



# A Quiet Crisis

## Lots of jobs, not enough skills

**CANADA, WE HAVE A PROBLEM.** We're hurtling towards the 2020s with perfect hindsight, not seeing what's clearly before us. The next generation is entering the workforce at a time of profound economic, social and technological change. We know it. Canada's youth know it. And we're not doing enough about it.

RBC wants to change the conversation, to help Canadian youth own the 2020s — and beyond. RBC Future Launch is our 10-year commitment to that cause, to help young people prepare for and navigate a new world of work that, we believe, will fundamentally reshape Canada. For the better. If we get a few big things right.

This report, based on a year-long research project, is designed to help that conversation. Our team conducted one of the biggest labour force data projects in Canada, and crisscrossed the country to speak with students and workers in their early careers, with educators and policymakers, and with employers in every sector.

We discovered a quiet crisis — of recent graduates who are overqualified for the jobs they're in, of unemployed youth who weren't trained for the jobs that are out there, and young Canadians everywhere who feel they aren't ready for the future of work.

Too many have been trained for jobs that may go away rather than equipped with skills that will be ever more valuable.

We all bear responsibility to change that. As employers, we need to rethink the way we hire, retrain and continuously reshape our workforces. As educators, we need to think beyond degrees and certificates. As governments, we need to take advantage of the world of instant information to harness the coming skills revolution. And young Canadians everywhere need to seize the moment, to demand more of Canada and more of themselves.

The age of automation need not be a threat. If we apply our humanity — to be creative, critical and collaborative — it can be a competitive advantage.

If we find new ways to support and unleash the skills of Canada's youth, they'll launch an amazing future — for themselves, and for all of Canada.



Dave McKay, President and CEO, RBC

A handwritten signature in blue ink that reads "Dave McKay". The signature is written in a cursive, flowing style.



# What We Found

## Learnings from our cross-country research project



1. 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.



2. An assessment of 20,000 skills rankings across 300 occupations and 2.4 million expected job openings shows an increasing demand for foundational skills such as critical thinking, co-ordination, social perceptiveness, active listening and complex problem solving.



3. Despite projected heavy job displacement in many sectors and occupations, the Canadian economy is expected to add 2.4 million jobs over the next four years, all of which will require this new mix of skills.



4. Canada's education system, training programs and labour market initiatives are inadequately designed to help Canadian youth navigate this new skills economy.



5. Canadian employers are generally not prepared, through hiring, training or retraining, to recruit and develop the skills needed to make their organizations more competitive in a digital economy.



6. Our researchers identified a new way of grouping jobs into six "clusters," based on essential skills by occupation rather than by industry.



7. By focusing on the foundational skills required within each of these clusters, a high degree of mobility is possible between jobs.



8. Digital fluency will be essential to all new jobs. This does not mean we need a nation of coders, but a nation that is digitally literate.



9. Global competencies like cultural awareness, language, and adaptability will be in demand.



10. 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.



A CALL TO ACTION

# What If ...?

1. What if employers agreed to hire for core skills over credentials?
2. What if employees, employers and governments contributed to lifelong learning funds to finance reskilling, the way we finance retirement?
3. What if all post-secondary institutions agreed to a national goal of exposing 100 percent of undergraduate students to meaningful work-integrated learning placements?
4. What if foundational skills and career planning were built into K-12 programs across the country, and measured for their achievement?
5. What if Ottawa and the provinces designed skills and employment programs specifically for people under the age of 30?
6. What if governments and employers agreed to a new national digital platform for skills and jobs information?
7. What if, together, we recognized the coming skills revolution as critical to the future of Canada?



# A New Mobility

## How young Canadians can prepare for what's coming next

**A** **MOBILE, SKILLED WORKFORCE,** constantly learning, training and upgrading to meet the demands of a changing world: That's a skills economy.

For young Canadians to flourish at a time of profound economic, social and technological change, we need to make this mobility a priority. We need to understand how young Canadians can move within and between jobs. How they can always be training for what comes next.

Our comprehensive data project analyzing the changing demand for Canadian skills looks past the standard economic data and digs into the work Canadians actually do: hundreds of common but disparate occupations identified by the federal government. It shows that these occupations are connected by the skills required to do them. Skills that range from reading and critical thinking to systems analysis and technology design, each bearing its own importance in any given line of work.

The occupations can be grouped into six broad "clusters," which we've called Solvers, Providers, Facilitators, Technicians, Crafters and Doers.

The clusters aren't grouped by industry, educational attainment, collar colour or income; they're grouped by the skills required to do the work. This allows us to see how skills apply across a wide range of jobs,

and how young people might be able to move from one profession to another by upgrading just a small number of skills. Out of 35 foundational workplace skills, it takes upgrading just four skills, for example, for someone in the Facilitator cluster to transition from dental assistant to graphic designer.

Of course some transitions between professions will require time, money and a personal commitment to bridging certain knowledge gaps — and it's no small thing to be constantly upgrading skills. Young Canadians will have to find the transitions that work for them. Not every dental assistant has the aptitude or desire to become a graphic designer.

The following page shows the six clusters and their skills emphasis, their susceptibility to automation, and examples of career transitions that can occur within each. This gives us a new understanding of how young Canadians can discover career paths, acquire skills and upgrade them. We've also used market forecasting to show which clusters stack up well against labour demand, and automation projections to show which clusters face the most risk of disruption.

If young Canadians can tap into these skills foundations and mobility potential, they can make unexpected leaps — within their clusters, and beyond.

# A Skills Economy

We've grouped the Canadian economy into six clusters based on essential skillsets: a roadmap for Canada's next generation

See more information about each cluster on page 18

## Technicians

*High in Technical Skills*

**Possible Transition:** Car Mechanic to Electrician



**Moderate** Probability of Disruption



**130,000** Job Openings\*

## Crafters

*Medium in Technical Skills  
Low in Management Skills*

**Possible Transition:** Farmer to Plumber



**Very High** Probability of Disruption



**360,000** Job Openings\*

## Doers

*Emphasis on Basic Skills*

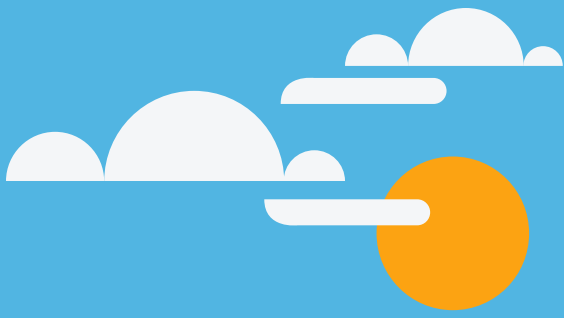
**Possible Transition:** Greenhouse Worker to Crane Operator [1]



**High** Probability of Disruption



**110,000** Job Openings\*



## Solvers

*Emphasis on Management Skills and Critical Thinking*

**Possible Transition:** Mathematician to Software Engineer

✓ **Minimal** Probability of Disruption

👤 **350,000** Job Openings\*

## Facilitators

*Emphasis on Emotional Intelligence*

**Possible Transition:** Dental Assistant to Graphic Designer

— **Moderate** Probability of Disruption

👤 **570,000** Job Openings\*

## Providers

*High in Analytical Skills*

**Possible Transition:** Real Estate Agent to Police Officer

✓ **Low** Probability of Disruption

👤 **850,000** Job Openings\*

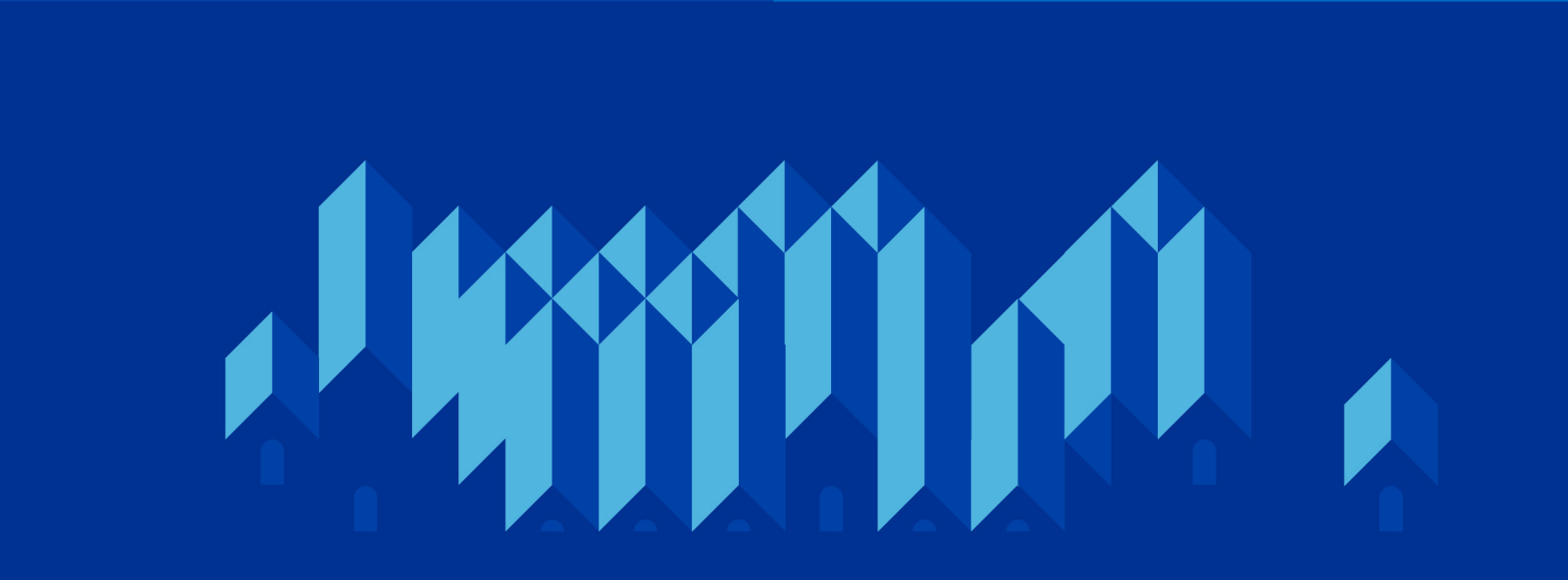


# Human After All

Canadian youth are entering the world of work just as it's being transformed. Among them is a cohort that is ready to benefit from change — they are staying ahead of disruption, and making bold transitions. Meet the role models for Canada's future economy of skills









**IMAGINE A YOUNG UNIVERSITY DROPOUT.** He reads meters for a utility company but new technology threatens to eliminate his job. He doesn't have the skills for other positions available at the utility. His career is in trouble before it's even begun.

