ACCELERATOR 2.0
A Call to Action

Canadian Supply Chain Sector Council
June 2018

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Canadian Supply Chain Sector Council | **Conseil canadien sectoriel de la chaîne d'approvisionnement**

www.supplychaincanada.org

The Province of Alberta is working in partnership with the Government of Canada to provide employment support programs and services.

Canada   Alberta

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Table of Contents

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Partners

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The CLC led the project in 2011/2012 that resulted in The Accelerator Project: A Call to Action report. Furthering workforce productivity and innovation remains a priority for Alberta's supply chain.

Research Team

Thanks to the GO Productivity team that conducted the research and prepared this report:

Ken Chapman – Executive in Residence
Jeff Griffiths – Executive in Residence
Kevin Nguyen – Office Research Coordinator

For information on GO Productivity, visit https://goproductivity.ca/our-services.

Project Advisory Committee

Corrie Banks, Cando Rail Services
Steve Banks, Triskele Logistics
Brad Beerling. Meridian Manufacturing Inc.
Chris Beringer, Economic Development & Trade, Government of Alberta
Pat Campbell, Canadian Supply Chain Sector Council
Siobhan Chinnery, Schenker of Canada
Heather Dewald, CERT Logistics, Metro Supply Chain Group
Jeremy Garton, Southern Alberta Institute of Technology
Deborah Gee, Sysco Foods
Marius Ghinescu, Raytheon Canada
Dan Giurescu, TerraHub
Jeff Griffiths, GO Productivity
Moses Idah, Supply Chain Management Association Alberta
Tracey Johnson, Workforce Initiatives Branch, Ministry of Labour, Government of Alberta
Miko Kutac, Brewers Distributor Ltd.
Masoud Sahebkar, Teck Resources
Marjerie Salisse, TransCanada PipeLines Limited
Sarah Stata, Sherritt International
Denean Tomlin, Western Canadian Defence Industries Association

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Executive Summary

Globalization and transformative technologies are causing changes in our economy that impact industries, employers and workers. Recently, the G7 Ministers of Employment and Innovation met on the theme of *Preparing for Jobs of the Future* to discuss these changes and to determine how governments can help people adapt and thrive in the new world of work. Discussions emphasized the fundamental shifts in our economy and labour market that are being brought on by innovation and new technologies.[1]

Demographics and disruptive technologies will also have an impact across supply chain functions in key economic sectors of the Alberta economy, including energy, construction, manufacturing, transportation and utilities, and business and commercial services. In 2016, these sectors accounted for almost 52% of Alberta's $314.9 billion provincial GDP.[2]

Accelerator 2.0 reports on the opportunities and challenges facing employers and their workforce in Alberta's supply chain sector. The differing nature of supply chain operations in different parts of the province necessitates specific, regionally focused strategies to inform workforce development planning in each region.

Representatives from provincial, regional, municipal and aboriginal governments, chambers of commerce, economic and business development agencies, community futures organizations, labour unions, private-sector employers and educational institutions in seven regions of Alberta were brought together to discuss the adoption of transformative technologies and their effects on the supply chain workforce. The goal of these roundtables was to identify proactive measures to support business growth and workforce development in each region through adaptation and transition to the jobs of the future.

This report provides details on the research methodology and the outcomes of these roundtables. It also delivers a Call to Action for the supply chain sector in Alberta and for each of the seven participating regions.

The Call to Action strategies discuss what policymakers, employers, educational institutions and people can do to improve competitiveness, stimulate innovation and remove barriers to labour force participation so that all Albertans can benefit from transformative technologies and the evolving skill requirements that are impacting the labour market.

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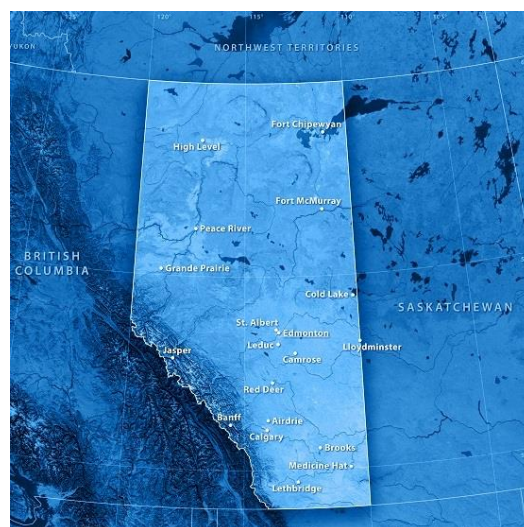
[1] G7 Public Engagement Paper. (2018). *Preparing for Jobs of the Future*. Retrieved from https://g7.gc.ca/en/g7-presidency/themes/preparing-jobs-future/g7-public-engagement-paper/.

[2] Government of Alberta. (2017). *Alberta Economic Quick Facts*. Retrieved from https://www.albertacanada.com/files/albertacanada/SP-EH_AlbertaEconomicQuickFacts.pdf.

Overview

Supply chains affect people and businesses across Canada every day. Walmart, Amazon, McDonald's Toyota, Apple, Sobeys and Proctor and Gamble are global super-brands, largely on the strength of their supply chains and the influence of the function in the C-suite. At Apple and General Motors, the CEOs themselves are former supply chain leaders.

Importance of Supply Chain to the Alberta Economy

Supply chains are at the cornerstone of the Alberta economy. Almost every enterprise in the province relies on supply chains to stay in business, whether to bring in the materials and supplies they require to produce goods and services, or to get these goods and services to their customers. Supply chain professionals track the movement of materials and finished products throughout the value chain and are able to avert delays, bottlenecks and other disruptions, maximizing the economic benefits to their employers, Alberta and the overall economy.

Industry Fast Facts

- The transportation and warehousing sector contributes $11.2 billion annually to the Alberta economy and employs nearly 130,000 people.
- About 90% of all Alberta exports are shipped to the United States. Alberta's second-largest market, Asia-Pacific, accounts for 5.5% of its exports.
- Pipelines are the major transportation mode for Alberta products, with commodity prices producing export values up to $83 billion and representing approximately two-thirds of all shipments.
- More than $1.5 billion worth of goods was shipped out of Alberta's airports to destinations around the world in 2014.
- Together, CN Rail and CP Rail operate approximately 9,600 route kilometres in Alberta and transport in excess of 60 million tonnes into and out of the province each year.

Source: www.albertacanada.com/business/industries/lma-about-the-industry.aspx

Supply chains are vital to the agriculture, aerospace/defence, construction, energy, manufacturing, natural resources and retail/wholesale trades – literally every industry sector in the province. In a land-locked province like Alberta, effective and efficient supply chains to move goods to and from foreign markets are critical to success.

In Alberta, the supply chain system is a crucial part of the province's economy, accounting for $20 billion in gross domestic product (6.6% of Alberta's total GDP) and enabling $62.6 billion in manufacturing shipments.[3]

The supply chain sector represents a significant opportunity to the economic prospects of the province. Studies indicate that improvements to supply chains create significant spin-off impacts across the entire economy. With each new high-tech job that a sub-national region can create, many other jobs are created, possibly as many as five[4].

The annual labour force growth rate is expected to be around 1.1% from 2017 to 2021, resulting in a

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[3] Canadian Supply Chain Sector Council. (2018, January). *Digital Supply Chain*, p 5. Retrieved from http://www.supplychaincanada.org/assets/u/The-Digital-Supply-Chain-Final-Report.pdf.

[4] Moretti, E. (2012), *The New Geography of Jobs*, Houghton Mifflin Harcourt Publishing, Boston.

projected total of 118,994 full-time workers employed directly within the Alberta supply chain by 2021. The supply chain is expected to grow in every province, with British Columbia and Alberta expected to lead growth. In this environment, attracting the right people with the right skills not only to replace retiring older workers but also to fill new positions will be a challenge.[5]

As a result of the increasing technological requirements in the sector, it is expected that the jobs created will require a different mix of skills and knowledge and comparatively higher levels of skill. Even entry-level positions will require greater skills than has traditionally been the case.

Labour Force Demand/Supply Issues

The impacts of the digital transformation on jobs are being widely discussed. Recent OECD estimates suggest that digital technologies will put about 14% of workers at a high risk that their tasks will be automated over the next 15 years, and another 30% will face major changes in the tasks required in their job and, consequently, the skills they would need to do their job. In short about half of all workers will confront the need to significantly adapt to the new workplace.[6]

These estimates of the risk of automation need to be put into perspective, however. For example, there is a difference between what can be automated from a technical point of view (which is what the OECD estimates aim to assess) and what will actually be automated in the real world. Data on the diffusion of specific technologies shows that while most firms have access to broadband networks, most have not yet adapted more advanced digital technologies, such as big data, which implies that diffusion is only occurring slowly.[7] This position is consistent with the results of our *Digital Supply Chain: Creating Skills for the Future* research and the comments from roundtable attendees.

What is more certain is that the digital transformation will involve significant structural changes particularly among business models as they adopt data-driven innovation strategies as well as a large re-allocation of labour. Most jobs will be transformed in some way, others will be displaced – as elevator and phone operators have been displaced in the past – and new ones will be created. The types of jobs that are being created are not the same as those that are disappearing and the workers affected by job loss in declining activities may not be those benefitting from the new job opportunities emerging in expanding areas. Many of the new jobs that will be created will use (and complement) digital technologies, as this will lead to more complex tasks.

Structural shifts will require workers, businesses, labour organizations and others to prepare for this new world of work, rather than to look for ways to stop or reverse these trends. Despite all the uncertainty about the depth and speed of change, clinging to the status-quo is not an option; rather a people-centred "adaption agenda" needs to be formulated so that all individuals may benefit from a

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[5] Canadian Supply Chain Sector Council. (2017). *Supply Chain Sector Facts and Figures*. Retrieved from: http://www.supplychaincanada.org/assets/u/Sector-FactsandFigures-English.pdf.

[6] OECD (2016), "Automation and independent work in a Digital Economy", *OECD Policy Briefs on the Future of Work*

[7] OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation, OECD Publishing, Paris, http://dx.doi.org/10.1787/97892642668821-en*

positive, forward-looking plan that does not leave anybody behind. By doing so, people, firms, regions and Alberta will benefit.

A Reskilling Revolution

Technology is changing the way supply chains operate. While this has always been the case, the pace of change we are undergoing today is unprecedented. . A wide-ranging digital transformation is affecting all economic sectors, characterised by almost universal connectivity and ubiquitous computing, and drawing on the generation and utilisation of vast amounts of data. The impact that these technologies will have (and are having) on supply chains is broad and profound, with the potential to completely change business models or create new models that allow greater value delivery to customers and clients.

In the past, changes happened over longer periods of time and it was often prudent for businesses to adopt a "wait and see" approach in the face of new technologies, particularly when multiple technologies were competing for market share. It was also often prudent to wait for a "winner" to emerge, rather than taking the risk of investing early in a technology that might ultimately fail.

This is no longer the case. Studies by the McKinsey Global Institute have concluded that the "first mover advantage" for these transformative technologies is so profound that late adopters may find that the game has left them behind and that they will be unable to catch up competitively. "Wait and see" is not a viable strategy when technology is changing as rapidly as is currently the case.[8]

Clearly then, organizations with the ability to adopt and exploit these technologies will have a marked advantage over those who do not – and the largest gains will accrue to those who adopt early and adapt continually.

Digital transformation is not just about the technology, but even more about the essential 'complementary investments' that employers need to make into skills, organisational change, process innovation, new systems and new business models.[9]

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[8] Willmott, P., LaBerge, L., &Schwartz, D. (2017, March 27). *Facing up to digital disruption: Reinventing the core with bold business strategy*. McKenzie & Company. Retrieved from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/facing-up-to-digital-disruption-reinventing-the-core-with-bold-business-strategy.

[9] Haskel, J. and S. Westlake (@017), *Capitalism without Capital" The Rise of the Intangible Economy*, Princeton University Press, Princeton, New Jersey.

In the face of these changes, reskilling and upskilling workers will be a significant factor. According to another McKinsey Global Institute study:

> In terms of magnitude, it's akin to coping with the large-scale shift from agricultural work to manufacturing that occurred in the early 20th century in North America and Europe and more recently in China. But in terms of who must find new jobs, we are moving into uncharted territory. Those earlier workforce transformations took place over many decades, allowing older workers to retire and new entrants to the workforce to transition to the growing industries. But the speed of change today is potentially faster. The task confronting every economy, particularly advanced economies, will likely be to retrain and redeploy tens of millions of midcareer, middle-age workers. As the MGI report notes, "there are few precedents in which societies have successfully retrained such large numbers of people."[10, 11]

The World Economic Forum (WEF) stated in its January 2018 report, *Reskilling Revolution*, that it is possible to adapt, upskill and reskill a large portion of the existing workforce in the face of technological change – but the window to do so is rapidly closing.[12]

The WEF report notes three significant conclusions:

1. **For individuals**, understanding and embracing the need for continuous learning and reskilling is vital to their continued economic success.

2. **For employers**, hiring people who already have the skills and knowledge needed won't be sufficient. Retraining and upskilling existing workers to exploit new technology will be critical, and despite uncertainty around the exact skills required, it should be a "no regret" action that will have benefits that outweigh any costs.[13]

3. **For governments**, promoting and facilitating continuous reskilling and lifelong learning is critical to maintaining an inclusive and viable labour force and a strong economy.[14]

But upgrading technological skills alone is not enough. In its third annual survey of supply chain organizations, Deloitte LLP concluded:

> …we find the (industry) leaders enjoying the highest levels of performance in their supply chains relying more on certain leading talent practices… they have taken a holistic approach to management that recognizes their companies' investments in enabling technologies and

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[10] Illanes, P., Lund, S., Mourshed, M., Rutherford, S., & Tyreman, M. (2018, January). *Retraining and Reskilling Workers in the Age of Automation*. McKinsey & Company.

[11] Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R., & Sanghvi, S. (2017, November). *Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills and Wages*. McKinsey & Company.

[12] World Economic Forum. (2018, January). *Towards a reskilling revolution: a future of jobs for all*. Retrieved from http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf.

[13] World Economic Forum. (2018, January*). Eight Futures of Work: Scenarios and Their Implications*. Retrieved from http://www3.weforum.org/docs/WEF_FOW_Eight_Futures.pdf.

