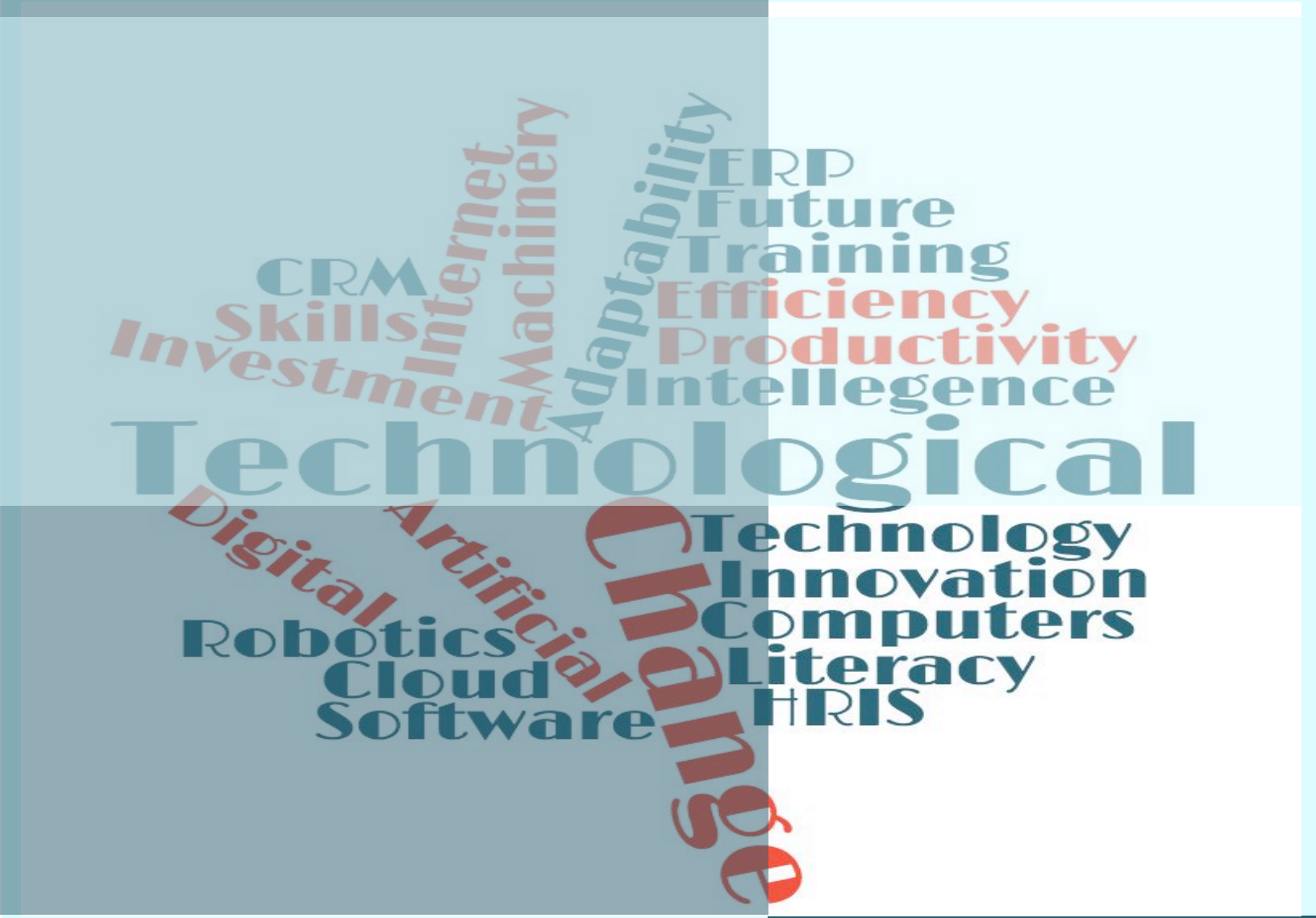

Canada Alberta

Applications Management Consulting Ltd.

Calgary & Area
Labour Market Report

Technological Change
and Impacts on the Workforce
Results from the 2017 Calgary & Area Employer Survey

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Introduction

Organizations implement or adopt new technologies for a variety of reasons - to speed up processes and save time, reduce costs, increase sales, reduce errors, increase market reach, better meet customer needs and preferences, manage information, and increase employees' options for flexible work arrangements to name just a few. In some cases, these technological changes directly impact employers' workforces, while in other cases, the impacts are minimal.

"We've added new software to expand the range of services we can offer to meet client needs. As a result of the technological advancements, we were able to hire two more consultants and two of our senior project managers required more training."
- Construction Employer

Technological change can have both positive and negative effects on an organization's workforce. On one hand, adopting new technology creates new jobs by enhancing the productivity of workers and creating new products and markets. On the other hand, the use of technology also allows for greater streamlining of processes, replacing workers for certain tasks. In addition, technological change is reshaping the demand for certain skills in the workplace, requiring organizations to hire workers with different skill sets or upgrade the skills of current workers with on the job training. The effect of all these scenarios on an organization's workforce can vary depending on the type of technology adopted, the size of the organization and the industry sector.

This report is focused on the technological changes that Calgary and area employers have implemented or plan to implement, and how these technological changes impact:

- ✓ the number of workers needed;
- ✓ training needs; and
- ✓ employee job descriptions.

In addition, this report explores the most important skills workers need when it comes to technological change, from the perspective of Calgary and area employers.

This report is based on a survey of 803 Calgary and area employers conducted between January 1 and December 31, 2017.

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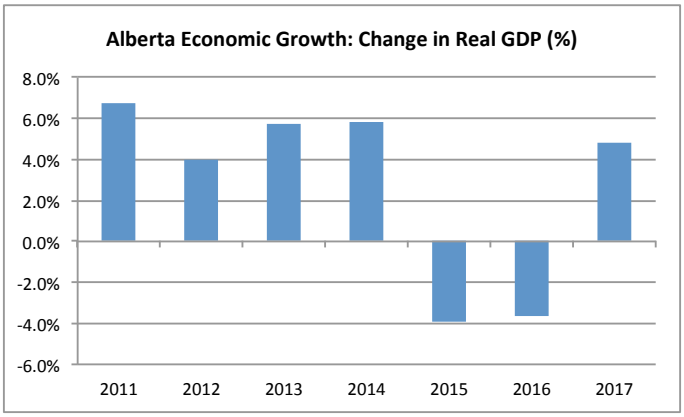
Economic Context

Before presenting the results of the 2017 Calgary & Area Employer Survey, it is important to understand the economic context in which the survey was conducted.

Following one of the worst recessions of the last 40 years, Alberta's economy grew by 4.9 per cent in 2017, the fastest among the 10 provinces. Output in Alberta's good-producing industries rose by an impressive 7.9 per cent, led by significant growth in the mining and oil and gas (+13.3 per cent) and manufacturing (+8.1 per cent) sectors. Output in the province's services-producing industries rose 2.9 per cent in 2017, led by growth of 10.1 per cent in the wholesale trade sector and 6.6 per cent in the transportation and warehousing sector. Despite the broad-based recovery, the construction sector remained weak in 2017, with output contracting nearly 1.0 per cent.



Source: Statistics Canada CANSIM Table: 36-10-0402-01

The price of West Texas Intermediate (WTI) oil continued to improve throughout 2016 and 2017, after hitting a low of US$26 per barrel in mid-February 2016. As the global oil market became more balanced due mainly to global supply cuts and oil demand improvements, the price of WTI finished 2016 at around US$50 per barrel and further strengthened to near US$60 per barrel by year-end 2017.

Job creation picked up in the province in 2017, although weaknesses remained in some segments of the labour market. Employment in Alberta rose by 23,100 or 1.0 per cent in 2017, with most of the job gains in wholesale trade (+9,700) and transportation and warehousing (+8,300).[1] Unfortunately, construction sector employment was unable to recover from the recession, posting annual job losses of 10,900. Employment in the other services sector and retail trade sector also declined by 7,200 and 4,800 respectively. Alberta's unemployment rate dropped to 7.0 per cent in December 2017, the lowest rate in two years.[2]

"There was a resurgence in provincial economic activity in 2017, following a two-year recession made worse by the devastation of the 2016 Fort McMurray wildfires. [...] From business output to household spending, much of the economy improved throughout the year."

Alberta Treasury Board and Finance, Economic Spotlight, March 2018.

[1] Statistics Canada, CANSIM Table: 14-10-0023-01.

[2] Statistics Canada CANSIM Table: 14-10-0287-01.

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Following two years of significant contraction in 2015 (-3.2 per cent) and 2016 (-3.7 per cent) brought on by the collapse in oil prices, the Calgary Census Metropolitan Area (CMA) economy bounced back even stronger than was anticipated in 2017, posting growth of 6.9 per cent. Output grew across all major industries, with the primary and utilities (+13.5 per cent), wholesale trade (+10.3 per cent) and retail trade (+8.9 per cent) sectors leading the way. Economic growth in the Calgary CMA is expected to moderate relative to 2017's rebound, with real GDP growth forecast at a rate of 2.0 per cent in 2018. Leading sectors should include wholesale and retail trade, health care services, and warehousing and storage. While Calgary is unlikely to again be the fastest growing CMA in the country (as it was in 2017), growth should come in slightly above the provincial average of 1.8 per cent.[3]

Total employment in Calgary rose by 3.3 per cent in 2017 - a gain of about 26,300 jobs. The average number of unemployed people in the Calgary CMA fell from 83,200 in 2016 to 76,800 in 2017, pushing the unemployment rate down from 9.4 per cent in 2016 to 8.5 per cent in 2017.[4] Employment in Calgary is forecast to increase by 2.4 per cent in 2018 (20,200 net new jobs). Most major industries are forecast to grow in 2018, with retail trade (+3,700), health care and social assistance (+3,200) and professional, scientific and technical services (+2,000) leading the way. The only industry expected to shed jobs is construction, where no growth is expected until 2020.[5]

[3] Applications Management Consulting Ltd., Calgary & Area Employment Forecast: 2017>Winter.

[4] Statistics Canada, CANSIM Table: 14-10-0096-01.

[5] Applications Management Consulting Ltd., Calgary & Area Employment Forecast: 2017>Winter.

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Calgary & Area Employer Survey Results - Overall Results

Employer Survey Overview

Since 2006, Applications Management Consulting Ltd. has been surveying Calgary and area employers on behalf of Alberta Community and Social Services about their labour market practices. A roll up of results since 2008 is captured in the Q4 2017 Calgary & Area Labour Market Report.[6]

Over the course of 2017, telephone surveys were conducted with 803 Calgary and area[7] employers across 10 industry categories:

- ✓ Q1 2017: 201 Large-sized companies with 100+ employees;
- ✓ Q2 2017: 200 Medium-sized companies with 50 - 99 employees;
- ✓ Q3 2017: 201 Small-sized companies with 10 - 49 employees; and
- ✓ Q4 2017: 201 Micro-sized companies with <10 employees.[8]

Employers were surveyed on their recruitment and retention practices, including questions about company expansions and downsizes, layoffs, vacant positions, future employment, recruitment methods, recruiting difficulties, employee turnover, and retention strategies.

