

North America 2.0

A Workforce Development Agenda



Table of Contents

Summary	1
The Challenges	3
Skill Gaps and Technological Changes	4
Job Displacement: Trade and Technology	9
Insufficient “Workforce Development” Budgets	11
The Need for a Public-Private North American Workforce Development Agenda	12
Current National Workforce Development Agenda in Canada	13
Current National Workforce Development Agenda in Mexico	14
Current National Workforce Development Agenda in the United States	14
Sub-National Successes	15
USMCA Opens a Window for Cooperation	17
Priorities for Action	20
Issue #1 Investing in Apprenticeships and Other Work-based Learning.....	20
Current Federal Apprenticeship Programs	22
Private Sector Initiatives	24
Issue #2 Addressing Credentials and the Host of Issues Surrounding Them	26
Issue #3 Improving Labor Market Data Collection and Transparency	28
Issue #4 Identifying Best Practices to Prepare for Future of Work	30
Implementing the North American Agenda	34
North American Agenda Recommendations	36
Acknowledgements	39
Endnotes	41

Summary

North America suffers from alarming skills “gaps” and “mismatches” that negatively affect the economic performance of all three countries. Those mismatches promise to cause more serious problems if not effectively addressed.

Simultaneously, accelerating technological changes of what is often called “Industry 4.0” or the “Fourth Industrial Revolution” will continue to sweep through workplaces across the continent, eliminating, altering and creating jobs and raising serious questions about the “Future of Work” in our societies. While these transformations could contribute to more and better jobs in the future, individuals, economies and governments need to prepare for the shocks accompanying the “creative destruction” ahead.¹

To address more effectively the social, economic and political challenges implicit in these transformations, the United States, Canada and Mexico need to increase quality investment in their workforces. They will need to reinvent the ways that each country, and the continent, educates, “up-skills” and “re-skills” its workers, preferably using people-centered and tech-enabled approaches. However, the United States, Canada and Mexico are not engaging creatively, diligently or strategically to help manage the changes underway in order that each country, and North America as a whole, can emerge stronger and more competitive from the revolutionary transformations ahead.

North America’s highly integrated production and commercial networks mean that more regional collaboration on these workforce and workplace challenges is essential. If done well, such collaboration can simultaneously create quality jobs, achieve higher levels of productivity and strengthen the competitiveness of the region vis-à-vis China and other global economic powers. To neglect this task or to do it poorly or not at all would be an invitation for severe economic and political disruptions.

North America needs leaders from the private sector, labor unions, academia and government to step forward and foster the engagement needed for good outcomes. There is nothing inconsistent in having an “America first,” a “Mexico first” or a “Canada first” approach and having a “North America first” approach to the international marketplace on workforce development. Sharing workforce solutions among the three countries can strengthen the continent’s valuable co-production and value chains.

North America would benefit greatly from a senior-level trilateral taskforce or steering group, established by the three governments, which would name public-private, federal-sub-federal working groups to develop specific proposals and launch concrete initiatives on workforce development issues. The taskforce and working groups could be incorporated into the new U.S.-Mexico-Canada trade agreement (called USMCA in the U.S.) as part of its chapter on competitiveness and building on elements of its Labor Chapter, which is still controversial. Building on a shared understanding of the challenges faced, the workforce agenda would focus on four areas:

1 Work-based learning: Promoting and investing in work-based training and learning programs, including the development of a shared definition of apprenticeship programs as well as other work-study and dual education models, and of standards for their implementation and funding, all of which must be flexible to allow national, local and sectorial diversity. The private sector must play a central role in the mix of workforce training, given the accelerating dynamism of job needs.

2 Credentials Transparency: Facilitating understanding, recognition and comparability of high quality credentials and competencies through the development and use of: a) common terminology; b) agreed open-source credential and competency frameworks that are periodically updated to take account of workplace transformations; and c) agreed guidelines for assessing and validating credentials and competencies.

3 Labor Market Data Collection and Transparency: Developing real-time labor market data and information platforms that are comparable across countries, and regions, as well as guidelines to make these tools openly available to all stakeholders and allowing for identification sub-regional and skill-level differences.

4 Preparing for Change: Sharing best practices and new models to prepare for the “Fourth Industrial Revolution” and the “Future of Work” given the transformative impact of new technology for good and bad in a very competitive global economy.

The successful implementation of a North American Workforce Development Agenda depends on joint collaboration and multi-stakeholder involvement, including federal, state/provincial and local governments, companies and employers, educational institutions, unions, NGOs and civil society, from the three countries.

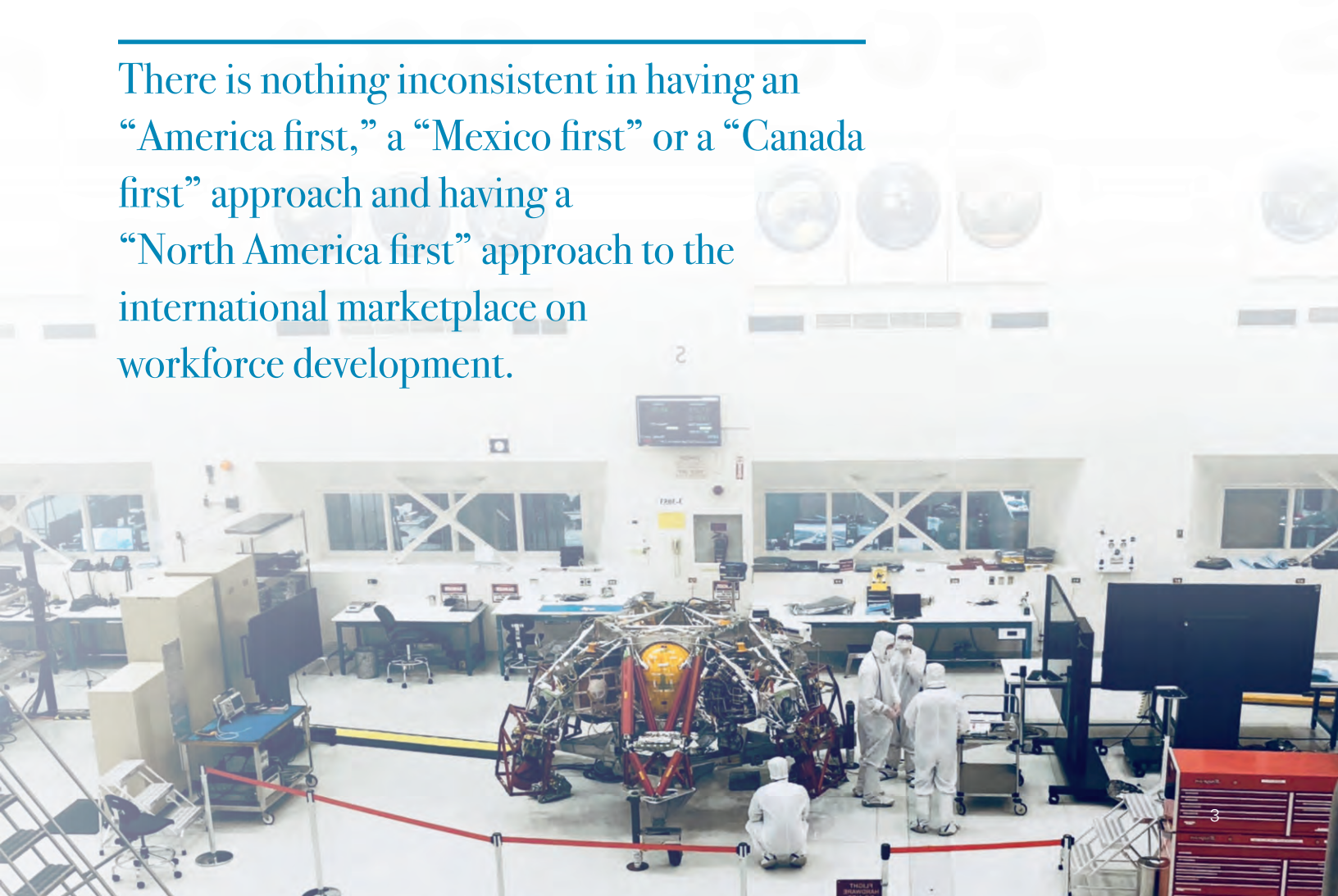
Essential for good results will be the commitment of national governments to facilitate the needed multi-stakeholder process and encouragement of results-validated policy mixes and practices. A good outcome entails creating virtuous ecosystems that reflect an understanding of the continent’s strengths and weaknesses and that can foster and sustain effective workforce development strategies that will be needed at national, sub-regional and local levels as well as in sectors that cross national borders.

The Challenges

Together, North American countries have one of the strongest trading and production networks in the world. The United States, Canada and Mexico share a population of over 495 million people, a GDP of almost \$32 trillion dollars, and their economies represent the 1st, 10th and 15th largest economies of the world² respectively.³

The United States is the largest trading partner of Mexico and Canada and those two countries are the number 1 and 2 export markets for the U.S. Over 50% of the trade within North America is in intermediate goods, reflecting the fact that the three countries build so much together.⁴ Trade has grown by a factor of four since the early 1990s and mutual investment is massive, yet these three economies are facing serious challenges regarding the development of their workforces and all that goes into educating and training them for the global competition of today and tomorrow.

There is nothing inconsistent in having an “America first,” a “Mexico first” or a “Canada first” approach and having a “North America first” approach to the international marketplace on workforce development.

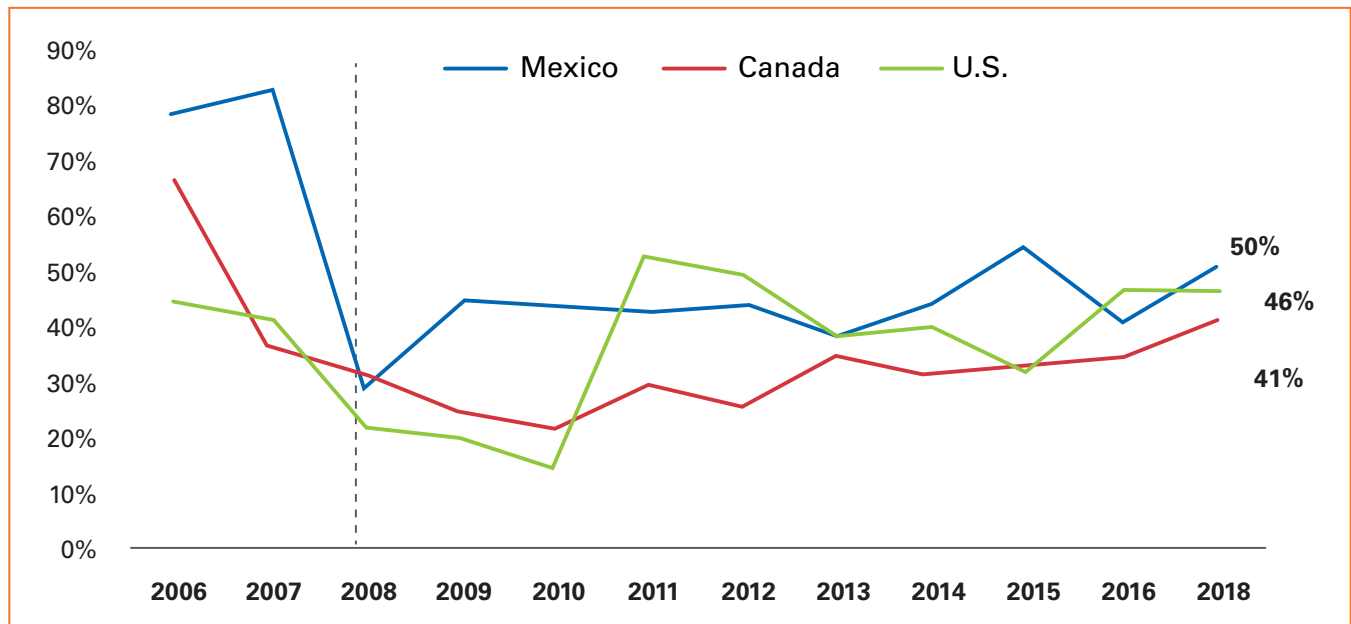


1. Skill Gaps and Technological Changes

Already, the three North American economies face alarming skills gaps and mismatches in large measure due to rapidly changing technology and lack of well-integrated and quality systems for educating and training employees and potential employees.

According to *Manpower's 2018 talent shortage survey*,⁵ 50% of Mexican employers are having difficulty filling jobs; while 46% and 41% of U.S. and Canadian employers respectively face the same problem in finding suitable candidates. Employers from the three North American economies reported the lack of applicants, lack of "hard" or technical and "soft" or human/social skills, and lack of experience as the main reasons why they have difficulty filling positions, particularly among younger workers. In addition, in Mexico and U.S. employers report that workers expected higher pay than offered.

Figure 1. Employers in North America Having Difficulty Filling Jobs



Source: Manpower Group, 2018 Talent Shortage Survey.

While there are significant regional variations in each country, these skills gaps and mismatches negatively affect their competitiveness and industrial performance. Predictions about the rapid pace of change in job content and the creation and destruction of jobs themselves, highlight the need to address skills mismatches and the expected need for new skills in the years ahead.

The World Economic Forum 2018 Future of Jobs report suggests that 54% of workers will require “reskilling” (largely for those displaced from jobs) or “up-skilling” (largely for those still employed but whose jobs are evolving) over the next five years.⁶ According to a study by the National Skills Coalition (NSC), 53% of U.S. jobs are middle-skill, meaning they require more training than a high school diploma, but do not require a four-year college degree.⁷ However, the NSC study reports that only 43% of U.S. workers are trained at this level, making upskilling and reskilling imperative.⁸ The U.S. Bureau of Labor Statistics predicts that 1.37 million U.S. workers will be displaced fully out of their roles in the next decade, requiring wholesale reskilling,⁹ while Deloitte argues that 47% of today’s jobs might be gone in the next decade.¹⁰ Deloitte also found that the skills shortages over the next decade could cost the US economy some \$2.5 trillion in lost output.¹¹

The OECD estimates that 14% of jobs across its member countries could disappear as a result of automation in the next 15-20 years and another 32% are likely to change radically.¹² The OECD report, among others, also highlights the substantial benefits that can accompany the application of automation and new technologies in the form of better and more jobs, but stresses that people, economies, societies and governments need to brace for change and put good policies and institutions in place to help manage the transformations ahead.¹³ Furthermore, a recent analysis carried in Foreign Affairs argues that the growing complexity of manufacturing and production will diminish the importance of cheap, unskilled labor.¹⁴ In fact, exports from low-wage countries to high-wage countries have already decreased from 55% of labor-intensive goods in 2007 to 43% in 2017. Therefore, to thrive in the coming wave of globalization and automation, a skilled workforce is needed more than ever.¹⁵

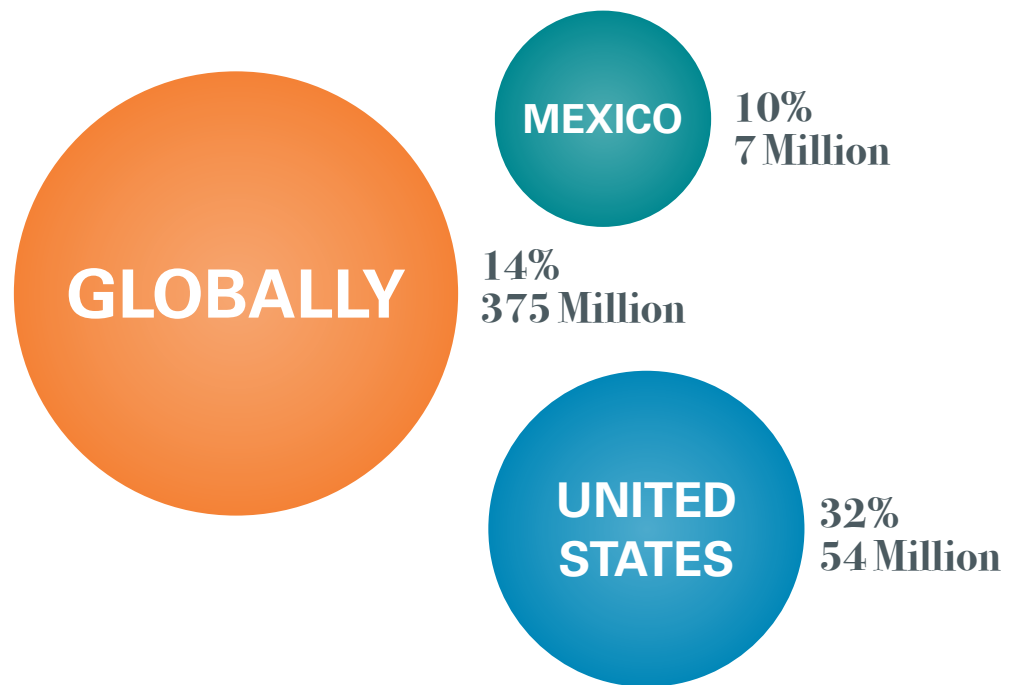
McKinsey Global Institute argues that by 2030, up to 375 million workers globally might need to change occupations or acquire new skills, including up to 54 million U.S. workers and up to 7 million Mexican workers¹⁶ (see Figure 2). An Accenture study argues that Artificial Intelligence (AI) will not so much eliminate jobs as change the content of jobs, requiring new systems for training and retraining workers as technology evolves. Companies need to better understand and implement the new training models needed as AI is deployed in their sectors, and they need to build retraining of their workers into their business models.¹⁷

A wide range of studies suggest that these new work models should maintain the centrality of people, allowing technology to enable their work, not displace it.^{17b}

...the three
North American
economies face
alarming skills gaps
and mismatches in
large measure due
to rapidly changing
technology and lack
of well-integrated
and quality systems
for educating and
training employees
and potential
employees.