A generation of Canadian youth could be staring down similar fates. But meter readers won't be the only ones under threat as the 21st-century workplace is reshaped.

Dentistry, mining, graphic design, radiology, surveying, farming, sales — in the new workplace, every occupation can be disrupted. Older generations have faced their own disruptions, of course, but they did not face such a fundamental rethinking of work as Canadians in their late teens and 20s are confronting today.

To help Canada's next generation do the disrupting instead of being disrupted, we need to start with 21st-century skills — skills they can use to grasp new opportunities and surf the waves of technology and innovation that are changing the world. We need to stop telling them that work revolves only around degrees, qualifications and jobs. We need to understand how to build something different: an economy and society based on skills.

Our research will contribute to that understanding. We wanted to establish hard facts about skills in the Canadian workplace, and envision ways to move forward. And we wanted to seek lessons in the experiences of those who are already trying to push those boundaries.

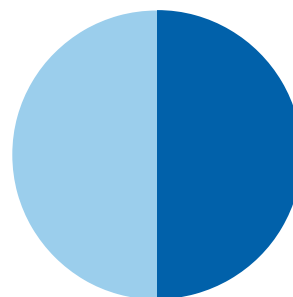
We spoke to employers, policymakers, educators, career counsellors and young Canadians across the country to understand what our future skills economy can look like. We also crunched data for nearly 300 typical occupations to draw lessons about how to get there.

Through the data, our researchers identified a new way to group occupations — not by industry or educational requirements but by the essential skills required to do the job. We established six clear "clusters" of occupations — each one placing emphasis on specific skills — from the Solvers who are critical thinkers such as architects or mechanical engineers, to the Facilitators who require emotional intelligence and include administrative assistants and Uber drivers. Young people can better understand how to prepare for and navigate an evolving workforce by identifying the skills they have and need, and where they fall within those clusters.

The data allow us to compare each cluster's skills to the 2.4 million jobs the federal government expects to be created between 2018 and 2021. Some skills will be prerequisites for nearly all these job openings; others for just a handful. And there will be significant unmet demand for members of two clusters.

Our research also shows us how automation will change the skills young people need. More than a quarter of Canadian jobs will be heavily disrupted in the decade ahead. Half will require very different skills than they do now. In one cluster, 74 percent of occupations will be very susceptible to automation in the next few years. In another, 93 percent of occupations will be practically bulletproof.

Armed with this research, we can all do our part to help young Canadians acquire the skills they need for more mobile, resilient careers.



**50%**

**OF OCCUPATIONS**

will undergo a significant skills overhaul

## TO COMPETE WITH TECHNOLOGY – OR WORK WITH IT

Some young Canadians are already upgrading their skills and making bold transitions. They are staying ahead of automation by building the right skill sets. They are role models for Canada’s future economy of skills: mobile workers, resilient, self-aware and ready to benefit from change.

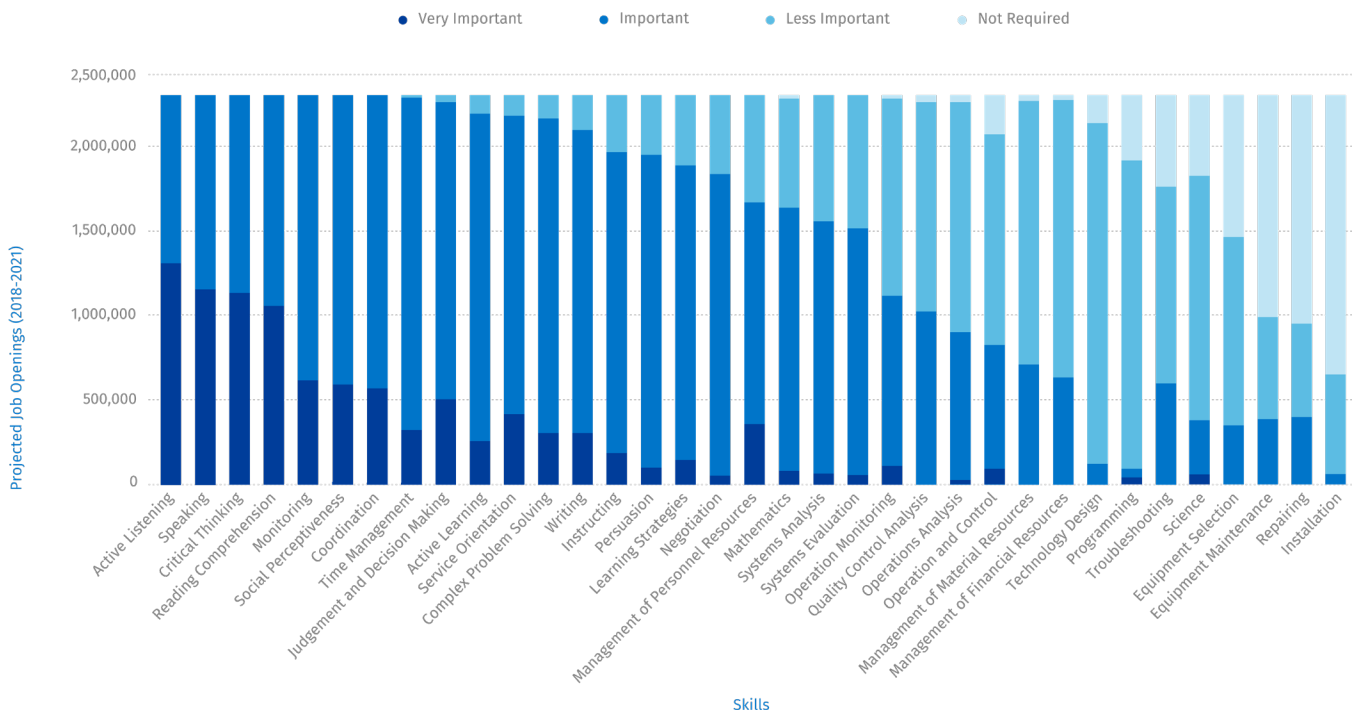
While shifts in the workplace will affect all of us, it is critical to understand that these younger Canadians — those under 30 — are the most at risk. The most profound disruption is likely still a decade away; they have a full career ahead of them, and need to develop the muscle memory for skills development and mobility now.

That future could look a lot like Hermel (Mel) Morin of Grand Falls, N.B., the young dropout mentioned earlier. Mel studied sciences and then education at university, but realized it was a bad fit after a third-year teaching placement. He dropped out and started reading meters for the provincial utility NB Power.

Mel was good at his job. He had a head for numbers and processes. He found ways to set up his meters in an ideal sequence, making the work easier and more efficient. But his job was turned upside down when the company started introducing radio-frequency meters, which saved time by being read remotely. “Instead of reading 500 meters a day, you could read 5,000,” he recalls. And the technology was only going to get smarter. “I could tell that meter-reader roles would get phased out.”

He could have started looking for other work that he was qualified for, or gone back to university or college. Instead, he took stock of his basic skills and started upgrading. He asked for on-the-job training to install the machines that were going to put him out of work — and to his employer’s credit, he received it. He learned to work with the new technology, rather than competing with it.

## PROJECTED SKILLS DEMAND FOR ALL OCCUPATIONS IN ORDER OF DESCENDING IMPORTANCE



That was the step that launched Mel on a quest for constant skills training and mobility. He asked questions, volunteered for training, accepted temporary assignments, and made long commutes to get experience fielding emergency calls. These upgraded skills took him from meter installer to truck scheduler to administration analyst, always working with or ahead of new developments and technology – and helping NB Power become more efficient.

*“In administrative roles, I brought skills from meter reading – I was able to improve processes. In engineering, the department I was supporting, I had to have organizational skills. Analytical skills have been crucial in every role I was in, and now I do this even better. My supervisor considered me extremely efficient.”*

His latest project is a secondment working with new software that could eliminate his full-time position. But he’s not worried. The skills he’s building will keep sending him up the ladder, wherever the work is.