Supplemental questions on technological changes and impacts on the workforce were added to the 2017 employer survey and results form the basis of the remainder of this report.

The 803 employers surveyed employed approximately 132,151 people. Of this total, 62 per cent were full-time employees, 22 per cent were part-time employees, and 16 per cent were either contract, seasonal, casual, temporary or relief staff.

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[6] Alberta Community and Social Services, 2017>Q4 Calgary & Area Labour Market Report,pages 55-98 https://www.alberta.ca/calgary-employment-services.aspx#toc-4

[7] Calgary and area includes the city of Calgary, communities west to Lake Louise, including Banff, Canmore and Cochrane, east to Chestermere, north to Crossfield, including Airdrie, and south to Cayley, including High River and Okotoks.

[8] See Appendix A for additional details.

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How many people does your company employ in the Calgary region?

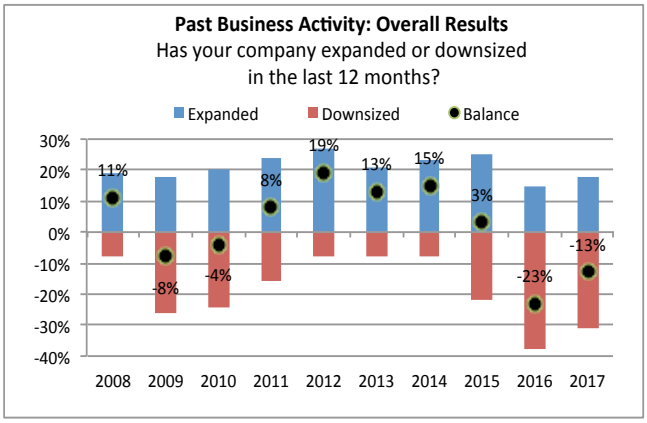
Industry	Total Employees	Number of Companies
Mining & Oil & Gas	6,728	80
Construction	6,718	80
Manufacturing	5,996	80
Wholesale & Retail Trade	19,587	81
Transportation & Warehousing	7,693	80
Professional, Scientific & Technical Services	6,113	80
Health Care & Social Assistance	45,797	80
Accommodation & Food Services/Arts & Entertainment	6,486	80
Finance, Insurance, Real Estate & Leasing	6,010	82
Other	21,023	80
Total	**132,151**	**803**

”Other” represents companies in any of the following industries: agriculture, utilities, information & culture, management of companies, administrative & support services, educational services, other services or public administration.

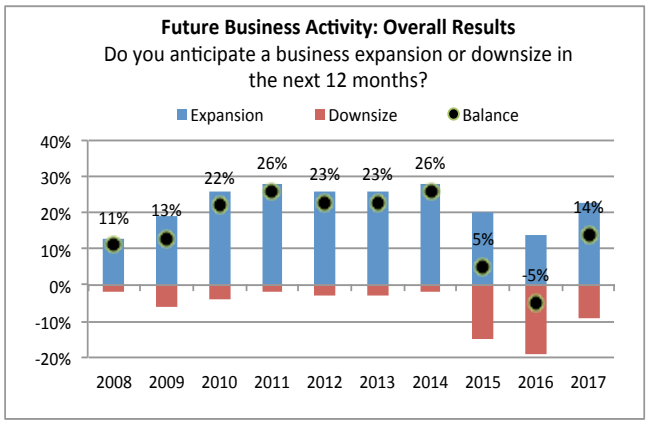
General Highlights

For many Calgary and area employers, 2017 was a year of slow recovery.

Past Business Activity: On balance, 13 per cent of the employers said their company downsized in the year prior to their survey (18 per cent expanded and 31 per cent downsized), an improvement from the 2016 results, when 23 per cent of the employers on balance reported their company downsized. Large-sized employers (19 per cent) and employers in the mining and oil and gas (30 per cent) and construction (29 per cent) industries were more likely to report business downsizing on balance.

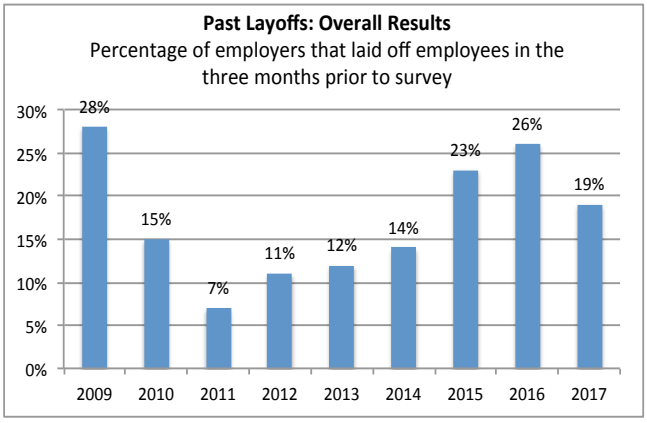


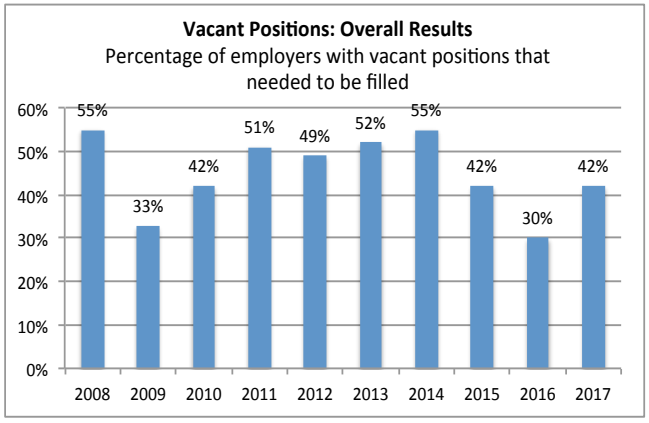
TECHNOLOGICAL CHANGE



Future Business Activity: On balance, 14 per cent of the employers anticipated a business expansion in the year following their survey (23 per cent anticipated an expansion and 9 per cent anticipated a downsize). These results are up significantly from the 2016 results, when 5 per cent of the employers on balance anticipated a business downsize in the year following their survey. Expectations of future business expansion were highest among large-size employers (19 per cent) and employers in the professional, scientific and technical services industry (29 per cent).

Past Layoffs: Nineteen per cent of the employers laid off workers in the three months prior to their survey, down from 26 per cent of the employers in 2016. The percentage of employers reporting they laid off employees was highest in the construction (33 per cent) and wholesale and retail trade (28 per cent) industries.





Vacant Positions: Forty-two per cent of the employers had vacant positions that needed to be filled at the time of their survey, up from 30 per cent in 2016. Employers reporting they had vacant positions was highest among large-sized employers (68 per cent) and employers in the 'other' (53 per cent) and health care and social assistance (49 per cent) industries.

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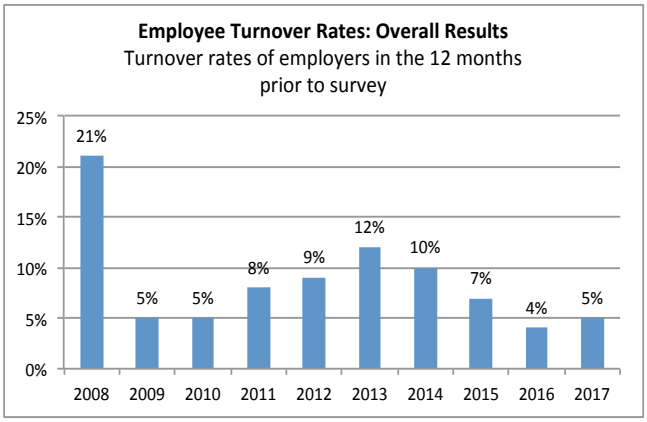
Difficulty Recruiting: One quarter of the employers reported they had difficulty recruiting qualified employees in the 12 months prior to their survey, up from 19 per cent when surveyed in 2016. More small-sized employers (29 per cent) and more employers in the wholesale and retail trade industry (36 per cent) had difficulty recruiting qualified employees.

Employee Turnover Rates: Fifty-nine per cent of the employers reported over 6,800 employees had left their company in the 12 months prior to their survey as a result of voluntary turnover. This equates to an average turnover rate of 5 per cent, up slightly from 4 per cent in 2016. Micro-sized employers (17 per cent) and employers in the accommodation and food services/arts and entertainment industry (22 per cent) had the highest turnover rates on average.



Questions Specific to Technological Change

Employers were asked the following specific questions about past or future technological changes in their company:

- Has your company implemented or adopted any technological changes in the past two years that resulted in: an increase/decrease in the number of workers needed and/or a need for some workers to upgrade their skills with additional training and/or a need for some workers to completely change their job description?
  - If yes, did the technological changes result in an increase or decrease in the number of workers your company needed? Describe the technological change, occupation affected, whether the demand for that occupation increased or decreased, and by how many.
  - If yes, did the technological changes result in a need for some workers to upgrade their skills with additional training? Describe the technological change, occupation affected, whether the training was provided by the employer or by an outside contractor, and how many employees were affected.
  - If yes, did the technological changes result in a need for some workers to completely change their job description? Describe the technological change, occupation affected, the new occupation, and how many employees were affected.
- Does your company plan to implement or adopt any technological changes in the next two years that will result in: an increase/decrease in the number of workers needed and/or a need for some workers to upgrade their skills with additional training and/or a need for some workers to completely change their job description?
  - If yes, do you anticipate the technological changes will result in an increase or decrease in the number of workers your company needs? Describe the technological change, occupation that will be affected, whether the demand for that occupation will increase or decrease, and by how many.
  - If yes, do you anticipate the technological changes will result in a need for some workers to upgrade their skills with additional training? Describe the technological change, occupation that will be affected, whether the training will be provided by the employer or outside contractor, and how many employees will be affected.
  - If yes, do you anticipate the technological changes will result in a need for some workers to completely change their job description? Describe the technological change, occupation that will be affected, the new occupation, and how many.
- If your company has implemented or plans to implement any technological changes, what would you say is the most important skill (or skills) your workers need/will need once this new technology has been successfully implemented or adopted?

Technological Changes

The World Economic Forum, in its *Future of Jobs Report*[9], outlines the top technological drivers of change as rated by survey respondents. These include:

- Mobile internet and cloud technology;
- Advances in computing power and Big Data;
- New energy supplies and technologies;
- The Internet of Things;
- Crowdsourcing, the sharing economy and peer-to-peer platforms;
- Advanced robotics and autonomous transport;
- Artificial intelligence and machine learning;
- Advanced manufacturing and 3D printing; and
- Advanced materials, biotechnology and genomics.