[14] Voss, Eckhart. (2009). *Organising Transitions in Response to Restructuring: Study on instruments and schemes of job and professional transition and re-conversion at national, sectoral or regional level in the EU, Final Report*. European Commission.

advanced supply chain management concepts must be matched by advances in talent management capabilities.[15]

In its March 2018 report, *Humans Wanted*, RBC notes that technological change is creating a need for a range of advanced skills and knowledge in science, technology, engineering and mathematics (the so-called STEM subjects) but it is also making certain foundation skills – critical thinking, co-ordination (working together/collaboration), social perceptiveness, active listening and complex problem solving – increasingly important. The report noted that these foundation (or "soft") skills will be a requirement for virtually all jobs in the future. The RBC report also noted the following:

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

- Canadian employers are generally not prepared, through hiring, training or retraining, to recruit and develop the skills and knowledge needed to make their organizations more competitive in a digital economy.[16]

According to the March 2018 background report for the Canadian G7 Innovation Ministers' Meeting entitles *Transformative Technologies and Jobs of the Future*, "Skills provide an important safeguard against the risk of automation. Fewer than 5% of workers with a tertiary degree are at risk of losing their job due to automation compared to 40% of workers with a lower secondary degree. To thrive in the digital era, all workers will need to be equipped with a wide set of skills, encompassing cognitive as well as non-cognitive and social skills (notably information and communication technology [ICT] skills; science, technology, engineering and mathematics [STEM] skills; and self-organisation skills)."

Even though cloud computing has increased the availability and affordability of computing resources, only 22% of enterprises with 10 to 49 employees used cloud computing services in 2016, compared with almost 47% of firms with over 250 employees.[17] With Alberta's preponderance of smaller organizations still reeling from the oil price shock of the last few years, coordinated multi-stakeholder approaches will be required.

Clearly, with the important role played by supply chains in the overall health of the economy, there is a critical need to act quickly to address the emerging skills issues.

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[15] Deloitte LLP. (2015). *Supply Chain Talent of the Future*. p 8. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Process-and-Operations/gx-operations-supply-chain-talent-of-the-future-042815.pdf.

[16] RBC. (2018, March). *Humans Wanted*. p 3.

[17] OECD (2016), *OECD Regional Outlook 2016: Productive Regions for inclusive Societies*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264260245-en

Project Background: A Continuing Partnership

The Accelerator Project
A SUPPLY CHAIN HUMAN RESOURCES STRATEGY
Furthering workforce productivity and innovation along the Asia Pacific Gateway and Corridor

A Calgary Logistics Council project in partnership with
Canadian Supply Chain Sector Council and
Asia Pacific Gateway Skills Table
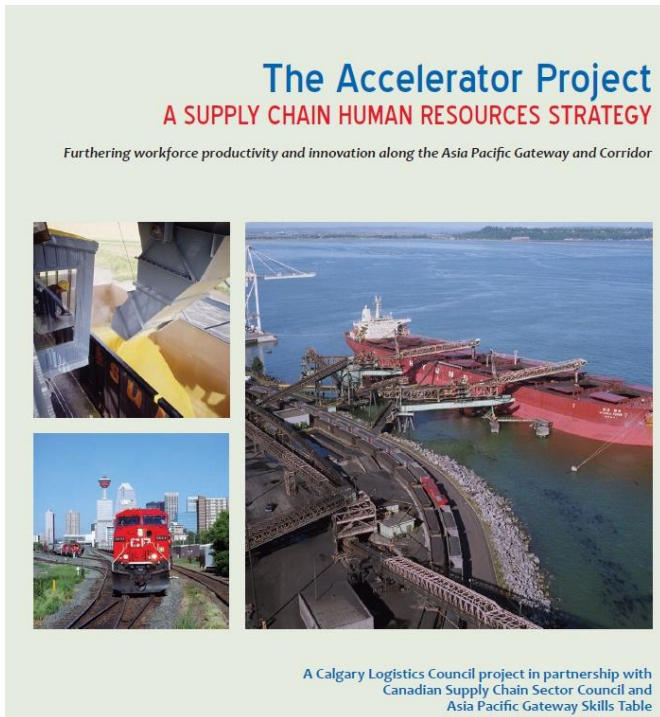
In 2011 and 2012, the Canadian Supply Chain Sector Council (CSCSC) partnered with the Calgary Logistics Council to produce *Accelerator: A Call to Action.* This report provides recommendations for workforce development in the sector. The major driver for the *Accelerator* initiative was the emergence of the Asia-Pacific Gateway and Corridor as a significant factor impacting supply chains in Alberta.

The circumstances outlined in the original *Accelerator* report – an aging workforce and subsequent age-related attrition, as well as increasing foreign competition and an increasing need to fuel domestic economic growth through exports – are still valid today. However, as noted above, the supply chain sector is changing at an ever-increasing pace as a result of the adoption of a number of transformative technologies that are fundamentally altering the industry. One consequence of this technological change is the need for greater levels of skill in many jobs. This challenge is multi-dimensional and involves:

- *Reskilling existing workers* for new jobs as technology renders some current jobs obsolete
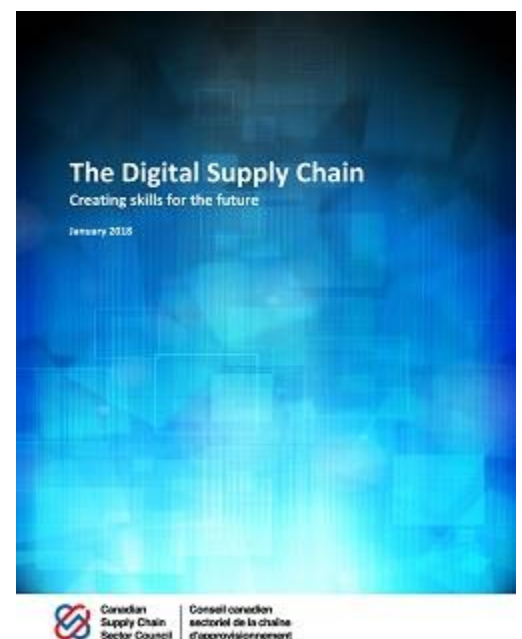- *Upskilling workers* whose jobs have been significantly altered by new technology
- *Creating new types of workers* from the ground up for jobs that currently don't exist but will be created as a result of technology adoption and technological shifts.

To address these issues, the Canadian Supply Chain Sector Council, with funding support from the Government of Alberta, once again partnered with the Calgary Logistics Council on a project called "Connecting People, Technology and Skills."

The first part of the project resulted in the release of the *Digital Supply Chain: Creating Skills for the Future* report in January of 2018. This document discusses six new technologies (autonomous vehicles, robotics and automation, big data analytics, drones, mobility internet and the internet of things, and blockchain) and the impact that they will have on job skills and labour requirements. It also highlights a number of innovative companies in Alberta that have already adopted new technologies. And finally, it includes a labour skills report that provides examples of the changing skill set required in the near future for a number of supply chain occupations.

The Digital Supply Chain
Creating skills for the future
January 2018

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The next step was to look deeper into the issues in Alberta's regions and determine specific, short-term workforce development strategies that would have maximum effectiveness in solving the looming workforce crisis.

For this phase of the project, CSCSC partnered with GO Productivity to convene a series of seven regional roundtables at locations across the province. Roundtables were held in Grande Prairie, Cold Lake, Greater Edmonton, Lethbridge, Greater Calgary, Red Deer and Fort McMurray between January and March 2018.

Representatives from regional employers, economic development agencies, chambers of commerce, business associations, municipalities and post-secondary educational institutions gathered to discuss the new technologies and the current levels of adoption, as well as the workforce challenges that these technologies present and how these challenges might be addressed on a regional basis.

One key finding from these roundtables is that small and medium-sized employers in particular don't know how to start to upgrade their technologies; they're afraid of making the wrong move or jumping in too soon. To address this issue, in partnership with SandBay Entertainment, the Canadian Supply Chain Sector Council produced a series of videos called *Jumping In: Embracing Technology in the Supply Chain.* These videos document interviews of representatives from Alberta companies who have chosen to embrace – or promote embracing – new technologies designed to improve efficiency, reduce costs or enable growth.

This graphic is licensed under CC BY-SA

The "good news" stories that these companies share demonstrate how early adoption of technology is imperative to success – and is doable. Getting started is crucial: determining the business processes that are a best fit for technology adoption, understanding the business case for implementation, making a "psychological commitment" to the technology and being prepared for a sharp learning curve, lots of work and change – these are the first steps that any company can take to get past the barrier of indecision that prevents it from taking advantage of emerging technologies.

Methodology

The purpose of the *Accelerator 2.0* part of the "Connecting People, Technology and Skills" project was to:

- engage with industry leaders in seven regions of Alberta to learn how they will be impacted by the changing technologies

- develop focused regional workforce development actions to ensure that the skills and knowledge needed for the supply chain sector are in place.

To manage the regional roundtables, CSCSC contracted with GO Productivity, an Alberta-based non-profit organization that focuses on solutions to improve the productivity and competitiveness of Alberta companies. Recruiting was done by engaging with economic-development agencies, chambers of commerce and other business associations in each region, as well as via direct appeals through the GO Productivity network. Multiple emails, web messages, and blog and social media posts were sent to generate interest in the sessions and encourage participation.

Attendees at Lethbridge roundtable session. Photo courtesy of Bridge City News.

Roundtable sessions were facilitated around three discussion questions that had been designed to generate dialogue within the group. The discussion questions were as follows:

1. From a prescribed list, which technologies are most impactful for your organization and how are they likely to impact your organization?
2. What are the key HR Challenges you anticipate as a result of these technologies?
3. What strategies could be prioritized and employed in the short term (3-12 months) to reduce barriers and enable employers and their workforce to adapt to the changing technological work environment?

Participant responses were collected and entered into a database for analysis.

To augment the data gathered in the face-to-face sessions, an online survey was developed and distributed to the targeted audience through economic development agencies, chambers of commerce and other business associations. Data from surveys was added to the data collected during the regional roundtables and was used to develop the final recommendations.

Appendix D contains more detailed information about the research methodology used in the *Accelerator 2.0* project.

Overall Observations

This section describes high-level observations, based on the roundtables and surveys.

1. **Business leaders across Alberta recognized that they have been slow to adopt and prepare the workforce for new technologies and that this may hurt the province's economy, but are unsure what to do about it.**

During the roundtable sessions, business leaders (almost exclusively from small to mid-sized companies) revealed a general awareness regarding these transformative technologies and the impacts they have on supply chain activities. However, this awareness isn't yet translating into action. Many roundtable attendees and survey respondents indicated that they had no concrete strategies for implementing transformative technologies, and fewer still had explored the human capital implications of these technologies. Business leaders understood that skills requirements were likely to change, but hadn't quantified the extent of the change. Most didn't know how they would ensure their companies had the talent necessary to be successful.

This observation points to one of the principle emerging needs: *Education and awareness-raising for business owners and senior managers are a key first step.* One participant described it as "mindset before skillset."

On a positive note, a recent CD Howe Institute study concluded that, in terms of the readiness of workers to adapt to these technological changes, Alberta rates second in the country (behind Ontario), largely due to the overall high levels of education and foundation skills in the province. The same study also determined that the impact of these technological changes would be less in Alberta (along with Ontario and British Columbia) due to the overall nature of the economy in these provinces.[18] So, while its industries are slow in getting started, Alberta has more breathing room than many other provinces in terms of the impacts of these technologies. Once a coherent strategy is determined and implemented, Alberta could see measurable results quickly.

2. **Grassroots success is key**

One thing that was clearly pointed out in every region was that "one-size-fits-all", centrally directed efforts will have a low likelihood of success. While these approaches can certainly be part of an overall strategy, it's clear that *grassroots initiatives, driven through regional partnerships to address regional priorities, must be the focus.*

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[18] Winch, R. (2018, January). *Risk and Readiness: The Impact of Automation on Provincial Labour Markets*. CD Howe Institute. Commentary #499, p 2.

Roundtable attendees repeatedly referenced a lack of broadband internet capability as a perceived barrier to adoption of these technologies and an obstacle to training and reskilling efforts. Where population density is low and the distance between learners and learning facilities is large, distance and distributed learning approaches have merit as learning modalities.

Regional and local development approaches can support promising economic opportunities by addressing geographic-specific obstacles to entrepreneurship, innovation and skills development in order to increase local growth.

3. Skill needs aren't just technical

In every region, attendees talked about the need for greater business acumen, collaboration, problem solving skills and general literacy as requirements for improving the adoption and utilization rates for transformative technologies. There is a general understanding that, while coding and programming skills

are important for a relatively small number of workers, *everyone will need to have higher levels of what the International Labour Office refers to as "21st Century Skills"[19] in order to function in the rapidly changing work environment*.

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[19] Ananiadou, K. & M. Claro. (2009). *21st Century Skills and Competences for New Millennium Learners in OECD Countries*. OECD Education Working Papers, No. 41. OECD Publishing, Paris. Retrieved from https://www.oecd-ilibrary.org/education/21st-century-skills-and-competences-for-new-millennium-learners-in-oecd-countries_218525261154.

The Canadian Supply Chain Sector Council's report *The Digital Supply Chain* and RBC's recent *Humans Wanted* national research study reaffirm the need for these skills in an evolving economy. [20] [21] The alignment between them is startling:

Humans Wanted Most-critical skills for the new world of work	Digital Supply Chain New skills for supply chain professionals
• Judgement and decision making, critical thinking	• Strategic thinking and problem solving
• Active listening, speaking, social perceptiveness (communication)	• Ability to collaborate across different business units, customers and functions
	• Leading and developing others
• Social perceptiveness	• Ability to manage global and diverse teams

Clearly then, there are foundational skills that need to be addressed to adapt to the evolving world of work – and these skills aren't limited to supply chain technical competencies.

Workplace learning and training

Once people enter the workforce, employers' decisions to invest in both informal and formal training and learning can contribute to a better skilled and more competitive workforce.

4. **Workforce development must be responsive and provide nimble, quick solutions that solve immediate problems**

Another clear message from business leaders across the province was that *whatever strategies and tactics are adopted, the effort must be focused and responsive to employer and community needs. Above all, these strategies must be developed and deployed rapidly and efficiently, and then adjusted and improved iteratively over time.*

Fostering innovation and entrepreneurship requires an emphasis on skills development and training for the labour force of tomorrow. This necessitates a new mindset of continuous learning that starts in

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[20] Canadian Supply Chain Sector Council. (2018, January). *Digital Supply Chain*, p 22. Retrieved from http://www.supplychaincanada.org/assets/u/The-Digital-Supply-Chain-Final-Report.pdf.

