The Conference
Board of Canada

The Labour Market of Tomorrow

Projections From the Model of Occupations, Skills, and Technology (MOST)

Data Briefing | October 11, 2022

Future Skills Centre

The Future Skills Centre – Centre des Compétences futures (FSC-CCF) is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead.

The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint, and The Conference Board of Canada.

If you would like to learn more about this report and other skills research from FSC, visit us at fsc-ccf.ca or contact info@fsc-ccf.ca.
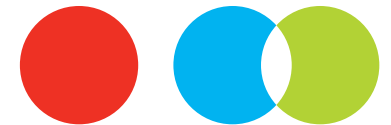
fsc-ccf.ca

Contents

Key Findings

- The Conference Board of Canada has launched a new labour market projection tool, the Model of Occupations, Skills, and Technology (MOST). MOST generates detailed occupational and industry-level projections for every region in Canada and also connects the projected occupations with skills. It is the basis for our analysis.

- Occupations that primarily require secondary school and/or occupation-specific training and those requiring on-the-job training were hardest hit during the pandemic while occupations typically requiring university education suffered the least. In fact, employment increased during the pandemic for many occupations requiring a high level of skill in programming, complex problem-solving, systems analysis, systems evaluation, critical thinking, and mathematics.

- Through 2030, the strongest job gains are expected in roles like web designer and developers, database analysts and data administrators, computer engineering, architecture, finance, veterinary services, and transportation.

- Over the next decade, jobs that typically require university education are projected to post the strongest gains, followed by jobs requiring college education, specialized training, or apprenticeship training.

- In terms of skills, the strongest growth will occur in occupations requiring a high level of functional skills that are more resilient to technological advancements and automation, such as complex problem-solving, systems evaluation, systems analysis, writing, and programming.

- MOST is able to incorporate and isolate the impact of technological change on the demand for specific occupations and skills. We find that some roles like electronic service technicians, mechanical engineers, computer network technicians, database analysts and data administrators, and computer and information systems managers will benefit from automation. Others, like dental technologists, laboratory assistants, data-entry clerks, and bookkeepers could see job losses of up to 8 per cent by 2030.
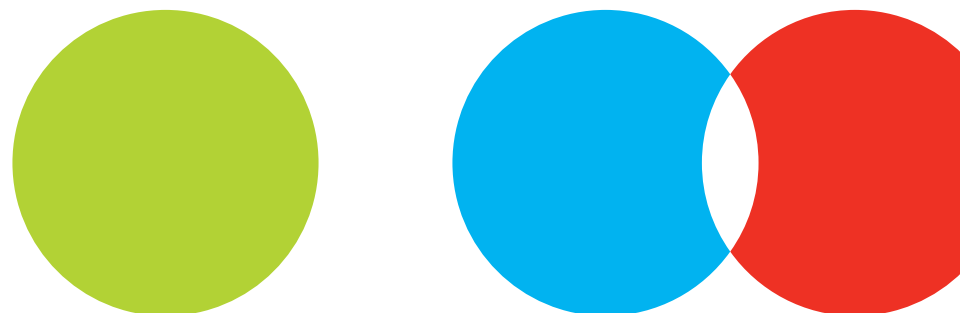
New Model Sheds Light on Changing Labour Market

The Conference Board of Canada has launched a new labour market projection tool, the Model of Occupations, Skills, and Technology (MOST), to inform and reshape the discussion around labour markets using standardized inputs, outputs, and methodologies. (See Appendix A for a more thorough discussion.)

Not only does MOST generate detailed occupational and industry-level projections for every region in Canada, it also connects the projected occupations with skills.[1] This unique feature allows for a more in-depth and holistic view of evolving labour market needs and trends.

Here we use MOST to provide insights into how the COVID-19 pandemic has disrupted traditional labour demand in Canada since March 2020 and will cast a shadow that extends out to 2030. We assess which job types and skills are most likely to see rising demand over this decade. We also assess how automation could potentially impact the demand for different roles and skills.

---

1   Currently the skills incorporated into MOST are based on the 35 skill categories used by the U.S. Department of Labor's Occupational Information Network (O*NET). National Center for O*NET Development, "O*NET OnLine."

The Pandemic Has Had Deep and Long-Lasting Implications for the Labour Market

The pandemic reduced employment in some occupations by one-third or more. Pandemic-induced shutdowns of major segments of the economy resulted in employment in Canada declining by 975,000 jobs, or 5.1 per cent, in 2020.[2] Among the 10 broad occupational categories, the pandemic hit jobs in sales and service and in art, culture, recreation, and sport the hardest. (See Chart 1.)

More specifically, the hardest-hit occupations were those related to sports and tourism—particularly jobs in recreation and entertainment, food and beverage services, and air transportation. (See Chart 2.)
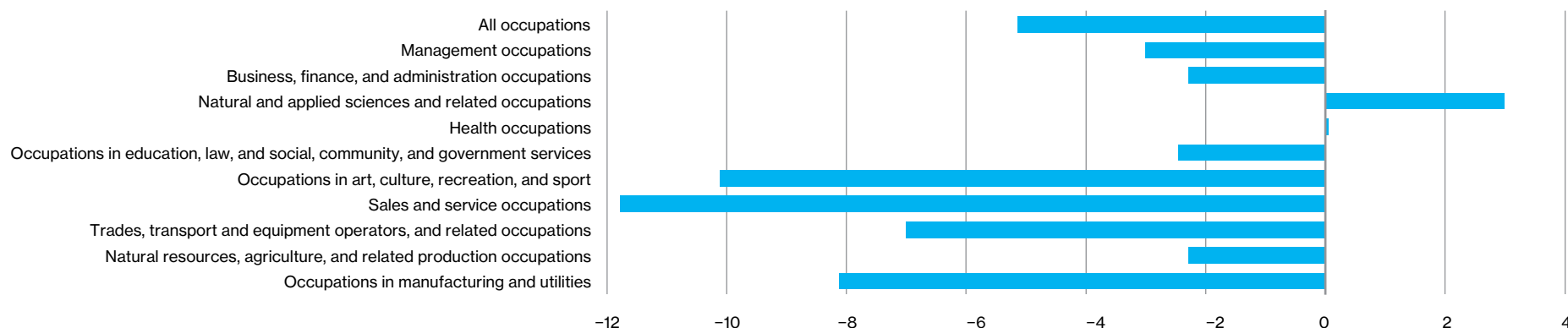

---

2   All employment figures in this data briefing are reported on an annual average basis.

Chart 1

First-Year Impact of COVID-19 on Employment by Occupational Group
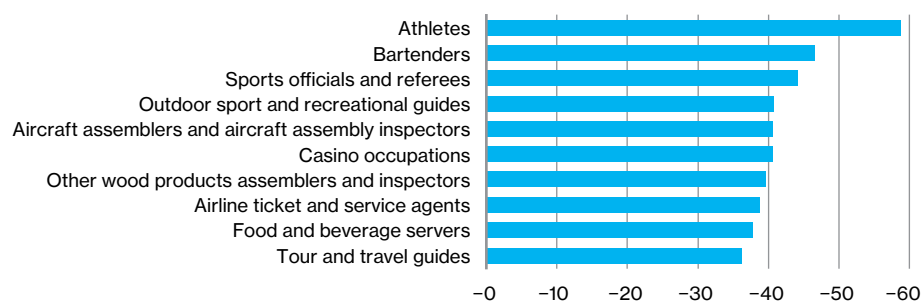(percentage change in employment, by occupational groups, 2019–20)

Source: The Conference Board of Canada.

Chart 2

Hardest-Hit Occupations in First Year of COVID-19
(percentage change in employment, by occupation, 2019–20)

Source: The Conference Board of Canada.

The subsequent recovery in employment has been mixed. Overall employment in 2021 was only 0.7 per cent below pre-pandemic levels. However, the recovery was not felt equally across all occupational groups. (See Chart 3.) While employment in business, finance, and administration occupations and occupations in education, law, health, and social, community, and government services had already fully recovered from the losses experienced in 2020, occupations in art, culture, recreation and sport, sales and service, natural resources, agriculture and related production, and manufacturing and utilities are still recovering.