Calgary and area employers describe a variety of technological changes that are impacting their workforces. These include, but are not limited to, information and communications technologies; software; applications; systems; automation; and machinery and equipment. Examples include:

- accounting, payroll, recruiting, applicant tracking, training, property management, registration, marketing, social media, website, sales, banking, finance, inventory control software systems;
- enterprise resource planning (ERP), customer relationship management (CRM), human resources information systems (HRIS) software and systems;
- electronic health records, cloud computing, quality control, scheduling, cyber security, AutoCAD software and systems;
- robotics, 3D printers, phone systems, tablets, desktop computers, laptops, smart phones, SMART Boards and TVs, point of sale systems and kiosks;
- GPS technology, solar energy technology, radiology technology, dental technology, various automated manufacturing technologies.

More detailed information on the types of technologies and impacts on the workforce can be found in the Industry Results section.

[9] World Economic Forum, The Future of Jobs Report, Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, January 2016.

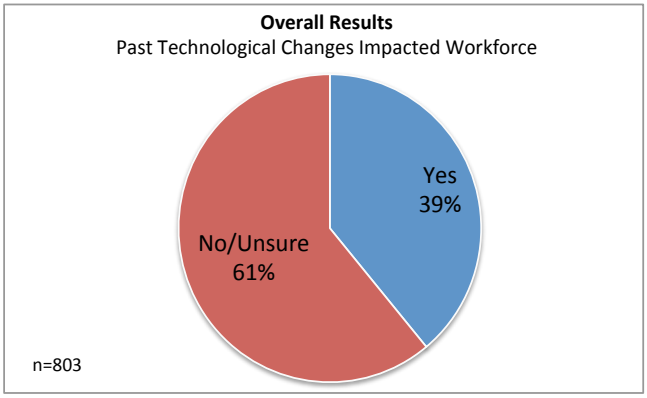
TECHNOLOGICAL CHANGE

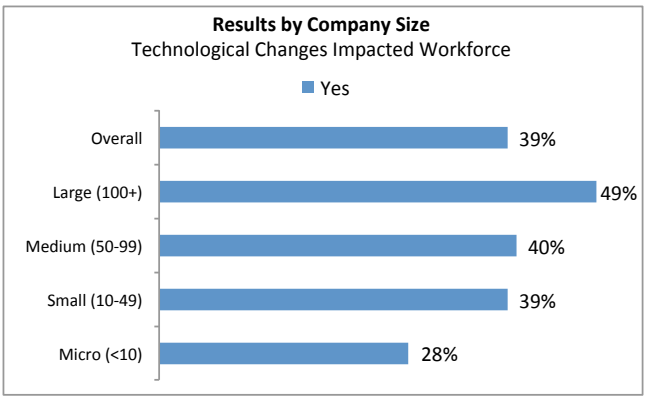
Overall Impact of Technological Changes on the Workforce in Past Two Years

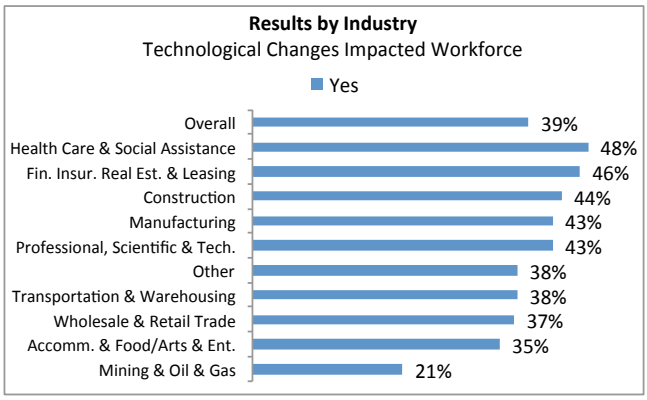
Q: Has your company implemented or adopted any technological changes in the past two years that resulted in a change in the number of workers needed and/or a need for some workers to upgrade their skills with additional training and/or a need for some workers to change their job description?

Overall, 39 per cent of the employers (314 employers) reported their company implemented or adopted technological changes in the past two years that impacted their workforce in at least one of the three ways described above.

Results varied by company size and by industry. Large-sized employers were more likely to report their company implemented technological changes that impacted their workforce (49 per cent), as were health care and social assistance employers (48 per cent).







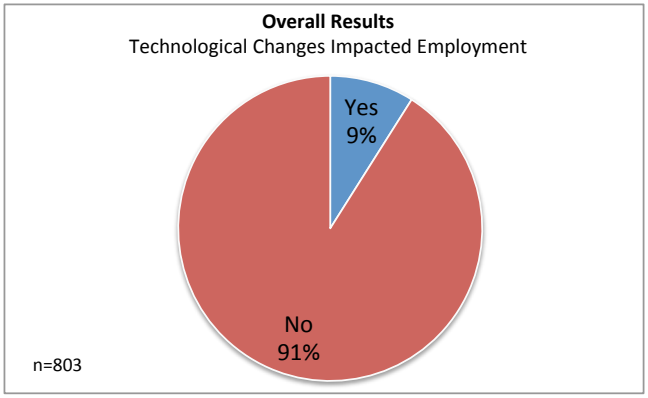
Impact of Technological Changes on Employment in Past Two Years

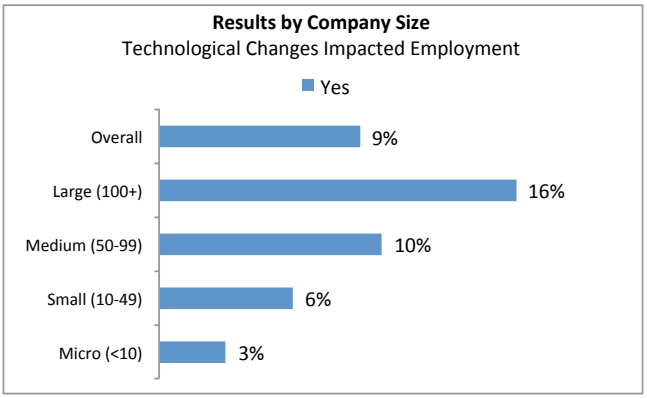
"We're a bank, so we have had to implement new software to improve the customer experience. This has allowed us to hire an additional 10 banking advisors."
- Finance, Insurance, Real Estate and Leasing Employer

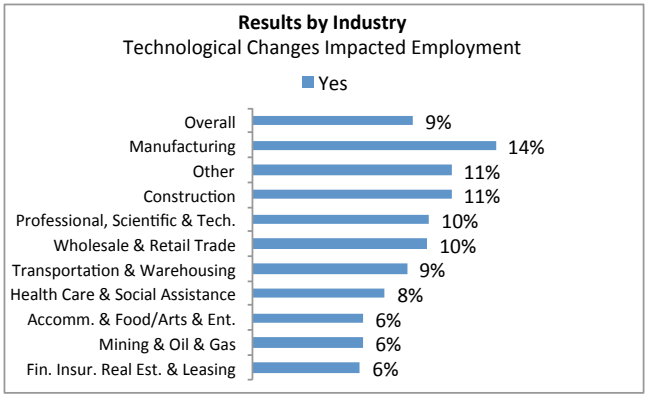
Q: Has your company implemented or adopted any technological changes in the past two years that resulted in a change in the number of workers needed?

Overall, 9 per cent of the employers (73 employers) reported their company implemented or adopted technological changes in the past two years that resulted in a change in the number of workers needed.

Results varied by company size and by industry. Large-sized employers were more likely to report their company implemented technological changes that resulted in a change in the number of workers needed (16 per cent), as were manufacturing employers (14 per cent).







TECHNOLOGICAL CHANGE

Technological changes resulted in a net employment increase of 63 workers.

The 9 per cent of employers (73 employers) were further asked to describe the technological changes, the occupations affected, and the number of workers that increased or decreased.

Overall, employment increased by a net 63 people (an increase of 206 workers and a decrease of 143 workers). Results varied by industry, ranging from a net increase of 31 people in health care and social assistance to a net decrease of 28 people in manufacturing and 21 in wholesale and retail trade. Results also varied by company size, from a net increase of 45 people among medium-sized employers, to a net decrease of 30 people among large-sized employers. Additional details on the technological changes and occupations affected can be found in the Industry Results section.

Change in Employment Due to Technological Changes Implemented in the Past Two Years

Industry	Employment increase	Employment decrease	Net change in employment
Health Care & Social Assistance	33	-2	31
Professional, Scientific & Technical Services	29	-8	21
Finance, Insurance, Real Estate & Leasing	24	-5	19
Transportation & Warehousing	23	-4	19
Mining & Oil & Gas	14	-3	11
Other	23	-14	9
Construction	12	-8	4
Accommodation & Food Services/Arts & Entertainment	5	-7	-2
Wholesale & Retail Trade	6	-27	-21
Manufacturing	37	-65	-28
Total	**206**	**-143**	**63**

Company Size	Employment increase	Employment decrease	Net change in employment
Large (100+)	95	-125	-30
Medium (50-99)	53	-8	45
Small (10-49)	42	-8	34
Micro (<10)	16	-2	14
Total	**206**	**-143**	**63**

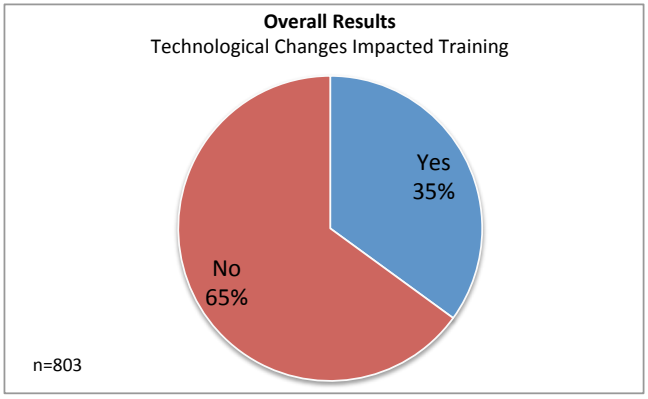
Impact of Technological Changes on Training in Past Two Years

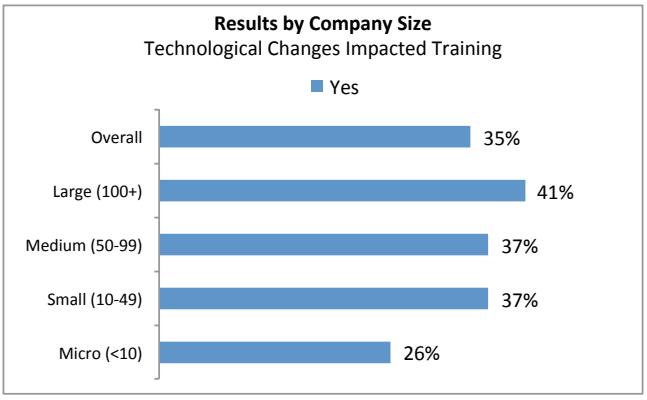
"We have implemented many new technologies in the field that have improved quality and materials for paving and roadwork, including GPS technologies and things like that. All of our project managers had to receive training." - Construction Employer

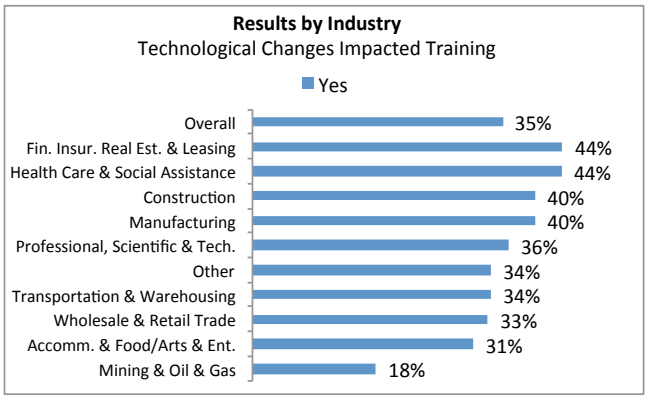
Q: Has your company implemented or adopted any technological changes in the past two years that resulted in a need for workers to upgrade their skills with additional training?