*“If anything, I’ll be involved in change management,” he says. “I like to be in an environment where things are changing.”*

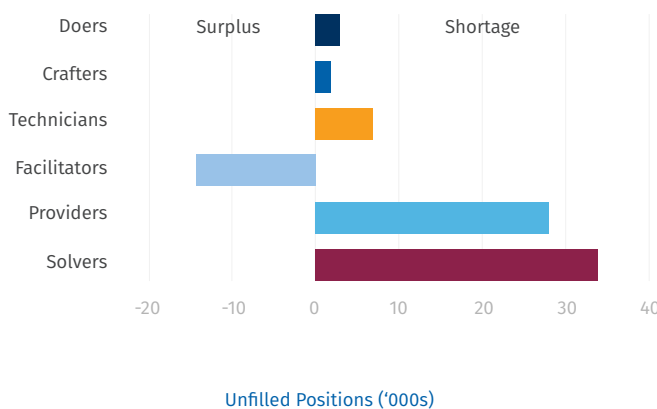






## Hermel (Mel) Morin

*Administration Analyst*

-  Grand Falls, New Brunswick
-  38 Years Old
-  3 Career Pivots

### PROJECTED LABOUR SHORTAGES: 2018 - 2021



-  Partial Bachelor’s Degree
-  Meter Reader
-  Misc. Administrative Roles
-  Administration Analyst



## Alyssa Deville

*Sheet Metal Apprentice*

 Vancouver, British Columbia

 28 Years Old

 3 Career Pivots

- Retail Representative
- Traffic Control Certification
- Operations Manager
- British Columbia Institute of Technology
- Sheet Metal Apprentice

### THE HOTTEST SKILLS: LISTENING AND JUDGMENT

Mel's story takes us to the heart of the data we've been crunching — in particular, our discovery of “clusters” of similarly skilled occupations.

To understand how skills and occupations are related, we started with the 292 occupations in the 2011 federal National Occupational Classification (NOC). We matched these to U.S. occupations, which have been assessed for 35 workplace skills in a U.S. Labor Department dataset called O\*NET. This allowed us to determine the degree to which each skill matters for each occupation, and the proficiency needed to perform it. The occupations broke down into six distinct clusters.

Before analyzing the data, we would have simply thought of Mel as working in the energy industry. But after quantifying the skills he's been using and upgrading, we can now see his place in the wider skills economy. Our analysis places him firmly within a cluster of medium-to-highly-skilled occupations we call Facilitators.

The Facilitators cluster includes meter readers, administration analysts, as well as a range of blue- and white-collar occupations that young Canadians will find familiar — from opticians and salespeople to Uber drivers and drone operators. At their core, Facilitator occupations are about serving or supporting other people's wants or needs (in Mel's case, the people who benefit from his company's energy services).

The cluster data tells us that skills training and open-minded employers can help young, determined Canadians build bridges between seemingly unconnected occupations. Our analysis shows that Mel built a bridge from imperiled meter reader to in-demand administration analyst by upgrading eight skills over more than a decade.



Not every young Canadian’s transition will take so long, or remain within one cluster. In fact, the faster and more comprehensively they upgrade their skills, the greater the potential for job opportunities across more than one cluster.

Our researchers spoke to another young Canadian, Alyssa Deville of Vancouver, who finished high school and couldn’t afford to attend university. She started working in retail, but her prospects were limited. She knew she wanted to be challenged and to do well for herself. So she decided to take a more practical approach to improving her skills.

Alyssa methodically upgraded her skills by way of certificate programs, college courses, on-the-job training and an apprenticeship. As a result, she’s been offered management roles and won gold at B.C. Skills, an Olympic-style competition held every year to promote skills in the province. She’s used her

newfound mobility to leap across three clusters, from vendor representative (Facilitators) to traffic-control manager (Providers) to sheet-metal apprentice (Technician). All by the age of 28, without a degree.

And she’s not finished. While apprenticing, she’s been taking computer courses so she can work with digital blueprints. She hopes to train her way into a foreman’s role, and eventually a teaching position at a technical school.

*“Both require lifelong learning. If you don’t continuously learn and keep up-to-date, you will be left behind.”*

Young Canadians are laying the foundation for lifelong learning in a way they never previously have. Mel and Alyssa are serial upgraders — they’ve made training a habit.

But many other leaps are just a handful of upgrades apart. Dental assistant to photographer? Four skills upgraded. Miner to veterinary technician? Three skills upgraded. Cardiology technician to graphic designer? Zero skills upgraded.

Of course, similar skills requirements alone don't guarantee easy transitions. Not every dental assistant has an aptitude for photography. And a lab technician would need to acquire a great deal of job-specific knowledge to succeed as a graphic designer. But the research shows that the underlying skills are nearly identical.

The same cluster data gives us a clear picture of which skills young people will need for the jobs of the future. Employment and Social Development Canada (ESDC) publishes a regular forecast of job openings; it expects 2.4 million of them between 2018 and 2021. Our analysis reveals which skill sets will be needed to fill them.

**2.4M** FORECASTED JOB OPENINGS  
Between 2018 and 2021

The strongest demand is for the foundational skills that separate good from great in every walk of life, and especially in Canada's increasingly services-oriented economy. Communication, emotional intelligence, critical thinking, analysis: young Canadians will need these skills in an age of rapid change. They will need to work well with an increasingly diverse range of other people — business partners from around the world, plus co-workers of all ages, genders, languages and cultures — and to complement technology, which will become ever more pervasive.

"I don't think the world will get any less globalized, and the intercultural aspect of that will affect collaboration and working in teams," says Noel Baldwin, co-ordinator of postsecondary education

and adult learning for the Council of Ministers of Education, Canada. "There's going to be a big transition in how computers and machines are integrated into these things."

Among the 2.4 million jobs in ESDC's forecast, demand will be nearly universal for several key human skills, the ones that help us learn and acquire knowledge. Active listening, speaking, critical thinking and reading comprehension will be "relatively" or "very" important for virtually 100 percent of these job openings, across all industries. Breadth of skills will be more critical than proficiency; this is good for young Canadians, who typically lack the years of experience needed to develop expert proficiency.

Among cross-functional skills, which help us perform more complicated tasks, our research shows that social skills such as co-ordination and social perceptiveness will be nearly as important across all occupations, followed by analytical skills such as judgment and decision-making.

We should emphasize that the skills above will be in demand across all occupations — including STEM (Science, Technology, Engineering and Math) and trades occupations, whose reputations play down the demand for social skills.

Take the mining sector. Mining engineers are constantly required to listen, persuade, negotiate and compromise in their sensitive relationships with local communities. "There cannot be a tradeoff between social and technical skills," says Ryan Montpellier, executive director of the Mining Industry Human Resources Council.

Other skills in demand will include service orientation — actively looking for ways to help others (required for more than 90 percent of job openings) — plus mathematics and personnel management (each about 70 percent of job openings).



Our analysis shows that labour demand will significantly outstrip supply in two clusters of occupations: Solvers and Providers.

Of the 2.4 million Canadian jobs that will be created in the next four years, Solvers will be required for about 350,000 — more openings than there will be Solvers to fill them. Solvers include legislators, architects, doctors, judges, driverless car engineers, mechanics, data scientists, cloud computing specialists — people who innovate and find solutions to intractable problems.

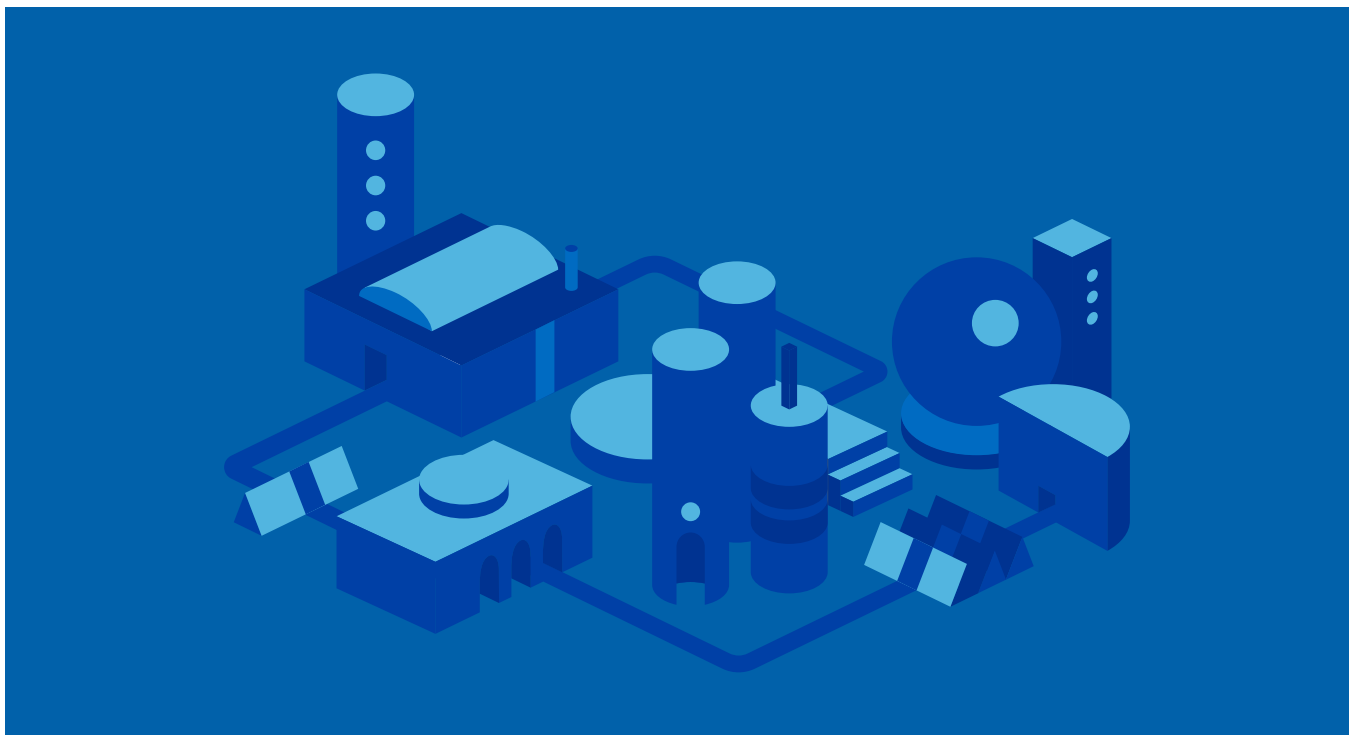
There will be 840,000 new jobs for Providers, the other high-demand cluster, but not enough of them to meet the demand. Providers include pharmacists, nurses, social-media managers, bloggers, real-estate agents, chefs, police officers — people who provide us with specialized services.

