

The background features a series of overlapping, wavy, semi-transparent red shapes that create a sense of movement and depth. The colors range from a deep, dark red to a lighter, almost white red, with the white appearing in the center where the waves overlap.

LEARNING NATION: EQUIPPING CANADA'S WORKFORCE WITH SKILLS FOR THE FUTURE

ADVISORY COUNCIL ON ECONOMIC GROWTH
December 1, 2017

Global labour markets are undergoing massive change, driven in large part by advances in technology. Increasing automation and the rise of the so-called gig economy are displacing existing jobs while creating new jobs that demand different skills, and changing the trajectory of our working lives. The scope and scale of these shifts are unprecedented and will deeply affect the lives of working Canadians. We estimate that by 2030, automation and changes in existing occupations could threaten the jobs of more than 10 percent of Canadian workers unless they acquire new skills.

Canada's skills development infrastructure is simply not equipped to meet the challenges that lie ahead. Our system today rests primarily on two pillars. The first one supports the development of skills before people enter the workforce, through K-12 and post-secondary education. The second pillar supports individuals when they leave the workforce, by providing assistance to the unemployed and the retired. That leaves a large gap in institutional support and training during Canadians' most productive years—and it is in this phase that workers will be most affected by the labour market turmoil. While our system has served us well in a relatively stable environment to date, it is not set up to address the coming labour-market disruptions.

Canada urgently needs a third pillar that focuses on supporting working adults. The Council anticipates that managing the expected labour market changes will require an **additional \$15 billion of annual investments in adult skills development**. The magnitude of the coming changes also necessitates the development of a **Skills Plan for Working Canadians** that will guide Canada's approach to assisting working-age adults in capturing new occupational opportunities. We recommend that the government¹ create the **Canada Lifelong Learning Fund**, which would support and provide incentives for both individuals and employers to significantly increase their investments in skills development. At the same time, we urge the federal and provincial governments to **transform Canada's network of employment centres** so they provide hands-on guidance to Canadians as they navigate the labour market changes brought about by technological change.

The federal and provincial governments have taken some initial steps toward building this third pillar through recent policy changes that bolster Canada's skills development ecosystem. While these changes are undoubtedly a move in the right direction, the Council believes that much more substantial changes are required—and required soon. It is time to fundamentally rethink how we equip Canadians for the work dynamics of the future. Meeting this challenge will require a system-wide approach, and active collaboration between employers, citizens, educational institutions, and governments. In essence, we must develop mechanisms that support Canadians on continuous learning journeys throughout their lives.

The Shifts Underway in the Labour Market

In some important respects, Canada's labour market rests on a strong foundation. The country ranks 13th in INSEAD's 2017 Global Talent Competitiveness Index, a gauge of 118 countries' ability to develop the skills they need to prosper.² The World Economic Forum places Canada 14th out of 130 countries in its 2017 Global Human Capital Index, a measure of the knowledge and skills needed to create economic value.³ We also have the highest proportion of working-age adults with post-secondary education (55 percent) in the Organisation for Economic Co-operation and Development (OECD), although Canada lags behind leading nations in granting advanced degrees.⁴

However, the world of work is changing rapidly. While this upheaval will present opportunities for many Canadians and Canada's economy as a whole, it will also create significant pressures, made all the more

difficult by the rapid pace of the change, its impact on multiple sectors at once, and the convergence of diverse technologies. As Erik Brynjolfsson, Director of the Initiative on the Digital Economy at MIT, observes, “Millions of jobs will be eliminated, millions of new jobs will be created and needed, and far more jobs will be transformed.”⁵ New technologies are enabling more extensive automation, which is projected to replace many of the tasks currently performed by humans across all areas of the economy. At the same time, a wave of innovations will create new positions, but these will require different skills than the ones workers currently have. Meanwhile, full-time employment is increasingly giving way to independent work arrangements, which is putting pressure on Canada's skills development ecosystem.

Job loss due to rapid technological change. Nearly half of the paid work currently performed in Canada could be automated by technology that already exists or is being developed. Already, robots can build your car, take your lunch order, review your legal case history, sell you insurance, or examine your X-rays. By 2030, the growing adoption of automation is projected to displace nearly a quarter of tasks performed by Canadian workers (Exhibit 1). While some of those most affected will be able to find alternative opportunities in the same or related field, we expect that 10 percent to 12 percent of the workforce will face job loss and struggle to find new positions unless they acquire new formal qualifications.⁶

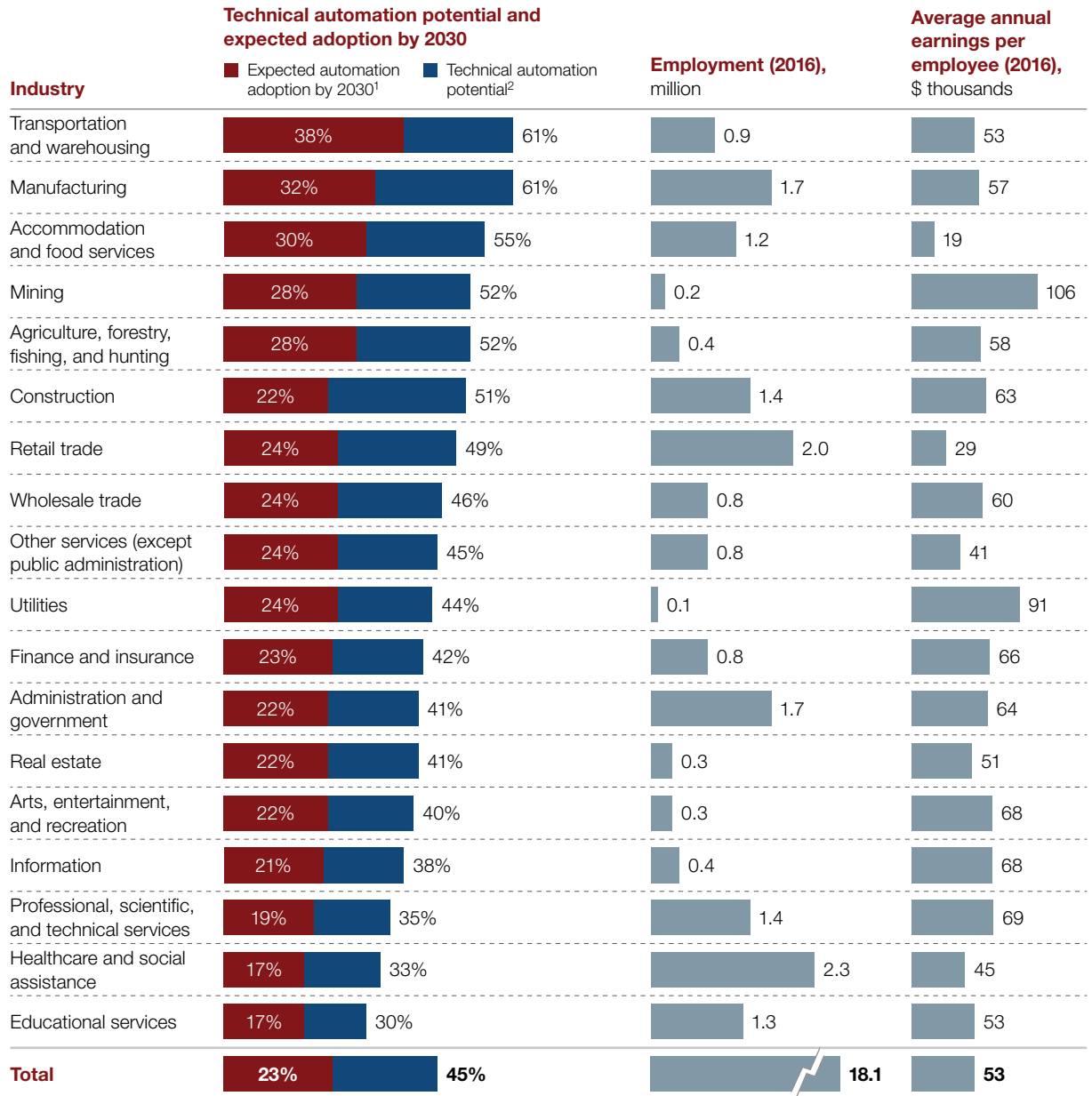
The occupations most at risk involve physical activities in highly structured environments—jobs often held by relatively low-skilled and often low-paid workers. For example, three-quarters of all tasks performed by truck drivers in the mining, oil and gas, and forestry sectors could be automated.⁷ Leading mining companies such as Barrick Gold, Teck, Rio Tinto, and BHP Billiton are already experimenting with driverless trucks, robotic rock-drilling rigs, and trains that can be loaded, unloaded, and driven automatically.⁸ Given the pace of technological change in most sectors of the economy, we can expect such job-threatening disruptions in numerous other industries in the years to come.