Overall, 35 per cent of the employers (284 employers) reported their company implemented or adopted technological changes in the past two years that resulted in a need for workers to upgrade their skills with additional training.

Large-sized employers were more likely to report their company implemented technological changes that resulted in a need for employee skills upgrading and training (41 per cent), as were finance, insurance, real estate and leasing and health care and social assistance employers (44 per cent each).







TECHNOLOGICAL CHANGE

Technological changes resulted in a need to train approximately 7,924 employees (19 per cent of total employees).

The 284 employers were also asked to describe the technological changes, the occupations affected, whether the training was provided by the employer or by an outside contractor, and the number of employees that were affected. Overall, about 7,924 employees were trained (19 per cent of total employees), with 89 per cent of the employees trained by the employer, 6 per cent trained by both the employer and an outside contractor, and 5 per cent trained by an outside contractor. By industry, the wholesale and retail trade industry trained the greatest number of employees (2,638) while the health care and social assistance industry trained the greatest proportion of their total workforce (38 per cent). By company size, large-sized employers trained the greatest number of employees (34,176), however, micro-sized employers trained the greatest proportion of their workforce (64 per cent). Additional details on the technological changes and occupations affected can be found in the Industry Results section.

Employee Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years

Industry	Number of employees trained by contractor	Number of employees trained by employer	Number of employees trained by both	Total number of employees trained	Total number of employees	Percent of employees trained
Wholesale & Retail Trade	22	2,595	21	2,638	12,456	21%
Health Care & Social Assistance	118	1,565	0	1,683	4,433	38%
Transportation & Warehousing	57	725	22	804	2,489	32%
Finance, Insurance, Real Estate & Leasing	7	561	63	631	3,494	18%
Manufacturing	92	433	9	534	2,357	23%
Other	37	335	30	402	5,959	7%
Construction	42	253	94	389	3,931	10%
Accommodation & Food/Arts & Entertainment	8	308	55	371	2,804	13%
Professional, Scientific & Technical Services	18	169	134	321	2,476	13%
Mining & Oil & Gas	1	140	10	151	1,013	15%
Total	**402**	**7,084**	**438**	**7,924**	**41,412**	**19%**

n=284

Company Size	Number of employees trained by contractor	Number of employees trained by employer	Number of employees trained by both	Total number of employees trained	Total number of employees	Percent of employees trained
Large (100+)	197	5,264	262	5,723	34,176	17%
Medium (50-99)	104	963	100	1,167	5,132	23%
Small (10-49)	71	721	59	851	1,818	47%
Micro (<10)	30	136	17	183	286	64%
Total	**402**	**7,084**	**438**	**7,924**	**41,412**	**19%**

n=284

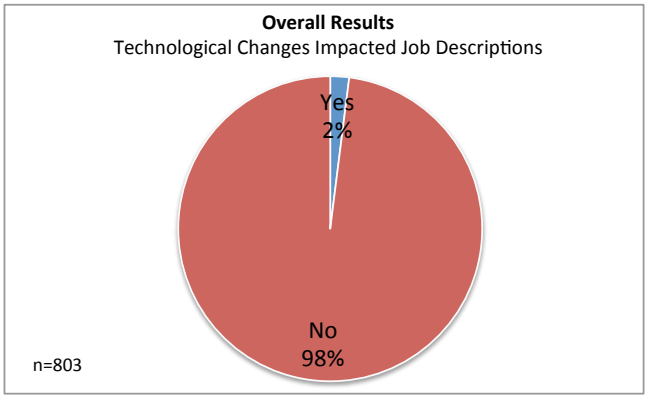
Impact of Technological Changes on Job Descriptions in Past Two Years

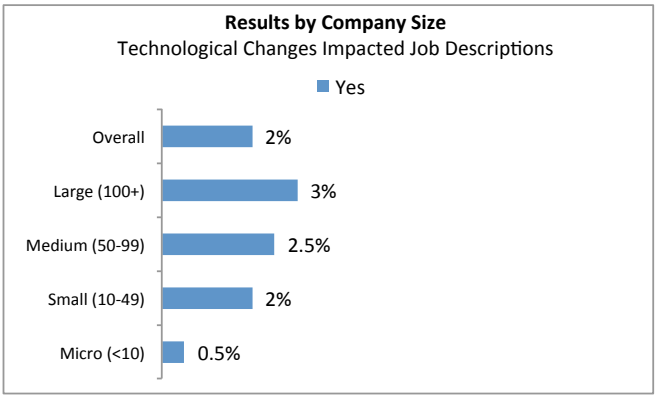
"We now do more social media type advertising. Our former office manager is now our business manager almost solely focused on that task."
- Health Care and Social Assistance Employer

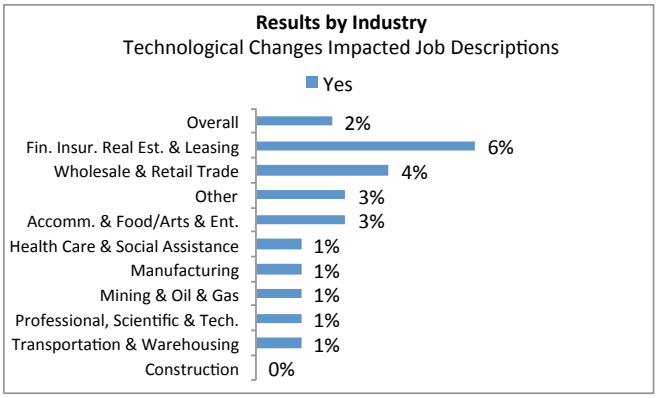
Q: Has your company implemented or adopted any technological changes in the past two years that resulted in a need for workers to completely change their job descriptions?

Overall, 2 per cent of the employers (17 employers) reported their company implemented or adopted technological changes in the past two years that resulted in a need for some workers to completely change their job descriptions.

Results varied very little by company size. By industry, finance, insurance, real estate and leasing (6 per cent) and wholesale and retail trade employers (4 per cent) were slightly more likely to report their company implemented technological changes that resulted in a need for workers to change their job descriptions.







Technological changes resulted in about 95 workers changing their job descriptions.

The 17 employers were also asked to describe the technological changes, the occupations affected, and the number of employees affected. Overall, there was a need for 95 workers to change their job descriptions, with the majority of those workers in the wholesale and retail trade industry. Additional details on the technological changes and occupations affected can be found in the Industry Results section.

Employers that implemented technological changes that resulted in a need for some workers to completely change their job descriptions

Industry	Number of employers that changed employee job descriptions	Number of employees affected	Total number of employees	Percent of employees affected
Wholesale & Retail Trade	3	65	10,063	0.6%
Finance, Insurance, Real Estate & Leasing	5	12	199	6.0%
Manufacturing	1	6	210	2.9%
Other	2	4	299	1.3%
Accommodation & Food Services/Arts & Entertainment	2	2	195	1.0%
Professional, Scientific & Technical Services	1	2	99	2.0%
Transportation & Warehousing	1	2	100	2.0%
Health Care & Social Assistance	1	1	13	7.7%
Mining & Oil & Gas	1	1	50	2.0%
Construction	0	0	0	0.0%
Total	**17**	**95**	**11,228**	**0.8%**

Company Size	Number of employers that changed employee job descriptions	Number of employees affected	Total number of employees	Percent of employees affected
Large (100+)	6	65	10,795	0.6%
Medium (50-99)	5	11	348	3.2%
Small (10-49)	5	18	76	23.7%
Micro (<10)	1	1	9	11.1%
Total	**17**	**95**	**11,228**	**0.8%**

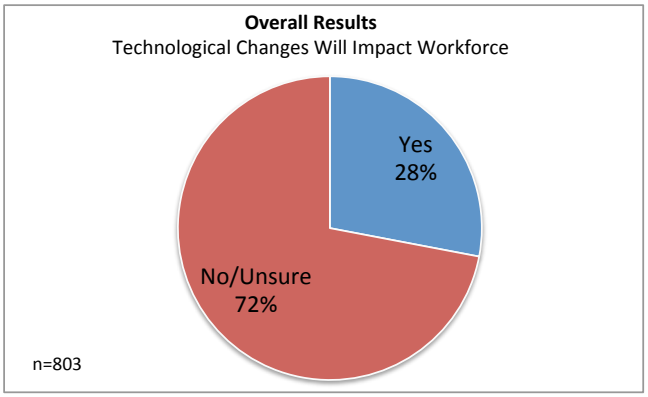
TECHNOLOGICAL CHANGE

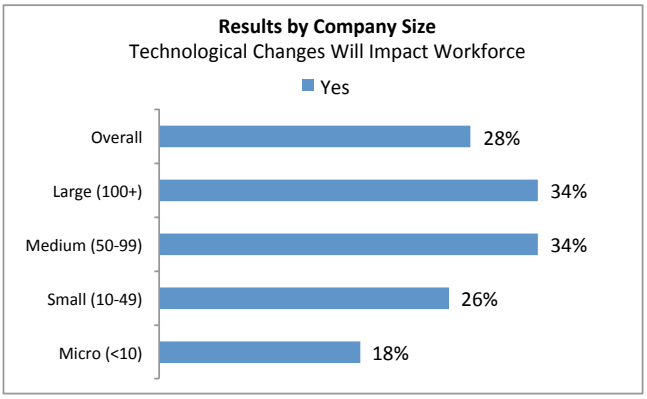
Overall Impact of Technological Changes on the Workforce in Next Two Years

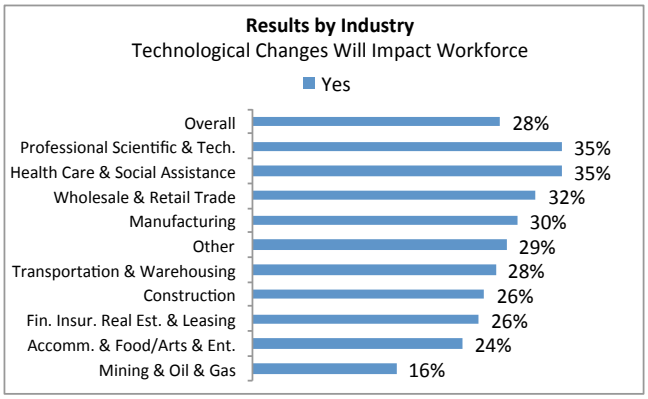
Q: Does your company plan to implement or adopt any technological changes in the next two years that will result in a change in the number of workers needed and/or a need for some workers to upgrade their skills with additional training and/or a need for some workers to change their job description?