What Solvers and Providers have in common is well-rounded and highly developed portfolios of basic and social skills. By 2021, approximately 45 percent of working Canadians will belong to these

**45%** OF WORKING CANADIANS will belong to the Solvers and Providers clusters by 2021.

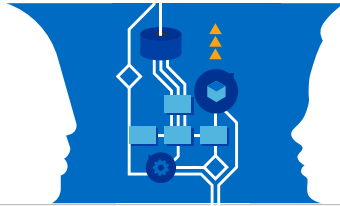
two clusters. They will be highly mobile and resilient because their skill sets will keep them in demand. They will also be the least vulnerable to automation.

Labour demand will be weakest for the Facilitators cluster. Facilitators include opticians, payroll clerks, customer service representatives, administrative assistants, Uber drivers, drone operators, mail workers — people who serve or support the wants and needs of others. The Canadian economy is expected to generate 570,000 job openings for Facilitators, the second-most of any cluster. But there will be more Facilitators than are needed to fill those jobs, partly due to artificial intelligence and digital processes (think chatbots and self-driving cars), which will leave half the cluster's occupations highly susceptible to automation.



# Skills Clusters

## Solvers



Total Number of Canadians	2.3 Million
Job Openings between 2018 and 2021	350,000
Probability of Tech Disruption	Minimal

## Providers



Total Number of Canadians	6.2 Million
Job Openings between 2018 and 2021	850,000
Probability of Tech Disruption	Very Low

## Facilitators



Total Number of Canadians	4.8 Million
Job Openings between 2018 and 2021	570,000
Probability of Tech Disruption	Moderate

### Traditional Jobs

Mechanical engineers, judges, architects, heavy equipment mechanics

### 21st Century Jobs

Driverless car engineers, cloud computing specialists, big data analysts

### Defining Characteristics

Critical thinking is most important skill  
 Management skills are highly valued relative to other clusters  
 Biggest shortage of workers in the next four years

### Traditional Jobs

Veterinarians, musicians, child care providers

### 21st Century Jobs

Social media managers, YouTube content creators, lifestyle bloggers

### Defining Characteristics

Analytical skills are valued highly relative to other clusters  
 Second largest shortage of workers in the next four years

### Traditional Jobs

Customer service reps, graphic designers, administrative assistants

### 21st Century Jobs

Uber drivers, drone operators, Zumba instructors

### Defining Characteristics

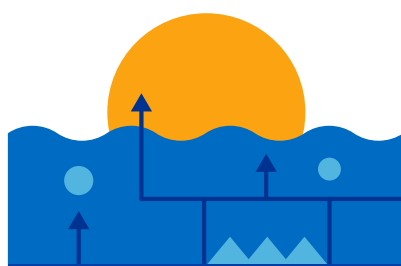
Emotional intelligence and complex problem solving valued most highly relative to other clusters  
 Lag in technical skills  
 Surplus of job seekers over the next four years

## Technicians



Total Number of Canadians	1 Million
Job Openings between 2018 and 2021	130,000
Probability of Tech Disruption	Medium

## Crafters



Total Number of Canadians	3.6 Million
Job Openings between 2018 and 2021	380,000
Probability of Tech Disruption	Very High

## Doers



Total Number of Canadians	845,000
Job Openings between 2018 and 2021	110,000
Probability of Tech Disruption	High

Official labour market classifications do not include new jobs and professions. To consider emerging occupations, we assigned emerging job categories to clusters based on similar jobs already in the National Occupation Classification (NOC) system. Uber drivers, for example, were placed in the Facilitators category based on their similarity to the delivery drivers in the current NOC system.

### Traditional Jobs

Machinists, sheet metal workers, electricians, carpenters

### 21st Century Jobs

Drone assemblers, robotics engineer technicians

### Defining Characteristics

Have the most diverse set of skills developed  
Technical skills are valued most highly relative to other clusters

### Traditional Jobs

Roofers, fishermen, bakers, cashiers

### 21st Century Jobs

Self-checkout supervisors, overnight couriers

### Defining Characteristics

Lag in analytical and management skills  
Relatively high on technical skills

### Traditional Jobs

Logging machinery operators, greenhouse workers, cleaners

### 21st Century Jobs

Machine learning trainers

### Defining Characteristics

Relative emphasis on basic skills  
Diminishing demand

## SOLVING FOR TECHNOLOGY

Technology and its bywords — artificial intelligence, machine learning, complex robotics, disruption — can bring insecurity or productivity, unemployment or opportunity. It's complex. Some call it our fourth industrial revolution.

New technology has been remaking economies and societies for as long as humans have been inventing tools, but we have learned that certain tasks are more likely than others to end up automated. Those doing manual and routine work — from the handloom weavers and telephone switchboard operators of the past to fast-food cashiers of today — are more at risk than those doing work that is cognitive and variable.

We matched our clusters of occupations against “computerization” probabilities identified by Oxford Martin School scholars Carl Frey and Michael Osborne, authors of an influential 2013 study titled *The Future of Unemployment: How Susceptible are Jobs to Computerization?*

Among our clusters, Solvers and Providers are the least vulnerable to automation. For example, 93 percent of Solver occupations have less than 10 percent susceptibility. It's difficult to automate the duties of a professor, a parliamentarian or a heavy-duty equipment mechanic — this work is so cognitive and variable that our existing technology can't replace it.

On the other end of the scale, 74 percent of Crafters (tailors, painters, assemblers, truck drivers) will be highly susceptible. It's not hard to imagine how robots could automate the manual duties of a tailor or truck driver — in some places, it's already happening.

# 74%

**OF CRAFTERS WILL BE  
HIGHLY SUSCEPTIBLE**  
to automation

These are unsettling prospects for Crafters, Facilitators and those in the two other clusters — Technicians and Doers — who face significant susceptibility to automation. But even in the most threatened clusters, the vast majority of Canadian jobs are a long way from being automated. Automatability is not the same as actual automation.

Indeed, actual automation rates are nearly impossible to predict, because automation is subject to more than our capability to automate. For instance, there are many roles where we will want to continue employing human beings for cultural reasons, such as nursing. Other factors might include:

**Labour costs.** *An employer is less likely to replace inexpensive labour.*

**Macro-economic cycles.** *They affect the cost of labour.*

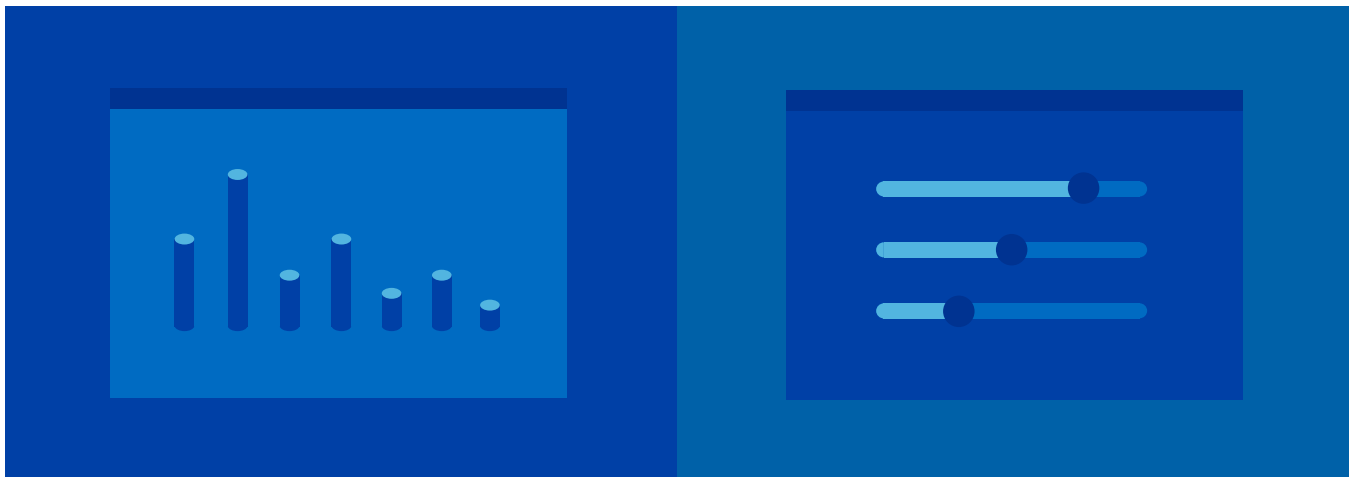
**Competitive pressures.** *Their absence lessens economic pressure to automate.*

**Social acceptance.** *Loss of jobs may be seen to violate an employer's community obligations.*

**Regulatory approval.** *Governments also have a say.*

In most cases, it's anyone's guess how many years or decades will pass before a given technology will make a tool obsolete. Noel Baldwin, of the Council of Ministers of Education, Canada, says unpredictability is no excuse for inaction. “While I agree with people who say we can't predict the future, we can start to talk about it,” he says.