The impact of automation is not limited to relatively low-skill occupations. Advances in artificial intelligence (AI) are increasingly making it possible to automate complex cognitive tasks, putting jobs that require higher skill levels in jeopardy. Machine learning will also affect white-collar workers, particularly those who focus largely on collecting and processing data.⁹ Even professionals with highly specialized skills will feel the impact. Earlier this year, for example, a team of scientists trained a machine to diagnose skin cancer with the same accuracy levels as qualified dermatologists.¹⁰

As automation and AI creep up the skills ladder from repetitive, manual tasks to cognitive and analytical ones, they will hollow out a range of “mid-skilled” professions and affect a large swath of the middle class. The challenge is exacerbated by the fact that labour conditions vary significantly across the country. Hence, as we argue in Box 1, “Jobs vs. skills: leveraging labour market information,” detailed and timely data on regional labour-market shifts will be necessary to craft an effective response.

Of particular concern is the fact that technological innovations will heavily affect groups already under-represented in the labour market. As discussed in the Council's report, [“Tapping economic potential through broader workforce participation,”](#) there is an economic and social imperative to raise workforce participation among Indigenous people, lower-income workers, women with young children, Canadians over the age of 55, and persons with disabilities. That task will become all the more difficult as technology replaces many of the jobs people in these groups currently perform. For example, the World Economic Forum projects

Exhibit 1 **Nearly a quarter of all current work activities in Canada could be displaced by automation by 2030**



¹ Percent of work activities in the sector expected to be automated by 2030

² Percent of work activities in the sector with potential for automation given current technology.

Source: McKinsey Global Institute, Statistics Canada

that the global job-loss rate among women will be double that of men over the next five years as automation heavily disrupts office and administrative roles that are largely filled by women (Exhibit 2).¹¹ Employment and Social Development Canada (ESDC) forecasts that the position of administrative assistant will see the fastest decline in employment over the coming decade.¹²

Exhibit 2 Top and bottom 10 occupations by employment growth, 2015–2024

	Occupation	Projected average annual employment growth (2015–24)	Jobs (2014), thousand
Fastest growing	Specialist physicians	2.6%	38
	Database analysts and data administrators	2.4%	30
	General practitioners and family physicians	2.4%	53
	Chefs	2.1%	60
	Computer and information systems managers	2.0%	56
	Nursing co-ordinators and supervisors	2.0%	21
	Physiotherapists	2.0%	27
	Information systems analysts and consultants	1.9%	175
	Computer engineers (except software engineers)	1.9%	23
	Social and community service workers	1.9%	14
Fastest declining	Printing equipment operators	-0.7%	18
	Papermaking and processing machine operators	-0.8%	17
	Managers in communication	-0.9%	12
	Other sales related occupations	-1.0%	36
	Industrial sewing machine operators	-1.1%	16
	Printing press operators	-1.3%	26
	Electronic service technicians	-1.5%	60
	Service station attendants	-1.5%	16
	Administrative assistants	-3.0%	113
	Fishing vessel masters and fishermen/women	-3.0%	11

Source: Canadian Occupational Projection System (Employment and Social Development Canada)

New opportunities requiring new skills. History has long shown that innovations supplanting existing jobs tend to create new positions, often in entirely new sectors.¹³ For example, while desktop publishing largely made typesetting jobs obsolete, it created entirely new career paths in digital design, more than offsetting any job losses. The same pattern continues today, but at a faster pace. “Sixty-five percent of today’s grammar school kids will end up in jobs that don’t even exist today,” Cathy Engelbert, CEO of Deloitte, recently told *Fortune* magazine’s Most Powerful Women Summit.¹⁴ One-third of new jobs created in the United States in the past 25 years were in industries that were not around before or existed in very different forms, such as mobile app development. In short, the net impact of technological advances on employment can be strongly positive.

Additionally, innovation often enables new forms of entrepreneurial activity. Digital technology has introduced e-commerce platforms that have helped countless small businesses reach new customers, often in distant markets. It has also given entrepreneurs access to previously unimaginable productivity-enhancing solutions.

As machines take over more tasks, jobs performed by people will increasingly entail interacting with these machines and complementing their work. For example, with automated systems increasingly performing routine medical diagnoses, doctors can devote more time to interacting with patients and their families, tracking patients’ mental health, or conducting medical research. But in many cases, people will need to develop new capabilities to take advantage of emerging opportunities. Digital skills, for example, remain in short supply in many segments of the workforce today, a problem that will become increasingly severe as jobs in the digital economy soar in the coming years.¹⁵

Many of the new jobs will also require relatively high levels of “soft” skills,¹⁶ be it to manage and develop talent, interact with stakeholders from diverse cultural and social groups, or find creative solutions that go beyond simple analytical thinking.¹⁷ These skills tend to fall into the categories of social and emotional intelligence, critical thinking and problem solving. Investing in their development will help workers gain resilience and adapt more easily to a shifting labour market that increasingly demands them. Between 1980 and 2012, jobs requiring high levels of social interaction grew by nearly 12 percentage points as a share of the US labour force, while math-intensive but less social jobs—including many STEM (science, technology, engineering, and math) occupations—shrank by 3.3 percentage points over the same period.¹⁸

In short, while addressing the displacement of workers in traditional jobs is a major concern, Canada must equally focus on preparing its workforce to take advantage of new opportunities that will be created in emerging sectors. This means strengthening our K-12 and post-secondary education systems to teach both specialized and soft skills, thus building a strong platform for further skills development (see Appendix 1). The fundamental goal must be to foster a dedication in all Canadians to continuous learning throughout their lives.

New patterns of work. Technology is also transforming traditional employment patterns, a development that in turn will require different approaches to training. In the past, people often worked for a single employer throughout their careers. Now and in the future, most will have several employers or even careers during their working lives. This presents a particular challenge for the growing ranks of older workers whose jobs are displaced—they may need to learn new skills only a few years before retirement or face the prospect of unemployment or a significant reduction in pay, responsibilities, and job quality.

The decline in long-term employment is happening in parallel with the rise of independent work.¹⁹ In developed countries, the growth of digital platforms such as Uber and Etsy has served as an enabler of the gig economy. Today, the proportion of working-age adults engaged in freelance or contract work hovers between 20 percent and 30 percent in the United States, the European Union, and Canada.²⁰ While 70 percent of these individuals choose to work as independent contractors, the rest do so out of necessity.²¹ Contract workers' livelihoods are often precarious, especially in fields where high competition forces them to set their rates below what they consider fair. Many work very long hours at high intensity and to tight deadlines to avoid saying no to assignments and risking the loss of clients.²² Independent contractors are also at a disadvantage in keeping up with skills demanded by a changing labour market, as most lack access to employer-led training programs.



Collectively, these trends raise a series of critical questions. How can Canada equip its citizens with the skills to take advantage of the new opportunities the technology shifts are creating? How can it support those buffeted by waves of workforce transformation? And, of equal importance, how do we help forge inclusive economic growth amidst the turmoil? How do we urgently develop a strategic national response that will equip Canadians with the skills required to succeed in the new economic environment throughout their working lives?

In the short and medium term, it is working adults who will bear the brunt of the disruption's impact. Over time, inaction would seriously damage Canada's economic stability and social cohesion. Given current trends, the labour-market changes may lead to roughly two million Canadian workers—more than 10 percent of today's workforce²³—losing their jobs by 2030, and lacking the prospect of finding alternative employment unless they move to a new field requiring new skills. Government policy (including tax exemptions and transfers) could help protect many citizens from the effects of job loss and flat or falling incomes. That said, job quality and income earned from employment have a strong effect on individuals' sense of self-esteem. What is more, growing income inequality can undermine social trust and be a harbinger of intolerant attitudes.²⁴ Therefore, relying solely on taxes, transfers, and the social safety net to absorb the impact of the labour-market shifts could not only place a major strain on government budgets but also undermine Canada's social fabric.

Global Experiments to Address Labour Market Disruption

Canada is not alone in grappling with these dramatic labour-market shifts. Some countries around the world are developing new training systems and experimenting with novel ways of instilling resilience in their workforces. While few proven solutions have emerged, some efforts point to possible paths forward.

Labour market innovations are evident on three key fronts: in gathering and analyzing data on the skills needed for the future economy, in developing diverse training models, and in finding ways to support and finance the upgrading of working adults' skills.

1. Tracking evolving trends and needs

A nuanced understanding of current and future skills demand can improve job and skill matching, help target educational and training programs, and empower individuals to make better-informed choices for their careers. The Council believes that the existing government efforts and the proper implementation of the [FutureSkills Lab \(an initiative we recommended in February 2017\)](#) is a step in the right direction as Canada tries to harness the potential of reliable and timely labour market information (See Box 1, "Jobs vs skills: leveraging labour market information"). The report "Ideas into Action: A Review of Progress Made on the Recommendations of the Advisory Council on Economic Growth" that we are publishing alongside this report provides more information on these efforts.