Figure 2. Percentage of Workers that Might Need to Change Occupations by 2030

Source: McKinsey Global Institute, “Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation,” 2017.



The OECD has produced a thorough and insightful set of studies on skills and employment. According to the OECD Skills Outlook 2019, there are some occupations at high risk of automation across its member countries, where governments, the private sector and educational institutions may want to target training programs (see Figure 3).

Figure 3. Occupations at High Risk of Automation that Might Need to be Targeted by Training Programs

Source: OECD, “OECD Skills Outlook 2019,” 2019.

Occupations	Risk of automation
1. Keyboard operators	91.3
2. Street vendors (excluding food)	89.6
3. Metal processing and finishing plant operators	87.3
4. Subsistence livestock farmers	87.0
5. Rubber, plastic, and paper products machine operators	86.7
6. Chemical and photographic products plant machine operators	85.0
7. Blacksmiths, toolmakers, and related trade workers	84.8
8. Wood processing and papermaking plant operators	80.4
9. Mining and mineral processing plant operators	72.0
10. Mining and construction workers	80.0
11. Medical and pharmaceutical technicians	78.8

The OECD estimates that the United States has 10.2% of workers in occupations with high risk of being automated who are in need of moderate training to find viable alternatives and another 2.3% in need of “important training” to avoid the risk of automation.¹⁸ For Canada, the OECD estimates that 8.5% of its workers are in need of moderate training to move to secure occupations and 3.2% are in need of “important training to avoid the risk of automation.”¹⁹ Regarding Mexico, the OECD does not provide similar percentage estimates, but finds that Mexico ranks at the bottom 20% on most measures of skills development and faces significant challenges in a range of areas to prepare its workers with the skills needed to succeed.²⁰

Hard or technical skills and *soft or human/social/employability skills* are crucial to navigate Industry 4.0 and to prepare for the “future of work.” A range of experts argue that given the economic transformations ahead, the ideal workforce would possess capabilities such as emotional intelligence, complex problem solving, adaptability and learning agility, as well as the technical or *hard* skills, such as programming, software development, coding and data management.²¹ In an international environment, understanding cultural labor differences and expectations will also be important. According to the World Economic Forum, proficiency in new technologies is an essential part of the 2022 workforce skill requirements.²² The trend of skills in demand (as well as skill mixes in demand) includes analytical thinking and innovation, active learning and learning strategies, as well as creativity, technology design and programming as the top four required skills moving into this new future of work (see Figure 4). (Some persuasively argue that not only skills, but a culture of learning and innovation will be essential for success.)²³

Therefore, to thrive in the coming wave of globalization and automation, a skilled workforce is needed more than ever.



Figure 4. Top 10 Trending Skills by 2022

Source: World Economic Forum, “The Future of Jobs Report 2018,” 2018.



To succeed in the evolving, technologically-enhanced economy ahead, the three North American countries must develop adequate learning and training programs that provide workers with the knowledge, tools and skills required to manage the new technologies and to adapt to the rapid changes expected.

The United States, Canada and Mexico will need agile and resilient workforces with public and private systems that better support workers and to better prepare students with the skills they will need. North America must also prepare for the threats of displacement and unemployment arising from technological change and global competition. There will be important social and political repercussions to such changes. (Attention should be given to any wage polarization, disproportionate effects on disadvantaged groups, and such factors as climate change, as well as impacts on broader social safety net programs, which this report does not examine.) Good preparation will require recognition of the value of employers that generate entry-level jobs at scale and at every point along the skill curve, and of educational institutions that adapt to provide the evolving skills and competency training required to meet local, national and continent-wide needs.

Skills mismatches in North America, combined with the unyielding pace of change in the economy, calls for concerted action by governments, the private sector and educational institutions. Businesses are recognizing some of the needs and building them into their planning: 74% of companies surveyed by the WEF, for example, say the primary factor in determining the locations for new investments will be talent availability.²⁴ But the public-private collaborative efforts, including government, business and academia, are still falling short.

McKinsey Global Institute argues that by 2030, up to 375 million workers globally might need to change occupations or acquire new skills, including up to 54 million U.S. workers and up to 7 million Mexican workers.

2. Job Displacement: Trade and Technology

In recent years, there has been a great deal of criticism in the U.S. domestic political discourse about trade agreements – in particular trade in North America – causing job losses. Trade has caused jobs to move between countries and within the United States for example, but serious studies point to productivity improvements and new technology,²⁵ as well as trade from China,²⁶ as the major drivers of U.S. manufacturing job losses in this century.^{26b} Results from a study by *Ball State University* found that over 87% of manufacturing job losses from 2000-2010 could be attributed to productivity improvements rather than as direct results of international trade.²⁷

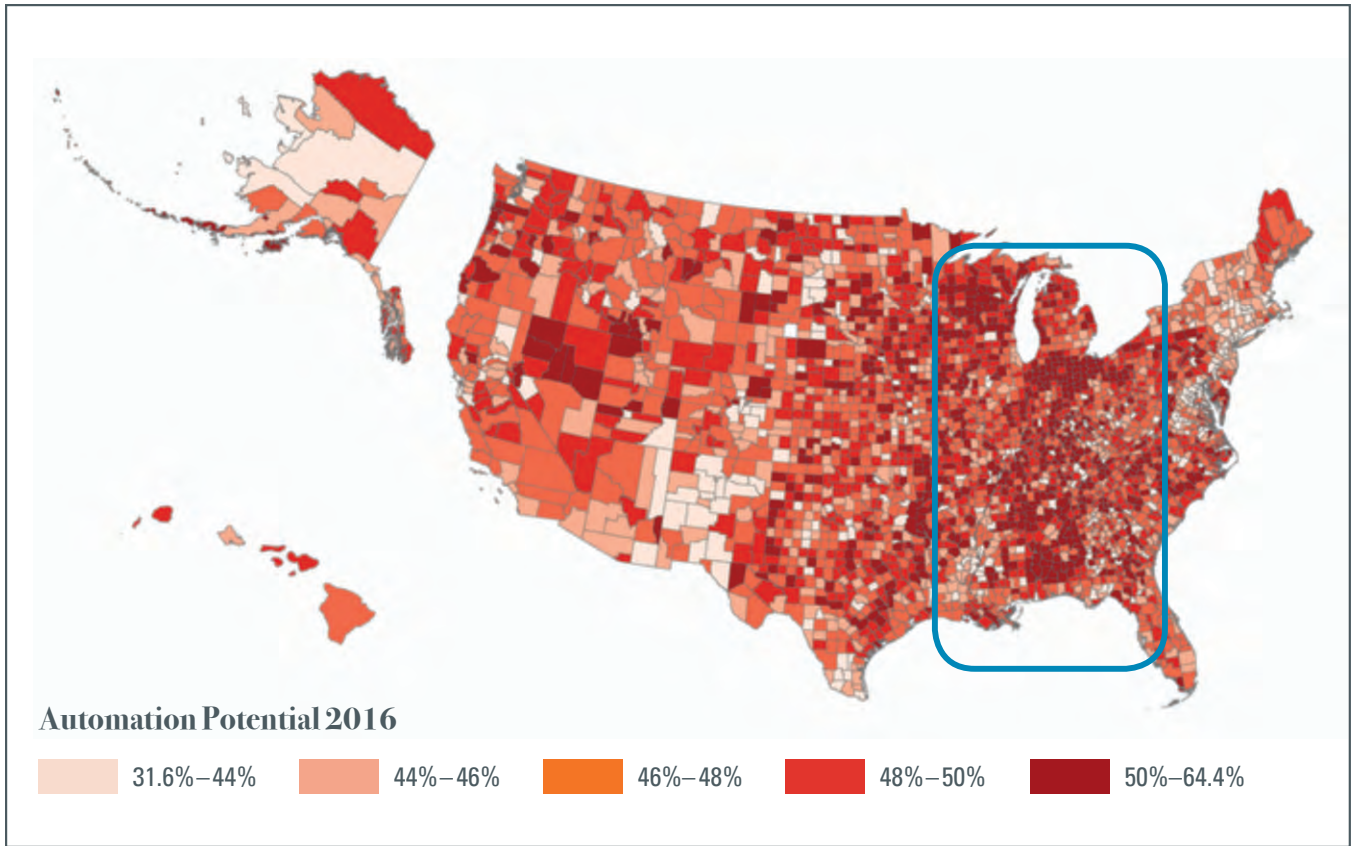
Not only the U.S. but also other advanced economies experienced similar declines of manufacturing jobs driven powerfully by the combination of international competition and new technology and production methods. The 2019 OECD Employment Outlook notes that across that group's membership, employment in the manufacturing sector has declined by 20% over the past two decades, while employment in services grew by 27%.²⁸

It is not surprising then that a 2019 survey by the Brookings Institution found that while 58% of Americans believed that manufacturing is vital to the U.S. economy, only 17% of respondents were very confident in the industry's future. Moreover, 64% said they believed in 10 years' time, there will be significant automation in the manufacturing industry.²⁹ These results underscore the importance of managing well training and reskilling issues.

Whatever the causes of the job losses or gains, too many workers and communities have been left behind as changes in the marketplace in recent years and programs instituted to help, such as the U.S. Trade Adjustment Assistance, have not produced the desired results.³⁰ Policymakers and private sector leaders need to identify solutions tailored to the evolving scale and dimensions of these problems.

More disruptive job displacement could be ahead. The Brookings Institution, for example, predicts that the spread of Artificial Intelligence (AI) will negatively affect the same geographic areas of the United States that suffered in the first decade of this century (see Figure 5), unless steps are taken in "at-risk" regions to mitigate the likely job displacement.³¹ A 2019 study by the National Bureau of Economic Research similarly found that the recent stagnation in the U.S. labor demand is explained by the acceleration of automation, particularly in manufacturing sector, and a deceleration in the creation of new jobs.³²

Figure 5. Average Automation Potential by County, 2016



Source: Brookings Institution, 2018.



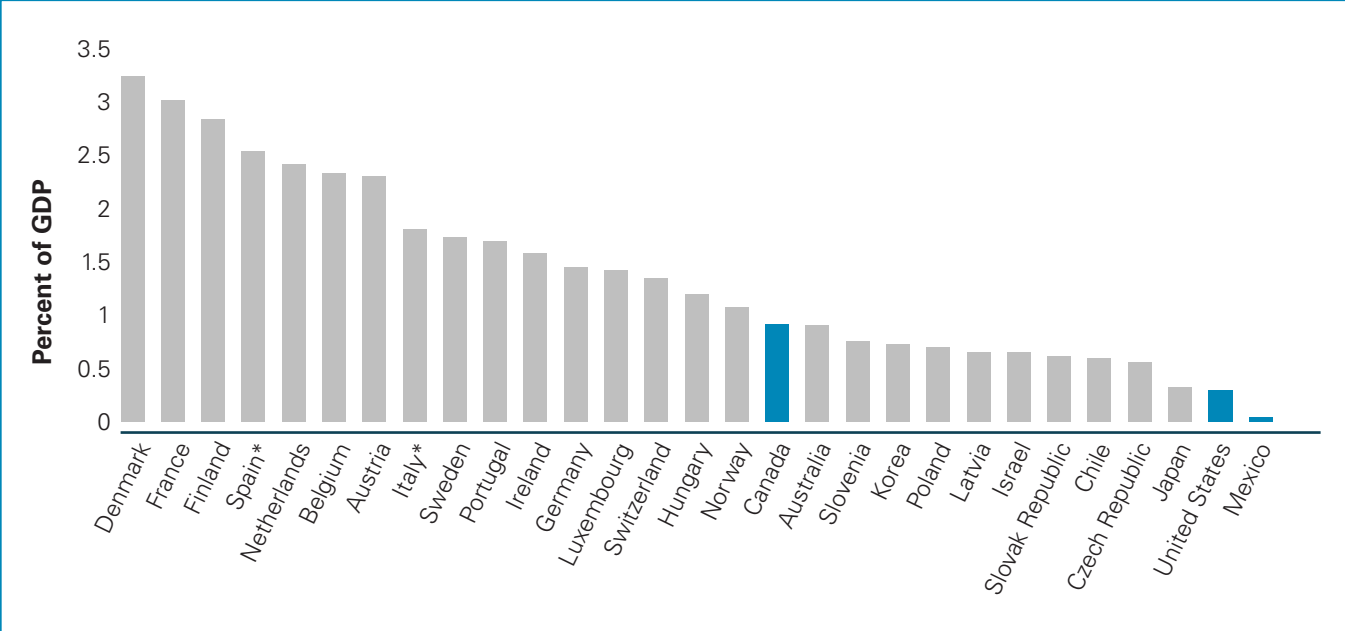
3. Insufficient “Workforce Development” Budgets

Besides improving and modernizing trade agreements, the North American economies should also be investing more and more smartly in the development of their current and future workers. Not only is this kind of investment an economic imperative, but it has overwhelming public support. A January 2019 poll from the National Skills Coalition found that 93% of likely voters in the 2020 U.S. election support increasing investment in skills training.³³ North America’s Countries are not leaders among OECD countries in this kind of public spending according to the OECD’s comparative studies (see Figure 6). In fact, U.S. investments in skills lag behind most other developed economies, and to make matters worse, Congress has cut funds for job training grants by 40% since 2001.³⁴

The skills gap will continue to increase without an organized and coordinated effort to address the problem areas with the rigor of quality investment and a focus on continuous education geared for adult learners in a workforce context. While higher-level skills are important for many sectors, there is also social value to businesses that generate entry-level jobs at scale as well as mid-level skills for key sectors.³⁵

A January 2019 poll from the National Skills Coalition found that 93% of likely voters in the 2020 U.S. election support increasing investment in skills training.