We've seen how demand for a broad range of soft, human skills will allow young people to complement or stay ahead of software and machines. But what about the modern skills we keep hearing will allow them to work with software and machines — skills such as programming, science, mathematics and technology design?



Our research shows lower demand for these skills in the next four years. Although they will remain critical for some industries, they are not used widely across occupations. Science, for example, will be in demand for just 16 percent of projected openings in the coming years. And programming will be important or very important for just four percent — fewer than 100,000 openings.

But we can't ignore technical skills, not for a second. Because as technology disrupts one occupation after another, some form of these skills will become more broadly important.

Few young Canadians will need the type of coding proficiency required to work in Silicon Valley, but most will need a healthy dose of digital fluency and comprehension. Soon, we'll come to think about digital literacy like we do regular literacy: a prerequisite for nearly any job.

A recent study by the Brookings Institution in Washington, DC found that 71 percent of U.S. jobs now require medium or high amounts of digital skills, up from 45 percent between 2002 and 2016. The share of jobs requiring low digital skills plunged from 56 to 30 percent. The percentages may vary in Canada, but the trend will not.

Gerald Clark, senior manager for labour relations at Clark Builders in Edmonton, says construction surveying used to require people to hold the grade rods while another person took the readings. Now, with 3D cameras, GPS units and powerful software, the same employees can produce better models, faster — but only if they have the technical skills.

*“Some of the surveyors ... can't or don't want to embrace new technology,” he says.*

Another field where technology has revolutionized the nature of a job is radiology, where artificial intelligence experts have claimed that image-detection algorithms can already detect abnormalities such as cancer with more accuracy than a trained doctor. Many have predicted that the occupation will be a casualty of automation, but we see it differently.

Medical startups like Silicon Valley's Enlitic have been applying deep-learning technology to X-rays and CT scans to search for fractures, tumours and more, something that was previously the province of radiology professionals. “A highly trained and specialized radiologist may now be in greater danger of being replaced by a machine than his own executive assistant,” one specialist in deep learning told *The Economist* in 2016.



## Andréa Crofts

*Digital Product Designer*

 Toronto, Ontario

 27 Years Old

 1 Career Pivot

-  Bachelor's Degree  
*Bachelor of Design in Fashion Communication*
-  Public Relations Co-ordinator
-  Coding Bootcamp
-  Software Product Designer

But while some remain anxious at these developments, the field is coming around to the idea that artificial intelligence will save radiologists time and free them from mundane tasks. Instead of being replaced by technology, they will be able to work with it, and spend more time with patients.

Tim O'Connell, a radiologist who is now CEO of the Vancouver medical tech company Emtelligent, says initial fear and doubt has given way to positivity. "AI will allow radiologists to get out of the dark rooms, evaluating scans, and into patients' rooms, giving patients care," he says.

If they haven't already, young Canadians will soon face similar moments in their own fields.

As part of our research, we asked 54 large Canadian companies and institutions about their views on hiring, automation and the skills economy. Twenty-seven percent of them said they expected less than one in 10 of their employees would be significantly impacted by automation, while roughly the same number of employers said that all employees would be impacted.

Workers' optimal skills profiles are changing according to most of these companies. They're looking for young hires to be critical thinkers and problem solvers, but also analytical with data and digitally literate — skills they weren't prioritizing 10 years ago. Some young Canadians are already upgrading to meet this demand.

Andréa Crofts of Toronto had already left public relations to pursue her longstanding interest in graphic design when she realized she didn't have the digital skills to produce what clients were asking for.

*"I slowly began experimenting with digital design on my own, but the website development portion always stumped me. I could design using a template, but I needed to learn code to be able to customize," she says. "That was the tipping point. I knew I needed more skills."*



She immersed herself in coding, enrolling in two web-development courses, including a nine-week boot camp. When she was done, she quickly landed a job as a product designer for a software design and development company.

By taking her technical skills into her own hands, Andréa leapt across clusters (from Facilitators to Solvers) and revamped her skills profile with nine upgrades, all of them technical. As these skills become more broadly sought, young Canadians like Andréa will find themselves in the driver's seat.

#### **YOUTH CAN'T DO IT ALONE**

Young people aren't the only ones with a stake in building a skills economy. We need all hands on deck to build the foundations for a more mobile and technology-enabled workforce. Canadian employers ought to be at the forefront. They are the ones who

must fill the skills gaps when there aren't enough doctors for rural hospitals, IT analysts for the tech corridor or trades workers for the oil patch. And they have just as much to gain from boosting skills training and identifying useful skill sets.

We saw an example of how it can work at Hoenhorst Farms, a dairy operation in Innerkip, Ont. The farm used to employ nine part-time workers milking cows on three shifts, beginning at 4 a.m. It was repetitive manual labour, and workers kept leaving for better-paying jobs at a local car plant. The Wensick family made the decision to introduce a robotic milking operation. The machines collect and read data, attach cups to the cows' udders and monitor the milk for flow and quality.

But instead of dismissing their human workforce, the Wensicks retrained it. They rehired several of the former milkers as full-time employees and taught



## Hanif Syed


*Regional Healthcare Director*

 Toronto, Ontario

 27 Years Old

 1 Career Pivot

 Undergraduate Degree  
*Industrial Engineering*

 Industrial Engineering Roles

 Leadership Program

 Regional Healthcare Director

them how to work with the robot software and the information it generates. The farm’s workforce is now a little smaller, but the former milkers are now better skilled and better paid. (And, for what it’s worth, they start work at a much more sociable hour.)

Even as some employers lament young Canadians’ skills gaps, they remain stuck in the habits of the jobs economy — for instance, sifting through résumés for standard keywords, overlooking all but the applicants who have certain formal degrees, qualifications and job titles.

Riz Ibrahim, executive director of the Canadian Education and Research Institute for Counselling, says many still believe at heart that credentials stand in for skills.

*“Employers will say one thing, but they will actually hire for something else.”*

To move forward, they’ll need to start recognizing core skills and competencies. When an open-minded employer hires young people that way, great things can happen.

Take Hanif Syed of Toronto, an industrial engineer who leapt into a seemingly unrelated leadership opportunity in the health field.

Hanif grew up wanting to be a pilot, a doctor and a professional basketball player.

*“As I grew up, my vision shifted, but my ambition didn’t.”*

He studied engineering at university, but diversified his skills with graphic design, information technology courses, a leadership program and an internship that turned into his first engineering job. He involved himself in all sides of the business: technical, sales, operations. And when an opportunity arose to become a regional director for Saint Elizabeth Health Care, a not-for-profit home-care provider, his old dreams of a career in health care resurfaced — and he was ready to make the leap.





Hanif was the one who acquired all the skills that allowed him to make the transition. “Saint Elizabeth really took a risk on me,” he says.

It took an employer with the right mindset to see how his skills trumped his former job titles.

Hanif’s transitions have taken him far from the field he chose to study in university, much like Mel and Andréa. The returns from formal postsecondary education appear to be dropping, speaking to employer concerns about a mismatch between education and skills demand.

#### **A CONVERSATION THAT CAN LEAD TO ACTION**

Young people are entering the world of work just as it’s being radically transformed, but they’re stuck with the same old career model — that’s Canada’s quiet crisis. Our research shows us that it’s possible

to move beyond the strictures of degrees, formal qualifications and job titles and draw lessons about these skills from people and data.

We can see how occupations are tied together by bands of similar but traditionally unrecognized skills. We can see the coming demand for a broad array of human skills, even in technical occupations. We can see how technology will affect the occupations available to young Canadians and the skills they’ll need to work beside it, or with it.

Yes, Canada has the makings of a skills economy. But too many of us don’t understand how urgently it’s needed. If we figure it out — if we help young people discard the old model and start building resilient, mobile careers — we can become the disruptors instead of the disrupted. Before we do that, we need to first come to grips with where we stand.

# Six Things You Need to Know About the Future of Work

## 1. Analytics are trending

Being able to draw inferences, make unexpected connections and identify overarching trends is a competitive edge. In the 21st century, data is an employer's greatest asset. From lumber production to content creation, you can't get anywhere without analytics.

## 2. Math is a big plus

Like it or not, numbers are here to stay. Over the next four years, 70 percent of job openings will place significant importance on math and numeracy skills. The ability to factor quantitative and spatial information into your decision-making (see: analytics) adds up to career success.

## 3. Firms want flexibility

Demand for expert skills will dwindle compared to demand for adaptable workers who are ready to learn new things. This lesson is about to become more important in many lines of work as the pace of technological adoption picks up. Embrace change or risk being left behind.