[21] RBC. (2018, March). *Humans Wanted*. p 12.

school, but includes continual upskilling and reskilling to ensure that the workforce is ready to fill present skills gaps and is able to grow into the jobs of tomorrow.

One key factor that must be emphasized: *Reskilling and upskilling efforts need to deliver return on investment to employers and workers alike.* As McKinsey points out, "Hard evidence of return on investment (ROI) is scarce for a lot of workforce development programs, and that is one of the reasons employers are often reluctant to participate, much less to pay for them." [22]

Training a portion of workers to become multi-skilled or cross-trained workers is a workforce development strategy than can help retain experienced workers[23] and minimize staffing shortages.[24] Multi-skilled workers are proficient in a main craft/job and have some training or proficiency in one or more others. Multi-skilling has been used in a variety of industry sectors including retail, construction and facility maintenance, technology manufacturing, healthcare and others.

While multi-skilling a portion or workers can have added costs (e.g., training costs, increased wages), there are many benefits. For instance, when multi-skilled construction workers form part of a team they reduce time, costs and hiring requirements.[25] Multi-skilled workers also have increased opportunities for career advancement and they are more likely to remain steadily employed within the same region.

Any programs developed must have built-in metrics that measure the impact on business performance. Successes need to be recognized and celebrated. Accounting for these initiatives should be holistic and should include the costs of program recruitment, the development and delivery of the training programs themselves, employer productivity, quality, competitiveness improvements, employee retention and satisfaction measures, as well as change in skills and "time to competency" measures.

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[22] Laboissiere, M. & Mourshed, M. (2017, February). *Closing the Skills Gap: Creating workforce development programs that work for everyone*. McKinsey & Company. Retrieved from https://www.mckinsey.com/industries/social-sector/our-insights/closing-the-skills-gap-creating-workforce-development-programs-that-work-for-everyone.

[23] Haas, C. T., Rodriguez, A. M., Glover, R. & Goodrum, P. M. (2011) Implementing a multiskilled workforce. *Constr. Manag. Econ.* **19,** 633–641

[24] Henao, C. A., Muñoz, J. C. & Ferrer, J. C. (2015) The impact of multi-skilling on personnel scheduling in the service sector : a retail industry case. *J. Oper. Res. Soc.* **66,** 1949–1959

[25] Lill, I. (2009) Multiskilling in construction -a strategy for stable employment. *Technol. Econ. Dev. Econ.* **15,** 540–560.

Emergent Themes for Consideration

Six of the eleven themes cited in the original *Accelerator* report emerged again as priorities during the roundtable discussions. The themes and their articulation represent the general consensus of roundtable attendees.

Labour Shortages Drive Automation and Innovation

Business has historically adapted its processes in response to a shortage of key production components. This is also true when labour is the resource in short supply.

Whether in the distribution process, the streaming of goods from production, a shift from trucking to rail in the face of driver shortages, or in response to increasing wages driven by high demand and/or short supply, the costs of automation and the return on investment of transformative technologies is becoming increasingly more viable for businesses. This message was most clearly delivered during the Lethbridge roundtable. (See *Appendix B.*)

Supply Chain Management is Emerging as a Key Corporate Business Strategy

It was clear that attendees saw critical business advantages in integrating supply chain functions into an overall business strategy. The ability for supply chain functions to contribute to customer loyalty, product strength, market stability, productivity and cost containment is seen as a strength in those businesses that have created visible and strong supply chain functions.

Many attendees were emphatic in their belief that formalizing supply chain functions as a distinct business line is critical to gaining the full strategic benefit. They noted that, when these functions are divided between other lines of accountability (e.g., finance or operations), the synergies of collaboration are lost. Supply chain and logistics' full strategic value will be realized when consolidated and given a place at the executive table.

There is a Critical Need for Employees with Soft Skills

When asked what critical skills workers will need to succeed as supply chain professionals, the soft skills were consistently heralded. This finding has been repeated in recent Canadian studies conducted by RBC and the Canadian Chamber of Commerce, and across industry in the U.S. and the EU. The need for workers to have strong skills in collaboration, innovation and strategic use of diverse knowledge sets, as well as the ability to work as part of a complex team, is increasing in importance to employers and industry. In some cases, this outstrips the need for technical or analytical abilities.

Business Issues Include Environmental Impact, Cost Containment and Sustainability

During the roundtables, there was ongoing reference to creating greener ways of doing business. As a business philosophy, sustainability is an overarching driver for three reasons:

- It is a recruitment benefit, as new employees are often attracted to firms they perceive as creating a positive environmental impact
- It can be a way to reduce operating costs when a new facility is put into production
- It provides brand support from the customer perspective, as customer loyalty can be enhanced by environmentally positive practices.

Communities Seek Ways to Meet Regional Needs with a Locally Developed Workforce

Many attendees considered strategies that would lead to a stable labour supply and increased retention. The ability to train workers close to home and enable them to work in their home community seemed to be the most viable and practical solution. Attendees expressed the idea that employees are more likely to want to develop their careers within the company rather than across several companies.

This was more important to those operating in rural communities than in urban ones. However, the concept was raised by attendees in urban areas as often as it was by those in more rural locations.

Human Resource Planning and Coordination Will Strengthen Competitiveness

Transportation of goods to market is a competitive business. With the impact of labour market changes affecting Canada, the U.S. and the EU, Alberta can enhance its ability to compete with other North American transportation hubs through coordination of training, standards of performance, mobility of workers and other human resource strategies.

Planning, programs and coordination can be cross-sectoral. The challenges created by the changing labour market and the needs of industry for workers who can collaborate, innovate and work effectively with complex technology are common to the supply chain professions throughout the country.

Workforce Development – Key Success Factors

Workforce development can be defined as "the co-ordination of public and private sector policies and programmes that provide people with the opportunity for sustainable livelihood and helps organizations achieve exemplary goals, consistent with societal context".[26] The dual public/private nature is critical to overall success. Research from McKinsey has identified some key factors in successful workforce development programs:

- They are employer driven – the best workforce development solutions happen when leading employers come together to address the talent problem for an entire sector; in other words, when competitors collaborate because they all face the same talent problem.[27]

- They have a clear ROI for employers and workers.

- They include collaborative partnerships between the public and private sector.

- Training encompasses the following five key components (see diagram on the following page):

  - It is engaging for attendees

  - It has a focus on specialized modules

  - It emphasizes practical tasks

  - There is regular assessment to show progress

  - There are multiple instructional delivery mechanisms.

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[26] Jacobs, R. & Hawley, J. (2009). *International Handbook of Education for the Changing World*. ed. Rupert. Maclean and David. Wilson. Springer, Netherlands. Quoted in: Columbia Basin Rural Development Institute. (2018 Winter). *Rural Workforce Development: Challenges and Strategies in the Technology Sector*, p 2.

[27] Laboissiere, M. & Mourshed, M. (2017, February). *Closing the skills gap: Creating workforce-development programs that work for everyon*e. McKinsey & Co. Retrieved from https://www.mckinsey.com/industries/social-sector/our-insights/closing-the-skills-gap-creating-workforce-development-programs-that-work-for-everyone.

Effective training incorporates five components.

Programs engage participants and deliver the exact skills required for each profession. The model is immersive and intensive.

Instruction is delivered in many different ways. In addition to conventional in-person classroom instruction, online, video, and mobile methods are all used.

A focus on specialized training modules integrates technical, behavioral, and mind-set skills required where on-the-job failure is most likely to occur.

Assessment is done on a regular basis, ensuring that problems are identified and addressed. Students must show mastery of all necessary skills.

The majority of the curriculum emphasizes practical tasks. Approaches include simulations (physical and/or digital), interactive animations, and site visits.

Source: *Closing the skills gap: Creating workforce development programs that work for everyone*. Martha Laboissiere and Mona Mourshed. McKinsey & Co. February 2017.

One other key success factor that is articulated in numerous research reports is the need for workforce partnership specialists – agencies or leaders in each region who "can play a vital role in building partnerships and networks as part of a region's workforce development strategy".[28] The importance of an independent coordinator in a given region who can forge partnerships between the various stakeholders (employers, industry and business associations, training providers, social agencies and various levels of government) can't be underestimated.

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[28] Columbia Basin Rural Development Institute. (2018 Winter). *Rural Workforce Development: Challenges and Strategies in the Technology Sector*, p 8.

Call to Action Strategies

To summarize, the research is clear:

1. Supply chains are vital to the Alberta economy.
2. Digital technologies are transforming supply chains at an unprecedented rate.
3. Transformation has the potential to deliver enormous productivity and competitiveness boosts to all sectors of the Alberta economy.
4. Many Alberta businesses are unprepared for these transformative technologies. This statement applies throughout organizations, top to bottom.
5. Awareness and understanding of how to incorporate transformative technologies into supply chains is lacking.
6. Specific skills related to operationalizing these technologies will need to be acquired.
7. General skills that allow individuals to adapt to transformative technologies and new business models will be required.
8. Measures targeted at underrepresented groups will be needed to address the growing labour demand.
9. It is critical to move quickly to address these issues or risk facing significant competitive challenges.

Demographics and disruptive technologies will change the workforce requirements as well as the skills profiles for positions throughout the supply chain sector. It is anticipated that the differing nature of supply chain operations in different parts of the province will necessitate specific, regionally focused workforce development strategies to inform planning in each region.

Many of the strategies identified in the *Accelerator: A Call to Action* and *HR Study Update* reports published in 2012 are redundant in today's environment. Moving forward, the focus will need to be on:

- Facilitating worker redeployment: Adapting to technological progress will require strategies that identify and recognize transferable skills and competencies, thereby facilitating the redeployment of workers and those from underrepresented groups (women, indigenous people, early school leavers, those not in employment, education or training (NEETs), long-term unemployed and underemployed and newcomers) across businesses and regions.

- Investing in skills: People, especially youth, will need to prepare for the jobs of the future by being equipped with the right mix of skills required to successfully navigate through technology-rich work environments. This mix includes general cognitive skills, complementary

skills such as problem solving, creative thinking, communication, ICT generic skills and technical skills and a strong ability to continue learning.

- Fostering dialogue: Anticipating future challenges and opportunities, finding solutions, managing change proactively, and shaping the future world of work can be more easily and effectively achieved if employers, workers and their representatives work closely in a spirit of cooperation and collaboration.

There is no one formula for a successful workforce development strategy, just like there is no one formula for economic development. The following is a continuum of workforce development strategies to be implemented over the next two to three years:

- Establish a coordinating and convening body (similar to the Calgary Logistics Council) with a workforce development mandate and provincial reach to do the following:

  - Improving measurement of the likely scope of the digital transformation on jobs and regions. Improving data and statistics will be an important contribution to the development of sound workforce development actions.

  - Create strategies and practices that prioritize knowledge transfer as part of succession planning processes.

  - Share best practices and identify approaches to assist employers in making the transition and adapting to changes in the labour market.

  - Encourage industry associations to play a role in finding ways to tell industry stories, such as through panel discussions with sage leaders, those who have become experts in niche areas and people who have made mistakes and learned valuable lessons from them.

  - Promote the supply chain sector by advocating and educating more effectively on the benefits created locally, nationally and globally. Improving perceptions about the industry will also help to recruit new workers. This includes women, indigenous people, early school leavers, those not in employment, education or training (NEETs), long-term unemployed and underemployed and newcomers.

  - Building on the success stories highlighted in the *Jumping In: Embracing Technology in the Supply Chain* series of success-story videos, engage in general awareness-raising activities to demonstrate the opportunities of these technologies.

  - Develop engagement activities at the executive/C-suite level to address technology adoption and development of new business models and opportunities.

- Create a Workforce Development Network with a mandate to bring people together to do the following:
    - Advance dialogue on the impacts of transformative technologies on business models, labour demands and skill requirements.
    - Conduct evidence-based research on the regional adoption of transformative technologies, current and projected labour demand and changing skill requirements.
    - Develop targeted training initiatives to address regional requirements.

Appendix A: A Provincial Strategy provides more-detailed direction on a highly recommended strategy: the establishment of a coordinating and convening body with a workforce development mandate and provincial reach. The need for broad and effective communication across each region (and between regions) is imperative to share lessons learned and best practices, and to maximize the use of scarce resources.

Appendix B: Regional Strategies summarizes the results of regional discussions with leading-edge employers, post-secondary institutions, economic-development organizations, chambers of commerce and other partners. It also sets out region-specific strategies that address the barriers and challenges identified by those who attended the roundtable sessions.

The goal of Appendix B is to recommend actionable strategies geared towards addressing any projected labour supply gaps and/or competency mismatches over the next two to three years. It should be seen as the foundation for future discussions of how supply chain's transformation is influencing its current and future career opportunities. Creative and collaborative solutions are required to improve and sustain the sector's competitive advantage and strengthen community endorsement.

Appendix A: A Provincial Strategy

Workforce Development through Partnership

In the past, workforce development was achieved through the efforts of different agencies operating independently. As the pace of change has accelerated, that model has become increasingly unproductive. Nowadays – as with all supply chain initiatives – workforce development necessarily involves many stakeholders, including employers, associations, educators and governments.

Many studies point to the problem of "silos" that separate stakeholders and show how this can hamper the overall effectiveness of workforce development strategies. To ensure coordination, collaboration, transparency and information sharing among the agencies, a partnership approach must be embraced.

Companies, educators, community-based agencies and other stakeholders all have a role to play in workforce development. It is important for professionals in each of these areas to avoid working in silos. Instead, they can seek to understand how their individual work can contribute to a broader collaborative effort in the development of workforce strategies. A key component of workforce development is bridging individual, organizational and societal interests in a mutually beneficial manner.

Many areas are suited for collaboration in workforce development. For example, when community colleges in a region (or across the province) work together they are able to share knowledge and resources, and effectively build their areas of expertise, which in turn can enhance learning opportunities, economic development and innovation. Developing strategies to stimulate job growth and up-skill workers in the supply chain requires collaboration, leadership and coordination among public and private stakeholders.