Figure 6. Total Public Expenditure on Labor Market Programs as a Percentage of GDP, 2016³⁶



Note: * Only 2015 data available.
Source: OECD Stat, 2019

Without effective strategies for providing new workers with relevant skills and for “reskilling” and “up-skilling” existing workers, the potential for widespread economic hardship and resulting social and political turmoil will increase.

Without effective strategies for providing new workers with relevant skills and for “reskilling” and “up-skilling” existing workers, the potential for widespread economic hardship and resulting social and political turmoil will increase, not to mention the likelihood of falling further behind international competitors who invest smartly in their workforces. Therefore, it is increasingly important for companies to provide on-the-job training and collaboration with education providers.

Productivity and technology advances will eliminate some jobs, create new jobs, and transform many others. In a recent ranking of who is ready for the coming wave of automation by the Economist Intelligence Unit, the U.S. was only ranked number 9, with Canada at 5 and Mexico at 23 out of 25 countries. This study estimates the substitution of human activity with the expected adoption of new technologies in all areas of the economy and society over the next 20-30 years.³⁷ High-income countries dominate the ranking; they provide significant support for technology innovation and strategies to address the workforce effects of automation.

I. The Need for a Public-Private North American Workforce Development Agenda

North America’s economies share common workforce challenges and opportunities, while their commercial and economic integration calls for regional cooperation to tackle these challenges. As 50% of the trade in North America is in “intermediate goods” (those used in the production of finished goods),³⁸ the three countries literally build things together. The massive cross-border production chains and trade networks have positioned the region as one of the most competitive globally.³⁹ However, skills gaps and mismatches across the three North American countries will increasingly harm economic and industrial performance.

More collaboration on workforce development in the region is an opportunity to generate more jobs, improve the overall quality of life for the citizenry, and bolster the productive power of all three economies, strengthening the global competitiveness of the North American region. The continent’s value chains are only as strong as their weakest points. Successful collaboration on workforce issues may also spark other “competitiveness” improvements.

There is nothing inconsistent in having an “America first,” a “Mexico first” or a “Canada first” approach while maintaining a “North America first” approach to the international marketplace with cooperation on workforce development. Competition and collaboration can co-exist across North America.

Current National Workforce Development Agenda in Canada

Canada's skills agenda focuses on building a resilient workforce prepared for the future of work by a) investing in programs that support high-quality talent and the tools, skills and experiences needed to succeed; b) leveraging innovation programming to incent investments in skills development; and c) by promoting partnerships to address skill challenges.

Canada's direct investments in workforce development include scholarships and fellowships, research grants, wage subsidies, entrepreneurial support programs, and training benefits for mid-career workers. Examples of programs being leveraged to incent private sector investments in people, skills development and new jobs include the Innovation "Superclusters" Initiatives, Strategic Investment Fund, and the Industrial Technology Benefits Policy.

Canada explicitly recognizes in its policies the need for collaboration and communication among stakeholders from all sectors to address current and future workforce challenges. In 2018, the Government of Canada created six Economic Strategy Tables (Digital Industries, Agro-Food, Resources for the Future, Clean Technology, Health/Bio-sciences, Advanced Manufacturing) comprising of industry CEOs, to investigate growth challenges within their sectors.⁴⁰ The Future Skills Centre, Council and Office, launched in 2019 with a significant multi-year budget proposal, is a multi-stakeholder undertaking that will identify emerging skill demands; develop, test and evaluate new approaches to skills development; and share results and best practices across public and private and not-for-profit sectors. The aims include increasing Canadians' access to quality training by demonstrating what training works for whom and in what context.

Currently, there are approximately 400 trades designated for apprenticeship across Canada.⁴¹ To build a talent pipeline for the skilled trade, the Government of Canada has made a commitment to develop an Apprenticeship Strategy to remove barriers to entry and progression to accreditation for skilled trade workers. In the 2019 budget, Canada announced new measures including a campaign to consider training and work in skilled trades and to develop a new apprenticeship strategy. The budget proposals also include steps to expand opportunities for work-integrated learning opportunities under Canada's Student Work Placement Program.⁴²

To foster a culture of life-long learning, Canada's 2019 federal budget announced the creation of a personalized, portable training benefit to reduce barriers to adult upskilling.⁴³ The Canada Training Benefit will help mid-career workers access upskilling opportunities, secure income support during training, and offer job protection while on training leave. Canadian workforce development specialists are hopeful with all of these investments, but highlight the need to measure and examine results.⁴⁴

Current National Workforce Development Agenda in Mexico

In 2019, the Mexican President and the Secretary of Labor and Social Welfare started one of the largest apprenticeship/mentoring programs the world, called “Youth Building the Future.”⁴⁵ The program’s objective is to increase productivity levels and economic growth by increasing job and training opportunities for 2.3 million young Mexicans aged 18-29 who are not studying or employed.⁴⁶ This mentorship program aims to train young people for up to one year with relevant work skills and link them to the private, not-for-profit and public sectors. This initiative gives priority to applicants who live in marginalized areas, with high rates of violence and with a predominantly indigenous population.⁴⁷ Young people who join this program receive a monthly stipend of \$3,600 Mexican pesos (around \$190 USD), and health insurance during their participation in the program. At the end of the training/mentorship year, young people will receive a certificate that describes the training received and the skills developed during the mentorship program, followed up by their incorporation into the labor market. Program monitoring will be done through the National Employment Service.⁴⁸ Mexican officials stress that this program represents a significant boost in government investment as a percent of GDP.⁴⁹ They say they want to strengthen the skills elements in this program and expand that focus to secondary and tertiary education. In addition, a massive Mexican labor reform has recently been approved. Changes to existing workers and union rights should encourage the development of a collaborative system of upskilling and reskilling workers and, overall, increase the country’s competitiveness.⁵⁰ (Including in these reforms better programs to incorporate skilled migrants returning from the U.S. into Mexico’s workforce would also help strengthen Mexico’s economy.) Mexican officials underscore their conviction that thriving economic sectors and value chains remain key for job creation. Expert observers stress the need to see results, including the measured skills and competencies obtained, the development of widely recognized certificates and the onward employment record of those successfully finishing the mentorship/training year.

Current National Workforce Development Agenda in the United States

Workforce development is an announced priority for President Donald Trump’s administration, with the active involvement of his daughter, Ivanka Trump, and the Departments of Labor and Commerce. In July 2017, President Trump signed an executive order to expand Apprenticeships in America.⁵¹ This order aims to provide more affordable pathways to secure high-paying jobs by promoting apprenticeships and effective workforce development programs, as well as ease regulatory burden on such programs and reduce or eliminate taxpayer support for ineffective programs. In July 2018, Trump established the President’s National Council for the American Worker.⁵² This group is in charge of creating a national strategy to ensure that workers and students are prepared to work in today’s economy and develop recommendations for the President on policy and strategy related to workforce development. The scope of the Council’s mandate encompasses key issues such as skills, competencies and training.⁵³ The Council met for the first time in March of 2019 and has created four working groups to address promoting multiple pathways to careers, increasing data transparency, modernizing candidate recruitment and encouraging more employer-led training, respectively.⁵⁴ The groups presented their recommendations on September 18, 2019.^{54b} As part of the National Council for the American Worker, the Trump Administration is asking companies throughout the country to sign a “Pledge to America’s Workers.” Over 200 companies and associations across the country are committing to create new education and training opportunities over the next five years.⁵⁵ The U.S. Administration says it aims to facilitate the creation of at least 6.5 million training opportunities — including apprenticeships and work-based learning, continuing education, on-the-job training, and reskilling — for American workers from high-school age to near-retirement. Observers note the need to measure and analyze the results of this largely voluntary program.

Sub-National Successes

Across the region, subnational governments (states, provinces and cities) already illustrate the importance of public-private partnerships to achieve economic growth and workforce development.⁵⁶ Examples of successful workforce development initiatives across North America at the state, provincial and local levels are numerous.

However, there is a lack of formal workforce development forums specifically designated to allow subnational governments to share their workforce development initiatives, especially in a North American setting, though several organizations bring state and city officials in the U.S. together frequently where workforce development is on the agenda.

The successful innovations at sub-national levels underscore the importance of developing mechanisms to collaborate, communicate and share best practices on these issues below the national or federal level. Being closest to the challenges, the subnational governments often engage the most rigorously on the subject of workforce development. A vigorous sub-federal dialogue will be necessary to foster continuous innovation and improvement on the issue.

In the **United States**, each state, as well as many municipalities, has a Workforce Development Board, comprised of business leaders, elected officials, educational institutions, and other stakeholders. These boards serve to set regional strategic plans relating to workforce development, and to determine funding priorities.⁵⁷ The boards also facilitate the disbursement of federal funds from the Workforce Innovation and Opportunity Act (WIOA), which is meant to promote adult technical and vocational education.⁵⁸ Workforce Development Boards in the U.S. are at the forefront of implementing the country's workforce development agenda.

There are hundreds of local and regional workforce development boards across the United States which facilitate most of the actual workforce development programming and which initiate many successful efforts to meet local needs. These boards are familiar with the particularities of the local workforce, and when working with local industry partners, educational institutions, and municipal governments to prepare the area's workers, they have a good track record of success.

One such example occurred when Siemens announced that it would open manufacturing facilities in Charlotte, North Carolina. The local workforce

The successful innovations at sub-national levels underscore the importance of developing mechanisms to collaborate, communicate and share best practices on these issues below the national or federal level.

The bottom line is that all three North American economies need to develop, evolve and perfect such multi-stakeholder models.

development board learned which skills Siemens employees would require, and worked with local community colleges to train and administer the proper certifications. They also created an exclusive website for candidates interested in working at Siemens to apply.⁵⁹ Thus, when the Siemens facilities opened, there was a highly-qualified workforce prepared to begin manufacturing.

The workforce development board in the region around Dallas, Texas, has also demonstrated success with local partnerships to engender training programs with community colleges and high schools aimed at preparing workers to meet the needs of the region's aerospace industry. 70% of aerospace jobs in Texas are now located in the Dallas region.⁶⁰ In Eastern Connecticut, too, the workforce development board worked with Electric Boat and other manufacturers to develop the Eastern Connecticut Manufacturing Pipeline, which provides classroom and online training to workers through local community colleges to create an available manufacturing talent pool for the regional industry. In just three years, this program placed more than 1,000 qualified candidates in manufacturing jobs.⁶¹ In San Diego, California, Qualcomm worked with local workforce development boards to create a program which trains middle school students from diverse backgrounds in programming and robotics to lay the foundations for a highly-skilled local workforce.⁶²

The National Skills Coalition has surveyed activities in all fifty states and identified states which are taking leadership roles in four key areas: 1) Integrated Education Training (IET), which helps people with skills gaps in basic areas develop the necessary skills to gain middle-skill employment; 2) stackable credentials, which allows workers to earn high level industry-recognized credentials in steps, where each step is in itself an industry-recognized certification; 3) job-driven financial aid, which permits students to complete middle-skill training; and 4) alignment policies, which combine and integrate a variety of important policies to ensure employment pathways for low-income, low-skilled individuals.⁶³ As of 2017, the NSC found that nine states had implemented policies in all four of these areas: Arkansas, Colorado, Iowa, Kansas, Minnesota, Oregon, Texas, Virginia, and Washington.⁶⁴

In **Mexico**, the Canadian aerospace and transportation company, *Bombardier Inc.*, whose production network encompasses all three countries, collaborated with and invested in the *Universidad Aeronáutica en Querétaro (UNAQ)* to develop a qualified workforce training program to fulfill the company's labor market needs. The program trains students in structural assemblies and composite materials manufacturing with the initial goal that the students could work for Bombardier upon completion of the program.⁶⁵ This partner-

ship expanded to embrace other companies' needs and contributed to transforming the state of Queretaro into an aerospace hub, and helping Queretaro to become the state in Mexico with the highest rate of GDP growth.⁶⁶ The state is now home to 80 aerospace companies and 7 specialized education centers. It has more than 8,000 people employed in the aerospace sector.⁶⁷ There are other examples of state-level best practices in Mexico as well as in Canada.

Simply implementing these kinds of programs is not enough, however. The three North American countries must also work to ensure that the relevant public and key stakeholders are aware of the programs' existence and the benefits that participation would create for students, workers and industry alike. The governments (both national and subnational) must effectively communicate the imperative of workforce development to potential stakeholders and beneficiaries, as well as the existence of current programs from which employers and workers could benefit. Without this crucial step, the initiatives cannot have their desired effect of preparing the North American workforce for the future of work.

The bottom line is that all three North American economies need to develop, evolve and perfect such multi-stakeholder models. They also need to build in careful examination of results. Getting such steps right will help the three economies to succeed in the global competition and technological change ahead.⁶⁸

USMCA Opens a Window for Cooperation

The renegotiation of the North American Free Trade Agreement (NAFTA) resulted in the United States-Mexico-Canada Agreement (USMCA) signed on November 30, 2018, by U.S. President Donald Trump, then-Mexican President Enrique Peña Nieto and Canadian Prime Minister Justin Trudeau. The new agreement must be ratified by all three countries, but as of this writing, it has only been approved by Mexico. Even if NAFTA is not replaced by USMCA soon, however, the "facts on the ground" demand continent-wide cooperation.

Trade between the three countries under NAFTA increased from just over 300 billion USD in 1993 to more than 1.3 trillion USD in 2018; that is a jump of some 390 percent.⁶⁹ Under NAFTA, the private sector built regional production networks, covering automotive, petrochemical, aerospace and other manufactured goods.

The proportion of U.S. jobs supported by trade in North America has increased significantly since the implementation of the North American Free Trade Agreement (NAFTA). In 2019, a Trade Partnership Worldwide study examined the net impacts of trade of goods and services in North America on U.S. jobs. This study estimated that in 1993 trade supported only a net of 14.5 million U.S. jobs compared to 39 million jobs in 2017. Moreover, trade with NAFTA partners supports more than 12 million jobs in the United States.⁷⁰ Some seven and five million U.S. jobs depend on trade with Canada and Mexico respectively (see Figure 7). In the case of Mexico, that reflects a seven fold increase from an estimated 700,000 in 1993 to the estimated 4.9 million in 2017. Those numbers would likely be bigger if one includes jobs created by the \$471 billion of foreign direct investment from Canada and Mexico in the U.S.⁷¹

Figure 7. Top 10 States - Number of U.S. Jobs Supported by Trade with Mexico and Canada, 2017

Trade with Mexico: 4.9 million			Trade with Canada: 7.2 million		
No.	State	Net Number of U.S. Jobs (Thousands)	No.	State	Net Number of U.S. Jobs (Thousands)
1	California	+ 572.2	1	California	+ 898.5
2	Texas	+ 399.5	2	Texas	+ 549.4
3	New York	+ 325.5	3	New York	+ 475.9
4	Illinois	+ 198.0	4	Florida	+ 446.3
5	Pennsylvania	+ 195.7	5	Illinois	+ 293.7
6	Ohio	+ 170.9	6	Pennsylvania	+ 282.3
7	Georgia	+ 158.2	7	Ohio	+ 257.5
8	North Carolina	+ 150.6	8	Georgia	+ 229.2
9	New Jersey	+ 141.2	9	North Carolina	+ 225.8
10	Virginia	+ 135.3	10	Michigan	+ 209.7

Source: Trade Partnership Worldwide, “New Study: International Trade Supports Nearly 39 Million American Jobs,” 2019.