## 4. Digital is non-negotiable

Humans are still in the driver's seat, but machines are riding shotgun. Coding is an advanced facet, but even basic digital literacy can provide a huge productivity boost that employers can't do without. Humans have been mastering new tools for millennia — don't let down your Stone Age ancestors.

## 5. The three C's are crucial

Communication, collaboration and critical thinking will serve you well in any career — even technical and scientific ones. Imagine a mining engineer who can't negotiate with her local community, or a doctor who can't talk to his patients. Well-rounded basic and social skills are must-haves across the board.

## 6. Mobility is a thing

We're all creatures of habit, but the future of work is about shaking things up. Your parents may have had clear-cut career paths with few detours, but your professional life will likely involve unexpected twists and turns. Career mobility is the new normal and it can be exciting — so buckle up and take the wheel.



FUTURE STATE

# Canada 2030

Older, more diverse, global, and knowledge-driven:  
A decade from now, the labour force will be visibly  
different from today

20%

of Canadians will be over the age of 65  
(compared to 17% today)

60%

of Canadians will be of working age  
(down from 66.5% today)

28%

of Canadians will be foreign-born  
(compared to 22% today)

Source: Statistics Canada

32%

of Canadians will be visible minorities  
(compared to 22.3% today)

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62%

What the labour force participation rate  
will be (today it is 66%)

---

1.5%

What the annual GDP growth rate will be per year (over  
the last two decades it has averaged 2.3% annually)

---

75%

Percentage of global GDP accounted for by the  
service sector; it will also account for 84% of jobs  
(today the service sector accounts for 70% of GDP  
and 80% of jobs)

---

40%

The percentage of global GDP that the emerging  
markets of the G20 could represent by 2030, surpassing  
that of the G7 (today the G7 represents half of global  
GDP, while the emerging markets make up just 30%)

# Canada, Get Ready

In pockets across the country, Canada is fueling innovation, blazing trails in co-op education and mining talent for new skills. But we are not adapting fast enough. In a world of work that's changing at warp speed, we need to make it our national mission – in our schools, in our recruiting, in our training – to connect a new generation with the opportunities of the future







**F**IRST SOME GOOD NEWS. In the skills economy, Canadians are among the best in the world.

For half a century, the University of Waterloo in Ontario has been a trailblazer in co-op education and work integrated learning. British Columbia is rebuilding the skills bridge between high schools and colleges. And Canadian employers, from Shopify to Cirque du Soleil to Maple Leaf Foods, are tilling new fields of talent as they grow an innovation economy.

Small wonder Canada is celebrated in space robotics, water technology, film animation, even YouTube productions — all growing sectors in the skills economy. We're transforming how soybeans are grown and forests harvested, how healthcare is managed and remote education advanced. We're building roads in all sorts of weather, and connecting people in all sorts of languages. All using skills the world envies, and the future needs.

For a young person entering the 2020s, there's no better place to start than right here in Canada.

Trouble is, we're not adapting fast enough to a world of work that's changing at warp speed.

Consider what it's like to be a young Canadian peering into the 2020s. Will you be working alongside robots or working for one? And all those human skills that shape your identity — creativity, passion for working with others, critical thinking — will you be able to apply those through a lifetime of work?

That's what we tried to consider as we travelled the country, talking with youth, teachers, employers and policymakers.

They agreed, we need to make this our national mission, to build a skills economy to connect a new generation with all the opportunity and ambition the world has to offer.

#### WHAT WE DID

**O**ver the past eight months, our eight-member team conducted rigorous quantitative and qualitative research using government data (ESDC NOC codes and the U.S. Department of Labor O\*NET dataset) and original RBC surveys. Our economists built a new dataset of all Canadian jobs and the skills required to do them. Using this dataset, our mathematicians developed a unique algorithm, grouping Canadians in an unprecedented way: by skillset. Altogether, we evaluated 20,000 skills rankings across 300 types of occupations accounting for

2.4 million new jobs in the next four years (2018-2021). In addition to our quantitative findings, we interviewed 30 educators, guidance counselors and policy makers, and surveyed 54 employers across Canada. Our research was guided by an external advisory council with representatives from diverse sectors including, manufacturing, natural resources, technology and more. The resulting insights on the Canadian labour market provide the path forward for Canadians as the country transitions through the fourth industrial revolution.

Here's where we can start:

### IN OUR SCHOOLS

For the 5 million Canadian kids in K-12, navigating the future of work must seem like the equivalent of a spacewalk. With an untested tether. Our schools have plenty of highly skilled teachers and guidance counsellors, with little access to real-time information from the world around them.

Across the country, we heard about challenges in guidance counselling, from a field that's underfunded and under-informed. When Canada's career counsellors were asked last year to rate their own system in terms of its ability to prepare students for the world of work, they gave it a 2.5 out of 5. Barely a pass.

It's a big reason why a quarter of post-secondary graduates end up in jobs they're overqualified for; a good many don't end up in sustainable jobs at all. And almost 900,000 young Canadians are not in any education, employment or training program. While colleges and polytechnics have a clear mandate to prepare students for the world of work, universities have a more tenuous connection with the labour market, often focusing on knowledge acquisition above in-demand skills.

15%

### OF RECENT SCHOOL LEAVERS

Will go into retail sales or food and beverage work

Statistics Canada projects that 15 percent of recent school leavers will go into retail sales or food and beverage work, as cashiers, food counter attendants or kitchen help between 2015 and 2024. Those areas currently make up only eight percent of the job market and are ripe for more automation.

If we can't get that information to students when they're making choices about the skills they're choosing to develop, they won't thrive in a skills economy.

### IN OUR TEACHING

Canadian colleges and universities have been among the world's leading innovators in education, but there's much still to do.

Toronto's George Brown College created a four-year Bachelor of Technology degree for construction management when the industry said it lacked tradespeople with management skills. McMaster University in Hamilton, Ont. has developed a hybrid of business and humanities degrees, to give business students the creative and communications skills they may lack and arts students the critical analysis they may need.

In Vancouver, Simon Fraser University is attracting the sorts of mavericks who make great entrepreneurs. No coincidence, it's now one of the biggest sources of students for the Next 36, Canada's leading program for young entrepreneurs.

But too many of our colleges and universities are degree factories, where instructors focus on content knowledge, rather than skills development.

Instead of "What do you want to do?" we should be asking, "Who do you want to be?"

Paul Davidson, who heads Universities Canada, says our education system leaves students with no real understanding of their skills or the skills landscape — and what will really transform their lives in the decades ahead.

"We need to build resilient, persevering young people who are fluent in cultural diversity," Davidson says.

Susan McCahan, Vice Provost of Innovation at the University of Toronto, speaks of the need for education to include writing an email in simple and effective language, working in teams across distances, holding your own at a business dinner, and using more than Google to conduct research.



McGill university provost Chris Manfredi points to the need for emotional intelligence: “The ability to read people and react appropriately.”

Siri, meet Socrates. But these are not the skills we are teaching.

Nobina Robinson, the CEO of Polytechnics Canada, says there’s still too much of a focus on credentials in education, especially in fields that are already in the early throes of disruption.

Instead of training people for the certainties of the past, we need to help them prepare for the ambiguities of the future. Which means preparing youth to work with knowledge that doesn’t yet exist, using practices that haven’t been developed and thinking about jobs that have yet to be created.

### **IN OUR RECRUITING**

Employers — public and private, big and small — need to step up, with 21st-century approaches to hiring, training and developing 21st-century skills.

In our survey of 54 major employers, who collectively employ 1 million Canadians, we found an overwhelming sense of workforce disruption coming at us, starting with administrative and repetitive roles.

Many employers told us they’re hiring youth for their digital skills, and yet are discovering the next generation has been so hard-wired for the digital revolution that we’ve forgotten about hiring for the soft code of sensibility.

Sarah Watts-Rynard of the Canadian Apprenticeship Forum says she’s seen changes in the way employers interview candidates, throwing in questions about perseverance, dedication, resilience and curiosity. Her favourite question to probe perseverance: What musical instrument do you play?

Nearly four in 10 employers told us they’re changing their recruitment policies to reflect the need for those soft skills.

Electronic Arts Canada, the Vancouver-based video game pioneer, told us it has gone from asking young people what they can do to getting them to explain how they learn. We heard the same from WestJet, Alberta Health Services and the law firm Osler.

The Montreal IT conglomerate CGI described its own thinking this way: We look for people who can go wide and then go deep.



### IN OUR MIX OF WORK AND LEARNING

At a roundtable we held with the University of Guelph, we heard from employers and students hungry to mix work with learning, to amplify the skills that are most in demand. Take the case of PepsiCo. The soft drink and snacks company can't find enough graduates who have the resilience and adaptability for sales, because no one teaches sales. So it recruits on campuses for personality and puts students in work-integrated training programs to develop their skills for sales, a profession that's not likely to be automated anytime soon.

Canadians are seeing this now in a national push for work-integrated learning that allows students to learn in both a classroom and a workplace. More than half of all undergrads are now part of such programs, which should be the turbo charger for our skills economy.

In Ottawa, the e-commerce dynamo Shopify has launched a groundbreaking program with Carleton University that allows students to gain a four-year degree in computer science while working over 3,000 hours (paid) at the company. Meals, tuition and a laptop are thrown in. Small wonder there's a line-up to get in.