Through 2022, the overall level of employment in Canada is expected to be higher than in 2019.[3] However, numerous occupations will continue to employ fewer workers than before the pandemic struck because of long-lasting and structural change.

3   Just as the COVID-19 pandemic has created (and will likely continue to create) uncertainty for labour markets, so too will the war in Ukraine. While projected economic ramifications of the war are incorporated in this analysis, the fluidity of the situation will continue to cause uncertainty in labour markets at least over the near term.

Chart 3
Labour Market Rebound Across Occupational Groups
(percentage change in employment, by occupational groups, 2020–21)

- Employment Growth (2021/2020)
- Employment Growth Required to Fully Recover
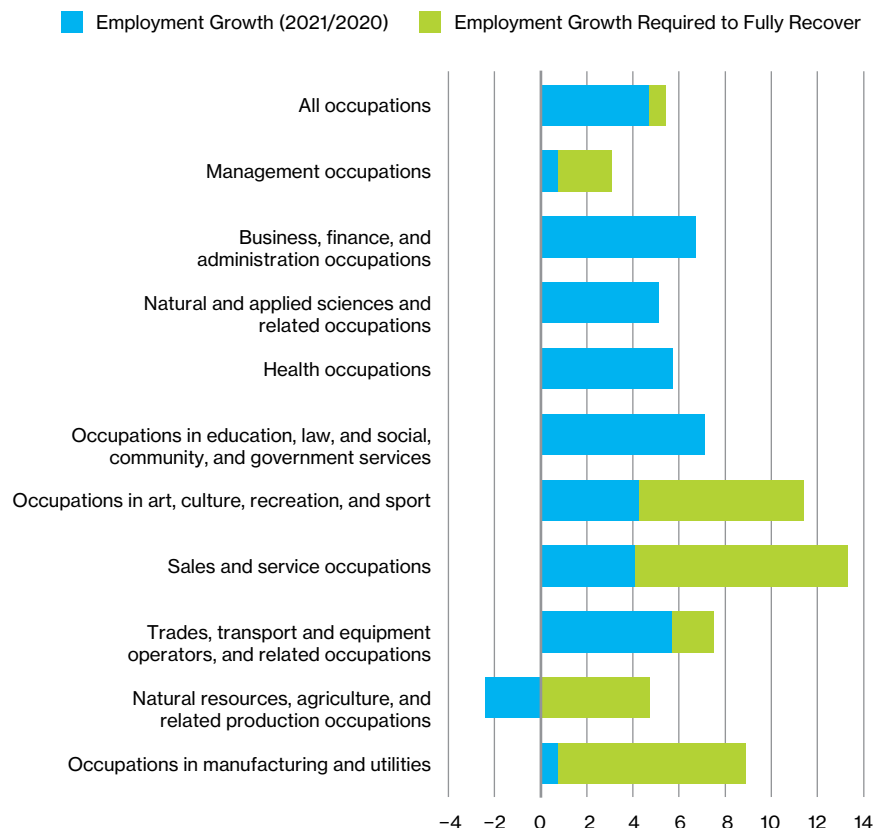
Source: The Conference Board of Canada.

Labour Market Impact

The pandemic will have a long-lasting and structural impact on the labour market.

Various factors will contribute to the fundamental shift in the labour market:

- remote work and hybrid workplace arrangements;

- buying online and pick-up in stores (BOPIS);

- changes in food and beverage services (ghost/virtual kitchens, increased scope in takeout service, and implications associated with remote/hybrid work);

- business travel (increased use of hybrid/virtual conferences and increased acceptance/capacity of videoconferencing);

- medical research and development (boosting internal capabilities to manage health crisis in the future).
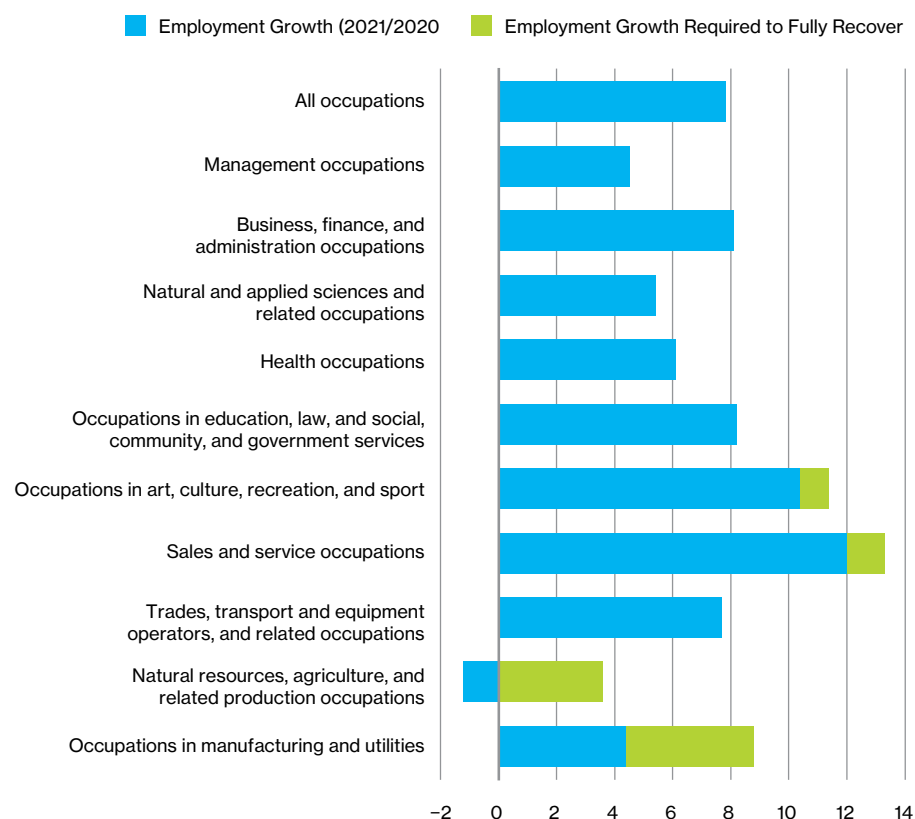
Source: Ice and others, "Expected pandemic-driven employment changes: a comparison of 2019–29 and 2020–30 projection sets." https://www.bls.gov/opub/mlr/2022/article/expected-pandemic-driven-employment-changes.htm.

Aside from occupations in the tourism sector, there will still be fewer jobs in natural resources, agriculture and related production, as well as in manufacturing and utilities. (See Chart 4.)
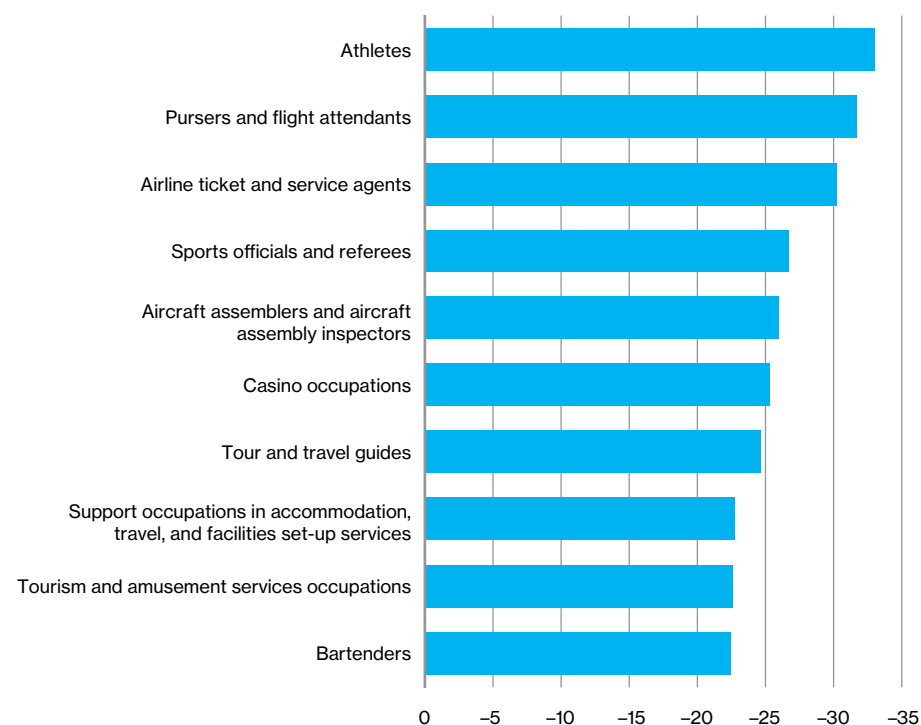
Projections from MOST show that employment in many tourism-related occupations will continue to be significantly below pre-pandemic levels through the end of 2022. (See Chart 5.)