2. New Approaches to Adult Training

The Council recognizes that numerous efforts are underway at educational institutions to develop curricula and delivery methods that help working adults adapt to the changing needs of the economy. Our post-secondary education institutions already support the development of skills by working-age adults. Colleges and polytechnics offer wide-ranging education and skills training options for mid-career workers that both build resilience for those currently employed and assist with career transition and workforce redeployment for those who are not. Through their faculties of continuing education, most universities offer a wide range of programs that cater specifically to adult learners.

Some models being tested in Canada and abroad include:

- **Shorter, modular, and part-time programs.** A number of new programs allow adult learners to take only brief career leaves, which limits the income they forgo and thus addresses a top barrier to adult training. For example, the [British Columbia Institute of Technology \(BCIT\)](#) allows mature students with previous post-secondary experience to skip the first year of some programs and fast-track their degrees. Other post-secondary institutions are adding shorter certificate or continuing-education programs to meet the growing demand from adults seeking new skills. Online education start-up [Udacity](#) offers "nanodegrees": short programs focused on developing specific skills in data science, machine learning, mobile programming and other highly sought occupations. Students need only invest about 10 hours a week for six to 12 months, at a cost of about \$200 per month. Nanodegrees are designed in collaboration with leading employers such as Google, Mercedes-Benz, or IBM and, if completed successfully, lead to formal credentials that have helped many participants secure jobs.²⁵

Jobs vs skills: Leveraging labour market information

Several initiatives already collect and analyze Canadian labour market information with a focus on jobs. Statistics Canada gathers data on labour demand and supply by job category, as well as unemployment and workforce participation rates.¹ The Sectoral Initiatives Program, run by Employment and Social Development Canada (ESDC), supports industry in developing sector-specific labour market intelligence, national occupational standards, skills certification, and accreditation systems. And the recently established Labour Market Information (LMI) Council, initiated by the Forum of Labour Market Ministers, will work to improve local data gathering, standardize methods and terminology, and disseminate labour market information through a new, collaborative platform.²

In February 2017, the Council proposed the formation of a national, non-governmental organization that would focus singularly on the study and development of **skills and capabilities** rather than jobs.³ As an arms-length organization, the **FutureSkills Lab** would be able to engage with all stakeholders in the skills development ecosystem and facilitate cross-sector collaboration. It could perform three core functions:

- **Identify and interpret new sources of skills information:** tracking labour market signals about future skills needs by amassing a portfolio of pilot program

proposals, collecting digital market signals, supporting innovative labour-market information initiatives focused on employer expectations, and extracting and synthesizing emerging skills trends;

- **Support innovative approaches to skills development:** encouraging, identifying, and co-financing innovative pilot programs that address known skills gaps among workers of all ages, as well as post-secondary students and youth;
- **Define skills objectives and guide governments and training-system participants in skills programming:** rigorously measuring outcomes of forward-looking, targeted training programs and initiatives that gather skills information; identifying and disseminating best practices (nationally and internationally) to employers, as well as education and training organizations across Canada; and determining a set of skills objectives for the future.⁴

The FutureSkills Lab can serve as a catalyst or incubator for the wider ecosystem of skills-development players. Educational institutions and skills-training organizations could use its analysis of current and future skills requirements to refine their curricula and, with the lab's support, pilot innovative approaches to developing skills in high demand.

¹ "A new way to track the job market," *Statistics Canada*, Published April 19, 2017, statcan.gc.ca.

² "Labour Market Information Council Background," Forum of Labour Market Ministers, Accessed on November 1, 2017, fmm-fmmt.ca.

³ Budget 2017 included the establishment of a similar organization with a budget of \$225 million over the first four years and \$75 million per year thereafter. "Building a Strong Middle Class: Budget 2017," *Government of Canada*, Tabled in the House of Commons on March 22, 2017, budget.gc.ca.

⁴ "Building a Highly Skilled and Resilient Canadian Workforce through the FutureSkills Lab," *Advisory Council on Economic Growth*, February 6, 2017, budget.gc.ca.

- **Stackable courses.** Modular courses are most beneficial when they can be complemented with further training in the same or related field. In some cases, students can transfer the credits they have accumulated to other institutions where they continue building their skills base and potentially obtain a diploma or a degree. The **Australian state of New South Wales** has developed a “stackable” vocational education and training system, whereby workers’ existing skills are measured and then built upon with new training modules. The **Massachusetts Institute of Technology (MIT)**, meanwhile, has introduced MicroMasters programs: Students earn credentials for completing a set of online courses and examinations, and the most successful among them can pursue a full-time Master’s degree at MIT or another university.²⁶
- **Online programs.** Adult learners often find it difficult to combine campus-based programs with family and work responsibilities. Many institutions now offer blended programs for adult learners that include in-person and online components. This approach not only gives students flexibility, but allows educational institutions to serve larger student cohorts at their facilities. Fully digital approaches are also being tried. The **US Defense Advanced Research Projects Agency** is experimenting with an interactive and adaptive “digital tutor system” to train new recruits for IT jobs. Students work with the system one on one, completing lessons and solving related problems, and when the tutoring system judges them to have mastered the material, it moves on to the next topic.²⁷
- **Experiential training integrated with work experience.** This method gives adult learners the confidence that the skills they acquire can be immediately applied in the workplace.²⁸ **Red River College in Winnipeg, Manitoba**, has worked in partnership with truck manufacturer Peterbilt to design and deliver a highly practical 12-week technician training program, which so far has helped all of its graduates secure jobs upon completing it. **SAIT’s MacPhail School of Energy in Calgary, Alberta**, provides hands-on, skills-based, and technology-focused education for careers in the energy industry. It offers students “action-based learning” in centres of applied technology developed by industry partners such as TransAlta, BP, and Encana.²⁹
- **Certification for skills.** Some programs recognize the skills students have acquired even if they have not earned traditional post-secondary degrees. **Singapore** has implemented a **Skills Framework**—co-created by employers, unions and governments—that defines existing and emerging skills needed for specific occupational roles and facilitates the recognition of skills acquired by maintaining a database of approved courses.³⁰ In Canada, the **prior learning assessment and recognition (PLAR)** program run by most polytechnics allows individuals with non-traditional education such as former and current Canadian Forces members to get formal validation of formal and informal learning they have previously engaged in. Thus, PLAR makes it easier for such mid-career individuals to transition to new occupations or get advanced placement in post-secondary programs.

While the focus of this report is training for working-age adults, Canada’s schools, colleges, polytechnics, and universities need to be fully mobilized in the national effort to prepare the future workforce to succeed in a rapidly changing labour market. In Appendix 1, we outline a set of priorities to guide this collective effort.

3. New Models for Funding Adult Skills Development

As labour market disruption requires more and more workers to upgrade their skills, individuals, employers, and governments face a financing challenge. Innovative efforts to address this need range from ambitious employer-run programs, to collaborations between private and public sectors, to government-financed national strategies that involve all participants in the labour market.

Corporate programs. As global companies adapt their business models to address economic and technological changes, they create new employment opportunities requiring skills their existing employees may not have. Many are now experimenting with ways to upgrade their workers' skills to fill those and future positions.

AT&T's Workforce 2020 Program, for example, aims to ensure that its employees' skills will match the company's future needs. In 2013, the company realized that more than a third of its workers were in roles that the organization probably would not have in a decade. AT&T launched the program to identify the skills it will need and create a blueprint for sourcing those skills internally by retraining 100,000 employees for radically new jobs by 2020. Since then, the company has spent about \$250 million annually on the program, including the launch of an online platform with career-planning tools, skills assessments, and skills mapping. Employees can use the platform to identify positions they are interested in, learn about the specific skills requirements, and find training options for acquiring those skills. The company has also realigned performance incentives to give more weight to in-demand skills, and partnered with Georgia Tech and others to provide low-cost, online learning. AT&T reimburses employees for the cost of training, but workers need to do it on their own time.

The company and its employees are already reaping benefits: As of May 2016, employees had taken more than 1.8 million emerging-technology courses, and last year AT&T filled more than 40 percent of its 40,000 job openings with internal candidates.³¹

Sector collaborations. Not all employers have the size and resources to provide training to their workers. For small and medium enterprises (SMEs), which represent the majority of Canada's businesses, collaboration with governments, larger companies, or non-profit organizations can get them closer to their goals.

For example, in 2001, the **South Korean government** set up an incentive program aimed at encouraging large companies to help their smaller partners and suppliers upgrade their workers' skills. The ultimate goal is to improve the productivity of workers in the country's SMEs, which account for more than 85 percent of all employees. The initiative subsidizes 80 percent of the cost of training programs offered by corporations to the SMEs in their value chain.