Some interesting cases that demonstrate the value of the above partnership approach, with a specific application to emerging and transformative technologies, can be found in Canada, the United States and Europe. *Appendix E* lists examples of such cases.

A Coherent Alberta Strategy

Business leaders across Alberta are aware of the transformative technologies that are such a frequent topic in business news nowadays. However, this awareness has not generally translated into action. Many companies have not developed strategies to implement new technologies.

As we have seen from national and international studies, first-mover advantage in the adoption of technologies can be critical to competitiveness. As one of the *Jumping In* video subjects says, "Be a bit fearless. Use free opportunities like Rainforest to get educated on technology. The longer

you wait, the less that you know."[29] Late adopters may not be able to catch up if they take a "wait and see" approach to technology.

During the roundtables, attendees consistently identified two key strengths that can provide a foundation for addressing the skills revolution needed to incorporate transformative technologies into productive and competitive business environments: its regional collaboration and innovation networks and Alberta's Adult Learning System.

Regional Collaboration and Innovation Networks

Alberta's regional collaboration and innovation networks are a key strength that could provide a foundation for addressing the skills revolution needed to incorporate transformative technologies into productive and competitive business environments.

Collaboration networks such as Rainforest Alberta (with chapters in Edmonton and Calgary) are growing across the province. These grassroots collaborations, a feature of technology innovation centres, are a significant resource for sharing ideas, information and best practices, nurturing innovation, and creating informal communities of practice. While Rainforest is focused on the startup/tech community, the concept has real value for fostering the regional Workforce Development Networks (discussed later in this report).

Adult Learning System

A recent study by the Conference Board of Canada found that many employers want post-secondary schools to increase work-integrated learning, such as cooperative education, internships, mentoring, capstone projects, group work and post-secondary education-based consultancy opportunities.[30]

Representatives from post-secondary education who attended the roundtable sessions reaffirmed the commitment of Alberta to an adult learning system in which current workers could fulfill their potential and contribute to their workplaces. Learning opportunities for future employees are expected to focus on the skills graduates will need to succeed in the changing technological environment and will be offered to meet the specific needs of the community.

Network Partnerships

Throughout this project, we have seen excellent examples of leading organizations willing to share their resources:

Alberta Innovates and the Regional Innovation Networks

Alberta Innovates provides technology commercialization advice, mentorship and access to program support and equipment through the Regional Innovative Networks (RINs). Spanning the length and width of the province, the networks are innovation nodes made up of like-minded public organizations

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[29] Canadian Supply Chain Sector Council. (2018). *Jumping In: Embracing Technology in the Supply Chain* [Video Series]. Case study retrieved from https://www.docdroid.net/glE4wuk/cscsc-jumping-in-case-study-ship-local.pdf.

[30] Mckean, M., Coburn, V. & Maclaine, C. (2016) *PSE Skills for a Prosperous British Columbia: 2016 Edition*.

that help small technology and knowledge-based businesses innovate and grow. They help to build a strong entrepreneurial culture in Alberta by working with small to medium-sized businesses.

Alberta's Regional Economic Development Alliances (REDA)

REDAs in Alberta are autonomous grassroots-based, non-profit organizations comprising member communities and regional stakeholders that work together to foster business development and prosperity in a defined geographic area. This collaboration and cooperation enables members and stakeholders to undertake projects that they could not necessarily do on their own.

Chambers of Commerce

Chambers are local or regional resources that champion ideas, harness energy and collectively move forward solutions of importance to their members.

Aboriginal Business Council Members

The Canadian Council for Aboriginal Business has over 200 members. Combined with Alberta's indigenous communities, these are strong resources to engage in regional networks, as communities develop a strong local supply chain workforce.

Supply Chain Management Association Alberta (SCMA)

With over 700 members, SCMA-Alberta is committed to delivering on its new strategic framework to expand learning initiatives to accelerate transformation and growth. Its first priority in this agenda is the development of competencies, career pathways and learning maps for supply chain professionals.

Canadian Institute of Traffic and Transportation (CITT)

CITT members are regional and community connections with personal insights into the current state and future evolution of their workplaces.

Post-secondary Institutions

Advancing the 2018 Growth and Diversification Act[31] vision, post-secondary institutions are critical to generating the human and information resources that will lead the province's knowledge-driven future.

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[31] https://www.alberta.ca/growth-diversification-act.aspx

Alberta Labour's Workforce Consultants

These professional resources are located across the province and ready to work with employers to recruit, retain and strengthen regional workforces. They can also connect partners to grant-funding opportunities.

Strategy Implementation

The recommended provincial strategy is to first define the knowledge and skill competencies of the supply chain profession.

A provincial coordinating and convening body would have a logical central role to establish or (re)affirm the competencies or required common body of knowledge (CBoK) and expected learnings of supply chain professionals from entry-level to executive. It would also have a central role in providing and delivering that education, particularly the continuing education that allows workers to move along a mapped career pathway.

Mapping career paths and transitions between supply chain streams creates an opportunity to strengthen end-to-end linkages and enhance professionalism. The production of a document defining the knowledge, skills, competencies and career paths for the profession would use the current 48 National Occupational Standards created by the sector with support from the Canadian Supply Chain Sector Council as a foundation, and would include the skills necessary to allow employers and employees to adapt to new business models and transformative technologies. The resulting document(s) should reflect extensive collaboration with and the perspective of educational and corporate stakeholders.

This information should inform a hiring manager of what skills are expected for a specific job title and what roles may be required in each organization. Defining these competencies and maps would enable post-secondary education and professional-designation organizations to not only leverage these to develop further learning offerings, but also help the profession advance in its maturation.

A provincial coordinating and convening body could set industry standards, practices and competencies, deliver relevant learning and educational opportunities, and coordinate regional activities to ensure that best practices are shared province-wide. Through a systems-thinking process, this body could astutely position itself to be a unifying partner; it could create this situation by being proactive, instead of reactive, to the competitive landscape.

Appendix B: Regional Strategies

To be effective, it is critical that a region's workforce development strategy is coherent, aligned with the regional economic development activities and strongly supported by stakeholders. It must also take into account the changing economic conditions and the specific needs of each industry sector within the region.

The CSCSC's regional roundtable sessions generated a great deal of interaction, discussion and dialogue among attendees, and some intriguing and novel ideas were generated. The general sense from the regional roundtables was that the activity was timely, and the opportunity to discuss these issues with local business peers and stakeholders was both welcome and valuable for the attendees.

Workforce Development Networks

Workforce development networks are partnerships, collaborations or alliances that typically involve community-based organizations, education and training institutions, employers and public sector organizations. The primary objective of workforce development networks is to provide stronger linkages between the supply- and demand-sides of the labour market. Community-based and public sector organizations play a crucial role in workforce development networks because they are well connected to both workers and employers, so they are aware of the skills that are needed and that should be sought in a region.

Green highlights three ways that workforce development networks influence the functioning of a region's labour market:[32]

1. They increase the information available to both workers (e.g., improved information about the avail-ability of jobs and skill requirements) and employers (e.g., access to and work ethic of potential hires).

2. They can smooth the transition of young workers' from school to work by improving information flow between educational institutions and employers (e.g., creating school-to-work, mentoring, internships and apprenticeship programs). This can prevent young workers from floundering through multiple jobs in a short time, which is a common problem in some rural and northern areas.

3. They can help employers overcome the collective action problem of everyone wanting a well-educated and trained workforce, but no individual employer wanting to risk investing in training an employee that they might lose to a competitor. Bringing employers together to set up training in a collaborative effort reduces the risk and cost to individual employers.

Services made available through workforce development networks can provide a region's workers with tools to meet their career needs and adapt to changes in the global economy. Arrangements such as career ladders, which create paths for career advancement within a local economy, can also benefit both small and large companies in a region. Smaller companies are able to hold on to workers and reduce turnover rates, while larger companies benefit from increased access to skilled and well trained workers. While employers may only see limited short-term benefits from involvement in workforce development networks, over time collaborative efforts can improve employee retention and recruitment.

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[32] Green, G. P. (2007) *Workforce Development Networks in Rural Areas: Building the High Road*. (Edward Elgar Publishing.

Calgary Metropolitan Region

The City of Calgary's population is over 1.2 million and the population of the entire economic region centred on Calgary is nearly 1.5 million.[33]

Economic Drivers

As the largest metropolitan region in Alberta, Calgary has a range of different industries. Although generally thought of as an oil and gas-based economy (albeit at the management rather than operational side of the industry), the region is also a major transportation and logistics centre.

Oil and Gas

The region is the headquarters for the Canadian energy sector, with numerous head offices established in Calgary. The economic downturn has hit these operations hard, hollowing out the downtown core and creating excess office space in the city. As the economy recovers, the sector is slowly rebuilding, but it seems unlikely that it will return to the size it was in the past. The industry is learning how to operate in a leaner and more cost-effective manner. This has implications at all levels of the economy – fewer people with more skills doing more things (multiskilling) will be necessary.

Transportation and Logistics

Calgary has emerged as a major transportation and logistics hub for southern Alberta, Saskatchewan, eastern British Columbia and parts of the northern U.S. Significant supply chain operations include Canadian Pacific Railway, Sobeys/Safeway, and Westfair Foods. WestJet airlines has its headquarters in Calgary, and DHL, FedEx and Purolator courier services have major operations at the Calgary International Airport (YYC) – the third-busiest airport in Canada (behind Toronto and Vancouver) in terms of aircraft movements. Air cargo worth over a billion dollars annually moves through YYC from all over the world.

Tech Sector

Shaw and Telus have major operations in Calgary, and the city is becoming a hub for biotechnology, as well. There is a growing "tech eco system" in the region and, increasingly, more small innovative tech companies are being launched.

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[33] Statistics Canada. (2016). *Census Profile, 2016 Census.*

Manufacturing

The Calgary region is actually home to more manufacturing firms than oil and gas – a statistic that surprises many. Advanced manufacturing for the telecommunications, aerospace and defence, and agribusiness sectors are also a significant contributor to the Calgary Metropolitan Region economy.

Roundtable Summary

Held in Airdrie, the Calgary roundtable was attended by individuals from an array of sectors, including representatives from manufacturing, digital entrepreneurs and the oil and gas sector, as well as municipal and regional governments and SAIT. Unfortunately, there were not many representatives from supply chain operations in the City of Calgary and Rocky View County, probably due to poor weather conditions.

The key findings from the roundtable are summarized in the table below:

Calgary/Airdrie	Roundtable Results
Impactful Technologies	• Big data analytics, robotics/automation, IoT
Barriers to Technology Adoption	• Fear of job loss • Lack of trust in robotics
HR Challenges	• Skill and experience gaps • Lack of understanding
Most Important Strategies	• Focused, immersive education • Policy around social impacts • Cross-train, learning organization mentality for business

Key Technologies

Attendees identified the following key technologies as being those that would have the greatest impact in the region:

Big Data/Analytics: The need for business intelligence to drive decision making was noted by several attendees. Larger firms are already harnessing big data for this purpose, and it is important that smaller businesses learn how to leverage the power of this technology to become more responsive and competitive. The presence of such a large supply chain and logistics sector with many large operations that are embracing these technologies means that there should be growing awareness, knowledge and skills available to assist other companies in harnessing the multiplier effect of these technologies.

Robotics/Automation: Similar to big data/analytics, supply chain businesses are using robotics and automation to make materials handling more efficient, safer and more responsive. The growth of the supply chain sector and its rapid adoption of these technologies should make it easier for other businesses to follow suit, as the know-how will become more readily available.

Internet of Things (IoT): Again, the advantage to business intelligence generated by an ecosystem of connected and interconnected objects and machines is being realized, albeit slowly. In a region like Calgary, which has excellent high-speed data-handling infrastructure (fibre optic, wired, wireless), it is significantly easier to use IoT technology. The "connected factory" and "connected workplace" are rapidly becoming the norm. It will be interesting to see how the emerging start-up/tech/entrepreneur movement in the region will accelerate the move toward a completely connected business world.

Perceived Barriers

Attendees noted that fear of job losses was a significant psychological barrier, particularly given the massive layoffs from the energy sector during the downturn. While many see the adoption of these new technologies as inevitable, attendees believe that implementation will be hampered when people see only the job losses and not the potential for job gain. In many ways, the emergence of a "start-up/tech entrepreneur" culture in the city – largely as a result of the economic downturn – is an effective counterpoint to the hesitancy to embrace technology. It remains to be seen which philosophy will prevail.

HR Challenges

Attendees cited skill and experience gaps as being significant, noting that there was a general lack of understanding about these technologies and their implications to business models. As such, there was no clear understanding of what specific skills might be needed. While the region has some excellent post-secondary institutions that can assist in filling skills gaps, until specific gaps are identified it will be difficult to exploit this resource.

Strategy Implementation

The Calgary Metropolitan Region Board is committed to working towards ensuring long-term, sustainable growth for the Calgary Region. For this reason, the region could be a hub for tailoring a regional workforce development strategy (per the WIRED approach in the U.S. – see *Appendix E*), augmented with specific resources and a mandate to handle this role. The region is large and complex; it is also a major bellwether for the overall provincial economy. As such, the necessary resources need to be put in place to make it as competitive and innovative as possible.

Ironically, the same big data/analytics skills will also be necessary components of a system to generate the sort of real-time labour market information that will help to anticipate skill demand and skill shortages, and proactively move to fill them. The Calgary region, with its excellent data telecommunications infrastructure and a host of large and sophisticated businesses, would be a nearly perfect laboratory for creating the sort of skills ecosystem that would be a model for the rest of the province.

Detailed skills assessments for the region and engagement activities at the executive/C-suite level were two priorities identified by attendees attending the Calgary-Airdrie roundtable.

1. *Coordinate regional skills assessments to address the first priority identified by roundtable attendees (and in consultation with professional supply chain organizations).*

   One recommended approach was to employ a three-phase strategy:

- *Phase 1*: Produce a general overview of the skills available in the region (cross-referencing Census data with NOC codes to get a high-level skills map).
- *Phase 2*: Develop a detailed profile of skills required for technology adoption and deployment (dependent on specific technologies).
- *Phase 3*: Prepare a gap analysis and design gap-filling measures (based on results of Phase 2).

For a region of well over a million people, skills assessment at a global level is exceedingly difficult. It may be possible to leverage other, smaller-scale studies on skills for particular industries or other demographic groupings in order to create a composite mapping of the regional skills base.