Chart 4
Two-Year Employment Recovery
(percentage change in employment, by occupational group, 2020–22)

Legend:
- ■ Employment Growth (2021/2020)
- ■ Employment Growth Required to Fully Recover

Categories (y-axis):
- All occupations
- Management occupations
- Business, finance, and administration occupations
- Natural and applied sciences and related occupations
- Health occupations
- Occupations in education, law, and social, community, and government services
- Occupations in art, culture, recreation, and sport
- Sales and service occupations
- Trades, transport and equipment operators, and related occupations
- Natural resources, agriculture, and related production occupations
- Occupations in manufacturing and utilities

X-axis: −2, 0, 2, 4, 6, 8, 10, 12, 14

Source: The Conference Board of Canada.

Chart 5
Hardest-Hit Occupations Two Years From Start of Pandemic
(percentage change in employment, by occupation, 2019–22)

Categories (y-axis):
- Athletes
- Pursers and flight attendants
- Airline ticket and service agents
- Sports officials and referees
- Aircraft assemblers and aircraft assembly inspectors
- Casino occupations
- Tour and travel guides
- Support occupations in accommodation, travel, and facilities set-up services
- Tourism and amusement services occupations
- Bartenders

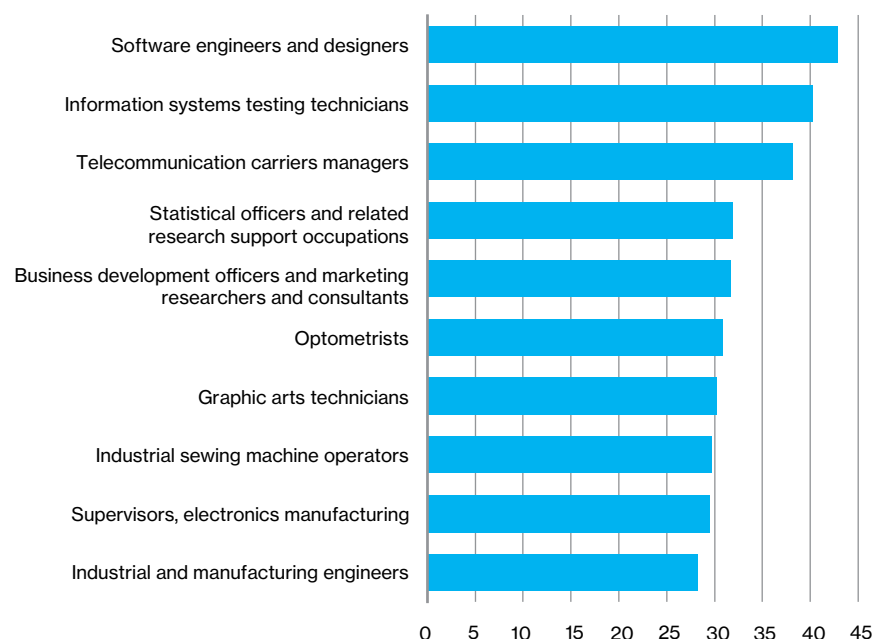X-axis: 0, −5, −10, −15, −20, −25, −30, −35

Source: The Conference Board of Canada.

At the other end of the spectrum are occupations that have done well despite, or possibly because of, the COVID-19 pandemic. (See Chart 6.)

Chart 6
Occupations Thriving Two Years From Start of Pandemic
(percentage change in employment, by occupation, 2019–22)

Software engineers and designers
Information systems testing technicians
Telecommunication carriers managers
Statistical officers and related research support occupations
Business development officers and marketing researchers and consultants
Optometrists
Graphic arts technicians
Industrial sewing machine operators
Supervisors, electronics manufacturing
Industrial and manufacturing engineers

0 5 10 15 20 25 30 35 40 45

Source: The Conference Board of Canada.

Full Recovery From the Effects of the Pandemic Will Take Years for Many Roles

Job Growth Will Slow Beginning in 2023, but Some Occupations Look to Gain

Between 2019 and 2030, overall employment in labour markets is projected to increase 10.2 per cent—that is, just slightly under 1 per cent per year compounded. Despite the modest overall growth, certain occupational groups will perform better than others. (See Chart 7.) In particular, the strongest growth is expected to be concentrated in health occupations and in natural and applied sciences and related occupations.

More specifically, projections using MOST show the strongest jobs gains are expected in fields related to information technology, engineering, architecture, finance, veterinary services, and transportation. (See Chart 8.)

Chart 7

Modest Overall Job Growth Masks Occupational Differences 10 Years Out

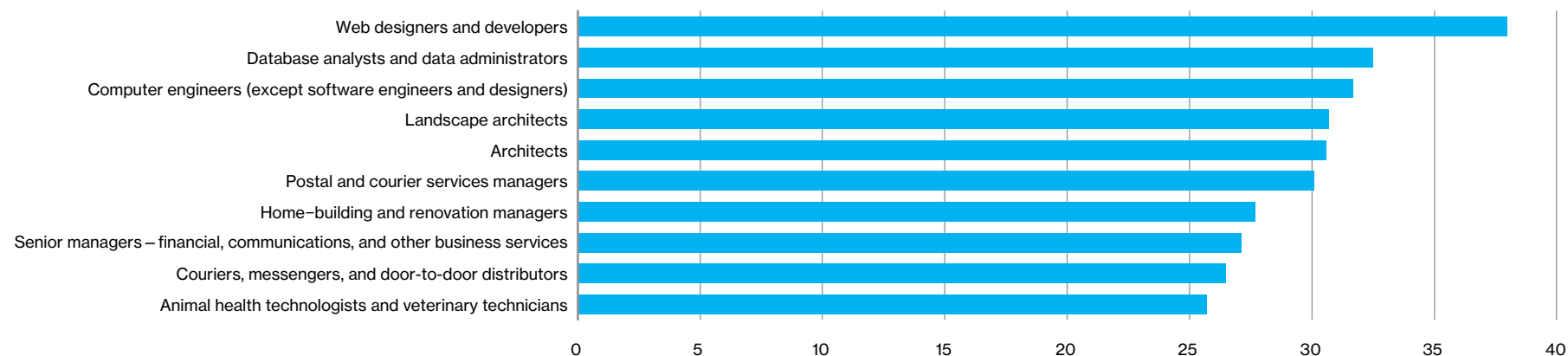(percentage change in employment, by occupational group, 2019–30)
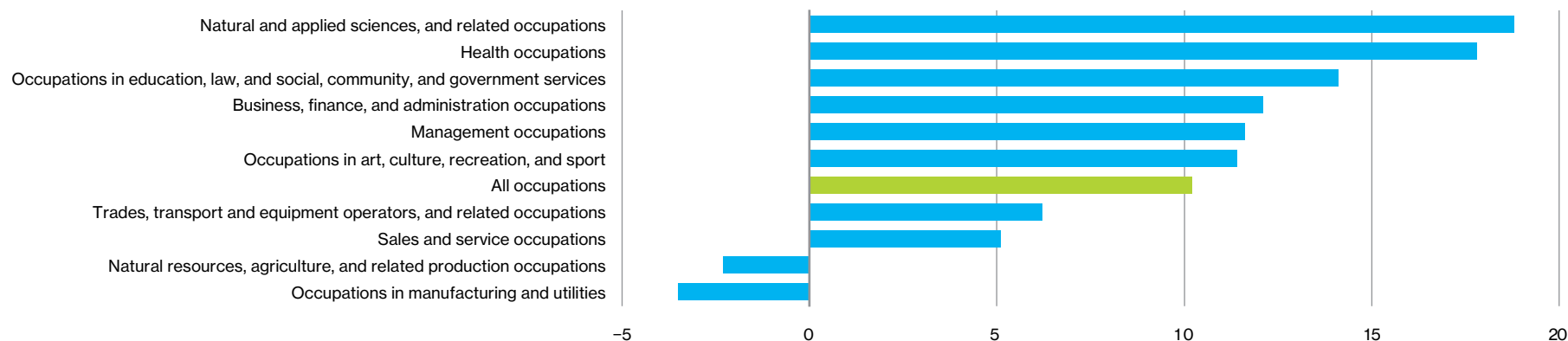
Source: The Conference Board of Canada.