Overall, 28 per cent of the employers (225 employers) reported their company has plans to implement or adopt technological changes in the next two years that will impact their workforce in at least one of the three ways described above.

Results varied by company size and by industry. Large and medium-sized employers were more likely to report their company plans to implement technological changes that will impact their workforce (34 per cent each), as were professional, scientific and technical services and health care and social assistance employers (35 per cent each).







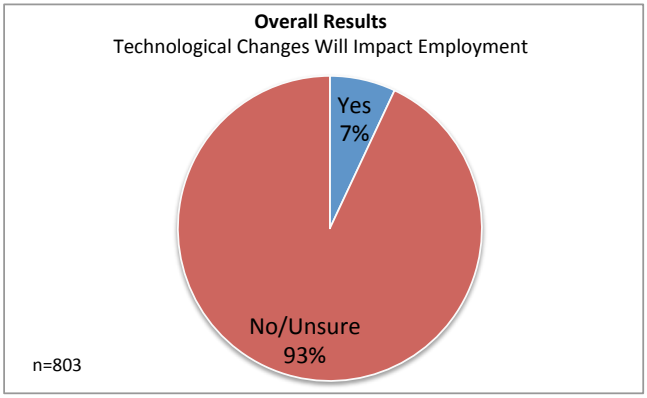
Impact of Technological Changes on Employment in Next Two Years

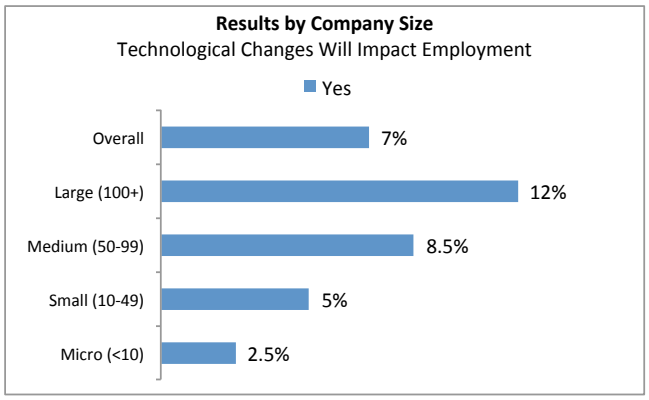
"There will be more automation when it comes to food ordering and that sort of thing. We will likely see a decrease in 8 to 10 servers in the long run."
- Accommodation and Food Services

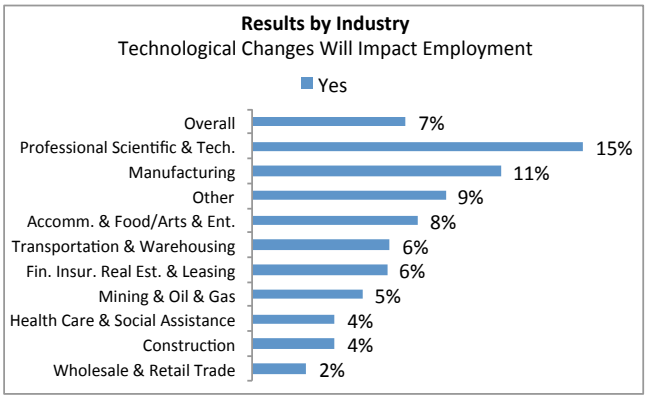
Q: Does your company plan to implement or adopt any technological changes in the next two years that will result in a change in the number of workers needed?

Overall, 7 per cent of the employers (56 employers) reported their company plans to implement or adopt technological changes in the next two years that will result in either an increase or decrease in the number of workers needed.

Results varied by company size and by industry. Large-sized employers were more likely to report their company plans to implement technological changes that will result in a change in the number of workers needed (12 per cent), as were professional, scientific and technical services employers (15 per cent).







TECHNOLOGICAL CHANGE

Technological changes expected to result in a net employment increase of 5 workers.

The 7 per cent of employers (56 employers) were further asked to describe the planned technological changes, the occupations that will be affected, and the number of workers that will increase or decrease.

Overall, employment is anticipated to increase by a net 5 people (an increase of 143 workers and a decrease of 138 workers). Results varied by industry, ranging from a net increase of 25 people in finance, insurance, real estate and leasing to a net decrease of 18 people in manufacturing. Results also varied by company size, from a net increase of 20 people among small-sized employers, to a net decrease of 20 people among large-sized employers. Additional details on the technological changes and occupations affected can be found in The Industry Results section.

Anticipated Change in Employment Due to Technological Changes Implemented in the Next Two Years

Industry	Employment increase	Employment decrease	Net change in employment
Finance, Insurance, Real Estate & Leasing	25	0	25
Mining & Oil & Gas	8	0	8
Accommodation & Food Services/Arts & Entertainment	22	-15	7
Wholesale & Retail Trade	3	0	3
Transportation & Warehousing	5	-6	-1
Construction	4	-5	-1
Professional, Scientific & Technical Services	17	-20	-3
Health Care & Social Assistance	20	-26	-6
Other	11	-20	-9
Manufacturing	28	-46	-18
Total	**143**	**-138**	**5**

n=56

Company Size	Employment increase	Employment decrease	Net change in employment
Large (100+)	79	-99	-20
Medium (50-99)	34	-34	0
Small (10-49)	25	-5	20
Micro (<10)	5	0	5
Total	**143**	**-138**	**5**

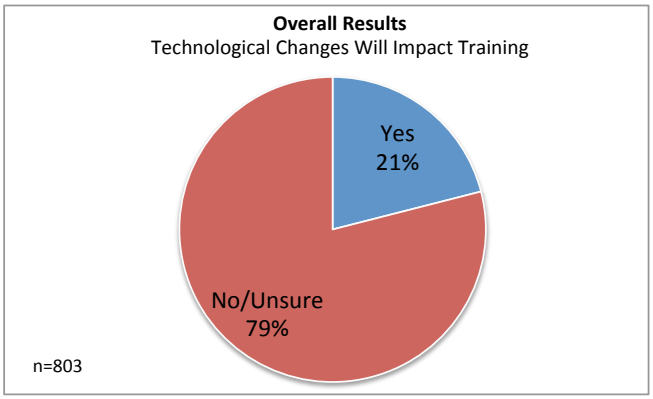
n=56

Impact of Technological Changes on Training in Next Two Years

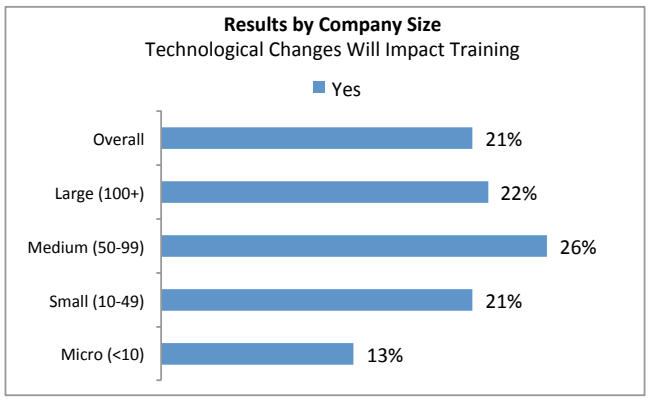
"We are moving over to e-logs instead of paper logs. Our drivers have to learn how to do it and we in the office have to learn how to operate the software, so eventually everyone will require additional training."
- Transportation and Warehousing Employer

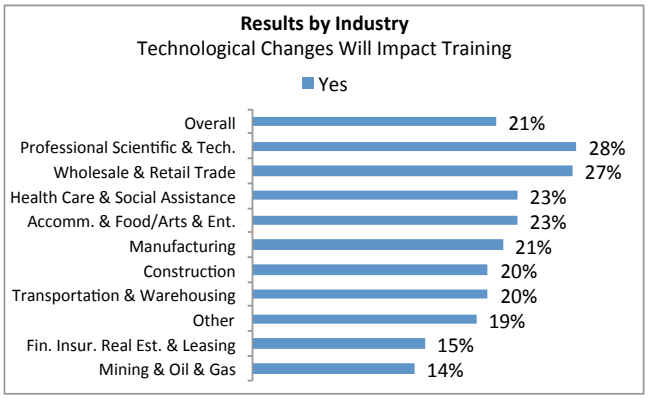
Q: Does your company plan to implement or adopt any technological changes in the next two years that will result in a need for workers to upgrade their skills with additional training?

Overall, 21 per cent of the employers (167 employers) reported their company plans to implement or adopt technological changes in the next two years that will result in a need for workers to upgrade their skills with additional training.



Medium-sized employers were more likely to report their company plans to implement technological changes that will result in a need for employee skills upgrading and training (26 per cent), as were professional, scientific and technical services (28 per cent) and wholesale and retail trade (27 per cent) employers.





Technological changes expected to result in a need to train approximately 5,356 employees (31 per cent of total employees).

The 167 employers were also asked to describe the technological changes, the occupations that will be affected, whether the training will be provided by the employer or by an outside contractor, and the number of employees that will be affected. Overall, about 5,356 employees are expected to be trained (31 per cent of total employees), with 90 per cent of the employees to be trained by the employer, 7 per cent to be trained by both the employer and an outside contractor, and 3 per cent to be trained by an outside contractor. By industry, the 'other' industry anticipates training the greatest number of employees (1,678) while the transportation and warehousing industry expects to train the greatest proportion of their total workforce (53 per cent). By company size, large-sized employers expect to train the greatest number of employees (12,952), however, micro-sized employers anticipate training the greatest proportion of their workforce (54 per cent). Additional details on the technological changes and occupations that will be affected can be found in the Industry Results section.