One participant, **SK Telecom**, shares its extensive eLearning library—which includes task-focused training modules as well as ones in leadership, values, and functional training—and offers more traditional training courses tailored to the specific needs of its SME partners. To date, SK Telecom has trained almost 210,000 people and believes its SME partners are more productive. It says communication and goodwill have also improved.³²

Another example of a sector collaboration are [Quebec's *mutuelles de formations*](#). These non-profit organizations assist their mostly SME members by connecting them to low-cost training options for their workers. The associations support businesses from a specific economic sector (*mutuelles sectorielles*) or within a given geographic area (*mutuelles territoriales*). For example, Forma Plus, a Montreal-based *mutuelle* with more than 150 participating SMEs and 7,000 combined employees, helps its members identify common learning and development needs, then procures training services cost-efficiently and seeks government funding if necessary.³³

[Palette](#), a rapid retraining and skill-matching platform currently being developed under the auspices of the Brookfield Institute, aims to facilitate industry-led training, thus helping small, fast-growing companies meet their skills needs. To do this, the platform would work with innovative companies to identify common high-demand job skills and support partnerships with training providers to create rapid, retraining programs.

[Government strategies](#). Some governments are developing comprehensive national strategies for upgrading workers' skills. These strategies include coordinating skills development frameworks and funding various programs, while still empowering individuals to take ownership of their lifelong learning journeys.

One of the most ambitious of such programs is [SkillsFuture Singapore](#). Launched in 2016, it is a national initiative that supports continuous learning in response to the rapidly changing needs of the economy. The program targets all participants in the labour market: students, early-career employees, mid-career employees, employers, and training and education providers. It is funded through a special levy on employers of 0.25 percent of their total payroll cost.³⁴ The centrepiece is the SkillsFuture Credit program, which gives every Singaporean over the age of 25 a credit worth \$500 that he or she can use to pay for training from a range of more than 18,000 government-supported courses. The credit does not expire and is topped up periodically during an individual's career. The aim is to make every student and worker the agent of his or her own learning path, free to choose the type of training they feel will help them reach their career goals, whether that means pivoting to a new industry or gaining specific hard or soft skills.

SkillsFuture includes a program specifically focused on adult skills upgrading. Through the Mid-Career Enhanced Subsidy, Singaporeans aged 40 and above can receive a subsidy of up to 90 percent on fees for approved courses. The strategy also tries to foster employer-led training through initiatives such as Earn and Learn, whereby the government co-funds structured job training provided by employers to recent graduates.

On the other side of the world, and on a more modest scale, the [US State of Virginia](#) has developed the New Economy Workforce Credential Grant that allocates US\$7.5 million per year to co-funding non-credit training that builds worker credentials in high-demand fields. The program is designed to provide incentives for individuals to invest in upgrading their skills and for training organizations to provide high-quality courses that lead to recognized credentials. Students are required to pay one-third of the total cost of the program upon enrolment, with government co-funding provided according to a pay-for-performance model.

Navigating labour-market change: Skills, training, and career guidance

Given the rapid and often confusing changes in the labour market, individuals need expert advice to understand the changing conditions and emerging opportunities. Several countries are trying new approaches on this front.

The [German Federal Employment Agency](#), for example, recently began a pilot for a lifelong vocational counselling program, aimed at supporting workers at every key decision point from secondary school onward. The program targets about four million people, or roughly 5 percent of the population. It uses a combination of face-to-face consultations and online services,

including a digital tool that guides participants to an efficient qualification- or skill-development track. Resources are particularly targeted to students pursuing degree programs with high dropout rates and workers at greatest risk of job loss as a result of automation.

The agency works directly with employers and has seen some impressive early results. During the program's first six months, more than 300,000 people used the digital service. SMEs, which often lack resources to invest in training, also have shown considerable interest in the counselling program.

The Gap in Canada's Adult Skills Development System

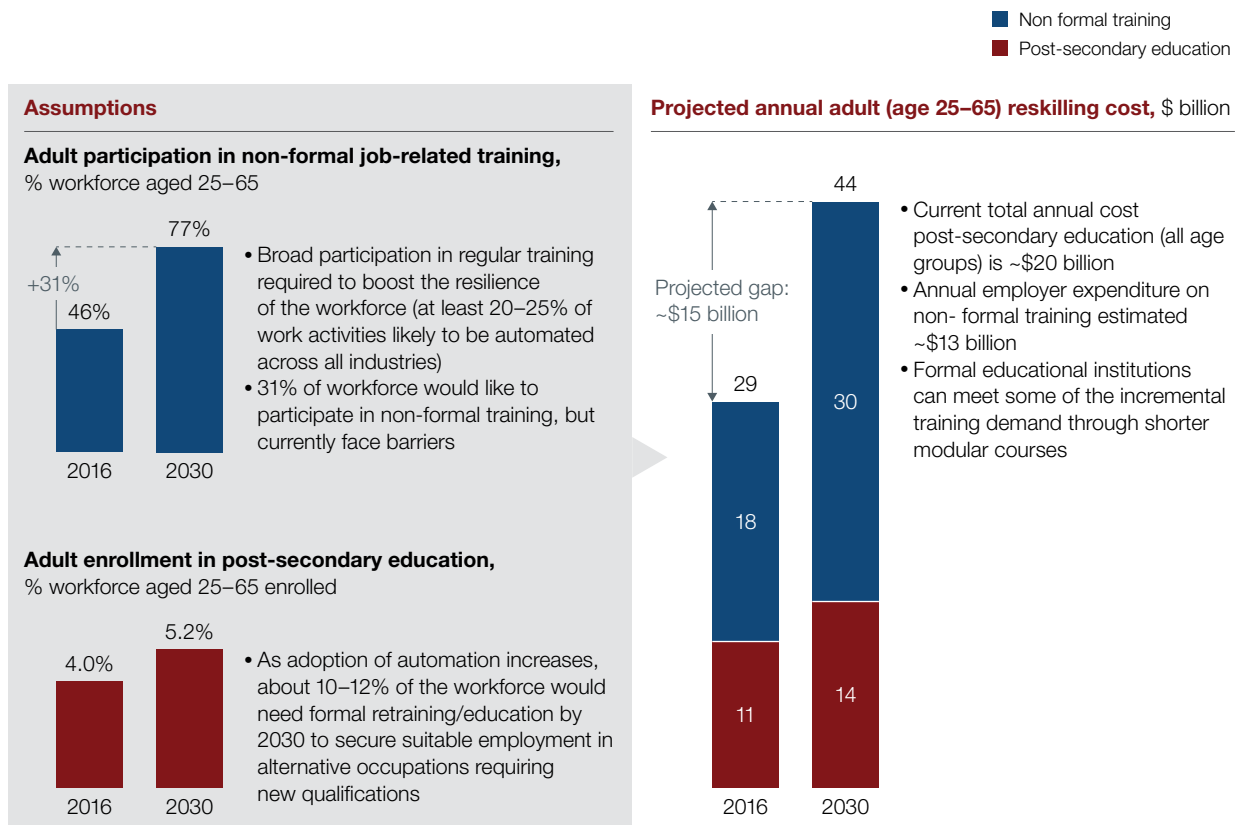
Canada's current workforce training infrastructure rests on two main pillars. First, the education system gives a foundation of broad knowledge and specialized skills before individuals begin careers. The total public expenditure on education (K-12 and post-secondary) amounts to more than five percent of Canada's gross domestic product, or approximately \$100 billion annually.³⁵

The system's second pillar—partially funded through Employment Insurance (EI)—provides Canadians who have lost their jobs with income support, as well as career guidance and training to help them find new opportunities.³⁶ It is reactive and exists largely to support individuals' re-entry into the labour market following unemployment. Federal funding for Labour Market Development Agreements (LMDAs), which cover training and guidance programs for unemployed individuals eligible for EI, is increasing from \$2.2 billion to \$2.5 billion annually.³⁷ The government is also broadening eligibility for LMDA-funded employment assistance services beyond EI-eligible unemployed individuals to also support employed workers. It is also increasing support for employers who need to upskill their workers to maintain their current employment.³⁸

While each of these two pillars plays an essential role in the skills development system, they leave a big gap in institutional support for working Canadians. At a time of rapid labour-market change, our system does not sufficiently enable working adults to continually upgrade their skills.

To fill that gap, Canada must erect a third pillar. We estimate that [the annual expenditure on training and post-secondary education for working Canadians will need to increase by approximately \\$15 billion](#) (Exhibit 3). Individuals, employers, and governments have to share in this critically important investment. Failing to make the necessary investments in the third pillar will prevent Canadians from taking advantage of new

Exhibit 3 The annual cost of adult reskilling would need to increase by ~\$15 billion to manage the effects of automation over the next two decades



Source: OECD Education at a Glance, Statistics Canada, McKinsey Global Institute, Conference Board of Canada, ESDC, Budget 2017

opportunities, leading to severe consequences for their families' wellbeing and the overall growth prospects of the country's economy.