Chart 8

Some Occupations Thriving Despite/Due to COVID-19 10 Years Out

(percentage change in employment, by occupational group, 2019–30)

Source: The Conference Board of Canada.

Those With Higher Educational Attainment Were Least Likely to be Impacted by the Pandemic

The differences in how COVID-19 affected employment are more pronounced when one considers the level of education required for the occupation. The analysis shows the pandemic did not significantly impact occupations requiring a university degree. (See Chart 9.) Using MOST reveals that employment among occupations requiring a university degree, in fact, increased by over 1 per cent in 2020.

While employment in occupations requiring university education posted further gains of 4.4 per cent in 2021, employment in occupations not requiring university education remained below pre-pandemic levels. (See Chart 10.)

Demand for Complex Problem-Solving and Programming Skills Increased

Similar results are found when we use MOST to analyze labour market demand from the perspective of high-level skill requirements in the workplace.[4] While overall employment declined 5.4 per cent in 2020, the demand for occupations requiring a high level of functional skill in particular areas outperformed the overall labour market. (See Chart 11.) Certain skills, such as complex problem-solving and programming, managed to post modest gains.
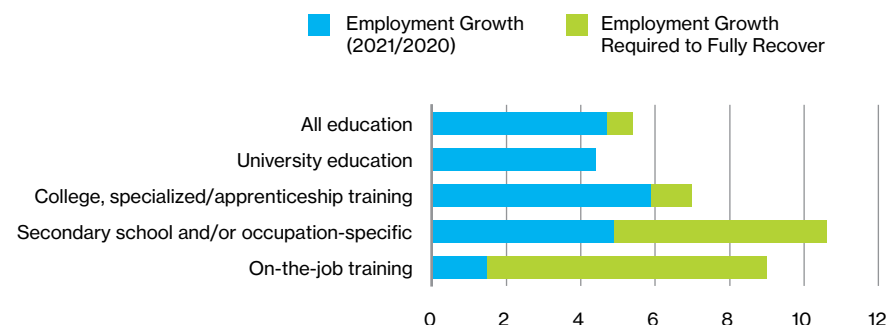
Chart 9

First-Year Impact of COVID-19 on Employment, by Educational Level Required

(percentage change in employment, by educational requirement, 2019–20)
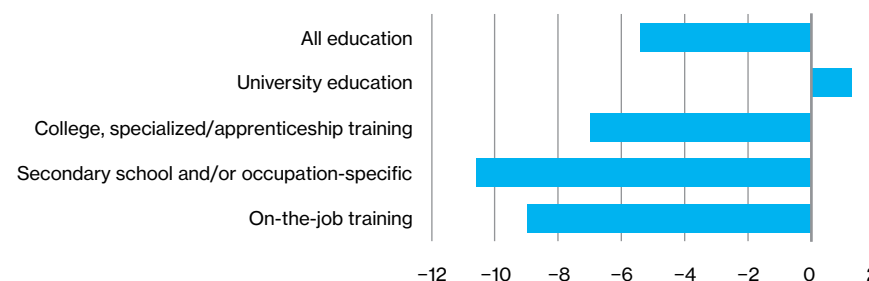
Source: The Conference Board of Canada.

Chart 10

Labour Market Rebound by Educational Level Required

(percentage change in employment, by educational requirement, 2020–21)

Source: The Conference Board of Canada.

4   While most occupations have a rating for both level and importance in nearly all of the 35 skills featured by the O*NET databases (a product developed by the National Centre for O*NET Development and sponsored by the U.S. Department of Labor), this analysis focused on the level of skill and imposed a cut-off on the rating at the 67th percentile and above in order to be deemed high level. (See Appendix A for further details.)

Chart 11
Demand for Some Skills Increased During the Pandemic
(percentage change in employment, by functional skill category, top 10, 2019–20)
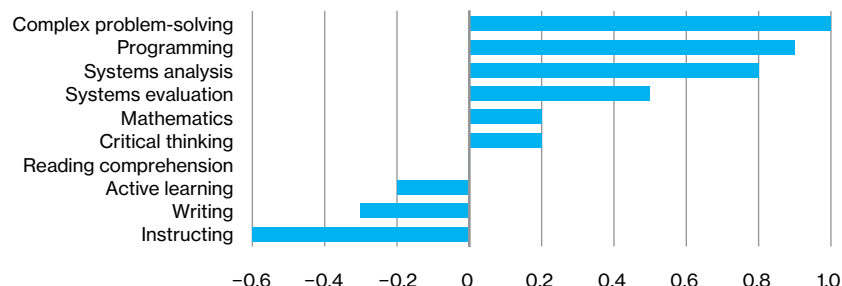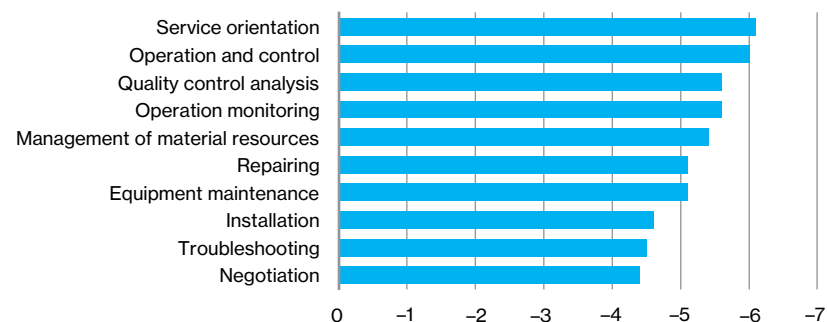

Source: The Conference Board of Canada.

On the contrary, demand for a high level of functional skills that require workers' presence on the premise was hit hard during the initial year of the pandemic. (See Chart 12.)

Chart 12
Demand for Skills More Likely to Require an Onsite Presence Declined During the Pandemic
(percentage change in employment, by functional skill category, bottom 10, 2019–20)

Source: The Conference Board of Canada.

The Outlook for Skills

Jobs Requiring University or College Education Will See the Strongest Growth This Decade

Overall, employment is expected to grow by just over 10 per cent between 2019 and 2030. Projections using MOST reveal that occupations requiring a university degree will see the strongest demand, followed by occupations requiring college education, specialized training, or apprenticeship training. (See Chart 13.)

Stronger employment growth among occupations requiring highly trained and highly educated workers is likely because such workers are relatively more resilient to technological advancements and automation. Automation is a broad term used to account for various new technologies, all with the potential to disrupt labour markets by displacing demand for workers and changing skill requirements of occupations.

Chart 13
Jobs Requiring Post-Secondary Education Will Experience the Strongest Growth
(percentage change in employment, by education level required, 2019–30)
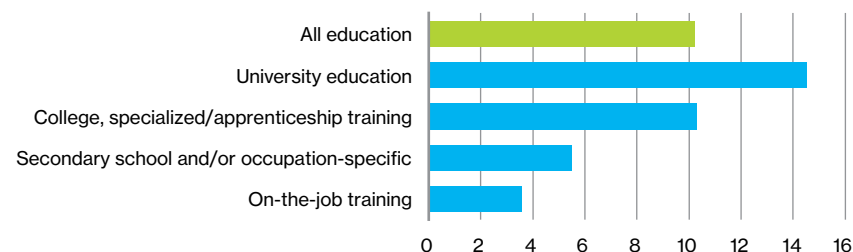
Source: The Conference Board of Canada.