Anticipated Employee Skills Upgrading and Training Due to Technological Changes Implemented in the Next Two Years

Industry	Number of employees to be trained by contractor	Number of employees to be trained by employer	Number of employees to be trained by both	Total number of employees to be trained	Total number of employees	Percent of employees to be trained
Other	28	1,565	85	1,678	3,229	52%
Transportation & Warehousing	53	742	0	795	1,488	53%
Manufacturing	12	637	114	763	2,065	37%
Health Care & Social Assistance	2	681	52	735	3,325	22%
Wholesale & Retail Trade	17	587	15	619	1,551	40%
Professional, Scientific & Technical Services	8	197	37	242	1,239	20%
Finance, Insurance, Real Estate & Leasing	0	185	25	210	431	49%
Accommodation & Food/Arts & Entertainment	7	124	36	167	1,607	10%
Mining & Oil & Gas	3	48	29	80	786	10%
Construction	9	54	4	67	1,809	4%
Total	**139**	**4,820**	**397**	**5,356**	**17,530**	**31%**

n=167

Company Size	Number of employees to be trained by contractor	Number of employeesto be trained by employer	Number of employees to be trained by both	Total number of employees to be trained	Total number of employees	Percent of employees to be trained
Large (100+)	51	3,412	209	3,672	12,952	28%
Medium (50-99)	56	1,068	81	1,205	3,556	34%
Small (10-49)	14	310	86	410	894	46%
Micro (<10)	18	30	21	69	128	54%
Total	**139**	**4,820**	**397**	**5,356**	**17,530**	**31%**

n=167

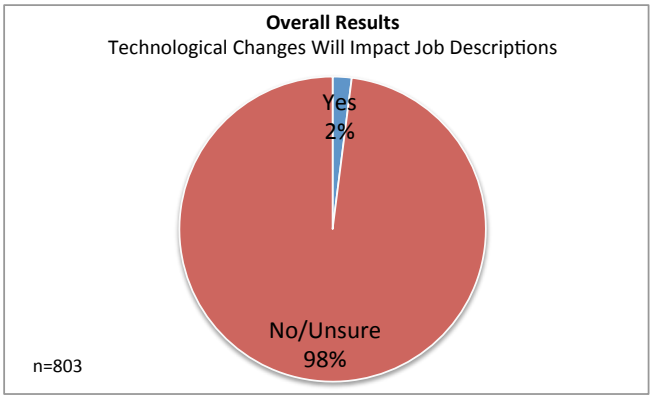
Impact of Technological Changes on Job Descriptions in Next Two Years

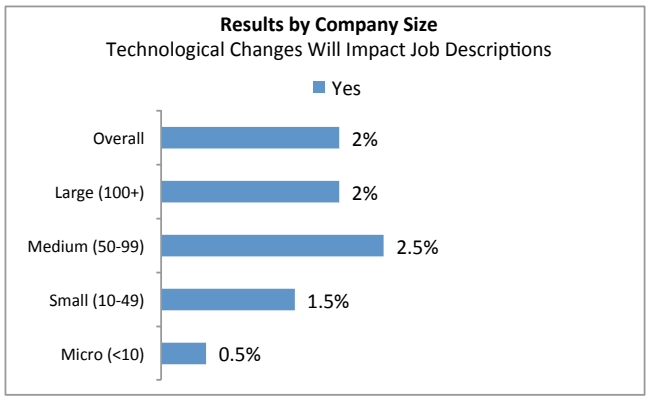
"We are replacing our retail locations with online shopping. This will result in all of our employees becoming their own supervisor from home, rather than being a salesperson in a store." - Wholesale and Retail Trade Employer

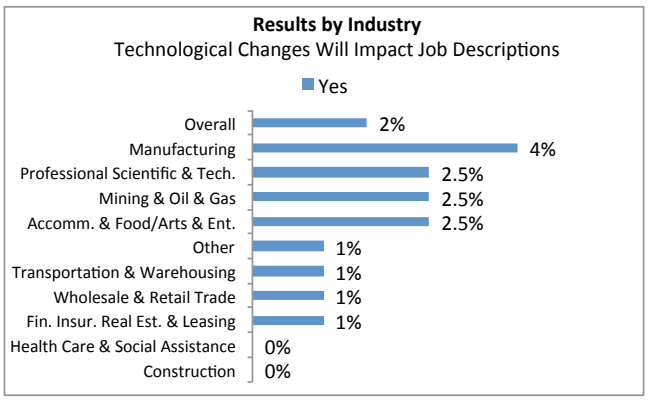
Q: Does your company plan to implement or adopt any technological changes in the next two years that will result in a need for workers to completely change their job descriptions?

Overall, 2 per cent of the employers (13 employers) reported their company plans to implement or adopt technological changes in the next two years that will result in a need for some workers to completely change their job descriptions.

Results varied very little by company size. By industry, manufacturing employers (4 per cent) were slightly more likely to report their company will implement technological changes that will result in a need for employees to change their job descriptions.







Technological changes expected to result in about 72 employees changing their job descriptions.

The 13 employers were also asked to describe the technological changes, the occupations that will be affected, and the number of employees that will be affected. Overall, employers anticipate a need for 72 workers to change their job descriptions, with the highest number of those workers in the professional, scientific and technical services industry. Additional details on the technological changes and occupations that will be affected can be found in the Industry Results section.

Employers that plan to implement technological changes that will result in a need for some workers to completely change their job descriptions

Industry	Number of employers that plan to change employee job descriptions	Number of employees that will be affected	Total number of employees	Percent of employees that will be affected
Professional, Scientific & Technical Services	2	23	140	16.4%
Manufacturing	3	16	420	3.8%
Wholesale & Retail Trade	1	13	13	100.0%
Other	1	10	250	4.0%
Mining & Oil & Gas	2	6	318	1.9%
Accommodation & Food Services/Arts & Entertainment	2	2	19	10.5%
Transportation & Warehousing	1	1	17	5.9%
Finance, Insurance, Real Estate & Leasing	1	1	50	2.0%
Health Care & Social Assistance	0	0	0	0.0%
Construction	0	0	0	0.0%
Total	**13**	**72**	**1,227**	**5.9%**

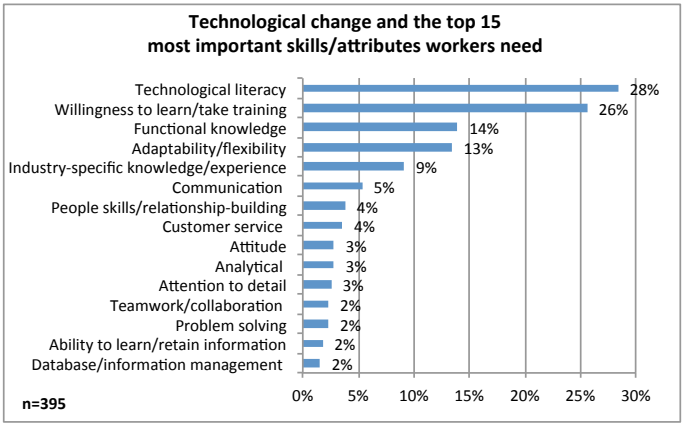
Company Size	Number of employers that changed employee job descriptions	Number of employees affected	Total number of employees	Percent of employees affected
Large (100+)	4	25	883	2.8%
Medium (50-99)	5	31	295	10.5%
Small (10-49)	3	15	40	37.5%
Micro (<10)	1	1	9	11.1%
Total	**13**	**72**	**1,227**	**5.9%**

Most Important Skills Required

"Beyond learning to use the new technology, typically it's understanding how it fits into the whole and the reasons why we need it. That awareness allows employees to make the best use of the new technology." - Manufacturing Employer

Q: If your company has implemented or plans to implement any technological changes, what would you say is the most important skill (or skills) your workers need (or will need) once this new technology has been implemented?

Of the 395 employers that have implemented or have plans to implement technological changes, 26 per cent said technological literacy[10] is the most important skill employees need or will need (28 per cent), followed by willingness to learn and take training (26 per cent), functional knowledge[11] (14 per cent), and adaptability/flexibility (13 per cent).



Only skills and attributes with a 2% or more response rate are shown in the chart.

Career skills generally fall into two categories — hard (technical or specific job related skills and knowledge that are more quantifiable and measurable) and soft (people/interpersonal skills and personal attributes that are more intangible). With this categorization in mind, 11 of the top 15 most important skills mentioned by Calgary and area employers fall in the 'soft' category. These include the personal attributes of willingness to learn/take training, adaptability/flexibility, attitude and ability to learn/retain information, as well as the skills of communication, people/relationship building, customer service, analytical, attention to detail, teamwork/collaboration, and problem solving. Additional details on the most important skills and attributes workers need can be found in the Industry Results section.

[10] Defined as the ability of an individual, working independently and with others, to responsibly, appropriately and effectively use technology tools to access, manage, integrate, evaluate, create and communicate information.

[11] Defined as knowledge, skill, and/or abilities required to fulfill required job tasks, duties or responsibilities.

Calgary & Area Employer Survey Results - Industry Results

Accommodation and Food Services/Arts, Entertainment and Recreation

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**6%** (Below overall average of 9%)	**Net change in employment (-2)** Employment increase (+5) Employment decrease (-7)
A need for worker skills upgrading and training	**31%** (Below overall average of 35%)	**371 workers** (13% of workforce)
A need for some workers to change job descriptions	**2.5%** (Above overall average of 2.0%)	**2 workers** (1% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Internet and WiFi	Information systems analysts and consultants	2
Tablets for takeout and delivery	Customer service, information and related clerks	2
Marketing on iPads	Professional occupations in advertising, marketing and public relations	1
Centralized payroll	Payroll clerks	-2
Automation of reservations	Cashiers	-5
Total		**-2**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Systems and software applications	Hotel front desk clerks	100
Automation of reservations	Food and beverage servers	40
Tablets for takeout and delivery	Food and beverage servers	30
Systems changes	Hotel front desk clerks	30
Computerized check in	Hotel front desk clerks	20
Tablets for takeout and delivery	Cooks	15
Electronic timesheet system	Not specified	14
Updates of computers	Program leaders & instructors in recreation, sport, fitness	12
Systems and software applications	Accommodation service managers	10
Property management system	Property administrators	10
Keyless access check in	Hotel front desk clerks	10
Tills	Cashiers	10
Electronic table ordering system	Food and beverage servers	8
New point of sales system	Food and beverage servers	8
Computerized the business	General office support workers	6
Ordering process	Restaurant and food service managers	5
Tablets for takeout and delivery	Restaurant and food service managers	5
New point of sales system	Not specified	5
New office software systems	Administrative officers	4
Payroll system	Payroll clerks	4
Training monitoring tools	Not specified	4
Computerized the business	Recreation, sports and fitness program and service directors	2
New machinery and equipment for ice plant and maintenance	Facility operation and maintenance managers	2

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Accounting software	Financial auditors and accountants	2
Updated website	Professional occupations in advertising, marketing, public relations	2
Payroll system	Personnel and recruitment officers	2
Online registration	General office support workers	2
Cybersecurity program	Restaurant and food service managers	1
Online training	Restaurant and food service managers	1
Online payroll system	Financial auditors and accountants	1
POS system	Financial auditors and accountants	1
Online registration	Administrative officers	1
Recruiting software	Personnel and recruitment officers	1
Electronic payroll system	Payroll clerks	1
New software	Announcers and other broadcasters	1
Mobile check in and centralized reservation services	Hotel front desk clerks	1
Total		**371**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Mobile check in and centralized reservation services	Hotel front desk clerks	Accommodation service managers	1
Online registration	Receptionists and switchboard operators	Administrative officers	1
Total			**2**