2. *Develop and deliver engagement activities at the executive/C-suite level to address technology adoption and development of new business models and opportunities.*

In conjunction with the above activity, it is necessary to engage directly with senior managers and decision makers around the potential benefits of transformative technologies on business. Engagement at the highest levels is necessary to ensure that there is a culture shift, and momentum towards, technology adoption and experimentation.

The professional and social interactions offered by SCMA-Alberta, the CITT Northern and Southern Councils and APICS Calgary Chapter are examples of supply chain training and certification organizations that could be approached to facilitate dialogue and resource sharing that:

- Generate awareness of the potential these technologies represent; and

- Promote tools that might enable regional business leaders to effectively incorporate these technologies into their business models.

Cold Lake

Cold Lake and the surrounding region are in the northeast portion of the province, close to the Alberta/Saskatchewan border. In 2016, the region had an overall population of 14,961.

Other communities in the region include Bonnyville (population 6,921), Saint Paul (population 6,004), and Lac La Biche (population 2,314). The overall population density is low.[34]

Economic Drivers

Military/Defence

CFB Cold Lake is an important centre for fighter and air defence training in North America. In addition to training Canada's fighter pilots, the base hosts Allied air forces for the massive Maple Flag exercises, held annually in late spring and early summer. Test facilities for aerospace and defence products, including the Primrose Lake Evaluation Range, serve as a focal point for perfecting systems and technologies with both military and civilian applications.

Supporting these activities requires extensive supply chain and logistics capability, both road and air. Shipments to and from CFB Cold Lake, as well as the consumer goods industries to support the local military and civilian population, account for a good percentage of the regional economy.

Oil Production

The Cold Lake Oil Sands deposit is a large bitumen deposit located in the Cold Lake region. Numerous companies, including Imperial Oil, Cenovus, Devon Canada, Husky Energy and Canadian Natural, operate in the region. Overall activity has been significantly reduced as a result of the drop in oil prices, and this has adversely impacted the regional economy. However, in situ heavy oil operations still require an effective supply chain to support ongoing activities, and increasing the efficiency of the supply chain can reduce costs and increase the competitiveness of the industry in the face of the downturn.

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[34] Statistics Canada. (2016). *Census Profile, 2016 Census.*

Agriculture

The region is also heavily agricultural with a focus on livestock, grain, oilseed and specialty crops. Agricultural products from the region are shipped across Canada and around the world.

Roundtable Summary

Co-hosted with the Cold Lake Rural Alberta Business Centre, this roundtable session attracted attendees from a broad cross-section of the community. Roundtable attendees included representatives from regional employers, Portage College, Onion Lake Cree Nation, economic-development organizations, chambers of commerce and municipal government. Many attendees said that alignment of interests with CFB would be key to successful collaboration and future economic opportunities for the supply chain cluster in this region.

Some general threads from the conversation are summarized below:

Cold Lake	Roundtable Results
Impactful Technologies	• Big data analytics, Internet of Things, robotics/automation
Barriers to Technology Adoption	• High-speed internet
Benefits of Technology Adoption	• Robotics will create higher productivity and diversification with a small labour force
HR Challenges	• Awareness and education – most don't know how to make use of the technology in their operations
Most Important Strategies	• Increase awareness and education • Encourage collaboration between businesses • Focus on leveraging regional strength

Key Technologies

Attendees identified the following key technologies as those that would have the greatest impact in the region:

Big Data/Analytics: The potential for big data/analytics to impact the region's industries is significant. Networking nodes along value streams to increase efficiency is important, but possibly even more

important is the advantage that can be gained by understanding the regional economy in a global context. Big data allows local operations, regardless of industry, to be visible to and have visibility into global supply chains, both business-to-business and business-to-consumer.

Internet of Things (IoT): Attendees expressed interest in IoT technologies, particularly with respect to their application to agriculture. In conjunction with big data/analytics, IoT technologies could have positive outcomes, in that they would allow much tighter control over equipment and machinery, and lower operating and maintenance costs, improve throughput and increase margins.

Robotics/Automation: There was also interest in robotics and automation, again primarily with respect to agriculture. Robotics, automation and autonomous vehicles are of high interest as they enable operator-free production. The technology was seen as a way of improving productivity and diversifying the regional economy – making up for the lack of a local workforce, augmenting capabilities and improving competitiveness.

Overall there is optimism (albeit cautious) regarding this sort of technological change.

Perceived Barriers

There was much discussion regarding the availability (or lack) of high-speed/broadband internet across the region as a limiting factor in adoption of new technologies. Nonetheless, there seemed to be a strong desire to move forward into these areas. One participant noted, "If we don't have broadband, we'll have to figure out how to do this without."

The overall sense from this group was that the perceived barriers are simply constraints to be managed, not reasons for not moving forward.

HR Challenges

According to the group, an issue that needs to be addressed is the general lack of awareness around the technologies. It was pointed out by several attendees that some business leaders in the Cold Lake region don't have enough understanding of the technologies to incorporate them into their business models – considerable support may be necessary to reduce risk. There was less concern regarding any perceived skills gaps at the worker level, the belief being that these gaps could be addressed reasonably quickly by companies once specific technologies had been selected.

Strategy Implementation

The recommended workforce development strategies for the Cold Lake region are:

1. *Create a Workforce Development Network with a mandate to bring people together to engage, dialogue and share "lessons learned" and improve innovation adoption across Alberta's supply chain ecosystem (similar to the Rainforest and other models listed in* Appendix E*).*

   Roundtable attendees were keen to explore regional collaboration/innovation networks as a means of reducing perceived risks and acting as a catalyst for technology adoption. Grassroots innovation networks could provide a low-risk environment for sharing lessons learned in ways that benefit the overall community and improve the economic outlook for all. Tapping into resources from outside the region as required could further enhance this capability.

The Rural Alberta Business Centre and Regional Innovation Network could be leveraged to drive skills development, in conjunction with innovation, at minimum increased cost. Other economic-development organizations and chambers of commerce may be willing to support the leadership demonstrated by the Rural Alberta Business Centre.

2. *Develop and deliver general awareness-raising activities (building on the success of the* Jumping In: Embracing Technology in the Supply Chain *series of success-story videos) to demonstrate the opportunities of these technologies.*

   As one of the biggest issues in this region is a lack of awareness of the technologies and their potential benefits to supply chains, it's imperative that the general level of understanding be raised. The *Jumping In* video series offers specific examples of business leaders who are taking advantage of technology to enhance their competitiveness and return on their investments. These could serve as a catalyst for similar innovation regionally*.*

It was also suggested that lists of consultants with specific capabilities (and who had been vetted through a trusted resource) would be a viable way to reduce the hesitance of many, particularly smaller, businesses to engage external assistance to craft plans to incorporate technologies into their business models. The Alberta Hub model in Cold Lake[35] could act as a catalyst in this regard.

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[35] Alberta Hub. (2018). www.albertahub.com.

Edmonton Metropolitan Region

The Edmonton Metropolitan Region (EMR) is Canada's sixth-largest metropolitan area, with a population in 2016 of over 1.3 million people. Cities in the region include Edmonton (population 932,546), Fort Saskatchewan (population 24,149), Leduc (population 37,069), St. Albert (population 65,589) and Spruce Grove (population 34,066).[36]

The Edmonton region is the hub for "Alberta's Industrial Heartland" (AIH) – the largest industrial area in western Canada, one of the largest industrial areas in the country and home to over 40 petrochemical companies.

Economic Drivers

Major economic drivers for the region include the following:

Oil and Gas Services

The Edmonton region is the staging point for oil and gas services in the Fort McMurray region and other parts of northern Alberta. Many drilling, pipelining and oilfield maintenance companies are located in and around Edmonton.

Petroleum Upgrading and Refining

Shell Scotford (Fort Saskatchewan), Suncor Energy (Edmonton), Imperial Oil (Edmonton) and Northwest Redwater (Sturgeon County) employ thousands of people and process heavy oil (bitumen) from the oil sands.

Petrochemical Processing

Dow, Sherritt International, Agrium and Shell Canada all operate petrochemical-processing facilities in Fort Saskatchewan, which is about 25 kilometres northeast of Edmonton. Other smaller operations also operate in the area, and there is considerable interest in growing this industry sector in order to increase the amount of value-added higher-margin products from Alberta's oil and gas sector.

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[36] Statistics Canada. (2016). *Census Profile, 2016 Census.*

Fabrication/Manufacturing

The region is a centre for metal fabrication and manufacturing, primarily related to the oil and gas sector. These companies service Alberta's industrial heartland and other customers across Alberta, Canada and around the world.

Transportation and Logistics

The Edmonton Metropolitan Region is a major logistics hub for oil and gas, and related industries. The region is home to the Port Alberta initiative, a major transportation and logistics hub encompassing road, rail, air, pipeline and intermodal facilities, as well as associated warehousing and professional services. Port Alberta includes a designated "foreign trade zone" at the Edmonton International Airport, where companies can import raw materials or partially finished goods, complete the manufacturing process and then export products throughout Canada, North America or internationally. The designated trade zone has a number of programs in place to help exporters to be globally competitive, using the region's robust supply chain infrastructure.

Roundtable Summary

Co-hosted with Leduc-Nisku Economic Development Association, the roundtable included representatives from a broad cross-section of partners from the Greater Edmonton Area. Those in attendance turned up for a lively and productive session. Roundtable attendees included representatives from regional and Cree and Métis employers, the Universities of Alberta and Lethbridge, economic-development organizations, chambers of commerce, and municipal and county governments. Given the important role for professional development and reskilling/upskilling training, it is unfortunate that representatives from local colleges (Northern Alberta Institute of Technology, Norquest, Robertson, etc.) were not present.

Attendees discussed the possibilities afforded by the Internet of Things (IoT) and the associated data analytic tools as ways to leverage capacity. The general mood was one of being cautious of, but not frightened by, these technologies.

Few firms were "all in" on the transformative technologies, however, and attendees noted that the adoption of these technologies was hampered by a general lack of awareness and education regarding how the technologies could best be exploited to improve business outcomes. This theme came up in discussions at other regional roundtables, along with the realization that, in addition to improving worker skills related to the technologies, it was necessary to educate business leaders on how they could or should begin leveraging the technologies in business. "Mindset before skillset," as one individual put it.

Some general threads from the conversation are summarized below:

Edmonton/Nisku	Roundtable Results
Impactful Technologies	• Big data analytics, IoT, drones
Barriers to Technology Adoption	• High costs, cannot risk mistakes • Bias against change; maintain status quo
Benefits to Technology Adoption	• Better resource utilization
HR Challenges	• Costs a lot to implement; can't risk a mistake • Resistance to culture change (preference to do what has worked before)
Most Important Strategies	• Assistance with skills/education • Understand impacts on people

Key Technologies

Attendees identified key technologies that would have the greatest impact in the region as follows:

Big Data/Analytics: Supply chain hubs such as Port Alberta, in particular, can benefit from big data/analytics to improve throughput, create business intelligence systems that allow more rapid response to customer demands, and allow businesses to identify trends far more rapidly than is currently the case. The technology has applications across the region and in every sector.

Internet of Things (IoT): Attendees noted the possibility that IoT technology would improve uptime by allowing constant monitoring of plant and equipment "vital signs." For large-scale industrial operations such as the ones in Alberta's industrial heartland, avoiding unscheduled maintenance is a critical consideration with enormous cost implications, not to mention the safety and environmental implications of emergency maintenance to control leaks, spills and so on.

Drones: There was considerable interest in the use of drones to leverage human capacity, increase efficiency and open new lines of business. Some representatives from "refinery row," in particular, indicated how the use of drones could improve operational efficiency on maintenance projects simply by doing a flyover of a laydown area. Use of drones would improve employees' understanding of where components are located and increase their ability to keep track of progress on jobs, allowing timely adjustments to be made as required. Not only would this increase efficiency along the supply chain, it would probably also make worksites safer: "You don't have to send someone up the steel to count bolts if you can do it with a drone," one participant noted. It was also noted that drones could be used for surveying and monitoring pipelines for integrity and for conducting security checks on remote facilities.

Perceived Barriers

Given the size of some regional industrial operations, it is perhaps not surprising that the cost of implementing these technologies at scale was a major consideration. Even on a smaller scale, the "cost versus risk of a wrong choice" dynamic was brought up by numerous attendees. The other identified pervasive barrier was people's attitudes: Several attendees noted that the argument, "We'll keep doing things the way we've always done them because it's always worked before" was holding back innovation and experimentation.

A service company attendee said it is important to remember that all sectors of the oil and gas industry are "in it together" and they have to work together to make the economics work through industry cycles. He pointed out that in the last few years many companies and people have disappeared because they couldn't make it work. A healthy supply chain sector is one that has the funding available to invest in research and development (R&D) to create solutions that will assist their customers as well as themselves. "The benefits of new technology accrue to both sides, but they won't be developed if companies are struggling just to keep the lights on."

HR Challenges

The mindset issue noted above was again brought out as a "people" issue. Generally, the group didn't seem as concerned with the skills requirements as much as the cultural implications of technology

change, and the need to break old habits and embrace new ways of doing things. The feeling was that an attitude/culture shift needed to occur at all levels of organizations, but was most critical for managers. One participant noted, "Should we do the same old thing better? Or should we maybe do something else entirely? That kind of thinking is what's needed."

Strategy Implementation

The Edmonton region is large and diverse, with employers of all sizes and in many different industries. A "one-size-fits-all" approach is not a viable option in the region, exemplifying the need for a multi-faceted approach with nodes touching particular industry clusters and/or sizes of organizations.

The recommended workforce development strategies for the Edmonton Metropolitan Region are as follows:

1. *Create a Workforce Development Network with a mandate to bring people together to engage, dialogue and share "lessons learned" and improve innovation adoption across Alberta's supply chain ecosystem.*

The regional innovation network model, building on existing grassroots capacity augmented with specific resources aimed at managing regional workforce development (as per the WIRED approach in the U.S. – see *Appendix E*), has considerable merit in this region. It makes a great deal of sense to share risks, lessons learned and best practices via a regional collaboration network linked to other similar networks in other regions. Multiple stakeholders can generate better results faster than any one agency – provided the organizational framework and communications capacity is in place.