Many functional skills found to be resilient to the effects of the Pandemic also possess the strongest growth prospects, particularly in the face of automation.
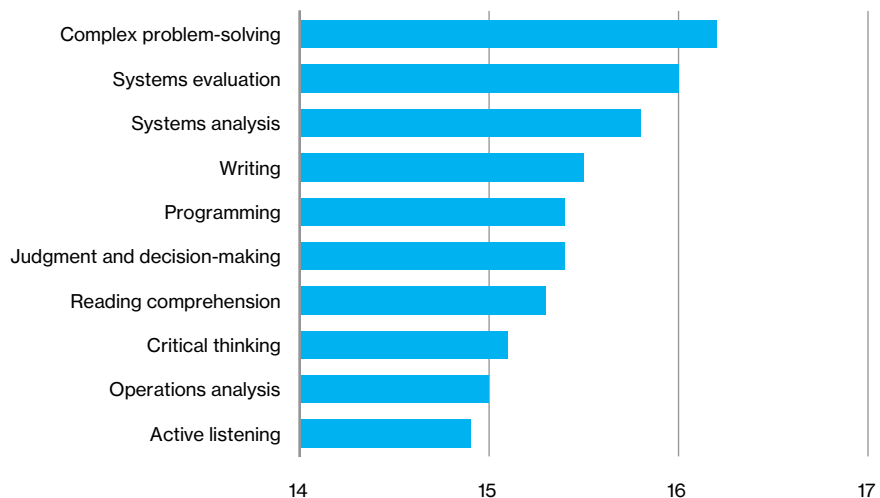
Automation Will Impact the Mix of Skills in Demand

Occupations that require high levels of functional skills that are more resilient to technological advancements and automation, such as complex problem-solving, systems evaluation, systems analysis, writing, and programming, are projected to experience stronger demand this decade. (See Chart 14.)

High levels of functional skills that are associated with occupations at risk of automation will see more modest gains in demand. These skills include equipment maintenance, repairing, equipment selection, and operation and control monitoring. (See Chart 15.)

Chart 14
Skills With the Strongest Demand Outlook
(percentage change in employment, by functional skill, top 10, 2019–30)

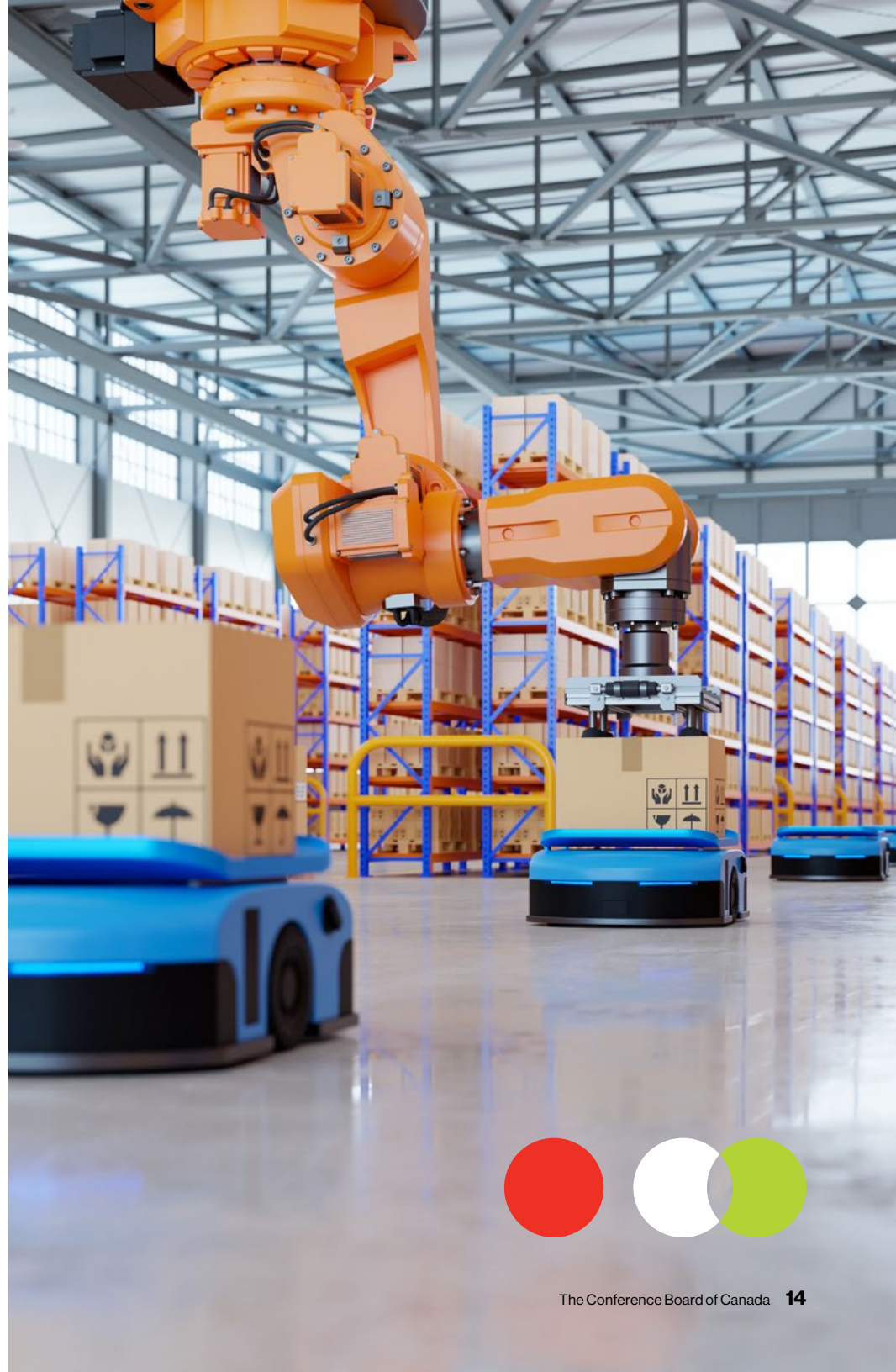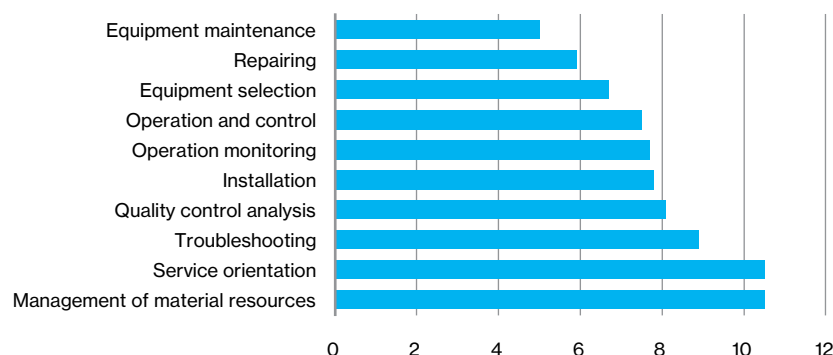| Skill	
Complex problem-solving	
Systems evaluation	
Systems analysis	
Writing	
Programming	
Judgment and decision-making	
Reading comprehension	
Critical thinking	
Operations analysis	
Active listening	

Source: The Conference Board of Canada.

Chart 15
Skills That Are Common in Roles at Highest Risk of Automation Will Experience the Weakest Growth
(percentage change in employment, by functional skill, bottom 10, 2019–30)

Source: The Conference Board of Canada.

MOST Reveals Regional Differences in Skills Demand Growth

The skill specializations most in demand in the various regions have many similar themes; however, the ranking of the top 10 reveals distinctive features along with a few unique elements. (See Table 1.)

