
3. Landman $93,600 7%
4. Product Analyst $74,900 19%
5. Information Assurance Analyst $98,900 18%
6. Quality Assurance Coordinator (RN) $69,000 16%
7. Clinical Applications Specialist $77,000 21%
8. Hospital Administrator $120,000 17%
9. Database Analyst $70,100 11%
10. Finance & Administration Director $97,300 7%
11. How have Universities responded thus far to these emerging trends?

The following Ivy-league universities have responded with accessible, free programming so that workers can “self-learn in areas of labour market shortages, particularly in the STEM fields”[[87]](#footnote-87)

* Columbia University
* Princeton University
* Brown University
* Yale University
* University of Pennsylvania
* MIT
* Harvard University
* Cornell University
* Dartmouth University

At the 4th Skills and Post-Secondary Education 2016 Summit, the Director of HR for RBC Bank, asserted that they have no qualified candidates when searching worldwide for talent who exist to fill their positions as Agile Scrum Leaders, Agile Development Coaches, Digital User Experience Directors and Digital Pioneers (Problem-Solvers for large companies).

**e)** In addition, here are the top, most popular courses and specializations on Coursera[[88]](#footnote-88) from select American universities:

Most Popular Courses of 2016 on Coursera

1. [Learning How to Learn: Powerful mental tools to help you master tough subjects](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Flearning-how-to-learn&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Learning+How+to+Learn%3A+Powerful+mental+tools+to+help+you+master+tough+subjects&index=3&md5=90ac0b9446363f8fb20885a08c3d5b1c) - University of California, San Diego
2. [Machine](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fmachine-learning&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Machine&index=4&md5=cca75be658355fe158d49203d9bf809e) [Learning](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fmachine-learning&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Learning&index=5&md5=f66b83b3659f7bc528217f22f9b42b6f) - Stanford University
3. [Programming for Everybody (Getting Started with Python)](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fpython&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Programming+for+Everybody+%28Getting+Started+with+Python%29&index=6&md5=52ef042e550bf975461648a2852d0389) - University of Michigan
4. [R Programming](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fr-programming&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=R+Programming&index=7&md5=38241441dcfd6d69973f94dbb9b6e725) - Johns Hopkins University
5. [Speak English Professionally: In Person, Online & On the Phone](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fspeak-english-professionally&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Speak+English+Professionally%3A+In+Person%2C+Online+%26+On+the+Phone&index=8&md5=1cbec72f30440aba1a6ed3646f4c6355) - Georgia Institute of Technology
6. [Grammar and Punctuation](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fgrammar-punctuation&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Grammar+and+Punctuation&index=9&md5=1e3e0a7c3bbe7a4de42b48321a525bda) - University of California, Irvine
7. [Seeing Through Photographs](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fphotography&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Seeing+Through+Photographs&index=10&md5=a76af097f81c168528690225ef04386f) - The Museum of Modern Art
8. [The Data Scientist’s Toolbox](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fdata-scientists-tools&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=The+Data+Scientist%27s+Toolbox&index=11&md5=902b75bc9ac52812e0723cbee4341d15) - Johns Hopkins University
9. [Buddhism and Modern Psychology](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fscience-of-meditation&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Buddhism+and+Modern+Psychology&index=12&md5=a87125da40cfc9754a9b67feb8c2f91e) - Princeton University
10. [Mastering Data Analysis in Excel](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Flearn%2Fanalytics-excel&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Mastering+Data+Analysis+in+Excel&index=13&md5=77bf55c744a33ee480964b5d941581c0) - Duke University