The funding increase is needed to address some severe shortcomings in the current system. The average working-age Canadian receives the equivalent of just one week of job-related training annually, or 41 hours. That figure exceeds the OECD average of 36 hours, but significantly trails some leading peers such as Denmark, New Zealand, and Norway. What is more, this training is not evenly distributed among the population. Only 46 percent of working-age Canadians participate in job-related training at all. Additionally, 31 percent say they want to participate in training but are facing barriers, most significantly insufficient time due to work or family commitments, high training cost, or lack of employer support.³⁹

The additional investment will allow broader access to job-related training, and increase the share of working-age Canadians who participate in training each year from fewer than half to more than three-quarters. Thus, it

would accommodate the 31 percent of Canadians who have the desire to upgrade their skills but face barriers. Expanding training access is critical given the expectation that nearly a quarter of typical work activities will be automated by 2030 across most occupations.⁴⁰ Additionally, the boost in investment would cover the cost of raising the number of working-age adults enrolled in post-secondary institutions from about 660,000 a year to about 860,000—a 30 percent increase.⁴¹ This would meet the needs of the approximately two million working adults who will have to acquire new qualifications and seek employment in new fields after their jobs are displaced by technological change.

With its recent reforms, the federal government has taken some initial steps toward providing the necessary support to working Canadians (Appendix 2). However, while these changes are undoubtedly important and headed in the right direction, they will not be sufficient to address the march of technological change and its rapidly growing impact on the labour market. A growing rate of job turnover means that a much wider group of adults will need to continuously upgrade their skills and acquire new qualifications throughout their working lives. While the government has to lead the way with a national strategy, employers and individuals both have important roles to play.

The role of employers. For some time, Canadian employers have been significantly underinvesting in worker training. Between 1990 and 2010, the average amount an organization spent per employee fell by more than 40 percent.⁴² In the past five years, that trend has reversed direction, with spending growing from a low of \$688 per worker in 2010 to \$800 in 2014-15, but Canadian companies still lag behind their US peers.⁴³ Mid-career employer-sponsored training has proven returns though. Carleton University economists have demonstrated that enrolment in such programs in Canada tends to boost employees' wages by five to nine percent and that this positive effect on wages is even stronger among low-skilled workers (up to 15 percent).⁴⁴

However, when employers invest in skills development, they prioritize the professional development of their higher-skilled and more senior staff. Managers, supervisors, and professional, technical, and scientific personnel account for about 70 percent of the average training budget, and receive much more intensive training than employees with lower qualifications.⁴⁵ This is concerning, as it is the lower ranks of the workforce who are most in need of skill upgrades and could benefit the most from training.

SMEs, which employ about 70 percent of all private-sector workers in Canada, often lack the resources to develop internal training programs. They also face relatively high employee turnover, which discourages them from investing in staff training.⁴⁶

As labour market pressures mount, it will become increasingly clear to organizations that they have a deep interest in developing their workers' skills. Business leaders must view training not simply as a cost, but as an investment in their organizations' human capital. In the knowledge economy, such investments are at least as important as those in equipment, physical structures, or intellectual property, as it is human talent that will underpin companies' future competitiveness.⁴⁷

The role of individuals. A significant number of Canadians, representing about 4 percent of the working-age population, are enrolled in educational institutions each year—a relatively high percentage given that most individuals pursue post-secondary degrees before the age of 25.⁴⁸ However, the rapid changes in the nature

of work may require many more Canadians to seek new formal qualifications. This is a difficult adjustment for most adults, especially when they have pursued a single career path so far. Therefore, helping people make informed choices about further education and training is critical for their future success in the workforce.

Provincial governments run employment centres (funded in part by LMDAs) that have traditionally offered job-counselling services to unemployed Canadians. These services can also benefit employed individuals whose jobs are at risk and who need to prepare themselves for a career change. Under recent reforms, employment centres will be able to extend their assistance to people who are not EI recipients. However, to serve working Canadians effectively, these counselling services must be redesigned to focus not only on helping someone find employment but also advise a wide range of citizens on high-impact training and new career options.

An additional obstacle for individuals who decide to pursue education or training is that most programs are not tailored to the needs of working adults. The programs often require students to take more time off than their circumstances permit, or do not provide sufficient opportunities to develop immediately marketable skills.

It is critically important to raise awareness among Canadians that they will need to continuously upgrade their skills if they are to remain competitive in a changing labour market. While government and employer assistance is necessary, this is a challenge individuals ultimately must take into their own hands.

Our Recommendation: Skills Plan for Working Canadians

In light of the pace, magnitude, and breadth of the coming labour-market shifts, Canada's leaders—representing governments, employers, workers, and educational institutions—need to engage in an urgent national dialogue on the best ways to prepare the country for the future of work. The objective of this process should be the development a comprehensive **Skills Plan for Working Canadians** that will fundamentally transform the system for upgrading the skills of working adults.⁴⁹

To provide a starting point for this national discussion, the Council offers two ideas that could compose the central elements of the strategic response the country needs:

1. **New, federally governed Canada Lifelong Learning Fund (CLLF)** that helps reduce the financial barriers to continuing training for adults by co-funding investments both employers and individuals make in skills development;
2. **Transformation of the government's employment centres** into hubs of hands-on career and training guidance not only for the unemployed but also for working adults and employers.

The Council acknowledges the continuing need to help unemployed Canadians return to the labour market through the multi-jurisdictional architecture of the Labour Market Development Agreements (LMDAs). We also recognize that the government is already providing some skills-development support to working adults through the provincially administered Workforce Development Agreements (Appendix 2). However, incremental programs will not be sufficient to address the major looming need for adult retraining.

While the existing mechanisms represent a basis upon which to build a third pillar, we believe that the federal, provincial, and territorial governments should re-examine, reinforce and reinvent these efforts through the lens of a comprehensive Skills Plan for Working Canadians.

We believe the Skills Plan for Working Canadians should consider several guiding principles:

- **Broad conversation and national commitment.** The strategy needs to emerge from a broad conversation with all key stakeholders in the skills development system—a discussion that will raise awareness of the challenges ahead and help forge a commitment to step up investment in this national priority.
- **Joint effort.** An issue of this scale cannot be addressed by just one level of government. Both federal and provincial participants must play a role in the formulation and execution of the new plan.
- **Innovative and agile programs.** The strategy should accommodate the testing of innovative interventions, adopting, and scaling up effective ones and discontinuing less successful ones.
- **Prioritization of highest need.** The plan should pay special attention to sections of the population with the greatest need of assistance. For example, individual training grants should prioritize lower-income Canadians. Similarly, CLLF co-funding for employee training should focus on industries undergoing significant transformations and on SMEs that lack the resources to run their own employee-training programs.
- **Tailored training approaches.** Most existing training is not well-suited to working adults' circumstances, so governments should promote new mechanisms and curricula tailored to adult learners. In particular, the plan should encourage beneficiaries of CLLF support to enroll in courses that are modular or part-time, offer transferable credits, combine work experience, rely on digital tools, and lead to formal credentials.
- **Seamless access.** To encourage more employers and individuals to invest in skills upgrading, governments should simplify the programs through which they offer support and make it as easy as possible to apply for benefits. To achieve that, they should transform employment centres into customer-friendly services that guide both individuals and employers through the available reskilling options.

Bringing the Skills Plan for Working Canadians to life

The two initiatives the Council proposes incorporate the above principles, and illustrate the steps the government needs to take.

1. **Formation of the Canada Lifelong Learning Fund.** To motivate both individuals and employers to significantly increase their investments in skills development, the government needs to deliver a jolt to the system by providing financial incentives, while also encouraging new training practices for all industries, all ages and throughout the country. We believe that to achieve this, the CLLF would need to match the financing currently available for skills development through Labour Market Development Agreements, or about \$2.5 billion annually.

Although the government is a key funder and strategic partner, the \$15-billion annual gap in funding for adult training needs to be filled through a joint effort. To stimulate higher overall investment in skills development, CLLF funds should be matched at least partially by contributions of the beneficiaries (individuals and employers).

The types of interventions that the CLLF should support include:

- Co-funding employee-training initiatives by large companies undergoing major technological or business-model transformations that require their employees to acquire new skills⁵⁰;
- Co-funding initiatives by SME consortia organized along sector or geographical lines to upgrade the skills of member companies' employees;
- Co-funding skill-development initiatives led by labour unions;
- Providing partial grants or loans to working adults who wish to enroll in programs that enable them to pursue new professional opportunities;
- Co-funding initiatives that allow working Canadians more time to engage in skills development, such as paid training leave.

Given the pace and scope of labour market change, the CLLF should function in an agile and adaptive manner, building on what works and accommodating an uncertain environment. We believe there is need for innovation not only in the design of adult skills-development programs but also in the way they are delivered. But time is of the essence; Canada cannot afford to engage in protracted negotiations to retool existing federal-provincial agreements.