In Atlantic Canada, jobs requiring a high level of skill in science is projected to experience the strongest demand. This strong demand will be largely attributable to solid growth in various health occupations, including professional occupations in nursing, technical occupations in health, and assisting occupations in support of health services. Atlantic Canada is also the only region with "instructing" as a skill among the top 10 growth projections. The demand for this skill also comes from various health occupations as well as from other occupations in front-line public protection services, including non-commissioned ranks of the Canadian Armed Forces.

Table 1
Regional Demand for Functional Skills Out to 2030, Top 10
(ranked strongest growth projections among functional skill categories, 2019–30)

Rank	Atlantic Canada	Central Canada	Western Canada	Northern Canada
1	Science	Complex problem-solving	Writing	Systems analysis
2	Complex problem-solving	Systems evaluation	Reading comprehension	Judgment and decision-making
3	Systems analysis	Systems analysis	Active listening	Systems evaluation
4	Systems evaluation	Judgment and decision-making	Programming	Complex problem-solving
5	Writing	Operations analysis	Complex problem-solving	Writing
6	Judgment and decision-making	Programming	Systems evaluation	Reading comprehension
7	Operations qnalysis	Writing	Judgment and decision-making	Critical thinking
8	Reading comprehension	Critical thinking	Systems analysis	Active listening
9	Instructing	Reading comprehension	Critical thinking	Monitoring
10	Programming	Active learning	Active learning	Active learning

Source: The Conference Board of Canada.

Given its large population base, the skills demanded in Central Canada follow, to a large degree, those of the overall country. For instance, the demand for complex problem-solving skills will be attributable to the growth in demand for various professional occupations in natural and applied sciences, including information systems analysts and consultants, and computer programmers and interactive media developers.

Western Canada stands out for having writing skills in the top position, with large contributions projected to come from numerous management occupations, including retail and wholesale trade managers as well as various occupations in education, law, and social, community, and government services.

Northern Canada will have the similar skill requirements as the rest of the country, but it is the only region to have "monitoring" in the top 10 future skills in demand. The demand for monitoring skill is projected to be led by growth from various occupations in education, law, and social, community, and government services—including lawyers, social policy researchers, consultants, and program officers.

Automation Will Have Measurable Impacts on the Skills and Occupations

From the labour demand perspective, technological innovation influences the level and composition of the workforce, the need for specific skills, and the tasks performed by workers.

Currently, there is ample speculation that the pace of innovation is poised to quicken and that its impact on the labour market could be significant. One technological change that is projected to have widespread impacts for labour markets is automation. Automation is a broad term used to account for various new technologies, all with the potential to dramatically disrupt labour markets by displacing demand and changing skill requirements. Artificial intelligence, machine learning, and robotics are specific applications of automation. By 2030, there will be clear winners and losers in terms of labour demand because of automation.

Projections using MOST reveal that the largest gains from automation are projected to occur for natural and applied sciences and related occupations, followed by management occupations; occupations in art, culture, recreation, and sport; education; law; social, community, and government services; and health occupations. Meanwhile, the largest losses from automation are projected to occur for occupations in manufacturing and utilities, followed by business, finance, and administration occupations; trades, transport, and equipment operators; and sales and service occupations. (See Chart 16.)

A more granular level of analysis using MOST reveals that certain occupations could benefit from automation, namely electronic service technicians, mechanical engineers, computer network technicians, database analysts and data administrators, and computer and information systems managers. (See Chart 17.)

Chart 16

Impact of Automation on Labour Demand by 2030

(percentage change in employment relative to no automation, by broad occupational categories)
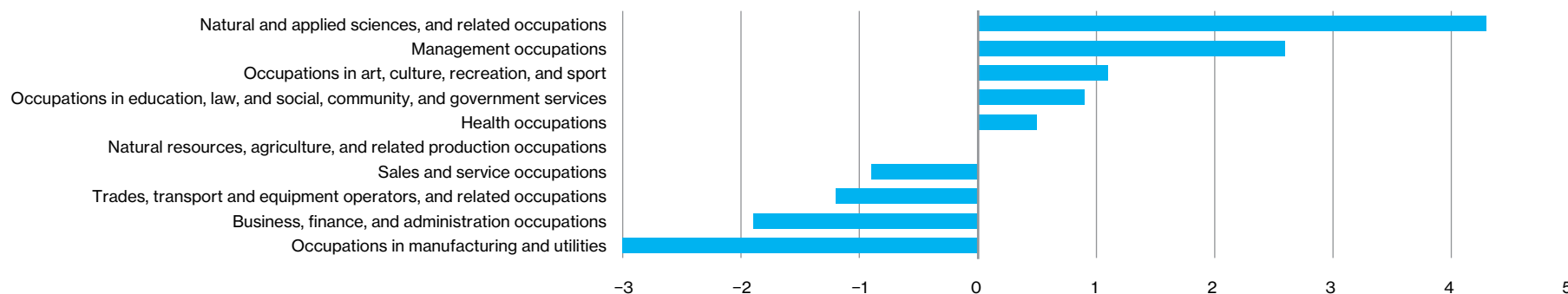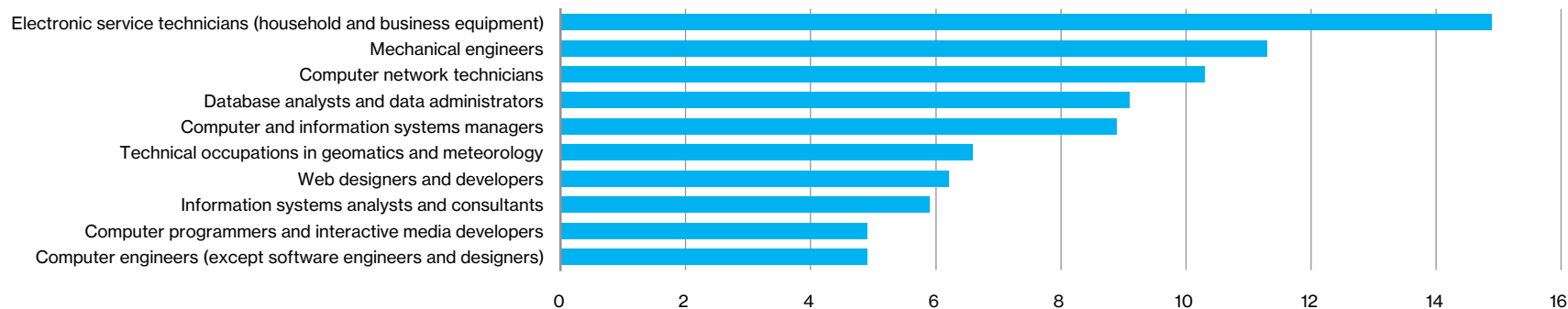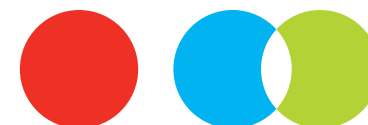

Source: The Conference Board of Canada.

Chart 17

Occupations That Will Benefit From Automation by 2030

(percentage change in employment relative to no automation, by occupation)

Source: The Conference Board of Canada.

Meanwhile, occupations that stand to lose the most from automation include dental technologists; technicians and laboratory assistants; photographic and film processors; camera, platemaking, and other prepress occupations; data-entry clerks; and accounting technicians and bookkeepers. (See Chart 18.)
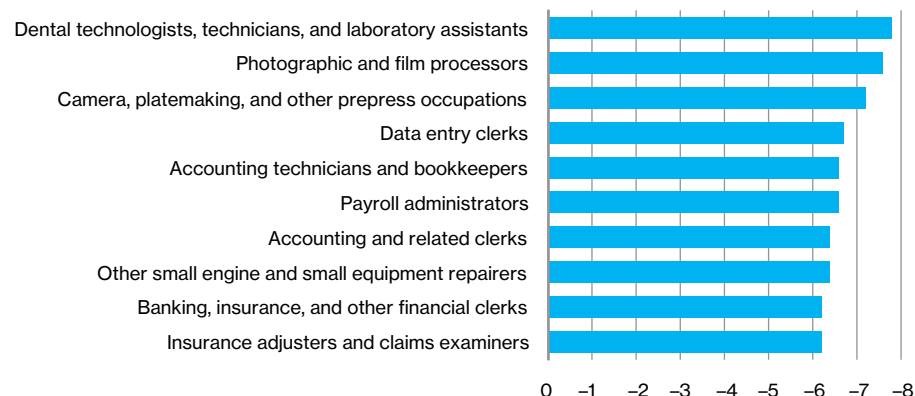
In relation to overall employment, automation is expected to have the largest positive impact on occupations that require a university degree. Meanwhile, many occupations requiring college degree, secondary school, or occupation-specific training are likely to experience some level of adverse effect of automation. (See Chart 19.)