**f)** Most Popular Specializations

1. [Data Science](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fjhu-data-science&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Data+Science&index=14&md5=bafbabc55d340b5060a8de73f8fab474) - Johns Hopkins University
2. [Python for Everybody](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fpython&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Python+for+Everybody&index=15&md5=9c14fc0745fcbfe155581781299479bf) - Duke University
3. [Excel to MySQL: Analytic Techniques for Business](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fexcel-mysql&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Excel+to+MySQL%3A+Analytic+Techniques+for+Business&index=16&md5=0be62bf35e4287903756401201dc770d) - Duke University
4. [Business Foundations](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fwharton-business-foundations&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Business+Foundations&index=17&md5=9f0c3d016ae63c59c269b637826bee0c) - University of Pennsylvania
5. [Academic English: Writing](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Facademic-english&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Academic+English%3A+Writing&index=18&md5=6c71a9a25fa47ab591f8cfc1d7b3462d) - University of California, Irvine
6. [Career Success](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fcareer-success&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Career+Success&index=19&md5=a2d73ac50aa4942a79e486de164f21ca) - University of California, Irvine
7. [Business Analytics](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fbusiness-analytics&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Business+Analytics&index=20&md5=fa56d75b2e19b3682d75023d942b359d) - University of Pennsylvania
8. [Improve Your English Communication Skills](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fimprove-english&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Improve+Your+English+Communication+Skills&index=21&md5=7dc46c3b79ac9f0faf3bd71f2e91b8e9) - Georgia Institute of Technology
9. [Big Data](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fbig-data&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Big+Data&index=22&md5=269dd9ac04dd41ed08ac2298f61cb9cf) - University of California, San Diego
10. [Digital Marketing](http://cts.businesswire.com/ct/CT?id=smartlink&url=https%3A%2F%2Fwww.coursera.org%2Fspecializations%2Fdigital-marketing&esheet=51482867&newsitemid=20161222005624&lan=en-US&anchor=Digital+Marketing&index=23&md5=eeb0dce6dfd4c21c867f6b99eff4979d) - University of Illinois at Urbana-Champaign

**g)** The Conference Board of Canada undertook a data run for Canada during the time period September 1, 2013-September 30, 2015, focusing on full-time permanent jobs. During this timeframe, Canadian employers advertised over 1.6 million jobs. The vast majority of high-income, hard and soft skill full-time jobs, across all sectors, including vocationally oriented disciplines such as business, finance, health care, Information Analytics and Communications Technology (ICT), were in:

* Structured query language (data analytics)
* Numeracy
* Creative Judgment
* Technical Output and Support
* Problem-solving
* Detail-oriented, evidence-based analysis
* Critical Thinking
* Computational thinking – Ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning.
* Sensemaking – Ability to determine the deeper meaning of what is being expressed.
* Novel and Adaptive thinking – Proficiency in thinking and finding solutions and responses beyond those that are role- or rule-based.
* Transdisciplinarity – Literacy in and ability to understand concepts across multiple disciplines
* Cognitive load management – Ability to discriminate and filter information for importance and to understand how to maximize cognitive functioning using a variety of tools and techniques.
* *Empathy with colleagues and clients, going the extra mile, taking initiative.[[89]](#footnote-89)*

In addition, to hold jobs related to Artificial Intelligence (AI) the skills required include coding, algorithmic understanding, math, teamwork and critical thinking.[[90]](#footnote-90)

To corroborate the need for judgment and decision-making, in its cross-country research project, RBC indicates that a key finding: “virtually all job openings will place significant importance on judgment and decision making”

***3.*** *The following is a list of research reports and articles with relevant passages highlighted:*

Lanvin & F Monteiro (eds) (2019). The Global Talent Competitiveness Index 2019: Entrepreneurial Talent and Global Competitiveness. INSEAD, The Adecco Group and Tata Communications: Fontainbleau, France

Canada ranks 15th on the Global Talent Competitiveness Index.