2. Transformation of Canada's employment centres. These centres already serve as critical points of access for unemployed or vulnerable Canadians. The Council supports the government's efforts to expand the mandate of these centres. Given the level and breadth of labour market disruption, they should offer job counselling services not only to unemployed Canadians eligible for EI but also serve as hubs for career and training guidance to working Canadians weighing different training options and to employers looking to deploy new employee-training programs. The federal and provincial governments should work together to establish national best practices and performance standards for the centres. These reforms will make it significantly easier for both individuals and employers to access the advice and co-funding offered through the Skills Plan for Working Canadians.

The employment centres would build two national partner networks: one made up of businesses that have job openings, and the other comprising education and training providers that offer programs suitable for working-age adults. Following the reform, provincial employment ministries would administer the employment centres, as they do now, but they would use a shared performance management framework to ensure the highest possible standards.

It is vital that the advisory services the employment centres provide rely on deep and up-to-date research into the existing supply of skills and emerging needs across Canada's diverse labour market. The centres should not merely encourage more training but prioritize the development of skills in specific occupations or sectors with a high growth potential, conveying market information to employers and workers so they understand the opportunities and the value of investing in skills development.

A central role for Canada's new skills innovation lab. Canada's new skills innovation lab (referred to as "FutureSkills Lab" in our earlier recommendations) has a unique opportunity to play an enhanced role in the formulation and execution of the Skills Plan for Working Canadians. It can convene the national dialogue that Canada needs to determine how it will address the labour market disruption ahead. Given its expert staff, the lab would also be well-positioned to advise on high-opportunity areas where reskilling efforts under the CLLF umbrella should concentrate. It could also assess the impact of the activities under the CLLF umbrella to help determine which programs should be expanded and which discontinued.



As businesses in nearly every industry strive to adapt to a rapidly changing global economy, the people who work for them must change, too—by acquiring the skills future work environments will demand. While Canadians and their employers need to be more proactive in the field of skills development—as they will be the primary beneficiaries of such activities—we believe the government should play a leadership role in helping both businesses and workers make the transition to this new world of continuous learning.

The labour market increasingly demands that people upgrade their skills throughout their working lives. To thrive in a future characterized by new jobs in new industries with new patterns of work, both employers and workers have to embrace investment in continuous learning. This focus is the cornerstone of the **Skills Plan for Working Canadians**—one of the key initiatives the Council believes is necessary to reach the goal of raising median pre-tax household income by \$15,000 above current projections by 2030. Leaders in government, business, and the training ecosystem must stand behind a vision of Canada as a resilient learning nation so this new way of thinking enters the mainstream and becomes a national priority.

Confronting the major labour-market disruptions ahead means incorporating a third pillar into the current system of education and unemployment support: one focused on continuous upgrading of working adults' skills. It is a big challenge that will not be addressed overnight. Our recommendations today are a call to action and a sign of the urgency that we attach to this issue. We also recognize the complexity of the issue and note that initiatives of the magnitude and scope of the suggested Canada Lifelong Learning Fund would require careful policy design to ensure that the funds are effectively targeted and achieve the desired behavioural changes. We hope that our recommendations trigger an urgent national debate that involves governments of all levels, employers both large and small, and Canadians from all walks of life. This debate is necessary to find truly transformative solutions for building a workforce that is equipped to capture the opportunities of the future.

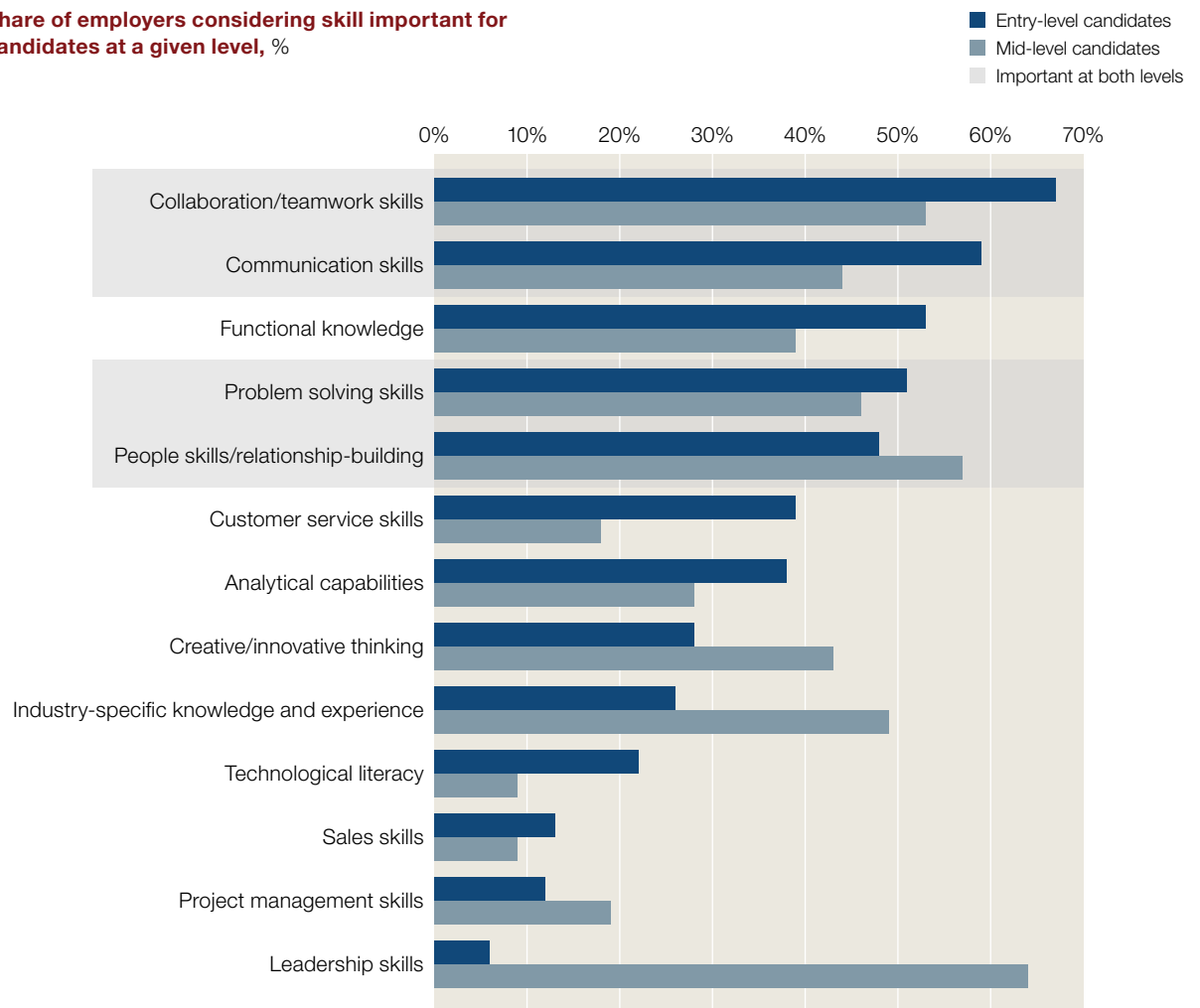
Appendix 1: Priorities for the Canadian Education System

Focus on transferable core and soft skills

While employers highly value core skills (such as math and science fundamentals) and soft skills (such as communication and problem solving), they are more likely to invest in strengthening employees' targeted, job-specific skills such as industry-specific knowledge (Exhibit 4). This makes it essential for our public education systems to focus on developing these foundational skills in the future Canadian workforce from an early age.

Exhibit 4 Soft skills are among the most important for both entry- and mid-level job candidates, demonstrating the need for focus on them in education

Share of employers considering skill important for candidates at a given level, %



Source: "Developing Canada's future workforce: a survey of large private-sector employers," AON Hewitt (2016)

The good news is that educational institutions and innovators of all types are already working on new approaches to this education, with promising results.

- **Actua** is an Ottawa-based organization that runs a range of programs focused on advancing students' skills in science, technology, engineering, and mathematics (STEM), with an emphasis on groups under-represented in the workforce.
- **Future Design School** is a Toronto-based company that helps schools redesign their approach to teaching soft skills such as creativity, communication, collaboration, and problem solving. It reviews curricula, introduces new methodologies (such as project-based learning and experimentation), and supports teachers' professional development so they can apply the new approaches successfully.
- In addition to supporting an active cluster of work- and learning-focused ventures, **MaRS Discovery District**, based in Toronto, provides entrepreneurial and innovation skills training (in person and online) to thousands of students and working-age adults—whether they are in transition between careers, employed by corporations, or working for start-ups.
- **CORE Districts** in California is one of the first experiments in making soft skills development central to the K-12 curriculum. Eight school districts in the state currently participate in the program, in which students' social-emotional skills (such as self-management, social awareness, self-efficacy and “growth mindset”) account for 40 percent of a school's performance assessment. Analysis of the results to date suggests the scales the schools use to measure student skills are both reliable and positively correlate with key indicators of academic performance and behaviour.⁵¹

Prioritization of specialized academic knowledge, and fundamental and applied research

As Canada transitions to a knowledge economy, deep training in specialized academic disciplines will be critical to continuing innovation and success in a highly competitive global environment. Businesses in many critical sectors, including healthcare, next-generation manufacturing and advanced computing, will demand deep specialization as a source of competitive advantage, as will new knowledge-intensive start-ups.