Workforce Development and the Border Regions

The U.S. and its neighbors also have much to gain from strengthening North American economic partnerships. For example, a 2018 “Bordernomics” study by the Perryman Group estimates that enhancing economic integration across the U.S.-Mexico Border would bring substantial benefits. For the U.S. Border States, the increase in employment and GDP could range from 700,000 to 1.4 million jobs, and from \$69 to \$140 billion dollars in added GDP, with the largest impact in the state of California. For the Mexican Border States, the “Bordernomics” study finds the increase in employment would range from 96,000 to 193,000 jobs and a GDP increase of \$4.8 to \$9.7 billion, with the largest impact in the state of Nuevo Leon, which has well-equipped universities and a tradition of academia-industry collaboration.⁷²

The immediate cross-border economies themselves are substantial. In 2017 alone, for example, the U.S.-Canada and U.S.-Mexico Border States’ GDP reached \$6.25 trillion and \$5.07 trillion, respectively. The GDPs of the Border States would constitute the 3rd-largest economy in the world,⁷³ after the U.S. and China with \$19.49 trillion and \$12.01 trillion respectively, surpassing Japan with \$4.87 trillion.⁷⁴ The three countries can benefit from focusing on improving the competitiveness and productivity of their Border States and co-production networks.

While the USMCA negotiations did not address workforce development directly, the chapter on Labor (Chapter 23) specifically calls for sharing of best practices and for developing cooperative activities on a range of the topics discussed in this paper including apprenticeships.⁷⁵ The Competitiveness Chapter (Chapter 26) outlines the parties’ shared interest in strengthening regional economic growth, competitiveness and prosperity for the North American region.⁷⁶

Chapter 26 calls for the establishment of a Committee on Competitiveness, which could encompass the multi-sector, multi-stakeholder dialogue on workforce development.⁷⁷ The Committee on Competitiveness will develop initiatives to incentivize production in North America, to facilitate trade and investment, and to respond to emerging markets and technologies. Each party will designate a contact point for the committee who will be responsible for coordinating with the corresponding government departments and agencies. The Competitiveness Committee will meet within one year after the three countries approve the agreement, and annually thereafter. However, there is nothing to prevent the committee from meeting more often or from designating specific areas for focused work under its auspices.

Workforce Development is a long-term effort and an issue of shared responsibility that requires a joint effort across national, state and local entities, and between governments, the private sector and academia. Success in the implementation of this agenda depends on the sustained involvement of many stakeholders: federal, state/provincial and local governments, companies and employers, educational institutions, unions, NGOs and civil society. The federal governments, however, should play a key role as facilitators of the agenda and play a lead in bringing stakeholders

from the three countries together for discussions under a trilateral umbrella.


Whether as part of implementing USMCA or separately, North America would benefit greatly from a public-private process where governments (at all levels), the private sector, unions, educational institutions and others could explore best practices on workforce development to better support preservation and creation of jobs during the technological changes and global competition ahead, while fostering people-centered, tech-enabled focus for the “future of work.” North American cooperation will create jobs, boost productivity, and strengthen the region’s competitiveness by addressing together our current and future skills shortages and mismatches as North America faces the Fourth Industrial Revolution.

II. Priorities for Action⁷⁸

To clarify challenges and action priorities on workforce development across the continent, we identified four clusters of issues: 1) apprenticeships and other types of work-based learning (WBL) and technical education, including internships, dual education and mid-career learning; 2) certifications and the host of issues surrounding them, including recognition and portability; 3) labor market data collection and transparency, including moving toward accepted norms for data collected and best practices for making that data widely available; and 4) best practices to approach/prepare for the “Fourth Industrial Revolution,” the expected onslaught of more new technologies, and massive workplace transformations, encompassed in “future of work” discussions. These are issues within each country as well as across the region.⁷⁹

Issue #1 Expand Apprenticeships and Other Types of Work-Based Learning (WBL) and Technical Education, Including Internships, Mentorships and Mid-Career Learning

Work-based or work-integrated learning programs encompass a wide range of models, with apprenticeships being a well-known but differentiated example. These programs can facilitate matching the demand and supply of skills and jobs. The mix of academic instruction and on-the-job learning equips individuals with relevant capabilities – *hard/technical* and *soft/employability* skills – to meet the current and future demands of the labor market, and provides businesses with the trained employees they need. These types of learning programs have positive impacts on the economy as these programs facilitate the transition from school to the labor market,⁸⁰ foster worker productivity, lead to higher wages, and can facilitate pursuit of higher education (including STEM) degrees by workers desiring to advance their careers.



Apprenticeship programs also address the skills gap because they immediately place workers in unfilled jobs, and the companies offering the apprenticeships can adjust the training to fit the current needs of the organization.⁸¹ Work-based learning provides an “on-ramp” to a career by immediately offering workers paying jobs and certifications that can help develop their marketable skills.⁸² Furthermore, the National Skills Coalition emphasizes the importance of pre-apprenticeship or pre-employment programs to provide foundational math and technical skills as well as career coaching to people who want to access apprenticeships. The NSC recommends that these programs be implemented to expand apprenticeship opportunities and education to traditionally underrepresented populations.⁸³ Postsecondary education can be enormously beneficial. The pursuit of short-term credentials at community and technical colleges in the United States is estimated to increase earnings by 30% or more compared to a high school diploma.⁸⁴

Apprenticeships and other WBL will need to evolve and adapt with the pace of technological change and workplace needs. The Organization for Economic Cooperation and Development (OECD) recommends that its member countries move away from front-loaded education systems to a model where skills are continuously updated during a working life to match changing job skill needs.⁸⁵

Despite the many advantages and benefits of work-based learning programs (WBL), they remain a second choice for many young people and parents in North America, as the NAM found in its survey in the U.S. Negative stereotypes persist regarding vocational education, which reduce the potential benefits of such programs and harm the economy.⁸⁶

There are, however, pathways through which young people can demonstrate career readiness to employers, such as ACT’s National Career Readiness Certificate. In association with the National Association of Manufacturers, ACT developed this portable credential which certifies that an individual has skills needed in the workplace.⁸⁷ Obtaining this credential allows young people to automatically earn some college credits, as well as helps them earn other industry credentials.

On-the-job training can be a robust tool to develop a qualified workforce at many skill levels that fulfills the changing skills needs in the workplace during the massive disruptions and transformations expected in the years ahead.⁸⁸ On-the-job training is beneficial for both employers and employees and can address both “reskilling” and “upskilling” needs. When employers invest in

their workers, it increases the probability of retaining them. In addition, they achieve higher levels of productivity and are better able to absorb new technologies to the benefit of the firm's bottom line.

The OECD reports that each year of postsecondary education that a worker receives leads to an increase in per capita income of 4 to 7%.⁸⁹ In the United States, over 36 million adults have foundational skills gaps (mostly in literacy or numeracy) and nearly two-thirds of that group are currently employed, suggesting that there is an underutilized group of workers who, if given the opportunity for more education or training, could be much more productive.⁹⁰

The World Economic Forum argues forcefully that a new virtuous cycle that includes both incorporating new technology and training employees to use it well should become the standard business model going forward, but serious questions remain to be addressed about how best to incent businesses to adopt such models.⁹¹

Current Federal Apprenticeship Programs

The three economies of North America have increased their investment in apprenticeships and other kinds of Career and Technical Education (CTE) in recent years.

In many **U.S. states**, CTE has become a policy priority. Michigan, Tennessee, Washington, Colorado, Nevada, Kentucky, and Wisconsin, among other states, have increased funding of CTE programs, including money to upgrade equipment and improve career counseling.⁹²

Labor Unions have historically been a major provider of apprenticeship and on-the-job training programs in the **United States**. The American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) lists registered apprenticeship programs, which the organization says provide on-the-job training under the guidance of professionals in the relevant industry.⁹³ According to the AFL-CIO, these training programs are funded through collectively-bargained contributions, and allow highly-skilled workers to learn on the job while earning a salary that can support a family. Furthermore, the labor unions promote Labor-Management Partnerships to help working people learn skills that are in demand. These training programs in the building and construction industries are estimated to contribute about \$1.5 billion to the U.S. economy yearly. Labor unions in the U.S. also offer highly-specialized programs, which allow workers to receive training while working. These union-based apprenticeship programs have historically been regulated by the Department of Labor, which was responsible for registering apprenticeship programs and ensuring that the individual programs met federal standards.

The United States has implemented the Work Opportunity Tax Credit (WOTC), which provides tax credits to companies hiring low-skilled workers

from certain groups. The National Skills Coalition recommends expanding this program to promote businesses' investments in work-based learning programs for their workers.⁹⁴

The current U.S. federal administration has called for the expansion of apprenticeships and vocational education as a national policy priority.⁹⁵ President Trump signaled his support for reaching five million apprenticeships by 2022,⁹⁶ and subsequently received a report on ways to promote apprenticeships.⁹⁷ The U.S. Department of Labor proposed an Industry-Recognized Apprenticeship Program on June 24, 2019.⁹⁸ As part of this initiative, the Trump administration and the Department of Labor proposed a new rule which allows apprenticeships to be registered and regulated by business associations, unions, and other private entities. The rule would allow the Department of Labor to certify these private organizations as Standards Recognition Entities (SREs), which would in turn be responsible for certifying and regulating the Industry-Recognized Apprenticeship Programs.⁹⁹ In conjunction with this program, the Department of Labor announced that it intends to devote \$183.8 million to expand apprenticeship programs implemented by university-industry partnerships. The Department has also allocated an additional \$100 million to develop more apprenticeship programs and close the skills gap.¹⁰⁰

Note: As of this writing, the tens of thousands of comments received on the proposed apprenticeship rule appeared to be largely from union members concerned about the quality of oversight that would be provided by the proposed new SREs, and who expressed their preference for union-run apprenticeship programs and continued oversight by the Labor Department. The final rule has yet to be issued, though with such negative comments it is possible that there will be modifications and/or delays in releasing it.

Mexico and Canada have also moved forward on the implementation and expansion of CTE. In 2013, Mexico's *Secretaría de Educación Pública (SEP)*, in partnership with the *Cámara México - Alemana de Comercio e Industria (CAMEXA)* and the *Confederación Patronal de la República Mexicana (COPARMEX)*, created the *Modelo Mexicano de Formación Dual (MMFD, Mexican Dual System of Vocational Education)*, which has expanded across the country. The Model follows a tripartite approach, in which governments, educational institutions, and industry have a key role to play.¹⁰¹ Another effort, the *Colegio Nacional de Educación Profesional Técnica (CONALEP, National College of Technical Professional Education)* is a federal institution that provides technical education across all states in Mexico, following the dual educational approach.¹⁰²

In **Canada**, the *Red Seal Program* is a long-standing federal-provincial-territorial partnership that develops common national standards, examinations, and certifications for an agreed set of trades.¹⁰³ The federal government, provinces and territories have been working in collaboration with industry to further harmonize apprenticeship training and align apprenticeship systems, as the provinces and territories are responsible for apprenticeship training and trade certification.¹⁰⁴ Another example of how technical education has proliferated in Canada is the emergence of a third pillar of post-secondary education, alongside universities and community colleges – polytechnics. Polytechnics offer industry-aligned technical and technological training, across a breadth of credentials, from four-year bachelor's degrees to apprenticeships in the skilled trades. Canadian polytechnics combine academic education with a broad range of experiential learning opportunities focused on the development of skills and application of technology, delivered via robust relationships with industry associations and employers of all sizes.¹⁰⁵

Private Sector Initiatives

A number of large companies and associations are leading the effort in North America. Walmart, for example, launched *Walmart Academies* in 2016, which now operates over 200 training academies across the U.S. where over 500,000 workers have been trained since the program's launch. The two-to-six weeks training program provides workers with advanced retail, technical and digital skills.¹⁰⁶

Amazon's *Career Choice Program* also provides employees with the opportunity to learn new skills and advance in their careers. The company pays 95% of the fees for their workers to get a certificate or diploma in qualified/in-demand careers, such as transportation, IT and computer science, mechanical and skilled trades, and healthcare. To incentivize the participation of workers, Amazon holds the training in classrooms at Amazon's facilities.¹⁰⁷ Amazon recently announced that it intends to spend an additional \$700 million to retrain one-third of its U.S. workforce to adapt to the increasing technological changes facing the industry. This upskilling and reskilling effort is expected to include 100,000 workers by 2025.¹⁰⁸ The "shelf life" of training is likely going to continue to shrink, making continual upskilling critical.

Siemens launched an extensive apprenticeship program in Charlotte, North Carolina. This program provides participants with an international industry certification, an associate's degree, and an apprenticeship completion certificate. The trainees graduate without debt and with a guaranteed job at Siemens earning \$55,000 per year. The company designed this on-the-job training program with community colleges in Charlotte, and has worked with other large companies and the Department of Labor to develop a model for other manufacturers interested in creating similar programs.¹⁰⁹

Furthermore, in the United States, business groups are playing a role in promoting technical education to ensure a supply of highly-skilled manufacturing workers. The National Association of Manufacturers (NAM) launched a program in 2019 called "Creators Wanted," which allocates \$10 million to altering the public's perceptions regarding technical education.¹¹⁰ A study launched by NAM found that only 27 percent of parents in the United States would encourage their children to pursue manufacturing as a career. The goal of the "Creators Wanted" program is to increase that number to 50 percent by 2025 by showing the importance of cutting-edge manufacturing to technical innovations. In changing the public's attitudes toward manufacturing, NAM hopes to narrow the skill gap by 600,000 workers by the end of 2025 and increase the number of students enrolling in technical and vocational schools by 25 percent.¹¹¹

Another business group, the Business Roundtable, introduced the Workforce Partnership Initiative in June of 2018. In this program, CEOs of major corporations partner with educational institutions and community leaders to augment essential workforce readiness skills, increase STEM skills among workers, boost the number of workers with specialized skills, and educate, train, and employ traditionally underrepresented populations.¹¹² This partnership has programs underway in ten regions. In August 2019, the Business Roundtable released a new Statement on the Purpose of a Corporation, signed by 181 CEOs, which commits companies to "supporting [employees] through training and education that help develop new skills for a rapidly changing world," among other pledges.¹¹³

Sadly, as the 2018 Accenture study highlights, most companies have not yet accepted the value of mid-career on the job training. Accenture argues persuasively that such programs are going to be more important than ever in the years ahead.¹¹⁴ The cost of upskilling and reskilling programs are often prohibitive for small and mid-sized businesses. Thus, the National Skills Coalition (NSC) argues that industry or sector partnerships with existing workforce stakeholders can allow these smaller organizations to reap more benefits from training programs.¹¹⁵ In fact, under the U.S. Workforce Innovation and Opportunity Act (WIOA), localities are required to create industry-sector partnerships which gather stakeholders from business, government, labor organizations, and education, to identify the needs of the local workforce and work to address

Despite this progress on recognizing the value of apprenticeships and on-the-job learning and training, much more needs to be done. North America can learn more from best practices and lessons from other countries, such as from apprenticeships systems in the UK, Germany, Switzerland and Australia, and from U.S., Mexican and Canadian states and provinces that have successful pilots or systems in place. Experts recommend that the development, implementation, evaluation and assessment of workforce development programs require agreement on a clear definition of the program goals, standards and a minimum set of criteria so that programs and credentials are comparable across each country and across the North American region, which can be especially important for specific industry sectors. That is not yet the case, despite the integration of continental production networks.