In the Edmonton Metropolitan Region, a regionally coordinated and provincially connected Rainforest network has begun to bring people together to discuss innovation adoption. From this group, supply chain leaders could work with Edmonton Economic Development, the Leduc-Nisku Economic Development Association (co-hosts of the Edmonton-Nisku roundtable), SCMA-Alberta and the CITT Northern Council to create a supply chain network with a similar mandate.

2. *Develop and deliver engagement activities at the executive/C-suite level to address technology adoption and development of new business models and opportunities.*

One issue that was raised during the roundtable was the need for a cultural shift toward change. Culture is largely a function of the leadership in organizations and, therefore, any effort to create a culture shift must begin with the "C-suite." Directly targeting high-level business leaders and line managers with messages about transformative technologies and the impact on business models, profitability and competitiveness could help create the impetus for change.

The professional and social interactions offered by SCMA-Alberta and the CITT Northern Council are excellent vehicles to engage the executive/C-suite level of employers.

Fort McMurray and the Regional Municipality of Wood Buffalo

Fort McMurray is the urban centre of the Regional Municipality of Wood Buffalo (RMWB). The RMWB is the second-largest municipality in Alberta by area, and in 2016 had a population of 71,589.[37]

Fort McMurray is recovering from the double shock of the oil industry collapse and the devastating fires of 2017. It takes time to recover, but this community has come together. Business leaders are focused on immediate operations, growth and longer-term investment with respect to the impact of these technologies.

Economic Drivers

The region is the centre for Alberta's vast oil sands deposits, which are the major economic driver for the region. Other industries include forestry and infrastructure/ construction.

Oil and Gas Extraction

The oil sands are critical to the region's prosperity. Large employers in the region include Syncrude, Suncor and Imperial Oil, all of which have regional and global supply chains that provide a wide range of goods and services. The cost pressures created by the drop in commodity prices and the ongoing discount on Canadian heavy oil due to distribution constraints have driven margins down (or eliminated them completely), and this has forced unprecedented "belt tightening" across the board.

Major projects in the region have been delayed, reduced or shelved altogether due to the uncertainty in the market. Some may eventually be ramped up, but in the meantime, oil and gas businesses in the region are feeling the pinch.

Forest Products

The other important industry in the region (albeit a distant second to the energy sector) is forest products. Northland Forest Products operates a sawmill in the region, and both Alberta Pacific Forest Industries and Millar Western have timber rights in the Wood Buffalo region. The products from these facilities are transported across Canada and internationally. Sustainable forest-management practices should ensure that these resources are available for years to come.

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[37] Statistics Canada. (2016). *Census Profile, 2016 Census.*

Roundtable Summary

Hosted by Keyano College, this roundtable experienced lower-than-expected participation. Those who were in attendance represented the energy, aviation and tech/entrepreneurial sectors, as well as members of the Keyano community (both staff and students).

Some general threads from the conversation are summarized below:

Fort McMurray	Roundtable Results
Impactful Technologies	• Big data analytics, IoT, drones
Barriers to Technology Adoption	• Awareness and education (knowledge of how to make use of the technology in their operations)
HR Challenges	• Low skill and people transferability • Safety exposure improvements • Value stream collaboration
Most Important Strategies	• Regional innovation networks • Focus on high-level soft skills

Key Technologies

Attendees identified key technologies that would have the greatest impact in the region as follows:

Big Data Analytics: Attendees discussed the significant business intelligence advantages that could be created by combining big data with connected equipment (IoT) to create far more flexible and responsive value chains. Major employers saw benefit in having greater visibility into supplier operations, and smaller businesses saw benefit in being able to proactively respond to their larger customers' needs. The ability to forecast trends based on data collection in order to avoid bottlenecks was also seen as critical in a new, lower-margin competitive environment for the energy sector. Big data/analytics were also viewed as a possible cost-containment tool.

Internet of Things (IoT): Connected machinery and equipment on oil sands sites that are linked to suppliers and maintenance providers was seen as a way to significantly boost productivity, reduce downtime and generally lower costs.

Drones: With cost and safety at the front of mind, attendees pointed to using drones and cameras for inspection and survey work, which would reduce hazardous exposure for individuals while freeing them up for higher-value work.

Perceived Barriers

One of the major barriers to adopting new technologies was that business leaders don't understand how to make effective use of the technologies in their operations. The reality is that, until business owners/executives drive change, there's no skills gap to fill and little incentive for individuals to invest in skills of their own accord.

Capital investment was another significant barrier. Businesses don't have a great deal of financial flexibility to take gambles on technology they may not fully understand, and instead take a "wait and see" approach.

HR Challenges

Traditionally, the region has relied on a "fly-in/fly-out" approach to meet human capital requirements. While this lifestyle is predicted to continue, a shift to a "produce and maintain" versus a "build and commission" emphasis for the major employers would likely make local skills more important. Census results for the region must be accurate and focus on skills/occupations in addition to "counting noses."

Attendees commented that there was opportunity to increase the skill level of individuals in the region, who lacked the transferable essential skills (and in some cases, the motivation) to acquire new skills for new industries. On the positive side, attendees noted that some of the key technologies (particularly drones) could greatly improve safety exposure for workers, which would improve working conditions and free people up for more value-added work – provided they were capable of it. Collaborative skills and communication skills were seen as key.

Strategy Implementation

Roundtable attendees recognized the importance of leveraging existing regional networks, augmenting their mandate and capacity for workforce development as needed. The recommended workforce development strategies for Fort McMurray and the Regional Municipality of Wood Buffalo are as follows:

1. *Create a Workforce Development Network with a mandate to bring people together to engage, dialogue and share "lessons learned" and improve innovation adoption across Alberta's supply chain ecosystem (similar to the Rainforest and other models listed in* Appendix E*).*

    Keyano College has expressed a keen desire to be front and centre in the region's recovery and renewal and is already conducting outreach to the Fort McMurray business and industrial community to provide assistance. Coordinating these efforts through models like Rainforest could leverage existing networks, assets and infrastructure.

2. *Develop and deliver general awareness-raising activities (building on the success of the* Jumping In: Embracing Technology in the Supply Chain *series of success-story videos), to demonstrate the opportunities of these technologies.*

"Good news" stories and concrete examples of success will be important in creating momentum around changes to business practices, particularly with respect to the potential that transformative technologies represent for supply chains. The adoption of autonomous vehicle technologies in the oil sands operations has been met with mixed emotions.

Left to right: Gursh Bal, Ron Belzil, John Dugdale, Bruce Gilkes – Featured in *Jumping In: Embracing Technology in the Supply Chain* videos.

3. *Develop and deliver targeted training initiatives to address local requirements. As the region recovers, it is critical to understand the current skills base and to create the infrastructure to provide communities with real-time, accurate labour market data based on the skills that their regional economy needs, so that skills can be generated rapidly and flexibly to meet demand.*

In addition to Keyano, private-sector training resources should be used to augment/expand capacity in true public/private partnership arrangements. The regional skills base will need to be upgraded and a "talent supply chain" created to ensure that the economic activity in the region generates jobs and prosperity for the region's residents. Close collaboration with indigenous communities and organizations will also be necessary – developing capacity to keep the economic benefits of recovery.

Similar to the Ontario Manufacturing Learning Consortium (OMLC) approach (see *Appendix E*), the key is rapid upskilling that is responsive to employers' immediate needs for competent people. This approach has proven capable of delivering skills with speed and efficiency that is simply unmatched by traditional approaches.

Grande Prairie

Strategically located in Alberta's vibrant Peace Region, Grande Prairie County serves the industrial, commercial and residential needs of Northwestern Alberta.

Grande Prairie County is home to roughly 25,000 people, and the city of Grande Prairie is the seventh-largest urban centre in Alberta, with a population in 2016 of 63,166. Other notable centres in the region include Peace River (population 6,842), Beaverlodge (population 2,465), Sexsmith (population 2,620) and Wembley (population 1,516). In 2016, the entire Athabasca/Grande Prairie/Peace River economic region had a total population of 267,474.[38]

Economic Drivers

The region is resource-rich and has four key industry sectors: agriculture, energy, forestry and commerce. Each of these sectors has extensive supply chains extending through North America and around the world.

Agriculture

Grande Prairie was built on a foundation of fertile farmland and, 100 years later, agriculture remains an important component of the region's diverse economy. The Peace Region is Alberta's second-largest crop-producing region. The cropland acreage totals 3.9 million acres, representing 16% of Alberta's cropland. Agriculture is predominantly concentrated in canola, wheat, barley and alfalfa.

Energy

Grande Prairie is a major oil field service centre, supporting both the Montney and the Duvernay formations, two of the largest gas players in North America. Output from the Montney has doubled since 2012 and now comprises a third of western Canada's natural gas production. It is projected to make up more than half of the country's production by 2040.

As a regional service hub, Grande Prairie is home to many major oil and gas regional headquarters and oilfield service companies. Companies such as Seven Generations Energy, Canadian Natural Resources, Halliburton, Schlumberger and Trican, together with many regional entrepreneurs, operate out of the region, servicing oil and natural gas activities in northwestern Alberta, northeastern British Columbia

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[38] Statistics Canada. (2016). *Census Profile, 2016 Census.*

and into the Northwest Territories. This large market aids in economic stability, keeping companies and employees working during periods of economic uncertainty in the energy sector.

2017 was a strong year for the energy industry in Grande Prairie and saw a major uptick in activity, with a 34% increase in well licences and a 48% increase in well completions over 2016.

This upswing in business activity in the Grande Prairie region may be one of the reasons for low participation in the roundtable (see *Appendix D*). "Folks are too busy to come" was a recurring theme.

Forestry and Forest Products

The region's forestry industry is one of the most important economic engines in the region, with four large operators in Grande Prairie: Weyerhaeuser, International Paper, Canfor and Norbord. These operations are among the most competitive in Canada and are the region's top industrial employers, directly employing over 1,100 people.

Roundtable Summary

In general, the attendees in Grande Prairie perceived one of the biggest barriers is the lack of leadership to drive collaboration and a dearth of institutional memory. "We're doing a terrible job with knowledge management," said one attendee, noting collaborations are developed when times are good but, once the cycle shifts and alliances end, the knowledge of how to create them is lost.

Since the economic downturn and recovery, managers have been exceptionally busy with day-to-day operations and have little time, energy or funds to look to future changes. The economic downturn has also required staffing and other reductions, creating very lean operating systems. Many operations have been "leaned" to the point where there simply isn't any extra capacity to plan for the future while operating the business today. This situation exemplifies the need for an external coordinating or convening body to facilitate workforce development efforts in collaboration with regional business, while keeping those business leaders from being mired in the details.

Some general threads from the conversation are summarized below:

Grande Prairie	Roundtable Results
Impactful Technologies	• Insufficient data (no single technology emerged as most impactful)
Barriers to Technology Adoption	• Missing technical skills • Integration of technical and soft skills for managers and line workers
HR Challenges	• There are opportunities to increase skills for the jobs of the future • "Mental bandwidth" is narrow because people are busy • Businesses are focused on recovery from the economic downturn
Most Important Strategies	• Raise awareness and sense of urgency with business owners/managers • Focus early through education (primary, secondary) as a long-term approach • Continue conversations to build awareness and trust • Employ micro-learning in collaboration with tech providers, industry/employers, Grande Prairie Regional College

Key Technologies

No particular technology emerged from the roundtable as "key", although attendees felt that there was merit in most of the new technologies. Attendees did note that, away from the main highway, the lack of broadband and wireless services made implementing some of the technologies problematic (if not impossible).

Perceived Barriers

Attendees expressed concerns about a general lack of technical skills and lack of awareness of the technologies at the managerial level, and suggested that this lack was a significant barrier to adoption of new technologies. It was also pointed out that "change readiness" and "soft skills" were critical to getting any new technology implemented, regardless of the sector.

HR Challenges

The group reported that the biggest "people" issues were skills-related. Attendees noted that the economic history of the region had created a low-skill culture in which lots of well-paid but not necessarily highly skilled positions were available in the resource sector, acting as a disincentive to a lifelong-learning culture. Another issue was that businesses in the region are busy again after the downturn but are still running very lean – there simply isn't enough time for business leaders to think strategically about technological change and its implications.

Strategy Implementation

The recommended workforce development strategies for the Grande Prairie region are as follows:

1. *Create a Workforce Development Network with a mandate to bring people together to engage, dialogue and share "lessons learned" as well as improve innovation adoption across Alberta's supply chain ecosystem (similar to the Rainforest models listed in* Appendix E*).*

2. *Develop and deliver general awareness-raising activities (building on the success of the* Jumping In: Embracing Technology in the Supply Chain *series of success-story videos) to demonstrate the opportunities of transformative technologies.*

   As one of the biggest issues in this region is a lack of awareness of new technologies and their potential benefits to supply chains, it's imperative that the general level of understanding be raised. The *Jumping In* video series offers specific examples of business leaders who are taking advantage of technology to enhance their competitiveness and return on their investments. These could serve as a catalyst for similar innovation regionally.

3. *Develop and deliver engagement activities at the executive/C-suite level to address technology adoption and development of new business models and opportunities*.

   For the Grande Prairie region, this is a key activity. The professional and social interactions offered by SCMA-Alberta through its Peace Country regional activities is an example of an excellent vehicle to engage the executive/C-suite level of regional employers. The CITT Northern Council and APICS Edmonton Chapter are examples of other supply chain organizations that could be approached to facilitate dialogue and resource sharing in order to:

   - generate awareness of the potential these technologies represent
   - promote tools that might enable regional business leaders to effectively incorporate these technologies into their business models.

   This activity could be done in conjunction with the above awareness-raising activities (#2 in list) to encourage regional business leaders to consider the advantages of incorporating transformative technologies into their business models.

Lethbridge

Lethbridge is southern Alberta's commercial, distribution, financial and industrial centre. The city itself has a population of 92,729 and the overall economic region (including Medicine Hat) has a population of 291,312.[39]

Economic Drivers

In 2017, Lethbridge had one of the fastest-growing economies of any urban centre in Alberta, with growth projected at 2.5%. This growth was driven by increased oil prices and by significant investments in regional manufacturing facilities.

Agricultural Processing

Several prominent employers in the region are engaged in agricultural processing, including McCain Foods, Cavendish Farms, Lantic Sugar and Richardson Oilseed. Both Cavendish and Richardson are constructing brand-new, state-of-the-art processing facilities. Finished products from these facilities will be exported across Canada, North America and internationally.