Higher education institutions play a critical role in producing curious lifelong learners, who renew their knowledge on a regular basis as new developments in their fields emerge. Engaging in research and developing the associated skills is an excellent way of preparing for future learning. In addition, institutions should increase their offerings of short, specialized programs (certificates, professional executive graduate programs) that will allow working adults to return part-time and expand their skills to take advantage of emerging market opportunities.

Canada needs to boost the research intensity of its post-secondary institutions to remain competitive in advanced areas of the knowledge economy. More students, including undergraduates, should be exposed to research opportunities. The country should also set higher targets for the number of Master's and doctoral graduates while strengthening incentives for businesses to hire this specialized talent.

Vocational training that includes transferable skills

Training that builds applied skills is important to prepare students for vocational occupations. We underestimate the vital importance of this part of our educational system in Canada. However, programs that limit training to skills needed for a single vocation may leave students under-prepared for technological change.

Vocational education providers should continue to broaden the scope of their curricula to ensure that students learn skills applicable to a range of occupations. Many Canadian colleges and polytechnics have already started applying such broader competency-based frameworks.

The Foundation for Young Australians also offers an interesting model: rather than teaching skills for specific jobs, the not-for-profit organization promotes teaching these capabilities in “job clusters”—that is, groups of skills applicable to classes of jobs, such as technologists, artisans, or designers.⁵²

The US State of California has tried to incorporate career and technical education⁵³ (CTE) into its education system, and there is evidence suggesting that such programs have a positive effect on students' career outcomes. Students completing CTE programs tend to have incomes 12 to 23 percent higher than their peers—a benefit that is particularly pronounced for programs in the healthcare sector.⁵⁴

Emphasis on intensive practice in workplace environments

Many studies demonstrate the value of work-integrated learning. Moreover, a majority of young people find hands-on learning to be the most useful mode of instruction.⁵⁵ Partnerships between companies and post-secondary institutions are particularly effective at providing these types of hands-on learning opportunities while giving students access to needed equipment, facilities, and expertise. However, such collaborations are less common in Canada than in many other developed economies. One in five employers says that they never coordinate with educational providers and fewer than one in ten do so on a monthly basis.⁵⁶

All participants in the skills-development ecosystem should increase the number and diversity of work-integrated learning opportunities for Canadians of all ages. The Canadian government has committed to encouraging work-integrated learning by supporting 10,000 work-integrated placements for post-secondary students through the not-for-profit organization Mitacs, helping students to gain experience and skills in the private sector. It also recently launched the Student Work-Integrated Learning Program, which will support partnerships between employers and post-secondary education institutions.⁵⁷ The Business Higher Education Roundtable (BHER), a partnership of Canada's largest companies and post-secondary education leaders under the auspices of the Business Council of Canada, is also advancing the cause by creating more sector-focused work-integrated learning opportunities for students.

Promotion of international educational experience

In an increasingly interconnected world, international education is not a luxury but a vital tool to equip Canadians for success. As the global centre of economic gravity shifts from west to east, Canadians who gain experience working with people from other cultures, especially from emerging markets, will have a crucial edge.

Canada needs a strategy for promoting global education, one developed by stakeholders beyond just educational institutions. Currently, only 11 percent of Canadian university undergraduate students participate in organized educational experiences abroad over the course of their degree, as opposed to 33 percent in France, 29 percent in Germany and 19 percent in Australia. What is more, Canadian students heavily favour traditional destinations, such as Europe, over emerging markets—only 3 percent of all students who went abroad in 2016 chose a Chinese institution.⁵⁸ The Study Group on Global Education recently recommended establishing [Go Global Canada](#), a national initiative that would see 15,000 post-secondary students per year go abroad over the next five years, increasing that number to 30,000 per year within 10 years. The group also advocates a focus on emerging-economy destinations and targeted support for students from lower-income families and under-represented groups.⁵⁹

Fostering a culture of life-long learning

Life-long learning habits need to be instilled early. As such, much of the responsibility for cultivating them lies with parents and the K-12 educational system. We believe that in light of the significant labour-force changes that lie ahead, Canada needs to undertake a comprehensive review of the K-12 education system to ensure we equip young people with the skills to thrive in the future workforce. Educational programs should embrace a variety of methods for encouraging students to be active learners, such as the use of more flexible curricula and a greater focus on projects that ask students to solve practical problems.

Universities, polytechnics, and colleges can also play a key role later in people's lives by engaging their alumni not only as passive supporters but as continuing students throughout their careers. Many professional programs already follow this model. Medical schools, for example, maintain active relationships with physicians, offering them opportunities to study advances in their fields, usually in partnership with relevant professional associations. Making our already strong post-secondary education system a core player in the new Skills Plan for Working Canadians will be critical to the strategy's success.

Appendix 2: Government Investment in Adult Skills Development

In recent years, the federal and provincial governments have recognized the need to improve its support for working adults as they adjust to the new world of work.

Education (first pillar). Approximately \$5.5 billion of the federal and provincial governments' funding for post-secondary educational institutions goes toward the training of the 660,000 working-age Canadians enrolled in these schools.⁶⁰ The federal government provides additional support and incentives through the Canada Student Loans Program (about \$769 million in loans and \$241 million in grants to students aged 25 or above in 2015-16). It also offer the Lifelong Learning Plan, a program that allows individuals to finance their own or their spouses' full-time training or education by withdrawing money from their registered retirement savings plans (RRSPs), but has seen limited uptake since it was launched nearly 20 years ago.

In 2017, the federal budget allocated an additional \$454 million over four years to providing adults who wish to enrol in further post-secondary education access to student loans and grants. As well, the budget proposed expanding eligibility for Canada Student Grants and Loans to part-time students and full- and part-time students with children, as well as the introduction of a three-year pilot project that will test new approaches to helping adult learners qualify for Canada Student Loans and Grants.

Support for the unemployed (second pillar). The government provides approximately \$3 billion annually in funding to provinces and territories to deliver a range of training and employment programming for Canadians through Labour Market Transfer Agreements (LMTAs). Provinces and territories design and deliver the programs and services funded under these agreements to meet the needs of a wide variety of clients including unemployed workers eligible for EI, unemployed workers not eligible for EI, low-skilled employed workers, persons with disabilities, and older workers. In 2016-17, LMTAs included the following investments in skills development: \$2.1 billion for LMDAs, \$550 million for the Canada Job Fund Agreements, \$222 million for the Labour Market Agreements for Persons with Disabilities, and \$25 million for the Targeted Initiative for Older Workers.⁶⁴

While the bulk of Canada's training and employment programming supports the unemployed (whether EI-eligible or not), Canada's approach has evolved significantly in recent years, expanding eligibility for support, streamlining existing transfer agreements and increasing funding.

The government is broadening eligibility for programs and services under the LMDAs to create more opportunities for Canadians to upgrade their skills, gain experience, or start businesses. Specifically, provincially run employment centres will be able to offer employment assistance services to all Canadians, not just the unemployed, and will provide support measures to employers who need to retrain their employees.⁶⁵

Following stakeholder consultations and a comprehensive review conducted in collaboration with provinces and territories, the government announced that it is undertaking a significant reform of the LMTAs, including:

- Consolidating the existing Canada Job Fund Agreements, Labour Market Agreements for Persons with Disabilities, and the Targeted Initiative for Older Workers into Workforce Development Agreements that would make transfers to provinces and territories simpler and more flexible to meet the specific needs of individuals, workers, employers⁶⁶ in the region;
- Introducing rigorous performance management that will track the earnings and employment outcomes of individual participants.