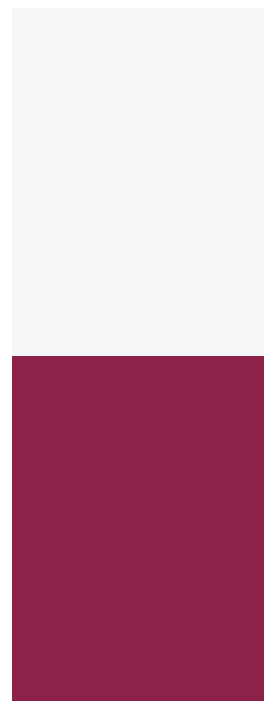
The kicker: Nearly 50 percent of the students are women and approximately a quarter are visible minorities — something few computer science programs have been able to achieve on their own.

Those who have experienced work-integrated learning know it can be the great social leveler of the skills economy, opening doors for young people regardless of their background.

# 50%

**OF STUDENTS  
ARE WOMEN**

At Shopify's computer science program collaboration with Carleton University



## IN OUR TRAINING

The enormous and growing demand for healthcare managers, HR professionals, information systems directors and social workers will be filled by young Canadians who did not necessarily train for those jobs, but have all the foundational skills they need to excel at them. They can help lay the foundation for a new approach to lifelong learning.

Statistics Canada expects more than 500,000 workers to move up the skills ladder in the next decade.

The cohort who came into the workforce after the financial crisis will lead the way, even though we're not ready.

U.S. employers, by contrast, are working frantically with educators to train workers, young and old, to ensure they're employable through the massive workplace disruption that's underway. Guardian Life Insurance and Prudential Financial are working with General Assembly, a private-sector pioneer in training, to equip employees with advanced digital skills. And in telecom, another sector being heavily disrupted, AT&T has committed US\$1 billion to a program called Workforce 2020 that aims to radically retrain 100,000 employees for the decade ahead.

# 500k

### NUMBER OF WORKERS

Statistics Canada expects to move up the skills ladder in the next decade

While such efforts help workers of all ages, it's the new generation of youth who will need to be more mobile, career-wise, than ever. They're the ones who are preparing for one line of work, knowing it won't be their last line of work.

Consider TransCanada, which emphasizes adaptability and problem solving in its hiring and

training. And Thomson Reuters, which is looking to hire 1,500 new staff with skills in cognitive computing and data analysis over the next five years. Perhaps the most skills-oriented employer, though, is the Canadian Armed Forces, which every year recruits unskilled and semi-skilled individuals with strong learning aptitudes and then trains them to be soldiers, doctors, nurses, electricians, plumbers and engineers. The Forces have a culture built on upskilling, and can help other employers, governments included, to see skills as the most movable asset in the land.

## IN OUR CULTURE

It's one of the painful ironies of our time. We keep telling ourselves, "The world needs more Canada." And yet not enough Canadians feel they need the world.

A lack of global skills was something we heard at every stop.

Margaret Biggs, former president of the Canadian International Development Agency, is trying to spark a revolution in the hearts of Canadian youth, to get them to see time abroad as an essential investment in their portfolio of skills. She's pushing for a massive change in the way we fund education to ensure all Canadian youth have the opportunity to work and study abroad, developing all those skills we keep coming back to, from problem solving and planning to adaptability and teamwork.

Wayne Goranson, owner of Mera Developments in Regina, sees it every day in his engineering firm, where he employs young graduates to build water and food systems all over the world. He figures there are 30 language and dialects spoken in his office, and yet challenges often arise when it comes to communication.

Teaching those communication skills is not a priority for engineering schools, he's found, and yet it's determining the success of Canadian engineers. So Goranson took matters into his own hands, hiring a consultant to train recruits in non-engineering skills like managing a business dinner with overseas clients or discussing the terms of a contract with a foreign government.

"Working together" is not part of any engineering course, he says, but it's an essential skill at Mera as it strives to become a global player.

As Canadians seek to keep pace with a fast-growing world, we also need our youth to work with that world as it moves here.

You can sense that the moment you walk through the door of one of Montreal's most successful start-up enterprises, Mnubo, which uses artificial intelligence to help companies work with data from smart devices, be they home thermostats or irrigation systems.

Mnubo's 48 employees come from 17 countries, which means local recruits need a new skill, the same one Biggs is talking about. Cultural competency is now up there with algorithm writing as a core need for Mnubo founder Frédéric Bastien. As he looks to add another 30 or so staff, Bastien needs engineers who can manage a conference call with Japan, while managing a project with co-workers from Brazil and France. IQ+EQ+CQ, in other words.

#### WHERE TO START?

The new skills economy is diverse and dynamic. Like the Canada that our youth want to build.

But if we want to learn more about how we can build it, we need to look abroad, to a world of work that's spinning faster and faster.

Singapore, the poster child of skills, has pivoted

# \$1B

#### INVESTMENT FOR SKILLSFUTURE

An initiative that gives every Singaporean over the age of 25 a credit for training programs

to lifelong learning through something called SkillsFuture, a US\$1 billion undertaking that has transformed the country's education sector and labour market. The initiative, which supports Singaporeans through all life stages (starting with kindergarten and continuing all the way through late career), empowers individuals, employers and educators to promote and pursue upskilling and career mobility. Among other things, SkillsFuture offers an online education and career guidance portal for all students; allocates (and periodically tops up) a \$500 training credit for all career professionals over 25 years old, and subsidizes at least 90 percent of course costs for Singaporeans over 40 years of age.

The nation is a pioneer, with a clear, national plan to build its skills economy.

Of course, when it comes to national plans, we have the forever challenges of our country, of power struggles between Ottawa and the provinces, of fiefdoms among universities, colleges and polytechnics, and of businesses that talk long term, act short term and think far too local.



**N** ONE OF THAT MAKES SENSE TO TAHARIMA HABIB, a 27-year-old microbiology graduate who is already seeding the skills landscape of the 2020s.

Born in Bangladesh, raised in Montreal, educated at Université de Sherbrooke, Taha wanted to be a high school science teacher. Until she discovered no one's hiring.

So she's gone from HIV research to science tutoring to LGBTQ activism to now running a community centre in a low-income part of Notre-Dame-de-Grâce. It's working out for her, because she's making it work. She's using her foundational skills from science — curiosity, perseverance, discovery, analysis — and melding those with the empathy and collaboration she's developing in community work, laying the foundations for a possible career in public policy and politics.

The future is bright for Taha, but only because she's had the resourcefulness to create her own opportunities.

*“The mantra is you have to have a degree. You need a Plan B. Our unpreparedness for Plan B is why so many people end up out of work.”*

She's now got the skills for a Plan B, C and D, which is what her generation needs.




That generation, Canada's youth, are embarking on a world of work that will span from here through our country's 200th birthday and beyond. They will navigate this new machine age, and if we help them get it right, they will create a new prosperity, for themselves and for Canada.




They're the best investment we can make.



## Taharima Habib

*Community Centre Co-ordinator*

-  Montreal, Quebec
-  27 Years Old
-  1 Career Pivot

-  Undergraduate and Master's Degree  
*Microbiology*
-  Tutor
-  Community Organizer
-  Community Centre Co-ordinator

# Future, Now

**WE HAVE A LOT OF WORK AHEAD OF US.**

While the makings may be there, a Canadian skills economy remains — unfortunately — just a vision. If we can realize that vision, it might look something like Matt Shea and Aria Guo. They live at opposite ends of the country and work in completely different fields. You haven't heard their stories, but they embody what Canada can aim for. Each has an intuitive grasp of the skills they need and how they can be mustered. That's the future we want for young Canadians.

We look to Matt, from St. John's, because he's resilient. At 24, his wide interests and broad range of skills have already allowed him to make big plans, adjust, adapt and succeed.

Matt had his heart set on becoming a doctor. But he didn't get in to medical school. Fortunately, he was already immersed in Plan B: YouTube content creator. He'd had his own channel since high school, reviewing video games for other young enthusiasts, and was ready to turn it into a full-time job.

YouTube couldn't be more different than medicine, but Matt used his social skills to turn it into his next career move. Matt's videos have been viewed about 600 million times. To maintain his massive audience, he wears all the hats of a film crew simultaneously: graphic designer, editor, director, cinematographer, data analyst. "No one skill on YouTube is going to get you anywhere. You need a little bit of each," he says.


"The most critical is the ability to adapt," he says. "Every now and then, YouTube shifts — and you have to shift with it." Matt embodies that spirit.

We look to Aria, from Vancouver, because she's mobile. She saw a need in the workplace, took advantage of new tools and training, and found herself in demand.








## Aria Guo

*Forest Inventory and Planning Data Analyst*

 Vancouver, British Columbia

 27 Years Old

-  Undergraduate Degree  
*Forestry*
-  Forest Technician
-  Air Photo Interpreter
-  Master's Degree  
*Remote Sensing in Forestry and Biodiversity Monitoring*
-  Forest Inventory and Planning Data Analyst



Aria already had a forestry degree when she started working for an Ontario consulting company, estimating timber supply in vast tracts of forest. But after long months of tramping through the bush and poring over photos, she felt the process was too slow, too manual, too labour-intensive. She was sure it could be done more efficiently.