Transportation and Logistics

Manufacturing inputs and outputs require a robust and diverse transportation and logistics capability. The Lethbridge region has good road, rail and intermodal facilities, and is close to the U.S. border and its I-15 North/South corridor.

Lethbridge is involved in an economic-development partnership, called "SouthGrow," with 24 other Southern Alberta municipalities. One of the initiatives of this partnership has been the Alternative Energy Partnership, which promotes business related to the emerging alternative energy market (wind, solar, bio-fuels).

Roundtable Summary

The mood among the roundtable attendees in Lethbridge was the most optimistic in the province.

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[39] Statistics Canada. (2016). *Census Profile, 2016 Census.*

With support from the Lethbridge Chamber of Commerce, the roundtable included attendees from many key economic sectors and post-secondary institutions (University of Lethbridge and Lethbridge College). In addition, those attending from the Royal Bank and the Business Development Corporation added great value to the discussions as they sought information on how best to support their clients.

Overall, there was recognition of the need for innovation around these technologies, as well as the value of regional strategies to help bridge skills gaps. Attendees from education were very keen to engage with and gain a clearer understanding of future skill requirements.

One interesting note from the roundtable was the common understanding that, while filling gaps for adults is important and necessary in the short term, growing the talent base must start much earlier. Those attendees from the education sector acknowledged the work of Alberta Education to weave digital and essential skills into the curriculum from kindergarten to grade 12.

Roundtable threads are summarized in the chart below:

Lethbridge	Roundtable Results
Impactful Technologies	• Big data analytics, robotics/automation
Barriers to Technology Adoption	• Financial risk
Benefits to Technology Adoption	• In the transportation sector: no job loss, but more efficient
HR Challenges	• Fear, lack of skills regionally • Employee "sabotage"
Most Important Strategies	• Get youth involved • Develop business/community/PSE partnerships • Explore new hiring paradigms

Key Technologies

Big Data/Analytics are critical to regionally based industries that are connected to global supply chains. The information gleaned from this technology can fuel ventures into new markets, assist in creating new products and new value streams, and identify new customers.

Robotics/Automation: It isn't surprising that the attendees were very interested in robotics and automation, given the amount of manufacturing and processing in the region. Robotics and automation are crucial to increasing productivity and can help address current labour shortages. As one participant put it: "We may want to hire locals, but if no one within the community wants to do this kind of work, then the robots will be able to take up the slack and we can keep operating."

Perceived Barriers

One barrier that resonated in the roundtable was the financial risk that small to mid-sized companies face when purchasing new technology. It was, therefore, encouraging to see a group of individuals from RBC taking part in the roundtable, in order to better understand the issues facing smaller businesses with respect to financing technology.

HR Challenges

Attendees noted that fear of job losses from technology had the potential to create significant resistance from incumbent workers, up to and including sabotage. Proactively educating employees to make them comfortable with new technologies and to equip them with the skills needed to shift to higher-skilled work (when technology made certain skills redundant) was deemed critical to success in implementing technologies. The strong manufacturing presence and the understanding that new technologies were likely to have the greatest impact on lower-skilled production workers in that sector no doubt had a significant influence on the discussion.

Strategy Implementation

The Lethbridge group identified the importance of engaging youth in any strategy. One possible mechanism for this is co-op placements or "work-integrated learning." This could begin at the secondary level and continue through post-secondary education.

The RBC Future Launch program is empowering Canadian youth for the jobs of tomorrow. RBC is moving beyond financial investment by engaging the public and private sectors to further understand the issue and make a significant impact on the lives of young Canadians. RBC Future Launch is a catalyst that could be accessed to create solutions so that young people are better prepared for the future of work within this region.

Targeted training initiatives to address regional demands could be accomplished by leveraging existing public capacity through the secondary and post-secondary education systems, augmented through partnerships that combine private/corporate training resources to maximize the use of existing training infrastructure. To this end:

- The Lethbridge Chamber of Commerce would bring critical employer resources to the initiative.
- RBC has a strong commitment to the economic growth of the region, as demonstrated by its presence at the roundtable.
- Positive engagement with the University of Lethbridge and Lethbridge College already exists.

Once specific needs are identified, an agile approach – a series of short "sprints" (two weeks each) to rapidly develop and implement solutions – could be implemented. In any case, timelines should not be longer than three months (90 days) to ensure the focus on delivering meaningful value rapidly is not lost.

Similar to the Apprenticeship 2000 and BioWork models in North Carolina (see *Appendix E*), partnerships could initially focus on youth. However, they should also provide the structure for ongoing skills upgrading and continuing education for those who wish to advance in their careers and integrate new skills into advancing technology workplaces. The responsiveness of these partnership programs in responding quickly to emerging community needs is a big reason why the companies in the consortium continue to thrive in the area.

Red Deer

Red Deer is the third-largest city in Alberta and is the regional hub for the central part of the province. The city has a population of 99,832, and the economic region is home to over 190,000 people.[40]

Economic Drivers

Key industries include oil and gas extraction/service, manufacturing, value-added agriculture, and transportation and logistics. Other sectors that support the Red Deer economy are retail trade, health care/social assistance and construction.

Oil and Gas

The region's competitive expertise is its source of innovation. In Red Deer, companies employ 5,619 people and are responsible for innovation in oilfield production technologies, equipment fabrication, and transportation and logistics services. The regional industry is adaptive, nimble and globally competitive with shipments to customers all over the world.

Manufacturing

One of the driving forces behind Red Deer's economic vitality is the manufacturing industry. There are over 250 manufacturers in the region that provide more than 5,000 jobs. Virtually every component used in the oil and gas industry is manufactured here. Red Deer manufacturers are leaders in supplying metal fabrication, petrochemicals and drilling equipment.

Agricultural Processing

Red Deer's access to primary resources is critical to its strong agricultural processing industry. Major meat producers like Olymel and Nossack Food Group process and distribute beef, pork, lamb and poultry, and ship to a worldwide market.

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[40] Statistics Canada. (2016). *Census Profile, 2016 Census.*

Transportation and Logistics

There are over 600 transportation and warehousing companies in the greater Red Deer region, of which 97% employ 50 people or less. With the expansion of the Red Deer Regional Airport, the transportation industry here is ready to become even larger and will add further growth to the regional economy.

Roundtable Summary

Of all the roundtables, the Red Deer session had the strongest business representation. This group, which also included attendees from economic-development organizations and municipal government, was enthusiastic regarding technology, while still cautious with respect to adoption.

Some general threads from the conversation are summarized below:

Red Deer	Roundtable Results
Impactful Technologies	• Big data analytics, IoT
Barriers to Technology Adoption	• Lack of skilled people to manage and implement systems
HR Challenges	• Corporate culture • Inadequate regional skills
Most Important Strategies	• Regional focused education • Regional innovation networks

Key Technologies

Attendees identified key technologies that would have the greatest impact in the region as follows:

Big Data /Analytics: Attendees were keenly aware of the interconnected nature of big data/analytics and the internet of things (IoT) technologies, and saw them as complementary, or as pieces of an integrated whole. Roundtable attendees expressed their enthusiasm for the business intelligence capability that big data could provide. They saw it as a way to give them a significant competitive advantage, a responsiveness to the market and, since it is the mid-way point between the two major metropolitan centres, an ability to serve both centres.

Internet of Things (IoT): Closely related to big data, the group saw connected machines as a key source for big data/analytics. Some attendees expressed a vision of real-time intelligence being gathered automatically from connected machines, analyzed automatically through big data/analytics applications, and then put to immediate use by business to create an incredibly flexible and customer-responsive value chain that would mesh well with the key industries in the region.

Perceived Barriers

One barrier to moving forward included a keen awareness that individuals with the right mix of skills to really drive technology adoption weren't readily available in the region (at least in large quantities). Secondly, it was felt that regional business leaders generally lacked a deep enough understanding of the implications of the technologies to properly incorporate them into their businesses. Awareness raising and general understanding at the leadership level were seen as an important part of an overall workforce development strategy.

HR Challenges

As noted above, the lack of a regionally based talent pool with the skills needed to exploit transformative technology was a clear concern. It was also pointed out that business/corporate culture in the region is traditionally change-averse, and that this would hamper adoption. Red Deer College is a willing partner in helping to close the skills gaps, but they acknowledged the need for closer collaboration with employers (or groups of employers) to be able to become engaged.

Strategy Implementation

The recommended workforce development strategies for the Red Deer region are as follows:

1. *Create a Workforce Development Network with a mandate to bring people together to engage, dialogue and share "lessons learned" and improve innovation adoption across Alberta's supply chain ecosystem (similar to the Rainforest and other models listed in* Appendix E*).*

2. *Develop and deliver targeted training initiatives to address local requirements. Working in partnership with post-secondary institutions and private training providers, the region could augment skill capacity. A "both/and" paradigm as opposed to an "either/or" approach would significantly accelerate development.*

   Building on specific examples tabled during the roundtable, the region could consider using the Ontario Manufacturing Learning Consortium (OMLC) approach, which uses accelerated apprenticeship models and collaboration between employers and education providers to provide rapid, responsive training and upskilling.

   The BioWork model in North Carolina is another example to consider. Its customized curriculum improves job prospects for attendees while addressing the specific skills gaps identified by employers. Both of these initiatives are more fully explained in *Appendix E*.

Appendix C – Labour Market Information

LMI Analysis: Identification of 15 Key Occupations in Supply Chain

Supply chain management is the process of strategically managing the flow of goods, services, finance and knowledge, as well as relationships within and among different organizations to realize greater economic value.

The 15 occupations listed below are anticipated to be critical to the success of the supply chain in Alberta. The ranking structure gives a simple picture of the status of the labour for each occupation in each year of the 2015-2021 forecast period. This information is drawn from the 2011 *Accelerator: Call to Action* report published by the Calgary Logistics Council and labour market data compiled and reported by the Canadian Supply Chain Sector Council.[41][42]

The chart demonstrates that significant growth in job demand, combined with labour supply challenges, will characterize the workforce requirement for the 15 key supply chain occupations between 2015 and 2021.

NOC Code	Occupation	2015	2016	2017	2018	2019	2020	2021	Expected Compound Annual Growth Rate (2017 to 2021)
2172	Database analysts and data administrators								6.1%
1122	Professional occupations in business services to management: consulting, compliance								4.4%
0113	Purchasing managers								3.8%
1215	Supervisors, recording, distributing and scheduling occupations								3.5%
0213	Computer and information systems managers								3.6%

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[41] Canadian Supply Chain Sector Council. (2011). *The Accelerator Project: A Call to Action*. Retrieved from http://apgst.ca/projects/pdfs/accelerator_hr_full_report_reduced.pdf.

[42] Canadian Supply Chain Sector Council. (2017). *Supply Chain Sector Facts and Figures*. Retrieved from http://www.supplychaincanada.org/assets/u/Sector-FactsandFigures-English.pdf.

Code	Occupation								Growth
2171	Information systems analysts and consultants	Medium	High	High	High	High	High	High	3.2%
2175	Web designers and developers	Medium	Medium	Medium	High	High	High	High	3.2%
1523	Production logistics coordinators, expediters, logistics planners, analysts, etc.	Medium	Medium	Medium	High	High	High	High	3.1%
4163	Marketing researchers and consultants such as forecast specialists, demand management specialists, etc.	Medium	Medium	Medium	High	High	High	High	3.1%
0714	Facility operation and maintenance managers	High	High	High	High	High	High	High	2.4%
1225	Purchasing agents and officers	Medium	High	High	High	High	Medium	Medium	1.0%
0016	Senior managers – goods production, utilities transportation and construction	High	High	High	High	High	Medium	Medium	0.7%
0731	Transportation managers	High	High	High	High	High	Medium	Medium	0.6%
1315	Customs, ship and other brokers	Medium	High	High	High	High	Medium	Medium	0.5%
7411	Truck drivers	Medium	Medium	Medium	Medium	Medium	Medium	Medium	

Medium	= Medium growth
High	= High growth

LMI Forecast

As of 2017, there were approximately 881,326 workers in the supply chain sector labour force within Canada (excluding truck drivers). The annual labour force growth rate in the supply chain sector is expected to be around 1.1% from 2017 to 2021, resulting in a projected 920,783 workers in 2021.

Over the 2017–2021 time period, demand is expected to increase across the majority of supply chain occupations. The greatest increase in job growth is expected to occur in professional and high-tech occupations (as shown in the above chart).

Demand in some lower-tech occupations is expected to be flat and could decelerate, depending on how fast disruptive technologies are adopted. These occupations include:

- Shippers and receivers
- Delivery and courier service drivers
- Material handlers
- Labourers in food processing.

As well as an anticipated continuation of growth in new jobs, the supply chain sector is expected to face challenges filling jobs left vacant due to retirements and worker turnover. For over two decades, labour market forecasts and analyses have identified the challenges and opportunities of the "baby boom bubble." In 2011, the baby boom cohort began to turn 65. The rate of retirement will increase significantly over the next 10 years, as more and more boomers decide to leave the labour force. The Accelerator report states that "supply chain occupations will lose 30% or more of the initial labour force by the end of the forecast period."[43]

This high proportion of labour attrition, combined with the adoption of transformative technologies, has business leaders concerned about productivity and lost experience. The competition for talent means that education, training and ongoing professional development are more essential than ever to instill the technical skills, keep pace with current trends and hone business and leadership abilities to harness value creation across the supply chain sector.

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[43] Canadian Supply Chain Sector Council. (2011). *The Accelerator Project: A Call to Action*, p 24. Retrieved from http://apgst.ca/projects/pdfs/accelerator_hr_full_report_reduced.pdf.

Appendix D: Detailed Methodology

Recruitment and Participation

Partnership Approach

The strategy used to get the right people into the room (i.e., those who represented a variety of industry sectors in each region) was to engage the help of local/regional partners who have extensive local networks.

To generate adequate participation, local/regional organizations that could help identify unique aspects to their respective economic/sector/regional priorities (i.e., economic-development organizations, chambers of commerce, trade/industry and professional associations, post-secondary institutions and Regional Innovation Networks) were targeted.