In North America, building from a broad agreement to promote work-based learning, the authors suggest the following elements should be agreed trilaterally:

1. A definition of modern apprenticeships, as well as definitions for other work-based learning systems, and a minimum set of criteria and quality standards of such programs, which will impact funding decisions.¹¹⁷
 - a. The agreement should leave enough flexibility to adapt to national, regional and local demands, while incorporating economic and technological changes and providing a sense of common professional skills attributes of graduates.
2. Broad guidelines in North America on assigning roles and responsibilities to governments, industry and intermediaries regarding the development, implementation and funding of apprenticeships, as well as other widely used models for work-based learning.
3. Building a tri-national Career and Technical Education (CTE) and apprenticeships taskforce to identify best practices in strategies to promote apprenticeships and other types of work-based learning programs (WBL). This taskforce should consider the range of WBL programs, including those tailored for secondary and for tertiary graduates.
4. A marketing strategy to increase public awareness of the benefits and advantages of work-based learning in order to change negative public misperceptions of such programs and reduce restricting stereotypes of vocational education and careers. Top-level officials must be engaged in the work to change public perceptions.
5. Building tri-national spaces to foster ongoing dialogue between stakeholders across the region in order to share best practices on work-based learning and training, and to strengthen public-private partnerships.

Professional
credentials
generally reduce
selection costs for
firms and lead to
higher wages and
quality of workers.

6. Further developing agreement on good ways to incentivize and support companies, including Small and Medium Enterprises, to develop training and learning programs for reskilling and up-skilling their workforces. Again, this effort should highlight the value and need of new work-based training models to keep up with the evolution of technology and job content in the years ahead. Creating industry-academia dialogue platforms within and across countries that are more than one-off events and that become part of the workforce ecosystem should be part of the agenda.

ISSUE #2 Address Key Issues Surrounding Credentials, Including Recognition and Portability, to Enhance Transparency

Professional credentials generally reduce selection costs for firms and lead to higher wages for a higher quality of workers. If widely recognized, credentials give businesses a clear sense of what skills a worker has or will have, and they facilitate mobility in the labor market. Enhanced mobility could well help alleviate the impact of job displacement taking place because of additional technological changes or of the kind of industrial shifts already experienced during this century. They can also improve employee retention by providing career development opportunities as credentials are accumulated.

The current fragmented system for credentials, among many U.S. states, for example, forms a barrier to mobility and portability when workers of many skills levels and vocations need to look for other opportunities elsewhere.¹¹⁸ Higher education systems and employment services are fragmented across the continent and too often disconnected from employer and industry needs, struggling to provide quality training in ways that respond to articulated needs of the labor market.

This is a major challenge across national borders, where lack of recognition of credentials of various types leaves skilled and well-educated individuals under-employed or working in less-skilled jobs.¹¹⁹ In addition, some employers are moving away from credential-based hiring to focus on competencies, but there are differing understandings of “competencies,” which can lead to perceived skills mismatches.

This is a very complex area for work, given the range of governmental jurisdictions and vastly different regional and sectorial differences. Yet, a number of efforts are underway. The Mexican National Competencies Framework¹²⁰ and the Canadian Red Seal Program¹²¹ are examples of national efforts to better coordinate and bring transparency to the credentials/competencies market. While several efforts to develop such a system in the U.S. exist, none has yet been widely accepted. In addition to challenges within each country, differences in education and training systems across the region


make it difficult to compare qualifications and assess skills of workers holding credentials from another North American country. Differing visa requirements add complexity.

It is vital, however, to work towards making credentials comparable, transferable and portable – more transparent – across sectors in order to support North American competitiveness against global competitors and to help meet skills gaps and mismatches. Part of this task is getting academic institutions, including accrediting organizations, and employers to validate and recognize education and experience from neighboring countries. The Pan-Canadian Framework for the Assessment and Recognition of Foreign Qualifications, for example, is a public commitment by provinces, territories and the Government of Canada to improve assessment and recognition of foreign qualifications so people are able to effectively use their skills in the Canadian labor market.¹²² These types of changes are needed as education is transformed from a largely front-loaded system to one in which skills are continuously updated during the working life to match changing skills needs, as the OECD promotes.¹²³

North America can learn from best practices of other countries/regions regarding credentialing systems. The European Union has developed a common language of competencies and skills by developing the European Skills/Competencies, Qualifications and Occupations Framework (ESCO), which facilitates comparability of qualifications between EU member states, encourages use and validation of credentials by the private sector and educational institutions, and ensures quality programs.¹²⁴

As a means to move forward on what will be a multi-year effort to enhance credentials transparency, the authors recommend the three North American countries (at federal and sub-national levels) work to build agreement upon the following elements:

1. A common language about credentials and competencies to facilitate understanding and transferability, as well as recognition, across the continent.
 - a. High quality credentials should be industry-defined and competency-based to ensure they meet the needs of the labor market, are accepted and used widely, and are comparable regionally.
2. Developing or strengthening national competency frameworks and aligning them to the tri-national common language of credentials and competencies.
 - a. A process to revise and update the frameworks periodically in order to meet evolving labor market needs. Promote the use of competency frameworks in



hiring processes. These frameworks could encompass innovations such as micro-credentials and digital badges and be aligned with innovation agendas.

- b. Fostering regional development through cluster-based initiatives and connecting them with the education sector to create virtuous ecosystems that strengthen the whole chain of value.
3. A set of guidelines to assess and validate informal learning and professional experience, and to identify skills associated with such experience. Share and emulate best practices within and across the three countries.

ISSUE #3 Improve Labor Market Data Collection and Transparency, Including Moving Towards Accepted Norms for Employment, Education and Skills-Related Data Collection and Best Practices for Making that Data Widely Available.

One of the biggest challenges is that neither public authorities nor the private sector and academia collect and share data on credentials, skills and workforce trends in ways that facilitate/improve the ability of students, workers and employers to make good decisions related to employment and career/hiring choices. Improved data collection can allow people to make better-informed career decisions and, if shared widely, can bring valuable transparency to the labor market.¹²⁵ Broader transparency and availability of key data would help optimize outcomes of workforce development initiatives and would make it easier to assess programs and replicate those that have worked well at the local or sub-federal levels.

More importantly, the speed of change in the economy increasingly requires the development of real-time “labor market information platforms” and databases of “in-demand” skills that are regularly updated. Technology has facilitated the collection of data and the creation of platforms to access it: it should be very possible to make this information available very rapidly.

In 2018, President Trump tasked his **Council for the American Worker** to “propose ways to increase access to available job data, including data on industries and geographic locations with the greatest numbers of open jobs and projected future opportunities, as well as the underlying skills required to fill open jobs, so that American students and workers can make the most informed decisions possible regarding their education, job selection, and career paths. The Council shall also propose strategies for how best to use existing data tools to support informed decision making for American students and workers.”¹²⁶ The U.S. Department of Labor already provides O*Net as a primary source of occupational information with a very substantial database of occupations freely available for those seeking jobs, training and skilled employees.¹²⁷

In 2018 the Government of **Canada** announced the creation of the “Education and Labour Market Longitudinal Platform” (ELMLP) and a “Labour Market Information Council” (LMIC). The ELMLP is a tool that is less about providing robust/granular Labor Market Information and more about finding information and trends related to individuals’ transitions from education to the labor market. However, the government is planning to make the digital platform available to the entire population and allow its use to monitor government programs to ensure they are achieving their objectives.¹²⁸ The LMIC is a non-for-profit groups established to provide timely, reliable and accessible labor market information in Canada.¹²⁹

In 2013, the Government of **Mexico** issued the National Digital Strategy, “*México Digital*,” as part of the National Development Plan 2013-2018. This strategy has guided government’s efforts towards five main objectives: 1) government transformation; 2) digital economy; 3) transformation of education; 4) universal, effective healthcare; and 5) civic innovation and citizen participation.¹³⁰ By 2017, Mexico’s sustained efforts in digital government and open government data were reflected in the country’s 5th ranking position in the OECD’s Open, Useful, Re-usable Data Index.¹³¹ According to the OECD, Mexico’s digital transformation of government has positioned itself as a global and regional leader.¹³²

Experience on regional data collection illustrates the advantages and benefits of tri-national cooperation on data collection and information platforms. In 2014, the federal governments of the three economies launched the North American Cooperation on Energy Information (NACEI) website, which compiles energy-related data, maps, and analyses from the three countries in English, French and Spanish. The initiative aims to create an institutional framework for sharing quality energy information and data, harmonize concepts and terminology to make it comparable across countries and the region, and make it publicly available for stakeholders.¹³³ Applying this model to skills, jobs, education and training across the continent could bring substantial benefits. We recognize, however, that it would be a complex process given the existing data collection and classification structures and systems. These include, the North American Industry Classification System (NAICS), Canada’s National Occupational System (NOC), the U.S. Standard Occupational Classification System (SOC), the U.S. O*Net system and Mexico’s CONOCER (Sistema Nacional de Competencias).¹³⁴ In addition, national statistical agencies will need to be key participants.

Furthermore, initiatives from the private sector include *Credential Engine*,¹³⁵ which is bringing transparency to the U.S. credentialing landscape through

Improved data collection can allow people to make better-informed career decisions and, if shared widely, can bring valuable transparency to the labor market.

Experts argue that the already rapid pace of change will increase and that the changes will produce massive job creation, massive job destruction and dramatic transformation of workplaces and work/life styles.

the use of open-source description schema, a centralizing registry of credential and competency information, and support of an open applications marketplace, and *LinkedIn Economic Graph*,¹³⁶ which collects data on workforce and employment trends based on their millions of users.

In a North American agenda, the authors suggest the following elements should be agreed upon trilaterally through a collaborative process among key actors:

1. A set of norms to collect real-time labor market data and information in a consistent and homogeneous way so it is comparable across countries and across the region.
 - a. The data collected could include a list of in-demand skills and competencies, longitudinal data to measure performance and the “Return on Investment” (ROI) of education and training programs and credentials, perhaps including information that addresses the development of *hard/technical* and *soft/employability* skills.
2. The development over time of a tri-national online platform (linked to national platforms) that uses open standards for linked data on the web that can serve as a hub of the real-time labor market data collected individually by the three countries and, ideally, as a hub of best practices from across the region, including in the private sector.
3. Guidelines to make the tri-national platform and data tools openly available to all stakeholders, while allowing space for the development of private sector initiatives. The goal would be that the vast majority of the population and isolated regions have access.

Issue #4 Identify Best Practices to Approach/Prepare for “The Fourth Industrial Revolution,” the Transformative Arrival of New Technologies and the Future of Work

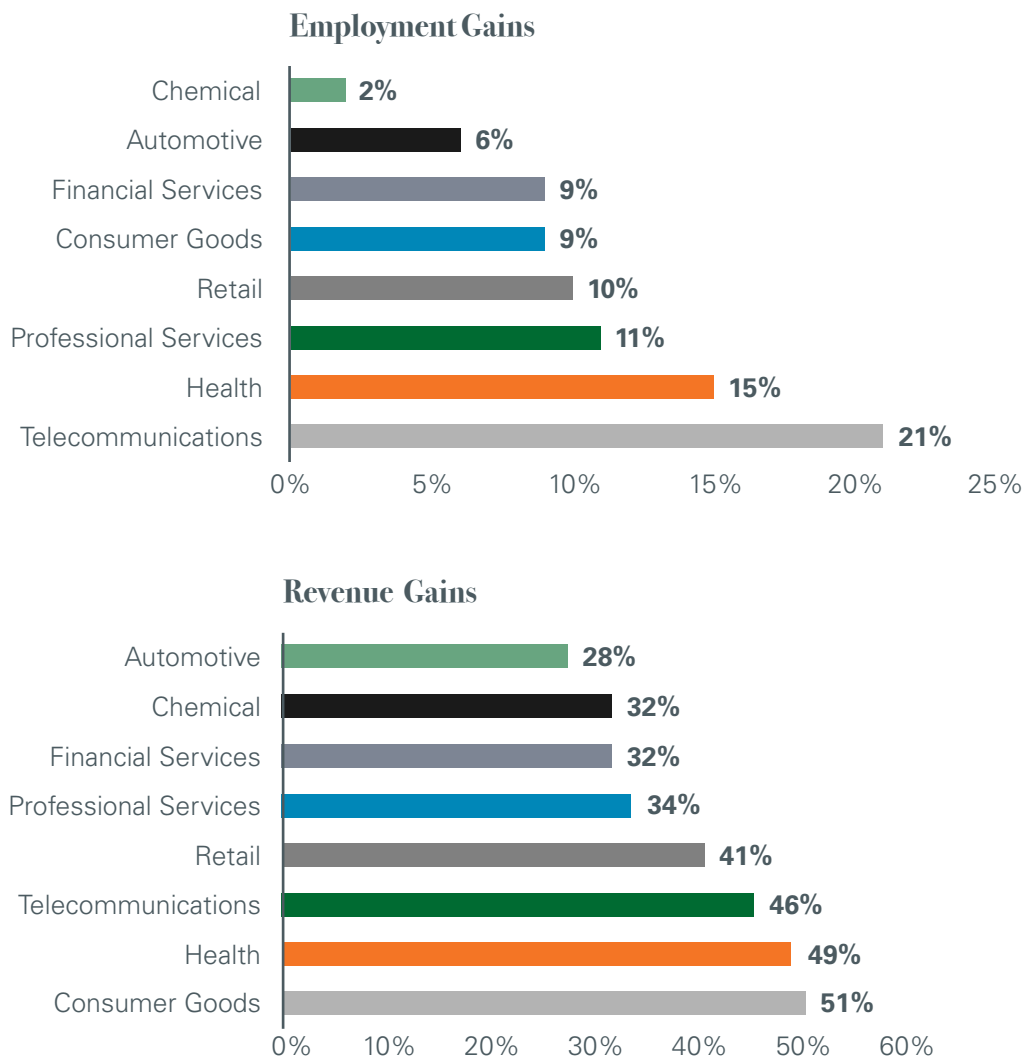
Experts argue that the already rapid pace of change will increase and that the changes will produce massive job creation, massive job destruction and dramatic transformation of workplaces and work/life styles.¹³⁷ The good news is that the new technology can allow businesses and individuals to achieve higher levels of productivity, creativity and economic (and potentially individual) growth. The bad news is that unless the transformations are guided well, societies and economies could face massive disruptions.

The OECD has developed policy recommendations for member state governments, including the array of policies and programs that can help those workers most susceptible to displacement in the transformations ahead, and its reports cite government programs in OECD countries aimed at addressing the challenges.¹³⁸ The broader discussion on this cluster of issues

suggests, however, that there is still a lack of understanding and agreement about which incentive structures will best lead the private sector to invest more substantially in training and skills development, versus relying on public sector actions to address disruption and future needs.

The World Economic Forum argues for the adoption of a new business model with full integration of investment in human capital as an integral element.¹³⁹ In this vein, according to Accenture, those companies that succeed in the integration of technology and human capital could increase profits by 38% and employment by 10% by 2022 (see Figures 8 and 9). Accenture finds that a

Figures 8 and 9. Projected Employment and Revenue Gains of Adopting New Technologies



Data Source: Ellyn Shook & Mark Knickrehm, “Reworking the Revolution,” Accenture Strategy, 2018.