**“Canada** (15th) is a top 10 performer for attracting talent (7th), which is achieved as a result of high levels of External Openness (10th) and Internal Openness (5th). A favourable Regulatory Landscape (7th) and positive Business and Labour Landscape (8th) contribute to a good showing in enabling talent (11th), despite a lacklustre Market Landscape (21st). A leading country in terms of High-Level Skills (4th), Canada’s pool of Global Knowledge Skills (12th) is dragged down by a relatively low Talent Impact (22nd). In the case of Vocational and Technical Skills (19th), however, it is the Mid-Level Skills (46th) sub-pillar that lowers the ranking, whereas the country performs relatively well in linking the education system to the labour market needs (12th in Employability). There is also scope for improvement in retaining talent (18th), particularly as it relates to Lifestyle (24th) indicators.” (p26).

**Korn Ferry (2018). Future of Work: The Global Talent Crunch, Korn Ferry**

“By 2030, demand for skilled workers will outstrip supply, resulting in a global talent shortage of more than 85.2 million people.” (p4)

Governments must be mindful

“Governments must be mindful of their citizens’ employability in the context of a global talent market. It’s essential that governments and companies focus on building and maintaining skilled talent pipelines and provide continuous access to both formal and on-the-job learning opportunities” (p. 42).

**CBI (2018) Educating for the Modern World. CBI/Pearson Education and Skills Annual Report, November 2018**

“Advances in technology and automation are rapidly affecting the way we live and work. These advances, as well as megatrends like demographic change, globalization, income inequality, environmental sustainability, and urbanization - will all have significant influence over the jobs of the future” (p. 6).

**NatCen (2018). How Employable is the UK. LifeSkills created with Barclays. October 2018**

“The research findings showed Millennials as the lowest performing age group, with just 4 in 10 (39 per cent) of 25-34 year olds able to display all of the core skills. This generation risks being overtaken in the increasingly competitive employment landscape by the younger Gen Z (16-24 year olds), a slightly greater proportion of whom (41 per cent) can demonstrate all 7 key skills, despite only just having entered the workforce. Across younger respondents however, the study found high levels of over confidence when matching actual abilities to how they rated themselves, showing the need for ongoing support in building skills.”

Universities UK (2018). Solving future Skills Challenges (2018), August 2018

“The importance of transferable skills and work experience was stressed by the Wakeham Review of STEM degree provision and employability (BIS, 2016a), which commented on the need for ‘softer skills such as teamwork and project management’ to be embedded in the curriculum and for more employers to offer work experience. This points to the importance of combining subject skills, transferable skills and work experience (BIS, 2016)” (p.14).

“In an increasingly disrupted world of work where companies are looking to ‘self-disrupt’ and engage in ‘perpetual reinvention’ (IBM, 2018) to ensure their future success and public employers are continually having to review services, enterprise skills can support graduate success by developing resilience and an ability to manage uncertainty “ (p. 15).

**INSEAD, WIPO, Cornell University and the 2018 GII Knowledge Partners (2018). Global Innovation Index. July 2018**

Canada ranks 18th in the GII, a “detailed quantitative tool that helps global decision makers better understand how to stimulate the innovative activity that drives economic and human development” (press release, July 2018).

**McKay, D (2018). Humans Wanted: How Canadian youth can thrive in the age of disruption. RBC, March 2018**

“More than 25% of Canadian jobs will be heavily disrupted by technology in the coming decade. Fully half will go through a significant overhaul of the skills required” (p. 3).

“Canada’s education system, training programs and labour market initiatives are inadequately designed to help Canadian youth navigate this new skills economy” (p. 3).

**CBI (2017) Helping the UK Thrive. CBI/Pearson Education and Skills Survey, July 2017**

“Reflecting these trends, the biggest growth in jobs in the years ahead is expected to be in management, professional and technical roles. Almost half of all employment (47%) is set to be in managerial, professional or associate professional and technical jobs by 2024.13 These jobs demand better levels of education and skills, so raising standards among all young people will be essential if they are to be able to take advantage of these growing opportunities” (p19).

***4.*** *Please also see the resources and references cited in this document. Many of these sources produce reports and analyses on a regular basis.*

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