Employer Comments: Accommodation and Food Services/Arts and Entertainment

- "We have started offering mobile check in and centralized reservation services. This has not led to a decrease in workers at our Calgary location. However, there has been a decrease in the need for workers company wide. In Calgary, the change led us to offer one front desk agent training on the new system at a local university. Once the training is completed, that person will become front desk manager." - Large-sized employer
- "We have been automating our reservations process. We're taking online reservations when we used to have somebody answering the phone. By automating payments we decrease our use of labour and therefore our costs. We probably reduced by about five customer service representatives. All of our servers needed training on the new system." - Large-sized employer
- "We've adopted keyless access check in so that customers don't have to come to the front desk to check in." - Medium-sized employer
- "Yes, we now use tablets for our takeout and delivery orders. This has led to an increase of two customer service staff. There was also cross-training for everyone working in the restaurant." - Medium-sized employer
- "The company centralized our payroll, which led to a decrease of two employees at this hotel." - Medium-sized employer
- "We are in the middle of the Rockies, so we've had to invest heavily to get Internet and WiFi. This included hiring two IT workers." - Medium-sized employer
- "We went computerized. We finally got out of the stone age. We had to train 8 people in management and the office." - Small-sized employer
- "Some of our software systems in our office have changed and some of our machinery and equipment for our ice plant and ice maintenance has changed. These changes resulted in training for half a dozen employees." - Small-sized employer
- "We now have an online registration system. This change resulted in our receptionist becoming an administrator." - Small-sized employer
- "We purchased some specific training monitoring tools. This is software that would update and use the workouts that we plan for the athletes. Everyone on staff had to learn how to use it." - Micro-sized employer
- "We've upgraded our point of sales system so that everything's online. That required training all of our staff. We have a website now and we've done tons of social media marketing." - Micro-sized employer

Accommodation and Food Services/Arts and Entertainment

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**8%** (Above overall average of 7%)	**Net change in employment (+7)** Employment increase (+22) Employment decrease (-15)
A need for worker skills upgrading and training	**23%** (Above overall average of 21%)	**167 workers** (10% of workforce)
A need for some workers to change job descriptions	**2.5%** (Above overall average of 2.0%)	**2 workers** (10.5% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Software and hardware upgrades	Sales representatives - wholesale trade (non-technical)	8
Marketing technology	Professional occupations in advertising, marketing, public relations	5
Website upgrades	Information systems analysts and consultants	3
Software and hardware upgrades	Conference and event planners	2
Software and hardware upgrades	Information systems analysts and consultants	2
Online reservation system	Customer service representatives - financial services	2
Self-serving technology	Food and beverage servers	-5
Automation of food ordering	Food and beverage servers	-10
Total		**7**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Automation of food ordering	Food and beverage servers	30
Online reservation system	Food and beverage servers	30
Table top tablets	Food and beverage servers	20
Online reservation system	Cooks	15
New computer systems	Administrative officers	10
Integration of software reporting systems	Recreation, sports and fitness program and service directors	5
Online reservation system	Restaurant and food service managers	5
New computer systems	Facility operation and maintenance managers	5
Sales software and hardware	Professional occupations in advertising, marketing, public relations	5
Sales program	Sales representatives - wholesale trade (non-technical)	5
Self-serving technology	Maîtres d'hôtel and hosts/hostesses	5
Property management system	Hotel front desk clerks	5
Online booking system	Facility operation and maintenance managers	4
Point of sales system	Administrative officers	4
Accounting software and hardware	Financial auditors and accountants	3
Applicant tracking system	Human resources managers	2
Accounting software	Financial auditors and accountants	2
Applicant tracking system	Specialists in human resources	2
New property management system	Property administrators	2
Customer service based technology expansion	Secretaries (except legal and medical)	2
Online records and services	General office support workers	2
Online marketing	Restaurant and food service managers	1

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
New registration system	Administrative officers	1
Payroll system	Payroll clerks	1
Moving from manual to electronic equipment	Announcers and other broadcasters	1
Total		**167**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Online records and services	Receptionists and switchboard operators	Administrative officers	1
Customer service based technology expansion	Secretaries (except legal and medical)	Customer service, information and related clerks	1
Total			**2**

Employer Comments: Accommodation and Food Services/Arts and Entertainment

- "There will be more automation when it comes to food ordering and that sort of thing. We will likely see a decrease in 8 to 10 servers in the long run. The remaining servers will need training on the new system." - Large-sized employer
- "For us we're going to be implementing specialized software and hardware for sales and accounting. These upgrades will result in an increase of about 10 to 12 employees and additional training for about eight employees." - Large-sized employer
- "We might be doing OpenTable, which is an online reservation system for restaurants. We expect to hire two more people. We're a team, so we will all need to know how to use the technologies in the restaurant." - Medium-sized employer
- "We will probably implement more self-serving technology. This will mean decreasing the number of servers by about 5 and training of about 5 hostesses." - Small-sized employer

TECHNOLOGICAL CHANGE

- "There will be some changes on the administrative side, specifically a new point of sales system and payroll system. Initially there will be some training in the implementation stage." - Small-sized employer
- "The technological change would be more focused on utilization of applications associated with bookings. We have a hockey facility, a fitness facility and a gymnasium, so there are three different applications for accessibility to those spaces. We are looking at a system for registration of time schedules and programming for that. There will be 4 facility managers in particular that will be trained. It will not change their job description, but it will change some components of the job as the tasks will be performed differently." - Small-sized employer
- "I believe we're going to start using a different registration system sometime in the next 6 months. The training will be focused on how to help people register for programs." - Small-sized employer
- "We are looking at a customer service based technology expansion, so our administrative staff will be impacted because they need to learn any new things we adopt." - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	12	32%
Willingness to learn/take training	7	19%
Functional knowledge	6	16%
Communication skills	3	8%
Customer service	2	5%
Industry-specific knowledge and experience	2	5%
People skills/relationship-building	2	5%
Adaptability/flexibility	2	5%
Note: 37 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Accommodation and Food Services/Arts and Entertainment

- "Patience. So often people will say, *"the computer did it."* No, the computer didn't do it all by itself - you did it. You have no idea how many times I wish I could say that." - Large-sized employer
- "The ability to operate the new technology." - Large-sized employer
- "Just computer IT type skills such as knowing how to deal with apps and programs." - Large-sized employer
- "It's very few of our employees that use technology or software. We have a limited number of office based positions. For those who are affected, we will be increasing our social media presence, so communications skills will become more important. We are also looking to expand what we report on, so analysis and Excel skills." - Large-sized employer
- "I would say information management skills." - Large-sized employer
- "Usually when we're implementing a new technology we're doing it so the employee has to do less work or it makes it easier for them or it allows for more efficiencies. Basically the biggest thing is that they just have to remember what we've taught them and their new training." - Small-sized employer
- "The most important thing is that it's used most appropriately." - Small-sized employer
- "For our small business it would just be operating the iPad and understanding our point of sales system." - Micro-sized employer

Construction

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**11%** (Above overall average of 9%)	**Net change in employment (+4)** Employment increase (+12) Employment decrease (-8)
A need for worker skills upgrading and training	**40%** (Above overall average of 35%)	**389 workers** (10% of workforce)
A need for some workers to change job descriptions	**0%** (Below overall average of 2.0%)	**0 workers** (0% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
ERP system	Administrative officers	4
New software to expand range of services	Civil engineers	2
Computer software upgrading	Software engineers and designers	2
System upgrades	Information systems analysts and consultants	1
Creation of a new website	Information systems analysts and consultants	1
Update website for marketing	Information systems analysts and consultants	1
Computer software upgrading	Computer programmers and interactive media developers	1
Automation of applicant tracking system	Personnel and recruitment officers	-2
Automation of ordering	General office support workers	-3
In house administration system	Receptionists and switchboard operators	-3
Total		**4**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Homebuilder ONE	Construction trades helpers and labourers	80
GPS technology	Construction managers	50
Homebuilder ONE	Construction managers	30
Hand held device software	Construction managers	25
Updated office technology	General office support workers	20
Accounting system	Construction managers	15
Plan management programming on site	Construction managers	15
Systems changes	Construction managers	15
Upgrades to cellphones	Plumbers	12
Smartphones in the field	Residential and commercial installers and servicers	12
Computer software upgrading	General office support workers	10
Homebuilder ONE	General office support workers	10
GPS technology added to equipment	Construction trades helpers and labourers	10
Online system to track work	Construction trades helpers and labourers	10
New AutoCAD program	Residential and commercial installers and servicers	7
Electronic devices on site	Construction managers	5
Onboarding system	Personnel and recruitment officers	5
Accounting system	Receptionists and switchboard operators	5
Smartphones	Landscaping & grounds maintenance contractors & managers	5
ERP system	Construction managers	4
In house administration system	Administrative officers	4
Estimating packages	Construction managers	3
New AutoCAD program	Interior designers	3

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
ERP system	Other business services managers	2
Customer relationship management system	Corporate sales managers	2
New software to expand range of services	Construction managers	2
Accounting system	Financial auditors and accountants	2
HRIS System	Specialists in human resources	2
ERP system	Supervisors, finance and insurance clerks	2
Computer programs to streamline office work	General office support workers	2
Estimating and time collection program	Accounting and related clerks	2
Accounting system	Payroll clerks	2
Estimating and time collection program	Payroll clerks	2
Payroll system	Payroll clerks	2
Automation of estimating	Construction estimators	2
Upgraded estimating software	Construction estimators	2
Upgraded safety processes and systems to digital	Construction inspectors	2
Solar energy technology	Not specified	2
Computer program to scheduling and payroll	Senior managers - goods production, utilities, transportation, construction	1
Social media advertising	Construction managers	1
Internal processes from paper to digital	Financial auditors and accountants	1
Online scheduling and exchange system	Administrative officers	1
Total		**389**

Employer Comments: Construction

- “We have a couple brand new systems that came in to create more efficiencies and to streamline processes. It has allowed us to do more work with the same amount of people, so the result was not a reduction in current staff but less need for additional staff. Our management team needed extensive training, but it was done in house.” - Large-sized employer
- “We have gone towards automated ordering and a more paperless flow. We decreased by three employees and they were in mid-level office positions.” - Large-sized employer
- “We have implemented many new technologies in the field that have improved quality and materials for paving and roadwork, including GPS technologies and things like that. All of our project managers had to receive training.” - Large-sized employer
- “We've upgraded our systems and added GPS to our equipment. We had training available in house for those who needed it.” - Medium-sized employer
- “We're implementing a total enterprise resource planning system. We'll see an increase in about four office professionals. It will also involve training of about four in management.” - Medium-sized employer
- “We implemented a new in house administration system. This led to a decrease of three office support staff and additional training for four office administration staff.” - Medium-sized employer
- “We've added new software to expand the range of services we can offer to meet client needs. As a result of the technological advancements, we were able to hire 2 more consultants and 2 of our senior project managers required more training.” - Small-sized employer
- “We have made some changes with our computer programming and different estimating packages available through the internet. About three project managers needed more training to use new technologies.” - Small-sized employer
- “We upgraded our estimating software, we upgraded our safety processes and systems to online and we moved most of our internal processes from paper to digital. This led to training for 2 estimating people, 2 safety people and 1 accounting person.” - Small-sized employer
- “We have made upgrades to cellphones so that we can text and send pictures back and forth. That's the biggest thing we've done. We trained all of our service technicians.” - Small-sized employer
- “We moved to an online scheduling and exchange system. The technology didn't affect what our employees were doing, just what I do. We also had to hire someone to update our website for marketing purposes.” - Micro-sized employer
- “We have looked at more education and training towards work in solar energy.” - Micro-sized employer