...according to Accenture, those companies that succeed in the integration of technology and human capital could increase profits by 38% and employment by 10% by 2022...

very low percentage of CEOs interviewed plan to invest in training programs needed to re-tool their workers (although a high percentage of workers want to develop the skills required to work with machines). However, to assure potential gains, Accenture argues, employers should start investing more in job training, especially in programs that are agile and flexible as part of their business model.¹⁴⁰ Several of the specialists consulted for this report stress that quality training fosters precision to company standards, retention, loyalty, and impacts the bottom-line with reduced turnover.¹⁴¹

If the mix of new technology and skills development is managed well, the outcomes can be good for the quality of work and productivity. However, private and public sector leadership is needed to get the mix right and to develop new public-private partnerships and models in order to adapt successfully to the pace of change, or all three countries will face serious workforce crises.¹⁴²

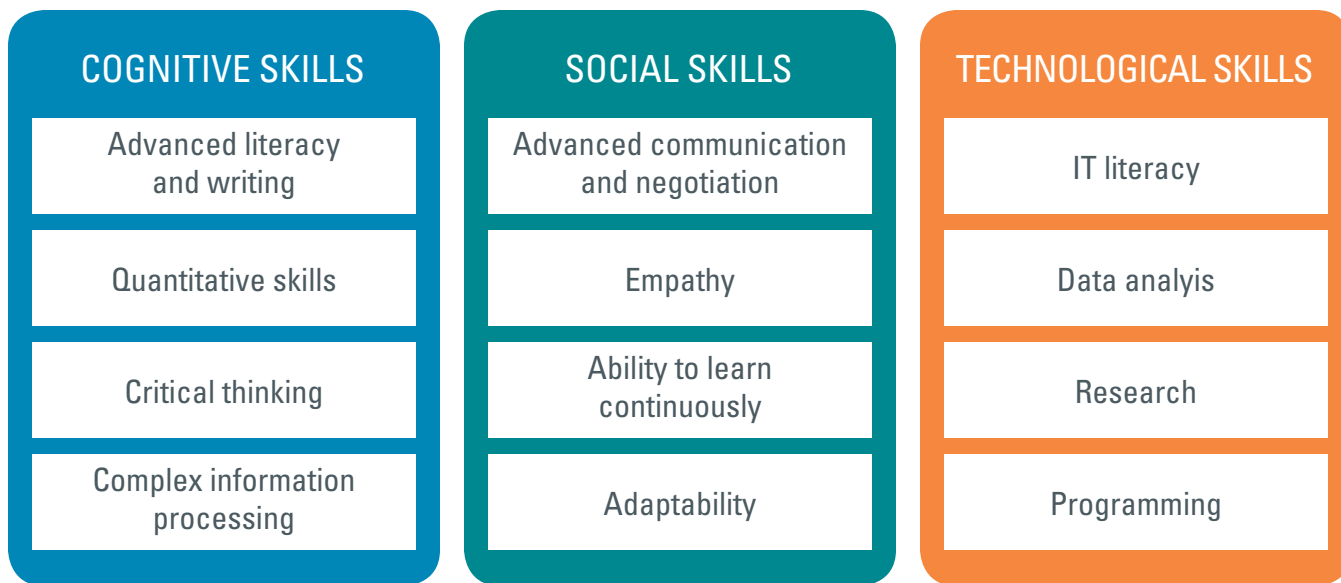
Public authorities, business leaders and educators need to be creative in order to provide workers with effective (and affordable) ways of learning new skills more quickly, such as short-term, agile learning, training and credentialing programs. In Canada, for example, sector-specific Economic Strategy Tables have emerged as a model for industry-government collaboration, focused on turning Canadian economic strengths into global advantages, with skills and talent as a signature priority.¹⁴³

The evolution needed goes beyond industry, however. All three countries need to modernize academic spaces and adapt the curricula to develop a 21st century educational system that meets the demands of the 21st century labor market. The OECD has underscored the need for educational improvements in all three countries but especially highlights the needs in Mexico.¹⁴⁴

McKinsey Global Institute argues that demand for higher cognitive skills, social skills and technological skills will increase by 2030 (see Figure 10).¹⁴⁵ The modernization of educational systems includes providing educators with relevant training, tools and skills, so they can also adapt their teaching and learning methods.

The competitiveness of the North American region relies on the ability of the three countries to manage the integration of people and technology in order to achieve higher levels of productivity and welfare. This will require national and cross-border policy decisions and investments. Success will depend on making the future of work succeed for each society, by giving employees the tools to better carry out their work. Additionally, North America's ability to compete successfully with other global production centers depends on the

Figure 10. Required Skills for Moving into Industry 4.0.



Source: McKinsey Global Institute, “Skill Shift Automation and the Future of the Workforce,” 2018.

ability of the United States, Canada and Mexico to collaborate and achieve higher levels of efficiency and production, enhancing regional integration.

In North America, the overall objective should be to identify, highlight and learn from the best mixes of public and private policies and collaborations that prepare the way for a high quality “future of work.” The authors suggest trilateral work to reach agreement in the following areas:

1. Identify and share best examples of steps and tools to incentivize companies to invest in reskilling and up-skilling of their workers, provide mid-career training and learning opportunities, and to develop short-term, agile training and learning programs to ease the transition for the Fourth Industrial Revolution. This should include exploration of local and sectorial approaches as well as national tools and policies.
2. Identify approaches and strategies to encourage companies to collaborate with educational institutions, unions, local/regional governments and other interested parties in order to better align curricula with the labor market needs, better connect graduates/students to the labor market, and foster the modernization of academic/educational spaces to meet evolving skills needs during individuals’ working lives.
 - a. Work to strengthen STEM education, as a strategic tool for creating a strong basis of skills that will allow the development of strategic technical workforce skills.
 - b. Recognize the social value of businesses that generate entry-level jobs at scale, and at multiple points along the skill curve.

The North American Workforce Development Agenda should be a collaborative, joint effort that includes North American governments, private sector, educational institutions, unions, and NGOs, among other stakeholders.

3. Build and maintain spaces that endure to share best practices on strengthening partnerships between the education and private sectors across the region to better link the priorities of the economic sector to those of the education sector, as well as to those of government.
4. Highlight best practices to support small and medium enterprises (SMEs) so they can better keep up with technological changes, innovation, talent creation and quality jobs.
5. Establish research and innovation projects in strategic economic areas through grants and scholarships. Invest in evaluation programs to assess future trends and to better prepare for evolving skills needs. Learn from existing efforts.¹⁴⁶

This process would include consideration of a range of pilot projects and encourage experimentation, with generous sharing of “lessons learned” and collaborative efforts. An overarching goal should be to forge broader understanding and agreement on the various mixes of public and private programs and partnerships that are producing quality and productive transitions to the “future of work” with good outcomes for the broad range of actors in all three economies and societies.

III. Implementing the North American Agenda

The North American Workforce Development Agenda should be a collaborative, joint effort that includes North American governments, private sector, educational institutions, unions, and NGOs, among other stakeholders. The Agenda should provide mechanisms to convene not only federal, but also subnational and local governments to collaborate and innovate on best practices in an ongoing manner. Many of the successes and innovative approaches are being forged at local levels. This creativity needs to be encouraged and best practices shared more widely and regularly across North America.

We recommend that the three national governments establish a senior level tri-lateral taskforce or steering group with substantial private sector and academic participation, which will guide an ongoing process. The taskforce would name public-private, federal-sub-federal working groups to develop specific proposals in the four areas described above. The taskforce should also ensure that new and existing programs are effectively and rigorously communicated to the public to maximize the opportunities for these initiatives to fully reach intended participants.

The task force and working groups could be linked formally to the ongoing work of USMCA as part of its competitiveness chapter,¹⁴⁷ or, if USMCA does not quickly enter into force, the process could operate in parallel with NAFTA as part of a broader competitiveness agenda, aimed at improving the continent’s ability to meet global competition.

The overarching goal is to forge agreements and understanding on ways to better support the preservation and creation of quality jobs during the technological changes and global competition ahead.

Workforce development is a long-term effort. North American collaboration should not be delayed any longer. The continent's leaders, stakeholders and experts in North America should move now to agree on and implement a robust North American Workforce Development Agenda.

The bottom line is that North America's workers and businesses will benefit greatly from pursuing an active dialogue and enhanced cooperation on workforce development to improve the economic, social and political well-being of the United States, Mexico and Canada.

The bottom line is that North America's workers and businesses will benefit greatly from pursuing an active dialogue and enhanced cooperation on workforce development to improve the economic, social and political well-being of the United States, Mexico, and Canada.



NORTH AMERICAN WORKFORCE DEVELOPMENT AGENDA

Elements that should be agreed among the three countries in a public-private multi-stakeholder process

ISSUE #1

Investing in
Apprenticeships
and Other Work-
based Learning
and Education

- 1 A definition of apprenticeships and other major types of work-based learning (WBL), and agree a minimum set of criteria and quality standards.
- 2 Agree on broad guidelines assigning roles and responsibilities to governments, industry and intermediaries regarding the development, implementation and funding of apprenticeships and other WBL.
- 3 Create a tri-national Career and Technical Education (CTE) and apprenticeship taskforce to identify best practices in strategies to promote apprenticeships and other types of WBL programs.
- 4 Agree on elements of a marketing strategy to increase public awareness of the benefits and advantages of work-based learning in order to change negative public misperceptions of such programs.
- 5 Build spaces to foster on-going dialogue between stakeholders across the region in order to share best practices on work-based learning and training, and to strengthen public-private partnerships.
- 6 Agree among the three countries on ways to incentivize and support companies, including SMEs, to develop training and learning programs for reskilling and up-skilling their workforces.

ISSUE #2

Addressing
Credentials and
the Host of Issues
Surrounding Them

- 1 Develop a common language (at federal, sub-national, continental levels) about credentials and competencies to facilitate understanding, high quality and transferability, as well as recognition.
- 2 Develop or strengthen national competency frameworks and align them to a shared tri-national common language of credentials and competencies.
- 3 Develop a set of guidelines to assess and validate informal learning and professional experience, and to identify skills associated to such experience. Share and emulate best practices across the continent.

ISSUE #3

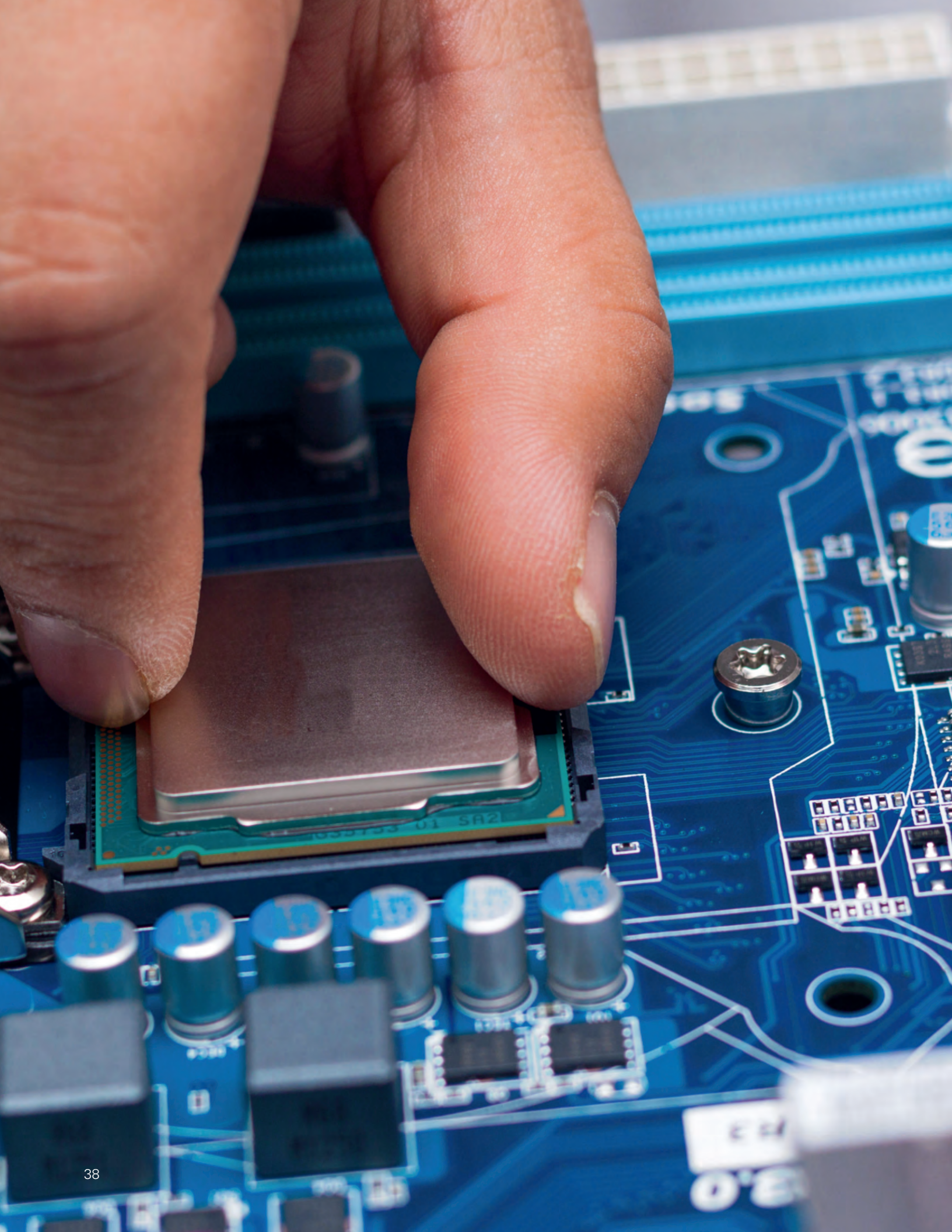
Improving Labor Market Data Collection and Transparency

- 1 Develop a set of norms to collect real-time labor market data and information in a consistent and homogeneous way so it is comparable across countries and across the region as well as easily accessible.
- 2 Develop a tri-national online platform (linked to national platforms) to serve as a hub for real-time labor market data collected by the three countries and for best practices from the public and private sectors.
- 3 Develop guidelines to make the tri-national platform and data tools openly available to all stakeholders, while allowing space for the development of private sector initiatives.

ISSUE #4

Learning Best Practices for “The Fourth Industrial Revolution” and the Future of Work

- 1 Identify successful examples of private and public collaboration, with emphasis on highlighting promising steps and tools to incentivize companies to invest in reskilling and up-skilling of their workers, to provide mid-career training and learning opportunities, and to develop agile training and learning programs to ease the transition and improve the quality of work transformations.
- 2 Agree on approaches and strategies to encourage companies to collaborate with educational institutions, unions and other interested parties to better align curricula with the evolving labor market needs, better connect graduates to the labor market, and foster the modernization of educational spaces.
- 3 Build tri-national spaces to share best practices on the implementation of Industry 4.0 and to strengthen partnerships to better link the priorities of the business and education sectors as well as government.
- 4 Identify best practices for SMEs to keep up with technological changes, innovation and talent creation.
- 5 Establish trilateral research and innovation projects in strategic economic areas through grants and scholarships. Invest in evaluation programs to assess future trends and prepare for future skills needs.



Acknowledgements

The policy recommendations in the report flow from several sources. The methodology we employed consisted of literature review and data collection on skills gaps, labor market needs, and best practices in workforce development, training and retraining. We consulted with experts on workforce development; interviewed government, business and labor representatives; and held roundtable discussions with experts from federal, state and local governments, manufacturers, unions, chambers of commerce, NGOs and academic institutions, from Canada, Mexico and the U.S.

We acknowledge the vital role these specialists and experts had in this process and express our explicit thanks for their contributions. The initial work to develop a [North American Workforce Development Agenda](#) was possible thanks to the financial support of RASSINI.¹⁴⁸

We would like to thank Duncan Wood, Director of the Woodrow Wilson Center's Mexico Institute, and Chris Wilson, Deputy Director of the Mexico Institute, for their guidance, support and valuable contributions to the development of this paper. We appreciate very much the support of Laura Dawson and the Wilson Center's Canada Institute.