The following list of regional partners provided access to their business networks:

- Cold Lake – Rural Alberta Business Centre
- Lethbridge – Lethbridge Chamber of Commerce
- Edmonton/Nisku – Leduc-Nisku Economic Development Association
- Fort McMurray – Keyano College

Other partners included:

- Airdrie Chamber of Commerce
- Calgary Chamber of Commerce
- Calgary Economic Development
- City of Red Deer
- Construction Owners Association of Alberta
- Edmonton Chamber of Commerce
- Edmonton Economic Development
- Fort McMurray Chamber of Commerce
- Grande Prairie Chamber of Commerce
- Grande Prairie Regional College
- Lethbridge College
- Northeast Alberta Information Hub
- Red Deer Chamber of Commerce
- Rural Alberta Business Centre

Provincially based organizations, such as the Alberta Chambers of Commerce, Canadian Manufacturers and Exporters, Supply Chain Management Association of Alberta and Resource Industry Supplier Association, were also recruited to assist in getting the word out and encouraging participation in the roundtables.

In each region, selected partners were asked to co-host their regional roundtable. They were also asked if they could provide an appropriate meeting space with adequate parking, plus refreshments and snacks as they deemed appropriate.

Pre-Session Engagement

To garner interest and increase engagement, pre-reading materials in blog formats were developed and posted in the public domain. The goal of these communications was to put context around the reasons for the roundtables, highlighting the skills strategy objectives.

A short survey regarding the identified disruptive technologies was field tested and was subsequently adapted to reflect a skills strategy. The survey was then sent through the local/regional partners' networks as the first regional recruitment tool.

Roundtable invitations and a number of e-blasts for the roundtables were then forwarded through local/regional partners' membership and networks.

Roundtable registrants received a package of pre-reading material to orient them to the roundtable topics. They were also asked to fill in a short questionnaire ahead of the session to provide the facilitation team with background information, allowing them to tailor/focus the sessions to specific local concerns.

Using the results of these pre-surveys, each regional roundtable facilitation team developed a short "igniter" presentation that identified three key questions about disruptive technologies specific to their region. These presentations were designed to orient attendees and provide focus for their roundtable.

Roundtable Participation

Participation varied by region and was impacted by a number of factors. Each workshop could accommodate a maximum of 50 attendees, with an objective of 25 per session.

Overall, the participation is as shown in the table below.

Location	Number of Attendees	Number of Registrants	Participation Percentage	Percentage of Target Group Attended (Registered)	
Calgary/Airdrie	13	19	68%	52%	(76%)
Cold Lake	16	24	67%	64%	(96%)
Edmonton/Nisku	24	39	62%	96%	(156%)
Fort McMurray	12	18	67%	50%	(72%)
Grande Prairie	6	12	50%	24%	(48%)
Lethbridge	35	50	70%	140%	(200%)
Red Deer	21	31	68%	84%	(124%)
Total	127	193	66%	73%	(110%)

In a number of cases, participation levels may have been impacted by inclement weather (Cold Lake and Calgary) and regional economic conditions (Grande Prairie and Fort McMurray).

Roundtable Execution Plan

Workforce Roundtables

Seven regional workforce roundtables were conducted in the following locations in early 2018:

- Grande Prairie region (January 22)
- Cold Lake region (January 23)
- Edmonton region (January 24)
- Lethbridge region (February 13)
- Calgary region (February 14)
- Red Deer region (February 15)
- Fort McMurray and Wood Buffalo region (February 21)

Roundtable Session Format

Roundtable sessions were designed to last approximately three hours, and used the following format.

Introduction

Attendees were welcomed by the facilitator, given a brief orientation to the agenda, and asked to identify themselves, their organization, specialty and specific motivation for attending the session to the group. The facilitator then used the pre-developed "igniter" presentation to present three key questions and to further orient attendees and focus them on the regional issues to be discussed at the roundtable.

Roundtables

The attendees were grouped five to six attendees per table. Scribes recorded the interactions at the tables.

The groups spent 20 minutes internally discussing and debating each of the three questions, recording their thoughts and observations. A final question focused on detailing specific actions that could or should be taken to address concerns raised by the "igniter" questions was posed.

Table Recaps

Each group presented the results from their table. Open discussion followed, with a view to determining consensus on key issues and actions.

Facilitated Q&A/Discussion

The facilitator led an open discussion to explore in greater detail the key questions or other areas of concern.

Wrap-Up

Sheets from tables and summaries were collected at the end of the session to assist in report development.

Appendix E – Workforce-Development Partnerships

All over the world, there are specialized companies and programs dedicated to fostering public/private partnerships as a key economic and workforce-development activity. The following are examples of innovative workforce development in Canada, the U.S. and Europe.

Canada

Workforce development, like education, is under the jurisdiction of the provincial and territorial governments. Approaches vary across the country, with a focus on specific regional concerns. Economic development, innovation, and skills development are intrinsically related, although the degree of integration of these activities is somewhat variable across jurisdictions.

Of these programs, the one most relevant to preparing workers for emerging technologies is the Canada Job Grant, which may reimburse training costs for both new hires and existing employees, in some circumstances up to 100% of the costs can be reimbursed.

In order to take advantage of government assistance, employers must first identify the skills gaps and determine appropriate methods to reduce the gaps, and then find third-party training providers to deliver the training necessary to close the gaps. There are other considerations and restrictions, which are outlined on the CAJG website and in a downloadable employers guide.

Training to fill specific needs related to technology adoption in the sector appears to be tailor-made for the job grant program, and it makes sense to assemble consortia of local employers, workers and training providers to maximize the benefits of the program.

Other interesting and innovative approaches to solving specific skills needs have been tried in other jurisdictions, some of these are detailed below.

Ontario

Ontario Manufacturing Learning Consortium (OMLC)

OMLC is a non-profit agency dedicated to solving skills gaps through innovative, competency-based workforce-development initiatives that are based on European-style accelerated apprenticeship models, and through collaborative efforts between employers and education providers. The key is rapid upskilling that is responsive to employers' immediate needs for competent people.

One of the hallmarks of this approach is that is 'demand driven' – that is, employers engage new workers before any training commences. This differs from the more usual 'supply side' approach to training workers, where training is provided and then graduates are left to find work after completion. In the demand-driven paradigm, only the required training necessary to give the worker specific skills is undertaken, which greatly shortens the training time and increases the engagement of both the worker and the employer in the process. Employers define the competencies needed, and OMLC screens potential

job candidates to find potential employees who are a good fit. The employer hires, and then training occurs on the job to the maximum extent possible.

The approach has proven successful for specific types of work in the manufacturing and aerospace sectors, but the general principles could be applied across any number of talent segments and industries.

The OMLC work in Ontario has been done via private sector training providers rather than the traditional post-secondaries, possibly because the duration of the required training doesn't fit well with their funding formulae. There is nothing in the approach that precludes public-sector training and education providers from taking part.

Overall, the approach has proven capable of delivering skills with speed and efficiency that is simply unmatched by traditional approaches, [44] and has enormous potential as a rapid skills development model for addressing specific skills gaps related to technology.

Manitoba

Red River College, Manitoba

Investments in training infrastructure, particularly in rural areas, are important. However, it is often unrealistic to dedicate facilities for short-term initiatives. One interesting option (as outlined in a report to the Manitoba government on post-secondary institutions in that province), discussed joint-use "applied research and training" platforms as a cost-effective tool for improving regional learning outcomes.[45] These types of facilities, equipped with leading-edge technology and funded through joint federal (NSERC) and provincial (advanced education) efforts, allow quality learning for regular students, while providing regional companies with facilities for training their workforce.

One notable example of this type of facility is at Red River College's (RRC) Stevenson Campuses in Winnipeg and Portage La Prairie, Manitoba. These facilities serve dual roles; not only do they train RRC students for careers in the aviation and aerospace manufacturing and maintenance fields, but they also serve as training facilities for programs customized to meet the needs of regional aerospace employers, such as Boeing Canada and the Bristol division of Magellan Aerospace. Some of these programs are delivered by the college, while others are employer-delivered courses that make use of the training facilities.[46]

The 'shared infrastructure' approach could work well for industry clusters in a region, or where one or more large employers in a particular sector are located in a particular geographic region. There is great potential to consider this model for addressing technology-related skills gaps within supply chain.

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[44] Ontario Manufacturing Learning Consortium. (2018). Retrieved from http://www.omlc.ca/about-us.

[45] Usher, A. & Pelletier, Y.Y. (2017). *Government of Manitoba: Manitoba College Review– System-Wide Report.* Toronto: Higher Education Strategy Associates. p 3.

[46] Usher, A. (2018, March 22). *A challenge and an opportunity in college education* [blog post]. Retrieved from http://myemail.constantcontact.com/One-Thought-to-Start-Your-Day--A-Challenge-and-An-Opportunity-in-College-Education.html?soid=1103080520043&aid=r61p9bA0Buo.

It seems clear that there are a number of successful initiatives in Canada that could be adopted or adapted for the specific needs of the supply chain industry in Alberta.

There are other examples from outside of Canada that can provide additional 'food for thought' around addressing workforce development challenges.

The United States

Higher Education Partners (HEP), Rhode Island

HEP acts as a "matchmaker" between colleges and companies to access capital to fund the development of new training facilities when government money to do so may not be available. One of its success stories is Bristol Community College in Massachusetts, which worked with HEP and Allied Health to renovate a vacant department store and turn it into a new campus for training health care workers. Programs have expanded year over year and represent a significant gain for the Cranston community.[47]

Apprenticeship Program 2000, North Carolina

The Apprenticeship 2000 program is an innovative collaboration between five manufacturing companies and Central Piedmont Community College (CPCC). The partnership is focused on initial workforce development, but also includes ongoing skills upgrading and continuing education for those who wish to advance in their careers and integrate new skills into advancing technology workplaces. The quick response of CPCC to emerging community needs is a big reason why the companies in the consortium continue to thrive in the area.[48]

Community College of Rhode Island (CCRI)

CCRI is actively restructuring its continuing education division to directly serve employers and better align with the state's economic priorities. It is building "ongoing partnerships with companies to keep it current on industry trends and operate training programs responsive to and in sync with the labour market."[49] For example, the college is currently working with the Indian technology services firm, Infosys, to help recruit and train 500 employees for its new design and innovation hub in Providence, Rhode Island.

Workforce Innovation in Regional Development (WIRED) Program, U.S.

The WIRED program was a U.S. Department of Labor initiative aimed at boosting economic activity in particular geographical regions through collaborative partnerships of multiple federal departments, state and local governments, community colleges, employers, social agencies and other stakeholders. Each region was given a grant of $100,000 to fund the development of a local workforce development

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[47] Higher Education Partners – Innovative Learning Solutions (2017) Retrieved from http://www.higheredpartner.com/higher-education-partners-about-us/.

[48] Apprenticeship 2000. (2018). Retrieved from http://www.apprenticeship2000.com/zwp/.

[49] Selingo, J. (2018, March 22) *The Third Education Revolution*. The Atlantic. Retrieved from https://www-theatlantic-com.cdn.ampproject.org/c/s/www.theatlantic.com/amp/article/556091/.

plan, and then $5 million over three years for that plan to be implemented. Results have been impressive, with commentators remarking that, while the overall concepts aren't new, the decentralized execution through regional networks (soft infrastructure), rather than physical infrastructure, with funding from the federal level, was a key to success.[50]

Biowork Initiative, North Carolina

Community colleges across North Carolina run an innovative non-credit program called BioWork that was developed and customized in collaboration with biotechnology companies to train job seekers for entry-level technician jobs in pharmaceuticals, chemical-product manufacturing and biomanufacturing. The program is available at 12 community colleges in North Carolina and targets high school graduates, workers who have lost their jobs in the traditional manufacturing sector and workers in lower-wage jobs. All eligible applicants are accepted at the community college of their choice, with enrollees typically choosing the college closest to their residence. Within sub-regions, individual colleges customized the BioWork curriculum for North Carolina employers, which improved job prospects for attendees.[51]

Europe

Digital Strategy, UK

In the UK, the government's Digital Strategy is committed to testing new approaches to lifelong learning that will allow people to retrain and upskill throughout their working lives. The initiative includes experimenting with AI and innovative educational technology in online digital-skills courses so that learners can benefit from this emerging technology, wherever they are in the country.

The strategy also includes elements to allow and encourage businesses – particularly small and mid-sized companies (SMEs) – to fully embrace the digital economy. They have announced a "Business Basics" pilot to support SMEs that have the potential to improve their productivity, but lack management capacity, practical resources and/or capability to adopt productivity-boosting technologies.[52]

Tax Credit, Italy

The Italian government provides a tax credit to companies that are training/retraining their workforce on transformative technologies. There is additional funding available to post-secondary educators to develop more high-tech specialization and training for the next-generation labour force. One key pillar of this initiative is the promotion of hands-on, competency-based learning.[53]

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[50] Marcuse, A. & Glassmaker, A. (2008). *Overhauling and Revitalizing Federal Economic Development Programs*, Economic Development Quarterly, Vol. 22, No. 2: p 83.

[51] Goldstein, H. A., Lowe, N. & Donegal, M. (2012). *Transitioning to the New Economy: Individual, Regional and Intermediation Influences on Workforce Retraining Outcomes*. *Reg. Stud.* **46,** 105–118. Quoted in Columbia Basin Rural Development Institute. (2017, Spring). *Rural Workforce Development Strategies*, p 8.

[52] Chairs Summary: G7 Ministerial Meeting on Preparing for Jobs of the Future. (2018, March) p 13. Retrieved from https://g7.gc.ca/wp-content/uploads/2018/05/Chairs_summary_preparing_jobs_future.pdf.

[53] G7, Op cit., p 14.

Mittelstand 4.0, Germany

Mittelstand 4.0 Competence Centres provide a wide range of awareness-raising, information, testing and training programs on digital technology, again with a focus on small and medium-sized businesses. For example, these centres deliver programs (such as Go-Inno, Go-Digital) that are designed to assist SMEs in acquiring the relevant competencies and capacities to adopt transformative technology. Additionally, this initiative develops recommendations for new training methods and presents best-practice examples showing how employers and their workforce can work together to create regional solutions to skills issues.[54]

Grande École du Numérique, France

This network offers free, short-duration digital training with no prerequisites. The sessions are specifically targeted at youth, with a goal of training 10,000 persons within 200 certified programs by the end of 2018. One hundred and seventy training programs have been certified as of April 2018.[55]

[54] G7, Op cit., p 14.

[55] G7, Op cit., p 14.