From the perspective of skill specialization, occupations requiring a high level of skill in systems analysis, complex problem-solving, systems evaluation, and operations analysis are projected to benefit the most from automation. (See Chart 20.)

Chart 19

Automation Will Increase Demand for Higher Education by 2030

(percentage change in employment relative to no automation, by education)

Source: The Conference Board of Canada.

Chart 20

Automation Will Increase Demand for Certain Skills by 2030

(percentage change in employment relative to no automation, by skill specialization)

Source: The Conference Board of Canada.

Chart 18

Occupations That Will Suffer Due to Automation by 2030

(percentage change in employment relative to no automation, by occupation)
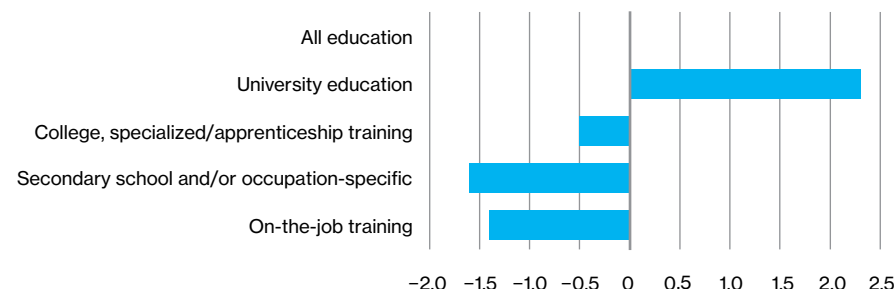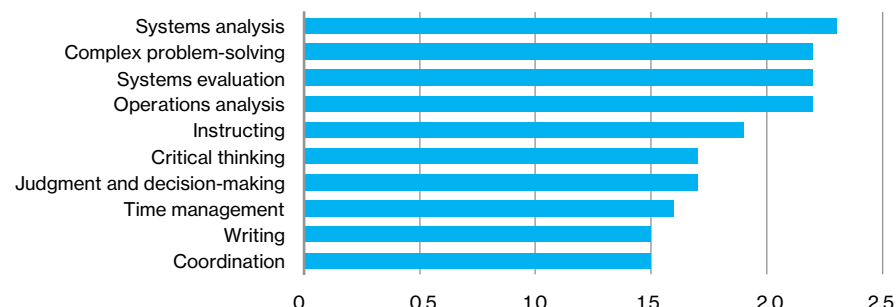
Source: The Conference Board of Canada.

Conclusion

Results from the new Model of Occupations, Skills, and Technology shed light on the immediate and longer-term effects of the pandemic on Canadian labour markets. Occupations that primarily require secondary school and/or occupation-specific training and those requiring on-the-job training were hit the hardest during the pandemic. Meanwhile, occupations typically requiring university education suffered the least.

In addition, jobs that typically require university education are projected to post the strongest gains beyond the COVID-19 recovery period. The strongest job gains are expected to be among occupations in natural and applied sciences as well as in the health sector. A few of the strongest-growth occupations include web designers and developers, database analysts and data administrators, and computer engineers.

Many of the functional skills required for occupations that were most resilient during the pandemic are also the skills that are projected to increase the most over the next 10 years, even in the face of technological advances and automation.

These skills specializations include a few core competencies, such as reading comprehension, writing, and mathematics. They also include process skills like critical thinking and active listening. All three systems skills (judgment and decision-making, systems analysis, and systems evaluation) generated strong growth outlooks in MOST, as did the cross-functional skill, complex problem-solving.

Within the category of technical skills, installation, operations analysis, and programming are identified as skills that provide solid employment stability through uncertainty and strong prospects for future growth. Meanwhile, instructing is perhaps the one social skill that has these features as well.

Our future research will use MOST to understand the vulnerabilities and opportunities on occupational employment and the demand for skills arising from each of the distinct technological advancements frequently grouped under the umbrella of automation. We will also probe the extent to which the labour supply, shaped by formal and informal training, work experience, and immigration, will be able to meet labour demands in the future. The findings from this research are expected to uncover vulnerable areas and mismatches in the labour market and provide insights to policy-makers where attention is needed most.

Appendix A

Methodology

Underlying Assumptions

MOST has been developed using a wide variety of credible and regularly updated data sources, including the Conference Board's own national and provincial/territorial economic forecasts that span both the medium term (five-year horizon) and longer term (20-year horizon). In essence, MOST is designed so that aggregate employment projections (at the 2-digit NAICS[1] level) align with the most recent Conference Board projections. Given that the Conference Board's economic and demographic projections are regularly updated, the projections presented in this data briefing reflect a particular point in time—coinciding with the Conference Board's most recent economic and demographic perspective of labour markets in Canada.

It should be noted that employment projections produced by MOST, as well as those from the Conference Board's own national and provincial/territorial economic forecasts, assume that the demand for labour will largely be met within the economy. While this may seem like an important (and potentially bold) assertion to make, this implies that the inner workings of the labour market will adapt to escalating imbalances and inefficiencies. This does not mean labour market adaptation will eliminate imbalances and inefficiencies in the labour market; rather, it means interactions within the labour market are dynamic. In fact, it will be through the interactions of labour demand and labour supply in MOST that the extent of changes required to allow the economy to perform at the levels projected will become evident.

On this basis, it is important that basecase projections of MOST remain consistent with the Conference Board's aggregate employment projections, which are interwoven within a broader range of economic, demographic, and fiscal assumptions devised to create the projections.

While these assumptions largely explain how the aggregate employment projections (largely at the 2-digit NAICS level) are derived, there are considerable discrete movements to account for at the 3- and 4-digit NAICS levels as well as at the occupational level. In this respect, MOST, once again, relies on a variety of sources to assist in adjusting the relative performance of industries at the 3- and 4-digit NAICS level to that of the more aggregate 2-digit NAICS level to which they fall under.

How We Infill Historical Data

The most detailed source depicting how the labour market operates in Canada comes from Statistics Canada's census. Until detailed employment data from the 2021 Census are released, MOST incorporates detailed data from the 2016 Census. This includes employment by 4-digit NAICS and 4-digit NOCS[2] by province and territory and forms the data platform upon which both the historical estimates and projections are based around.

Different sources are used to make the adjustments over historical periods where reported data at detailed levels do not exist (or do not exist reliably) as well as over both the short- and longer-term future time horizons. Historical data at a detailed level are informed by the annual labour force survey at a national level that primarily tracks industry performance at the detailed (4-digit NAICS) level between 2015 and 2021. The relative performance of national-level data indicating performance of industries at the detailed 4-digit NAICS level is assumed to hold at both the provincial and territorial levels; however, a further adjustment is made to ensure that higher-level aggregations of employment at the various 2-digit industry levels continue to align with estimates from the respective Conference Board provincial and territorial employment projections (estimates) at the 2-digit level.

---

1   The North American Industry Classification System (NAICS) is the system used by statistical agencies in Canada, the United States, and Mexico to classify industries.