We deeply appreciate the invaluable contributions of all the subject-matter experts and government, business and labor representatives from the U.S., Canada and Mexico, who generously shared their knowledge and experience with us. We would also like to recognize the outstanding support provided by the following individuals, who have also demonstrated outstanding commitment to workforce development issues in North America and in other parts of the world: Sergio Manuel Alcocer, Andrew A. Baird, Romina Bandura, Chris Bates, Scott Cheney, Paul Davidson, Ervin Dimeny, Alejandro Encinas Najera, Graham Flack, Jean Francois Larue, Marlene Grass, Christian Gomez, Laura Gonzalez Murphy, Daniel Komesch, Sheila Martin, Nobina Robinson, Benoit Tessier, Sarah Watts Rynard, and Deborah L. Williamson.

We also would like to thank Edward Alden, Dominic Barton, Anthony Carnevale, Anil B. Deolalika, Michael Fix, Jeff Griffiths, Rodrigo Guerra Botello, Sen Manley Casimir, Angelica Natera, Leo Reddy, Ron Painter, and Daniel F. Runde for their valuable comments and support. We look forward to working with them and others as we move forward develop and implement this agenda.

Earl Anthony Wayne is a Public Policy Fellow at the Woodrow Wilson Center and co-chair of the Advisory Board of its Mexico Institute as well as a Distinguished Diplomat in Residence at American University's School of International Service. He retired from the U.S. diplomatic service in 2015 with the rank of Career Ambassador and postings at Ambassador to Mexico and Assistant Secretary of State for Economic and Business Affairs, among many other postings. He holds graduate degrees from Harvard, Princeton and Stanford and did his undergraduate studies at UC Berkeley.

Grecia De La O Abarca served as a Research Assistant at the Woodrow Wilson Center's Mexico Institute. Grecia previously worked as Program Manager of two International Development and Social Change programs at the Middlebury Institute. Her work on quality education and labor force in Latin America has taken her to various international organizations including the Inter-American Development Bank, the Global Compact, the Institute for Latin American Concern, and the Peace Boat, where she has focused on issues related to women and youth. She holds a M.A. in International Policy and Development from the Middlebury Institute of International Studies, and a B.A. in Economics from Middlebury College.

Raquel Chuayffet Godinez is a Research Analyst at the International Monetary Fund's Office of Budget and Planning. Prior to this, she was a Research Assistant at the Woodrow Wilson Center's Mexico Institute, where she focused on workforce development issues and contributed to the Workforce Development Agenda for North America. Before the Wilson Center, she interned at the Embassy of Mexico in the United States and the Mexican Permanent Mission to the Organization of American States. Raquel also served as a short-term consultant at the World Bank, where she worked on youth empowerment and gender issues. Raquel has an M.A. in International Affairs and Development from the George Washington University's Elliott School of International Affairs and a B.S. in Economics from Universidad Iberoamericana in Mexico City. The views expressed on this chapter are made in Ms. Chuayffet's personal capacity and do not necessarily reflect the views or policies of the IMF, its Executive Board, or IMF management.

Emma Sarfity is a research assistant at the Woodrow Wilson Center's Mexico Institute. Prior to this, she worked at the Wilson Center's Argentina Project, as well as at the National Security Archive. She earned her B.A. in International Affairs from George Washington University, where she focused in security policy and Latin American studies, and is currently working toward her Master's in International Relations with a concentration in Latin American Studies at Johns Hopkins University's School of Advanced International Studies.

Endnotes

1. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
2. IMF, "World Economic Outlook Database," 2019, <https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/index.aspx>
3. World Bank, "Open Data," 2019, <https://data.worldbank.org/>
4. Joseph Parrilla, "How US states rely on the NAFTA supply chain," Brookings Institution, 30 March 2017, <https://www.brookings.edu/blog/the-avenue/2017/03/30/how-u-s-states-rely-on-the-nafta-supply-chain/>
5. Manpower Group, Talent Shortage Survey 2016/2017, <http://www.manpowergroup.com/talent-shortage-2016>
6. World Economic Forum, "The Future of Jobs Report 2018," 2018, http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
7. Melissa Johnson and Katie Spiker, "Broadening the Apprenticeship Pipeline," National Skills Coalition, August 2018, https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf.
8. Melissa Johnson and Katie Spiker, "Broadening the Apprenticeship Pipeline," National Skills Coalition, August 2018, https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf.
9. World Economic Forum, "Towards a Reskilling Revolution Industry-Led Action for the Future of Work," 2019, http://www3.weforum.org/docs/WEF_Towards_a_Reskilling_Revolution.pdf
10. Deloitte, "2018 Deloitte and The Manufacturing Institute skills gap and future of work study," 2018, <https://documents.deloitte.com/insights/2018DeloitteSkillsGapFoWManufacturing>
11. We were unable to locate similar information for Canada and Mexico, which points to the value of developing a shared or common process to collect and share such data as recommended in this report.
12. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
13. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
14. Susan Lund, James Manyika, and Michael Spence, "The Global Economy's Next Winners: What It Takes to Thrive in the Automation Age," Foreign Affairs, July/August 2019,
15. Susan Lund, James Manyika, and Michael Spence, "The Global Economy's Next Winners: What It Takes to Thrive in the Automation Age," Foreign Affairs, July/August 2019, <https://www.foreignaffairs.com/articles/world/2019-06-11/global-economys-next-winners>.
16. McKinsey Global Institute, "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation," 2017, <https://www.mckinsey.com/~media/McKinsey/Global%20Themes/Future%20of%20Organizations/What%20the%20future%20of%20work%20will%20mean%20for%20jobs%20skills%20and%20wages/MGI-Jobs-Lost-Jobs-Gained-Report-December-6-2017.ashx>
17. Elynn Shook & Mark Knickrehm, "Reworking the Revolution," Accenture Strategy, 2018, <https://www.accenture.com/us-en/company-reworking-the-revolution-future-workforce>
18. OECD, "Skills Outlook 2019 – How do the United States compare?," 2019, <https://www.oecd.org/unitedstates/Skills-Outlook-UnitedStates-EN.pdf>

- 17b. According to a new survey conducted by Pearson, workers in China and India are far more likely than North American workers to be upskilled or reskilled. The survey found that 56% of Chinese respondents and 36% of Indian respondents were enrolled in professional certification programs, whereas only 28% of U.S. workers and 19% of Canadian workers were enrolled. Similarly, Chinese and Indian workers received training from their employers (57% and 48%, respectively) when compared to the U.S. (41%) and Canada (33%).
Pearson, "The Global Learner Survey," September 2019, <https://www.pearson.com/corporate/news/global-learner-survey.html>
19. OECD, "Skills Outlook 2019 – How does Canada compare?," 2019, <https://www.oecd.org/canada/Skills-Outlook-Canada-EN.pdf>
20. OECD, "Skills Strategy 2019 – Mexico," 2019, <http://www.oecd.org/mexico/Skills-Strategy-Mexico-EN.pdf>
21. The World Economic Forum, "The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution," 2016, http://www3.weforum.org/docs/WEF_FOJ_Executive_Summary_Jobs.pdf
Burning Glass, "Beyond Point and Click: The Expanding Demand for Coding Skills," 2016, http://burning-glass.com/wp-content/uploads/Beyond_Point_Click_final.pdf
Ana Bruce-Lockhart, "Are you ready for the jobs revolution?," The World Economic Forum, 2016, <https://www.weforum.org/agenda/2016/09/jobs-of-future-are-you-ready>
22. World Economic Forum, "The Future of Jobs Report 2018," 2018, http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
23. For example see: <https://innovation.umd.edu/>
24. World Economic Forum, "The Future of Jobs Report 2018," 2018, http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
25. Marcus Noland and Soyoung Han, "Automation, Labor Market Disruption, and Trade Policy," Peterson Institute for International Economics, July 25, 2019. https://www.piie.com/blogs/trade-and-investment-policy-watch/automation-labor-market-disruption-and-trade-policy#.XUL_ieVSQyc.email
26. David Autor, et. al., "Import Competition and the Great U.S. Employment Sag of the 2000s," The National Bureau of Economic Research, 2014, <http://www.nber.org/papers/w20395>
- 26b. The IMF's October 2019 World Economic Outlook found that job displacement was not driven by global trade, but rather by technology shocks, which "raise unemployment in regions that are more vulnerable to automation, with more exposed lagging regions particularly hurt."
International Monetary Fund, *World Economic Outlook*, "Closer Together or Further Apart? Subnational Regional Disparities and Adjustment in Advanced Economies," October 1, 2019, <https://www.imf.org/en/Publications/WEO/Issues/2019/10/01/world-economic-outlook-october-2019>.
27. Michael Hicks & Srikant Devaraj, "The Myth and the Reality of Manufacturing in America," Ball State University, 2017, <https://conexus.cberdata.org/files/MfgReality.pdf>

28. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
29. Darrell M. West, "Brookings survey finds 58% see manufacturing as vital to US economy, but only 17% are very confident in its future," Brookings Institution, July 9, 2019, <https://www.brookings.edu/blog/techtank/2019/07/09/brookings-survey-finds-58-percent-see-manufacturing-as-vital-to-u-s-economy-but-only-17-percent-are-very-confident-in-its-future/>.
30. U.S. Department of Labor, "Trade Act Programs," 2019, <https://www.dol.gov/general/topic/training/tradeact>
31. Brookings, "Countering the geographical impacts of automation: Computers, AI, and place disparities," 2019, <https://www.brookings.edu/research/countering-the-geographical-impacts-of-automation-computers-ai-and-place-disparities/>
32. National Bureau of Economic Research, "Automation and New Tasks: How Technology Displaces and Reinstates Labor," 2019, <https://www.nber.org/papers/w25684.pdf>
33. National Skills Coalition, "Poll Finds Overwhelming Support for More Funding for Skills Training," February 2019, <https://www.nationalskillscoalition.org/news/press-releases/body/Poll-Finds-Overwhelming-Support-for-More-Funding-for-Skills-Training.pdf>.
34. National Skills Coalition, "Skills for Good Jobs Agenda 2019."
35. A study by the Lumina Foundation and Accenture found, for example, that Cigna's Education Reimbursement Program earned a 129% return on investment, and workers who participated earned an estimated 43% more within 3 years.
36. Based on OECD measures, total public spending on labor market programs include training, employment incentives, sheltered and supported employment and rehabilitation, direct job creation, start-up incentives, out-of-work income, maintenance and support, and early retirement; OECD Stat, "Public Expenditure as a Percentage of GDP," 2019, <https://stats.oecd.org/Index.aspx?QueryId=8540>
37. The Economist, "The Automation Readiness Index: Who is ready for the coming wave of automation," 2018, <https://www.automationreadiness.eiu.com/static/download/PDF.pdf>
38. Brookings Institution, "How US states rely on the NAFTA supply chain," 2017, <https://www.brookings.edu/blog/the-avenue/2017/03/30/how-u-s-states-rely-on-the-nafta-supply-chain/>
39. The Bush Institute, North America Competitiveness Scorecard, <http://www.bushcenter.org/scorecard/>
40. Economic Strategy Tables, <https://www.ic.gc.ca/eic/site/098.nsf/eng/00027.html>
41. Government of Canada. "Hiring and training apprentices," 2018, <https://www.canada.ca/en/employment-social-development/services/apprentices/hire-train.html> and Red Seal Trades in Canada http://www.red-seal.ca/trades/tr.1d.2s_c.1n.1d.1-eng.html
42. Government of Canada, "Budget 2019: Chapter 1 – Investing in the Middle Class," 2019, <https://www.budget.gc.ca/2019/docs/plan/chap-01-en.html>
43. Government of Canada, "The Canada Training Benefit," 2019, <https://www.budget.gc.ca/2019/docs/themes/good-jobs-de-bons-emplois-en.html>
44. Canada's 2019 federal budget has also introduced substantial investments and initiatives aimed at addressing current and future workforce challenges, including: 1) The creation of the Canada Training Benefit to help Canadians with the cost of training fees (\$1.7 billion over five years and \$586.5 million per year ongoing); 2) the expansion of the Student Work Placement Program to provide students with access to work-integrated learning opportunities in all

disciplines (\$631.2 million over five years); 3) the development of partnerships with innovative businesses to create more work-integrated learning opportunities (\$150.0 million over four years); 4) support for the Business/Higher Education Roundtable (\$17 million over three years) as it forges partnerships for work-integrated learning opportunities; 5) the expansion of the Canada Service Corps youth service program (\$314.8 million over five years, with \$83.8 million per year ongoing); 6) the development of an outbound student mobility program, on a pilot basis, to help Canadian post-secondary students gain the skills needed to succeed in a global economy (part of an investment in international education - \$147.9 million over five years, starting in 2019-20 and \$8.0 million per year ongoing); 7) the development of an Apprenticeship Strategy and investments in organizations such as Skills Canada, focused on promoting skilled trades and technologies. See more: <https://www.budget.gc.ca/2019/docs/plan/budget-2019-en.pdf>

45. Programa Jóvenes Construyendo el Futuro. Government of Mexico, "Jovenes Construyendo Futuro," 2019, <https://jovenesconstruyendoelfuturo.stps.gob.mx/>
46. ADN Politico, "Las claves y todo lo que tienes que saber sobre Jóvenes Construyendo el Futuro," 10 January 2019, <https://adnpolitico.com/mexico/2019/01/10/las-claves-y-todo-lo-que-tienes-que-saber-sobre-jovenes-construyendo-el-futuro>
47. Secretary of Labor and Social Protection, "Abre Jóvenes Construyendo el Futuro etapa de inscripción," <https://www.gob.mx/stps/prensa/abre-jovenes-construyendo-el-futuro-etapa-de-inscripcion?idiom=es>
48. For 2019, Government spending on social programs represents about the 0.02% of the Mexican GDP; El Economista, "Ofrecen 3,857 millones de pesos en programas sociales," 19 January 2019, <https://www.eleconomista.com.mx/politica/Ofrecen-3857-millones-de-pesos-en-programas-sociales-20190122-0151.html>; INEGI, "Producto Interno Bruto," 2019, <https://www.inegi.org.mx/temas/pib/>
49. Ariadna Ortega, "8 claves para entender la reforma laboral aprobada en la Cámara de Diputados," 12 April 2019, <https://adnpolitico.com/congreso/2019/04/12/8-claves-para-entender-la-reforma-laboral-aprobada-en-la-camara-de-diputados>; Canal del Congreso, "Diputados avalan Reforma Laboral, en lo general y en lo particular," 11 April 2019, https://www.canaldelcongreso.gob.mx/noticias/11910/Diputados_avalan_Reforma_Laboral%2C_en_lo_general_y_en_lo_particular
50. The White House, "Presidential Executive Order Expanding Apprenticeships in America," 15 June 2017, <https://www.whitehouse.gov/presidential-actions/3245/>
51. The White House, "Executive Order Establishing the President's National Council for the American Worker," 19 July 2018, <https://www.whitehouse.gov/presidential-actions/executive-order-establishing-presidents-national-council-american-worker/>
52. The White House, "Executive Order Establishing the President's National Council for the American Worker," 19 July 2018, <https://www.whitehouse.gov/presidential-actions/executive-order-establishing-presidents-national-council-american-worker/>
53. The Department of Commerce, "Remarks by U.S. Commerce Secretary Wilbur L. Ross at the American Workforce Policy Advisory Board with Ivanka Trump in Charlotte, North Carolina," <https://www.commerce.gov/news/speeches/2019/06/remarks-us-commerce-secretary-wilbur-l-ross-american-workforce-policy>.
54. The White House, "Pledge to America's Workers," 2019, <https://www.whitehouse.gov/pledge-to-americas-workers/>