The 2017 federal budget allotted additional investments in skills development programs, including an additional \$1.8 billion over six years for LMDAs and an additional \$900 million over six years for the new Workforce Development Agreements. ■

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- ¹ Note that throughout the report, we use “the government” to refer to the Government of Canada.
- ² The Index measures a set of policies and practices that enable a country to develop, attract, and optimize the human capital that contributes to productivity and prosperity. Bruno Lanvin and Paul Evans, eds., “The Global Talent Competitiveness Index, 2017,” *INSEAD*, 2017, gtci2017.com.
- ³ “The Global Human Capital Report 2017: Preparing people for the future of work,” World Economic Forum, 2017, weforum.ent.box.com.
- ⁴ It should be noted that a significant share of students with post-secondary education do not complete four-year degrees. Therefore, Canada performs less well in terms of the share of graduates that have a masters or doctoral degree (9 percent versus 13 percent OECD average), and the successful placement of those graduates in the economy. Müge Adalet McGowan and Dan Andrews, “Skills Mismatch and Public Policy in OECD Countries,” *OECD*, April 28, 2015, oecd.org.
- ⁵ Emily Anthes, “The shape of work to come,” *Nature* 550, 316–19 (2017). nature.com.
- ⁶ Unpublished McKinsey Global Institute analysis of Canada’s labour market; the findings are consistent with the work of Frey & Osborne. Carl Benedikt Frey and Michael A. Osborne. “The future of employment: How susceptible are jobs to computerisation?” *Technological Forecasting and Social Change* 114 (2017): 254-80. oxfordmartin.ox.ac.uk.
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- ¹⁰ Andre Esteva, Brett Kuprel, Roberto A. Novoa, Justin Ko, Susan M. Swetter, Helen M. Blau, and Sebastian Thrun, “Dermatologist-level classification of skin cancer with deep neural networks,” *Nature* 542, 115–118 (2017), nature.com.
- ¹¹ “The Industry Gender Gap Women and Work in the Fourth Industrial Revolution,” *World Economic Forum*, January 2016, www3.weforum.org.
- ¹² In the long term, jobs in growing sectors may counter declines in positions affected by automation, as is the case with healthcare services to ageing populations that are today predominantly performed by women. Neil Howe, “The Spread of the Pink-Collar Economy,” *Forbes*, February, 28, 2017, forbes.com. Employment and Social Development Canada projects that healthcare and social assistance will be the industry with the second-highest employment growth in Canada between 2015 and 2024 (1.8 percent annually), trailing only Computer System Design Services (2.4 percent annually). “Canadian Occupational Projection System,” Employment and Social Development Canada, Accessed November 1, 2017, occupations.esdc.gc.ca. This is the reason why a recent analysis by Patricia Meredith argues for policies to support the growth of the so-called “caring economy.” Patricia Meredith, “Reforming the Income Tax Act to Drive Inclusive Prosperity and Support the Caring Economy,” August 4, 2017, ourcommons.ca.
- ¹³ Manyika et al, “A Future That Works: Automation, Employment and Productivity.”
- ¹⁴ Clifton Leaf, “A Day Without Interruption,” *Fortune*, October 10, 2017, fortune.com.
- ¹⁵ Anthes, “The shape of work to come.”
- ¹⁶ Also referred to as “social and integrative skills.”
- ¹⁷ Manyika et al, “A Future That Works: Automation, Employment and Productivity.”
- ¹⁸ David J. Deming, “The Growing Importance of Social Skills in the Labor Market,” *The Quarterly Journal of Economics* 132, vol. 4 (2017): 1593–1640, nber.org.
- ¹⁹ Often referred to as freelance work, independent work has three defining characteristics—a high degree of autonomy; payment by task, assignment, or sales; and a short-term relationship between worker and client. James Manyika, Susan Lund, Jacques Bughin, Kelsey Robinson, Jan Mischke, and Deepa Mahajan, “Independent work: Choice, necessity, and the gig economy,” *McKinsey Global Institute*, October 2016, mckinsey.com.
- ²⁰ According to Statistics Canada, 1.9 million Canadians are self-employed, while another 2.3 million are classified as temporary employees. Combined, these two groups make up over 20 percent of the Canadian workforce.
- ²¹ Manyika et al, “Independent work: Choice, necessity, and the gig economy.”
- ²² Anthes, “The shape of work to come.”
- ²³ Projections indicate that by 2030, as much as a quarter of all work activities in Canada are likely to be displaced by automation. However, judging by previous waves of automation, a substantial share of the most affected workers would be able to find alternative opportunities in the same or a related field without the need to acquire new formal qualifications. James Manyika, Susan Lund, Michael Chui, James Bughin, Parul Batra, Ryan Ko, and Saurabh Sanghvi, “Jobs lost, jobs gained: Workforce transitions in a time of automation,” *McKinsey Global Institute*, November 2017; OECD research confirms these findings, highlighting that about 10 percent of Canadian workers are in jobs at a high risk (over 70 percent) of being automated. Melanie Arntz, Terry Gregory, and Ulrich Zierahn, “The Risk of Automation for Jobs in OECD Countries,” *OECD Social, Employment and Migration Working Papers*, No. 189, May 2016, oecd-ilibrary.org.

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- ²⁷ "MITx MicroMasters: Bringing MIT to you," *Massachusetts Institute of Technology*, Accessed on November 12, 2017, micromasters.mit.edu.
- ²⁸ Anthes, "The shape of work to come."
- ²⁹ Work-integrated learning is also beneficial for employers. A study of Canadian apprenticeships found that employers get returns of \$1.47 for every \$1 spent on such training. "It Pays to Hire an Apprentice: Calculating the Return on Training Investment for Skilled Trades Employers in Canada," *Canadian Apprenticeship Forum*, 2009).
- ³⁰ "Action-Based Learning," *SAIT MacPhail School of Energy*, Accessed on November 5, 2017, sait.ca.
- ³¹ "Skills Framework," *Skills Future Singapore*, Accessed on November 1, 2017, skillsfuture.sg.
- ³² John Donovan and Kathy Benko, "AT&T's Talent Overhaul," *Harvard Business Review*, October 2016, hbr.org; Aaron Pressman, "Can AT&T Retrain 100,000 People?" *Fortune*, March 15, 2017, fortune.com; Thomas Friedman, *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations* (New York: Farrar, Strauss and Giroux, 2016).
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- ³⁶ "Government expenditure on education, total (% of GDP)," *The World Bank*, Accessed November 12, 2017, data.worldbank.org.
- ³⁷ We note that there are several programs supporting employed working-age adults who are looking to upgrade their skills. These include the Canada Student Loans Program, the Canada Student Grants Program, the Canada Job Fund, the Labour Market Agreements for Persons with Disabilities, and the Targeted Initiatives for Older Workers (more information in Appendix 2).
- ³⁸ Transfers under the LMDAs are planned reach \$2.5 billion by 2022-23.
- ³⁹ In addition to LMDAs, the Government transfers funds to provinces and territories under the Canada Job Fund agreements to design and deliver employment and training programs targeting non-EI eligible unemployed workers, low-skilled employed and employers, through programs such as the current Canada Job Grant. Note that the Canada Job Fund will soon be consolidated with Labour Market Agreements for Persons with Disabilities and the Targeted Initiative for Older Workers into the new Workforce Development Agreements.
- ⁴⁰ "Education at a Glance 2017: OECD Indicators," *OECD*, Accessed November 1, 2017, oecd.org.
- ⁴¹ Manyika et al, "Jobs lost, jobs gained: Workforce transitions in a time of automation."
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- ⁴⁹ "Postsecondary enrolments, by program type, credential type, age groups, registration status and sex."
- ⁵⁰ In a forthcoming book, Isabel Sawhill of the Brookings Institution proposes a "GI Bill for America's Workers," an idea that similarly focuses on mid-career skills development on a national scale. Isabel Sawhill, *The Forgotten Americans and the Dignity of Work* (Yale University Press, forthcoming, 2018)
- ⁵¹ This would represent a significant scaling up of the current activities of the Canada Job Grant program which co-funded employer-led training of 362,000 workers in 2014-15 (Employment and Social Development Canada data).
- ⁵² Martin R. West, "Should non-cognitive skills be included in school accountability systems? Preliminary evidence from California's CORE districts," *Brookings Evidence Speaks Reports*, Vol 1, #13, March 17, 2016, brookings.edu; "Data-Driven Change: A School Community Champions Growth Mindset," *Core Districts*, Accessed on November 1, 2017, coredistricts.org.
- ⁵³ "The New Work Mindset: 7 New Job Clusters to Help Young People Navigate the New Work Order," *The Foundation for Young Australians*, 2017, fya.org.au.

- ⁵³ Career and technical education is the term commonly used in the United States to refer to vocational education.
- ⁵⁴ Ann Huff Stevens, Michal Kurlaender, and Michel Grosz, "Career Technical Education and Labor Market Outcomes: Evidence from California Community Colleges," NBER Working Paper 21137, April 2015, nber.org.
- ⁵⁵ Barton et al, "Education to Employment: Designing a System that Works."
- ⁵⁶ Ibid.
- ⁵⁷ "Building a Strong Middle Class: Budget 2017."
- ⁵⁸ Rita Abrahamsen and Randall Hansen, "Global Education for Canadians: Equipping Young Canadians to Succeed at Home and Abroad," *Study Group on Global Education*, November 2017, goglobalcanada.ca.
- ⁵⁹ Ibid.
- ⁶⁰ "Financial Information of Universities and Colleges (For the Fiscal Year Ending 2016)," CAUBO, Accessed November 1, 2017, caubo.ca.
- ⁶¹ Employment and Social Development Canada data
- ⁶² "Building a Strong Middle Class: Budget 2017."
- ⁶³ Including under-represented groups such as Indigenous peoples