2   The National Occupational Classification (NOC) is Canada's system for classifying occupations.

How We Construct Forecasts

To construct credible estimates at more detailed 3- and 4-digit NAICS level over the short-term horizon, it is imperative to account for dramatic swings in performance contributed by the COVID-19 pandemic. Here, it is important to, first, understand the degree to which the COVID-19 pandemic has already impacted industry performance (at the 3- and 4-digit levels) as well as on occupations. Once again, detailed annual data from the Labour Force Survey (at both an industry and occupational level) are used. These data not only allow for a current understanding of the degree to which the COVID-19 pandemic has impacted "relative" performance (again from the perspective of 3- and 4-digit NAICS industries to that of the respective 2-digit NAICS to which it belongs but also to key occupations relative to one another). By understanding the recent performance (in both 2020 and 2021 due to the pandemic), estimates can be made relative to a recovery path out to 2025.

Most industries and most occupations are assumed to rebound to a pre-pandemic (or 2019) level before 2025; however, some industries and occupations may require further time or may never fully recover. In many instances, the path of recovery is aided by incorporating more detailed real GDP projections (usually at a 3-digit NAICS level) that originate from the Conference Board's National economic model. It should be noted that to use these real GDP projections to help adjust relative performance of industries at more disaggregated levels under their respective 2-digit level (where employment projections are available), it requires that the GDP projections are further adjusted to account for their relative labour productivities at that level. Here, MOST incorporates historical estimates that reflect relative labour productivities at the level corresponding to the GDP data.

Longer-term employment trends are themselves informed from various sources, including changes that have occurred at both an industry and occupational basis (at a 4-digit level) over the past two censuses (2016 and 2011). This trend will be further updated when detailed employment data are released for the 2021 Census. The longer-term trends are integrated in a manner that allows the historical trends to have a bigger influence earlier in the longer-term projection period (2025), with its effect gradually diminishing over time.

Another source used to determine longer-term trends is the industry and occupations projections from the U.S. Bureau of Labor's 10-year projections.[3] Contrary to the approach used to integrate historical trends observed over the past two Canadian census periods, the trends observed from the U.S. data are integrated in a manner that allows this source to have a bigger influence toward the end of the longer-term forecast horizon (2030) as opposed to earlier on (2025). The trends captured from the two distinct perspectives are integrated such that the resulting underlying trends incorporate both a historical perspective and a forward-looking perspective. As each source gets updated, the changes will also be integrated into MOST.

Skills

Another integral data source used by MOST is the skills profiles of occupations developed and maintained by the O*NET databases, specifically the profiles that assess occupations based on level and importance for 35 distinct skills specializations.[4] Here the 35 skills are categorized under seven broader skill category bundles, which themselves roll up into two main skill categories descriptors—Basic and Cross-Functional Skills. While the actual rating assignments of each occupation to each of the 35 skills (both in terms of level and importance) is originally done using the U.S.-based Standard Occupational Coding (SOC) coding, previous work from the Conference Board has produced a crosswalk of those ratings to apply to the Canadian NOC that is used in MOST.[5]

The crosswalk that was applied to the ratings also had an additional benefit of standardizing the ratings of each occupation between 0 and 100 for both level and importance (two discrete units of measurement).[6] While there tends to be significant alignment between the rating of each skill on level and importance, this study focused only on the rating related

3 While the industry breakdowns from the U.S. Bureau of Labor largely align with the coding of industries used in Canada, occupations require a specific mapping that shows a concordance between different occupation coding systems, including that of Statistics Canada, "Correspondence: National Occupational Classification (NOC) 2016 Version 1.3 to Standard Occupational Classification (SOC) 2018 (US)."
4 National Center for O*NET Development, "O*NET OnLine."
5 The Conference Board of Canada, *Modelling Job Transitions in Canada*.
6 Ibid.

to level. Considering that the rating for each skill is not binary (0 or 1) but instead wide-ranging (from 0–100), it is necessary to establish a reasonable cut-off value to represent a distinctive feature of the rating. In this case, the cut-off chosen to represent a high-level value of each skill was that the rating of the skill needed to be at the 67th percentile or higher. The cut-off level chosen effectively means that the occupation was rated in the top third for that skill. It should be noted that the choice of a different cut-off value would undoubtedly yield different results. If too low a cut-off level was chosen (i.e., 0 percentile), then no differentiation would be noted and the outlook for all skills would be identical and just match the overall growth of all occupations. Conversely, if too high a cut-level was chosen (i.e., 95th percentile), then this would run the risk of putting too much emphasis on only very high-level skills and effectively eliminate most of the occupations in the economy. It is expected that future applications of MOST will strategically target the use of different cut-off values to not only understand the outcomes associated with labour demand but also potential mismatches as results from the labour supply perspective are integrated.

Technology

To account for the impact of technology, MOST builds upon the work of McKinsey & Company to identify the proportion of tasks that can be automated and the work of Frey and Osborne to assess the likelihood that it will occur over the next 10–20 years.[7] In essence, the impact on occupations is calculated as being the product of both the proportion and likelihood. This approach effectively differentiates the impact of automation on an occupational basis. To be conservative, the aggregate effect of automation is assumed to represent 50 per cent of the actual product of the proportion and likelihood with the full effect only slated to occur by 2040. From a phasing-in perspective, MOST assumes that the pace of automation will begin to impact labour markets in 2023 and increase on an annual basis until it achieves the full effect in 2040.

Given that the Conference Board's medium- and long-term economic forecasts are assumed to represent only "most likely scenario," the projections stop short of explicitly specifying either the level or scope by which automation is assumed to occur. In this respect, it may be assumed that the projections implicitly incorporate a "modest" assumption regarding automation. Without a means to compare economic projections derived by varying the level or scope of automation, the assumption incorporated into MOST is that automation will create as many jobs as it potentially takes away. In addition, if new (and yet unnamed) occupations were to eventually be "spun off" (i.e., captured by NOC using new categories) through automation, they are assumed to naturally flow out of occupations that have a stronger-than-average outlook. These assumptions represent important caveats to consider when examining the derived impacts of automation generated through MOST.

---

7   See also Brookfield Institute for Innovation + Entrepreneurship, "The Talented Mr. Robot."

Appendix B

Bibliography

Brookfield Institute for Innovation + Entrepreneurship. "The Talented Mr. Robot: The Impact of Automation on Canada's Workforce." Accessed May 1, 2022. https://brookfieldinstitute.ca/the-talented-mr-robot.
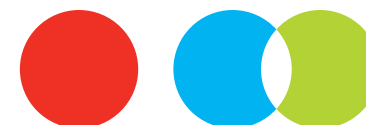
Conference Board of Canada, The. *Modelling Job Transitions in Canada*. Ottawa: The Conference Board of Canada, March 16, 2021. Accessed August 19, 2022. https://www.conferenceboard.ca/temp/d06d509f-ee47-48ec-9b72-dda028fa95c5/10870_25042_primer_modelling-job-transitions-in-canada.pdf.

Dubina, Kevin S., Lindsey Ice, Janie-Lynn Kim, and Michael J. Rieley. "Projections Overview and Highlights, 2020–30." *Monthly Labor Review*, October 2021. Accessed August 19, 2022. https://fraser.stlouisfed.org/title/monthly-labor-review-6130/october-2021-609979/projections-overview-highlights-2020-30-614199.

Lindsey Ice, Michael J. Rieley. "Expected pandemic-driven employment changes: a comparison of 2019–29 and 2020–30 projection sets". *Monthly Labor Review*, February 2022. Accessed August 19, 2022. https://www.bls.gov/opub/mlr/2022/article/expected-pandemic-driven-employment-changes.htm.

National Center for O*NET Development. "O*NET OnLine." n.d. Accessed August 19, 2022. https://www.onetonline.org/.

Statistics Canada, "Correspondence: National Occupational Classification (NOC) 2016 Version 1.3 to Standard Occupational Classification (SOC) 2018 (US)." November 23, 2020. Accessed August 19, 2022. https://www.statcan.gc.ca/en/statistical-programs/document/noc2016v1_3-noc2021v1_0.

The Labour Market of Tomorrow: Projections From the Model of Occupations, Skills, and Technology (MOST)
The Conference Board of Canada

To cite this research: Conference Board of Canada, The. *The Labour Market of Tomorrow: Projections From the Model of Occupations, Skills, and Technology (MOST)*. Ottawa: The Conference Board of Canada, 2022.

Where insights meet impact