She went back for a master's degree at the University of British Columbia, where she learned all she could about new remote sensing technology and software that could do her old job faster and better. Timberwest recruited her to help squeeze more value from their data. "Traditionally, inventory in forestry is very labour-intensive, but now we're using technology to determine timber attributes," she says. "It's less labourious, it's automatic once you build the model and it's transferrable to other areas."

Aria says young people following her into the workforce should aim to think differently, stay on top of new technology and take advantage of every opportunity to upgrade their skills. "The way they did a job last week might not be applicable this week," she says.

That's Canada's future.



## Matt Shea

*YouTube Content Creator*

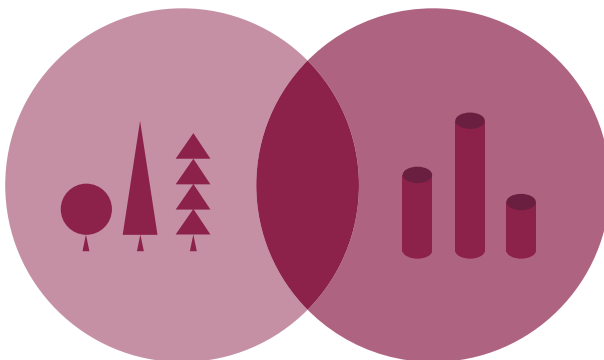
 St. John's, Newfoundland

 24 Years Old

 Undergraduate Degree  
*Psychology, Neuroscience*

 YouTube Content Creator

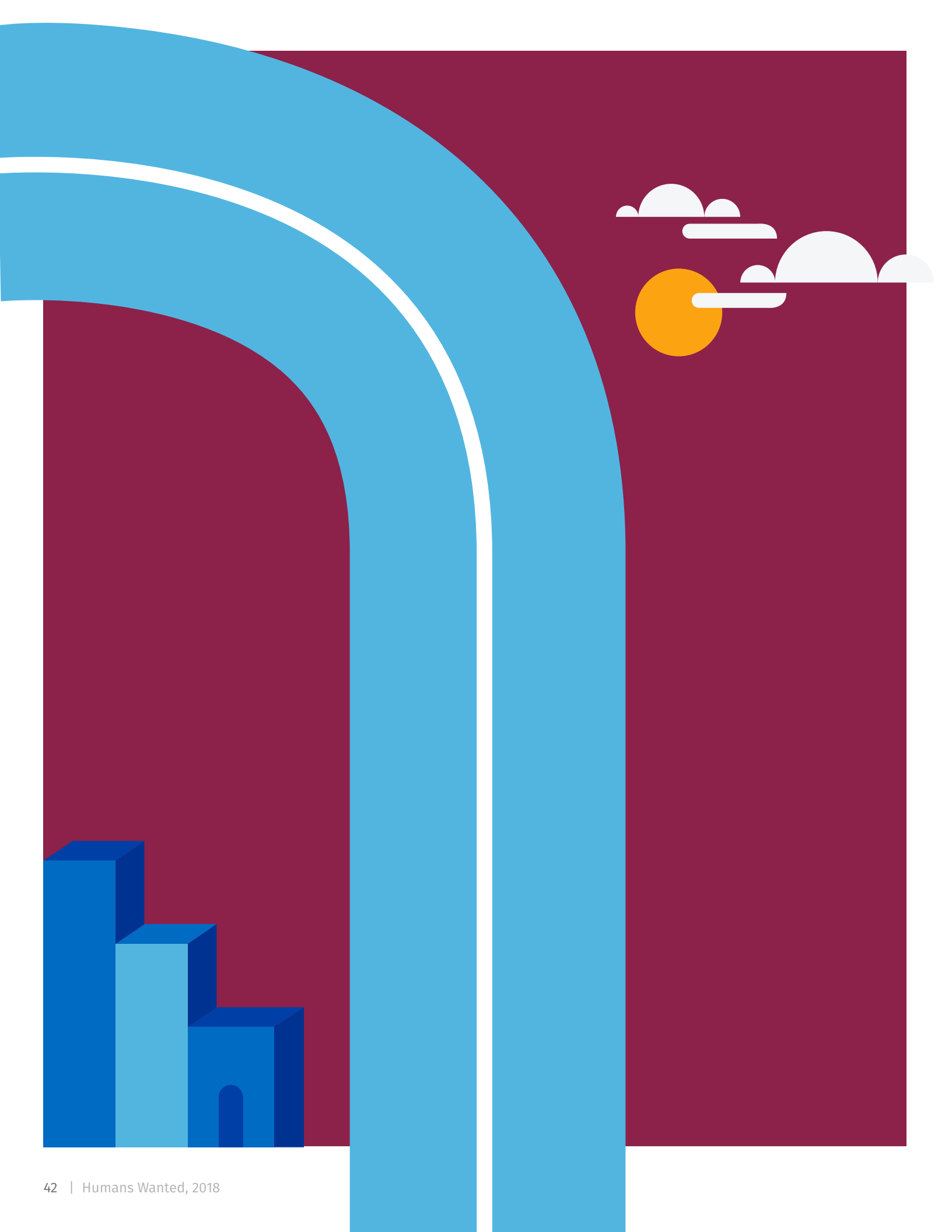
### DATA ANALYSIS



Aria's Path: Forestry Analytics

Matt's Path: YouTube Analytics

Matt and Aria have very different paths, but the skill they have in common is Data Analysis. Who knew YouTube and Forestry had anything in common?



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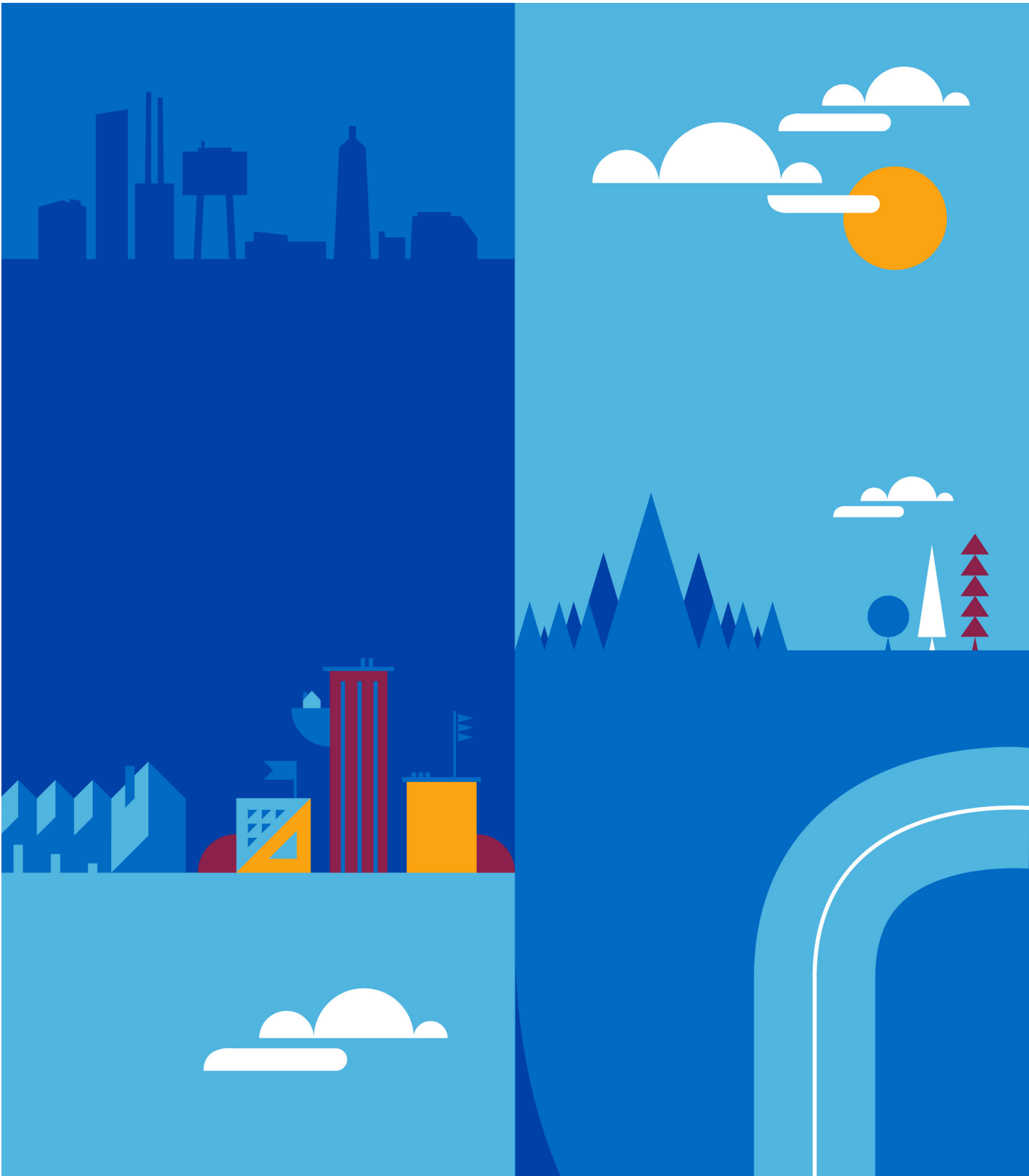
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### METHODOLOGY

You can find the full methodology behind this report here:  
[rbc.com/humanswanted](https://rbc.com/humanswanted)



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