- 54b. The recommendations given include a variety of proposals for developing an advertising campaign, increasing data transparency, modernizing recruitment and training practices, and measuring and encouraging employer-led training investments. U.S. Department of Commerce, 2019, <https://www.commerce.gov/americanworker/american-workforce-policy-advisory-board>.
55. Edward Alden & Laura Taylor-Kale, "The Work Ahead," Council of Foreign Relations, 2018
56. Department of Labor Career One Stop, "What are Workforce Development Boards?" <https://www.careeronestop.org/BusinessCenter/TrainAndRetain/FundingEmployeeTraining/what-is-a-WDB.aspx>.
57. The National Association of Workforce Boards, "Workforce Innovation and Opportunity Act Resources," https://www.nawb.org/wioa_resources.asp.
58. The United States Conference of Mayors Workforce Development Council, "Siemens Hiring Aided by Charlotte Workforce Board."
59. Dallas-Fort Worth Aerospace Consortium, "North Texas Aerospace and Aviation Talent Pipeline Study," 2018.
60. Chamber of Commerce of Eastern Connecticut, "Growing a Dynamic Workforce," <https://chamberect.com/ewib/>.
61. Chris Jennewien, "City Leverages Qualcomm Model for Tech Workforce Development," *Times of San Diego*, March 2016, <https://timesofsandiego.com/politics/2016/03/01/city-leverages-qualcomm-model-for-tech-workforce-development/>.
62. National Skills Coalition, "Skills Equity Policies in the States," January 2017, <https://www.nationalskillscoalition.org/resources/publications/file/Scan-Summary-Final.pdf>.
63. National Skills Coalition, "Skills Equity Policies in the States," January 2017, <https://www.nationalskillscoalition.org/resources/publications/file/Scan-Summary-Final.pdf>.
64. UNAQ, "Entrenamiento para el trabajo," <https://www.unaq.edu.mx/oferta-educativa/entrenamiento-para-el-trabajo/>.
65. The Offshore Group, "Queretaro's Manufacturing Workforce," 2016, <https://go.offshoregroup.com/hubfs/Ebooks/Manufacturing%20in%20Queretaro%20Ebook.pdf?t=1496957684322>
66. "Aerospace Industry in Queretaro," Aerospace Meetings Queretaro, <http://mexico.bciaero-space.com/en/aerospace-industry-in-queretaro.html>.
67. Some argue that more systemic policy changes are needed, e.g. see <https://www.niskanen-center.org/the-free-market-welfare-state-preserving-dynamism-in-a-volatile-world/>
68. Francisco Sandoval, "US- Mexico Trade Relationship under NAFTA: Modernization and Opportunities," <https://naftamexico.net/naftaworks/presentations/US-MXTradeRelationshipAUG2018.pdf>, Plate 8 August 2018; Holly K. Sonneland, "Chart: NAFTA by the Numbers in 2017," 1 March 2018, <https://www.as-coa.org/articles/chart-nafta-numbers-2017>
69. Trade Partnership Worldwide, "New Study: International Trade Supports Nearly 39 Million American Jobs," 18 March 2019, <https://www.businessroundtable.org/new-study-international-trade-supports-nearly-39-million-american-jobs>
70. Office of the United States Trade Representative, "Mexico," 2018, <https://ustr.gov/countries-regions/americas/mexico>; Office of the United States Trade Representative, "Canada," 2018, <https://ustr.gov/countries-regions/americas/Canada>; of course, a more thorough analysis of the jobs impact would look at job quality (e.g. type and income levels) and the diversity of sub-regional employment impacts, which is beyond the scope of this report.

71. The Perryman Group, "Bordereconomics: Defining Economic Opportunities, Potential, and Challenges Confronting the US – Mexico Border Region and Strategies for Enhanced Prosperity," 2018, <https://www.perrymangroup.com/wp-content/uploads/Perryman-Bordereconomics-Exec-Summary-2-7-2018.pdf>
72. Mexico Institute's calculations based on the US Bureau of Economic Analysis, 2018 and INEGI, 2018
73. International Monetary Fund, "GDP, Current prices," 2019, <https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD>
74. https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/23_Labor.pdf
75. USMCA, "Competitiveness – USMCA Chapter 26," 2019, <https://usmca.com/competitiveness-usmca-chapter-26/>
76. USMCA, "Competitiveness – USMCA Chapter 26," 2019, <https://usmca.com/competitiveness-usmca-chapter-26/>
77. The Independent Task Force report by the Council on Foreign Relations titled *The Work Ahead: Machines, Skills and U.S. Leadership in the Twenty-First Century*, is an excellent source for analysis and ideas on the broad range of challenges and policy options related to the future of work and workforce development. See <https://www.cfr.org/report/the-work-ahead/>
78. We do not address important issues regarding funding for programs and relevant tax policies, for example, some which can be discussed as "best practices" but which will largely be explored in national, state and local level decisions.
79. Edward Alden & Laura Taylor-Kale, "The Work Ahead," Council of Foreign Relations, 2018
80. Melissa Johnson and Katie Spiker, "Broadening the Apprenticeship Pipeline," *National Skills Coalition*, August 2018, https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf
81. Melissa Johnson and Katie Spiker, "Broadening the Apprenticeship Pipeline," *National Skills Coalition*, August 2018, https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf
82. Melissa Johnson and Katie Spiker, "Broadening the Apprenticeship Pipeline," *National Skills Coalition*, August 2018, https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf
83. National Skills Coalition, "Skills for Good Jobs Agenda 2019."
84. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
85. Kelly Field, "Why are women still choosing the lowest paying jobs," *The Atlantic*, 2018, <https://www.theatlantic.com/education/archive/2018/01/why-are-women-still-choosing-the-lowest-paying-jobs/551414/>
86. ACT, "The National Career Readiness Certificate," <http://www.act.org/content/act/en/products-and-services/workkeys-for-educators/nrcr.html>.
87. Edward Alden & Laura Taylor-Kale, "The Work Ahead," Council of Foreign Relations, 2018
88. OECD, "The Well-Being of Nations: The Role of Human and Social Capital," 2001, <http://www.oecd.org/site/worldforum/33703702.pdf>.
89. Amanda Bergson-Shilcock, "Better Together: How Adult Education/CTE Collaborations Benefit Workers and Businesses," *National Skills Coalition*, January 2019, <https://www.nationalskillscoalition.org/resources/publications/file/NSC-EL-PASO-Dec2018-Online-FIN.pdf>.

90. World Economic Forum, "The Future of Jobs Report 2018," 2018, http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
91. Advance CTE, "State Policies Impacting CTE: 2017 Year in Review," 2017, <https://careertech.org/resource/2017-state-policies-impacting-cte>
92. AFL-CIO, "Careers and Apprenticeships," <https://aflcio.org/about-us/careers-and-apprenticeships>.
93. National Skills Coalition, "Opportunity Knocks: How expanding the Work Opportunity Tax Credit could grow businesses, help low-skill workers, and close the skills gap," November 2017.
94. Presidential Executive Order Expanding Apprenticeships in America, 2017, <https://www.whitehouse.gov/presidential-actions/3245/>
95. National Skills Coalition, "Getting to Five Million Apprenticeships," April 2017.
96. Secretary of Labor, "Task Force on Apprenticeship Expansion," 18 May 2018, <https://www.dol.gov/apprenticeship/docs/task-force-apprenticeship-expansion-report.pdf>
97. Jack Smith, "Trump Apprenticeship Program: Some Answers, Many questions," 18 December 2018, <https://news.bloomberglaw.com/daily-labor-report/trump-apprenticeship-program-some-answers-many-questions-3>
98. Federal Register, "Apprenticeship Programs, Labor Standards for Registration, Amendment of Regulations," <https://www.federalregister.gov/documents/2019/06/25/2019-13076/apprenticeship-programs-labor-standards-for-registration-amendment-of-regulations>.
99. United States Department of Labor, "U.S. Department of Labor Makes Major Announcements on Apprenticeship Expansion," June 24, 2019, <https://www.dol.gov/newsroom/releases/eta/eta20190624>
100. Subsecretaría de Educación Media Superior, "Modelo Mexicano de Formación Dual," http://www.sems.gob.mx/es_mx/sems/modelo_mexicano_formacion_dual
101. Government of Mexico, Colegio Nacional de Educación Profesional Técnica, <https://www.gob.mx/conalep/que-hacemos>
102. Red Seal Program, "Harmonization," 2017, <http://www.red-seal.ca/initiatives/h.1rm.4n.3z.1t.3.4n-eng.html>
103. Government of Canada, "Apprenticeship Grants," <https://www.canada.ca/en/employment-social-development/services/apprentices/grants.html>
104. Polytechnics Canada, <http://www.polytechnicscanada.ca/polytechnic-advantage/what-polytechnic>; professionals in field note that in Canada, as in the U.S., public community colleges, private career colleges, union training centers and individual companies are key participants in apprenticeship work.
105. The Walmart Academy, <https://blog.walmart.com/opportunity/20170417/what-is-a-walmart-academy-how-theyre-building-confidence-and-careers>
106. Amazon Career Choice, <https://www.amazoncareerchoice.com/home>
107. Chip Cutter, "Amazon to Retrain a Third of its U.S. Workforce," *Wall Street Journal*, July 11, 2019. <https://www.wsj.com/articles/amazon-to-retrain-a-third-of-its-u-s-workforce-11562841120?mod=d-jemalertNEWS>.
108. Siemens, "Apprenticeships: a model that works," <https://new.siemens.com/us/en/company/sustainability/business-to-society/developing-jobs-and-skills.html>.

109. James Hohmann, "NAM launches a \$10 million campaign ahead of 2020 to make manufacturing jobs more appealing," *The Washington Post*, July 9, 2019. https://www.washingtonpost.com/news/powerpost/paloma/daily-202/2019/07/09/daily-202-nam-launches-a-10-million-campaign-ahead-of-2020-to-make-manufacturing-jobs-more-appealing/5d2376c61ad2e552a21d52f2/?utm_term=.3533d4d017ac
110. Michael Short, "NAM to Mark 125th Anniversary with \$10 Million 2020 Campaign," National Association of Manufacturers, July 9, 2019. <https://www.nam.org/nam-to-mark-125th-anniversary-with-10-million-2020-campaign-5439/>
111. Business Roundtable, "Expanding Skills and Employment Pathways through Innovative Partnerships," <https://www.businessroundtable.org/wpi>.
112. Business Roundtable, "Business Roundtable Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans.'" August 19, 2019, <https://www.business-roundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans>.
113. Elyn Shook & Mark Knickrehm, "Reworking the Revolution," Accenture Strategy, 2018
114. Katie Spiker, "Partnering Up: How Industry Partnerships Can Bring Work-Based Learning to Scale," *National Skills Coalition*, <https://www.nationalskillscoalition.org/resources/publications/file/Partnering-Up-Brief-FIN-LOW-RES.pdf>.
115. Katie Spiker, "Partnering Up: How Industry Partnerships Can Bring Work-Based Learning to Scale," *National Skills Coalition*, <https://www.nationalskillscoalition.org/resources/publications/file/Partnering-Up-Brief-FIN-LOW-RES.pdf>.
116. Institute for WorkPlace Skills & Innovation America, "It's time: Using Modern Apprenticeship to Reskill America," 2019, <https://www.iwsiamerica.org/itstime/>; Urban Institute, "Center on Labor, Human Services and Population," 2019, <https://www.urban.org/policy-centers/center-labor-human-services-and-population/projects/competency-based-occupational-frameworks-registered-apprenticeships>
117. Edward Alden & Laura Taylor-Kale, "The Work Ahead," Council of Foreign Relations, 2018
118. Jeanne Batalova, Michael Fix and James D. Bachmeier, "Untapped Talent: The Costs of Brain Waste among Highly Skilled Immigrants in the United States, 2016, <https://www.migrationpolicy.org/research/untapped-talent-costs-brain-waste-among-highly-skilled-immigrants-united-states>
119. CONOCER: Sistema Nacional de Competencias, http://conocer.gob.mx/acciones_programas/sistema-nacional-competencias/
120. Red Seal Program, <http://www.red-seal.ca/about/pr.4gr.1m-eng.html>
121. Government of Canada, "A Pan-Canadian Framework for the Assessment and Recognition of Foreign Qualifications," <https://www.canada.ca/en/employment-social-development/programs/foreign-credential-recognition/funding-framework.html#h2.3>
122. OECD, "OECD Employment Outlook 2019: The Future of Work," 2019.
123. European Qualifications Framework, https://ec.europa.eu/ploteus/search/site?f%5B0%5D=im_field_entity_type%3A97
124. Edward Alden & Laura Taylor-Kale, "The Work Ahead," Council of Foreign Relations, 2018
125. The White House, "Executive Order Establishing the President's National Council for the American Worker," 19 July 2018, <https://www.whitehouse.gov/presidential-actions/execu->

[tive-order-establishing-presidents-national-council-american-worker/](#)

126. ONet Resource Center, 2019, <https://www.onetcenter.org/overview.html#starting-points>
127. Labour Market Information Council, "Main Results: LMI Interactive Dashboard", 2018, <https://lmic-cimt.ca/lmi-interactive-dashboard/>
128. LMIC General site: <https://lmic-cimt.ca/>; also now a data dashboard: <https://lmic-cimt.ca/lmi-interactive-dashboard/>
129. Government of Mexico, "National Digital Strategy", November 2013, <https://www.gob.mx/mexicodigital>
130. OECD, "Digital Government in Mexico", 2018, <https://www.oecd.org/gov/digital-government/digital-government-mexico-2018-policy-brief.pdf>
131. OECD, "Open Government Data in Mexico", 2018, <http://www.oecd.org/gov/digital-government/open-data-mexico-executive-summary-2018.pdf>; OECD, "Digital Government Toolkit", 2014, <https://www.oecd.org/gov/mexico-digital-strategy.pdf>
132. North American Cooperation on Energy Information NACEI, <http://www.nacei.org/#/overview>
133. CONOCER: Sistema Nacional de Competencias, http://conocer.gob.mx/acciones_programas/sistema-nacional-competencias/
134. Credential Engine, <https://www.credentialengine.org/about>
135. LinkedIn Economic Graph, <https://economicgraph.linkedin.com/>
136. McKinsey Global Institute, "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation", 2017
137. OECD, "Skills Strategy 2019", 2019, <http://www.oecd.org/skills/oecd-skills-strategy-2019-9789264313835-en.htm>
138. World Economic Forum, "The Future of Jobs Report 2018", 2018, <https://www.weforum.org/reports/the-future-of-jobs-report-2018>
139. Elyn Shook & Mark Knickrehm, "Reworking the Revolution", Accenture Strategy, 2018
140. Elyn Shook & Mark Knickrehm, "Reworking the Revolution", Accenture Strategy, 2018
141. McKinsey Global Institute, "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation", 2017
142. Economic Strategy Tables <https://www.ic.gc.ca/eic/site/098.nsf/eng/home>
143. OECD, "Education Policy Outlook Mexico", 2018, <https://www.oecd.org/education/Education-Policy-Outlook-Country-Profile-Mexico-2018.pdf>
144. McKinsey Global Institute, "Skills Shift Automation and the Future of the Workforce", 2018, <https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>
145. For example, the Canadian Occupation Projection System <http://professions.edsc.gc.ca/sppc-cops/w.2lc.4m.2@-eng.jsp>
146. Sens. Cruz, Gardner, Daines Pen Letter to President Trump Urging Bold New Approach to Modernizing NAFTA, March 21, 2018, https://www.cruz.senate.gov/?p=press_release&id=3685
147. Learn more about Rassini's work at <https://www.rassini.com/>



One Woodrow Wilson Plaza
1300 Pennsylvania Avenue, N.W.
Washington, DC 20004-3027

 www.wilsoncenter.org/mexico

 mexico@wilsoncenter.org

 facebook.com/MexicoInstitute

 [@MexicoInstitute](https://twitter.com/MexicoInstitute)

 202.691.4325