Construction

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**4%** (Below overall average of 7%)	**Net change in employment (-1)** Employment increase (+4) Employment decrease (-5)
A need for worker skills upgrading and training	**20%** (Below overall average of 21%)	**67 workers** (4% of workforce)
A need for some workers to change job descriptions	**0%** (Below overall average of 2.0%)	**0 workers** (0% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Automation of estimating	Construction estimators	2
ERP system	Professional occupations in business services to management	1
Electronic timekeeping system	Supervisors, recording, distributing and scheduling occupations	1
Automation	Labourers in wood, pulp and paper processing	-5
Total		**-1**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Invoice from the cellphone	Plumbers	12
Electronic forms	Heavy equipment operators (except crane)	12

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
GPS tracking system	Heavy equipment operators (except crane)	10
ERP system	Professional occupations in business services to management	5
Estimating software	Construction estimators	4
New contact management software	Senior managers - goods production, utilities, transportation and construction	2
Electronic timekeeping system	Supervisors, recording, distributing and scheduling occupations	2
HRIS system	Personnel and recruitment officers	2
Computer programs to streamline office work	General office support workers	2
Invoice from the cellphone	General office support workers	2
Automation of estimating	Construction estimators	2
Automation	Labourers in wood, pulp and paper processing	2
Solar energy technology	Not specified	2
Online training programs	Senior managers - goods production, utilities, transportation and construction	1
Computer upgrades	Construction managers	1
Invoice from the cellphone	Construction managers	1
Visual representation of construction plans	Construction managers	1
New phone system	Receptionists and switchboard operators	1
Changing payroll system	Payroll clerks	1
Automation	Construction trades helpers and labourers	1
Updating machinery	Landscaping and grounds maintenance labourers	1
Total		**67**

Employer Comments: Construction

- “There will be an increased focus on automation. We will decrease by three to five general labourers as a result. Also, two general labourers will need employer training.” - Large-sized employer
- “We are updating our technology in the field on a regular basis. Our boss believes that it's important to have up to date machinery, and not to use old machinery. We have 22 skid steers for example and they will be traded in every two years whether they need to be or not. Having up to date machinery means we can provide up to date work. Better work and better productivity means more money in the long run. We offer the training as needed to our landscapers each time we introduce new machinery in the field.” - Large-sized employer
- “We're planning on implementing an electronic timekeeping system later this year. We are also going to be introducing a whole new business system because we're upgrading our enterprise resource planning system. It will probably involve some hiring for new positions. I find that most of time when a company implements those types of systems, they have to hire more staff. Training will probably be through us as the employer.” - Medium-sized employer
- “It will be a continuation of automation of estimating take off, as well as new technology for visual representation of construction plans. It's tough to say at this point, but we will probably increase by a couple of people and train a couple more people.” - Medium-sized employer
- “We will be getting new contact management software and we will also be changing our payroll system program. Some training will be necessary as a result.” - Small-sized employer
- “We will be using GPS type tracking technology, which means training our 10 equipment operators.” - Small-sized employer
- “We're in the process of implementing a new human resource information system (HRIS) in the next bit. Again, training will be mainly through the employer but will also involve a third party.” - Small-sized employer
- “We are going to implement the ability to invoice from the cellphone. All of our staff will need to be trained to ensure they can do this properly.” - Small-sized employer
- “We will continue looking into solar energy. All of our staff will need training through a contractor.” - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Willingness to learn/take training	17	41%
Adaptability/flexibility	9	22%
Technological literacy	4	10%
Functional knowledge	3	7%
Ability to learn/retain information	2	5%
Note: 41 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Construction

- "Adaptability to change is the biggest skill set we need." - Large-sized employer
- "They all need to have a keen eye to detail in order to input the right information." - Large-sized employer
- "I think honestly it's more about a competency than skill. We require that continuous flexibility in employees to be able to change. The market is fairly adaptable and therefore adaptability is the biggest skill we're looking for. We are looking for people who strive for continuous improvement and are okay with change." - Large-sized employer
- "The ability to learn that new technology and retain that information." - Large-sized employer
- "I think just awareness that [the technology] is there to use and available. The technology itself is pretty user friendly." - Medium-sized employer
- "They just need a good work ethic." - Small-sized employer
- "The ability to adapt to the change. They need to take the change head on and run with it." - Small-sized employer
- "Reliability is the most important thing." - Micro-sized employer
- "The most important skill in this business is public relations." - Micro-sized employer
- "I think honestly it's more education." - Micro-sized employer

Finance, Insurance, Real Estate and Leasing

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**6%** (Below overall average of 9%)	**Net change in employment (+19)** Employment increase (+24) Employment decrease (-5)
A need for worker skills upgrading and training	**44%** (Above overall average of 35%)	**631 workers** (18% of workforce)
A need for some workers to change job descriptions	**6%** (Above overall average of 2.0%)	**12 workers** (6% of workforce)
n=82		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Rewriting core business software	Software engineers and designers	10
New banking software to improve customer experience	Loan officers	10
Stability, cyber security, backups and business interruption strategy	Information systems analysts and consultants	2
HRIS system	Personnel and recruitment officers	1
Payroll system	Payroll clerks	1
HRIS system	Specialists in human resources	-5
Total		**19**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Gmail	Financial and investment analysts	100
Software upgrading and accounting packages	Legal secretaries	80
More efficient accounting software	Not specified	50
HRIS System	Not specified	49
Payroll system	Not specified	49
Technology changes	Insurance, real estate and financial brokerage managers	48
Stability, cyber security, backups and business interruption strategy	Not specified	46
Efficiencies with systems	Insurance agents and brokers	15
CRM sales tool	Loan officers	12
Software upgrades	Administrative officers	10
New email system	Secretaries (except legal and medical)	10
Time keeping and docketing software	Legal secretaries	10
Time keeping and docketing software	Lawyers and Quebec notaries	10
Software streamlining of the workload	Insurance agents and brokers	10
Improved phone system	Not specified	10
Maintenance and information sharing system	Not specified	10
New management software	Not specified	10
HRIS System	Specialists in human resources	9
Electronic data exchange	Insurance agents and brokers	6
New banking software to improve customer experience	Loan officers	6
Computer programs	Financial managers	5

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Major software development	Supervisors, finance and insurance clerks	5
CRM marketing	Administrative officers	5
Proprietory system and CRM tool upgrades	General office support workers	5
ERM system	Data entry clerks	5
IT systems	Information systems analysts and consultants	5
Software for tracking of sales opportunities	Loan officers	5
Launch pad tablet check in	Customer service representatives - financial services	5
Stability, cyber security, backups and business interruption strategy	Information systems analysts and consultants	4
Upgrades to online systems	Not specified	4
Software changes	Other financial officers	3
Internal program database changes	Database analysts and data administrators	3
New software platforms	Insurance agents and brokers	3
Increase in online advertising	Senior managers - financial, communications and other business services	2
New software and server	Financial managers	2
Upgraded computer software	Financial managers	2
Payroll and human reosurces information system	Specialists in human resources	2
New software	Administrative officers	2
Upgraded hardware	General office support workers	2
Microsoft Exchange	Receptionists and switchboard operators	2
New phone system	Receptionists and switchboard operators	2
Payroll and human reosurces information system	Payroll clerks	2
Data transfer technology	Database analysts and data administrators	2
Payroll system	Other administrative services managers	1

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
HR systems	Specialists in human resources	1
Payroll system	Administrative officers	1
Outlook systems	Information systems analysts and consultants	1
Total		**631**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Accounting software	Financial auditors and accountants	Other financial officers	5
CRM system	Administrative officers	Professional occupations in advertising, marketing and public relations	3
Data transfer technology	General office support workers	Database analysts & data administrators	2
New software and server	Insurance agents and brokers	Financial managers	1
Electronic data exchange	Administrative officers	Records management technicians	1
Total			**12**

Employer Comments: Finance, Insurance, Real Estate and Leasing

- "We have changed our Customer Relationship Management (CRM) marketing and IT systems. This resulted in some administration staff getting additional training in marketing and their job description completely changing." - Large-sized employer
- "We implemented a Human Resources Information System (HRIS) that resulted in a decrease of five HR positions and training for another five positions." - Large-sized employer

TECHNOLOGICAL CHANGE

- “The technological change was a review of our stability and cyber security, which also involved ensuring we have proper backups in place and implementing a business interruption strategy. We've used IT consultants to do some of that work because it's highly specialized and temporary work. There was some training throughout the organization, but there was targeted training for key IT personnel that was more extensive.” - Medium-sized employer
- “We implemented more efficient software to help us deliver services to clients. All of our staff required additional training and some changed their job description as a result.” - Medium-sized employer
- “A new human resource information system (HRIS) and a new payroll system led to increase in employment. All of the company was affected by training requirements.” - Small-sized employer
- “We're a bank, so we have had to implement new software to improve the customer experience. This has allowed us to hire an additional 10 banking advisors. We have had to train 6 existing staff.” - Small-sized employer
- “Basically it was adjustments to how we communicate between our office and other insurance companies. We got new technology related to data transfer. Our two data analysts were retrained.” - Small-sized employer
- “We now use a program called Activity Management that is basically for tracking of sales opportunities. This led to some internal training of our sales department.” - Small-sized employer
- “Training on new efficiencies in our sales system in the Calgary office impacted at least 60% of the staff.” - Small-sized employer
- “We made changes to our email system and new internal programs related to databases. About half of our staff were trained as a result. Two staff were also redeployed to new roles.” - Small-sized employer
- “We added more electronic data interchange, which led to training for two-thirds of our insurance staff. In addition, one administrative role was refocused towards records management.” - Micro-sized employer

Finance, Insurance, Real Estate and Leasing

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**6%** (Below overall average of 7%)	**Net change in employment (+25)** Employment increase (+25) Employment decrease (0)
A need for worker skills upgrading and training	**15%** (Below overall average of 21%)	**210 workers** (49% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**1 worker** (10.5% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
New claims system	Immigration, employment insurance and revenue officers	10
New banking software	Loan officers	10
HRIS system	Specialists in human resources	2
Upgrading software	Insurance agents and brokers	2
Customer relationship management system	Personnel and recruitment officers	1
Total		**25**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
New finance system	Not specified	50
Upgrading database software system	Not specified	50
Accounting systems change	Property administrators	30
New telephone system	Not specified	15
New claims system	Immigration, employment insurance and revenue officers	10
Software streaming of workload	Insurance agents and brokers	10
Self-service options	Not specified	10
Upgrading software	Not specified	10
New banking software	Loan officers	6
Streamlining our products across the group of companies	Financial managers	5
HRIS system	Personnel and recruitment officers	5
Software to streamline processes	Insurance agents and brokers	4
Software changes	Other financial officers	3
Upgrade computer software	Financial managers	2
Total		**210**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
New claims system and streamlining technology	Not specified	Not specified	1
Total			**1**

Employer Comments: Finance, Insurance, Real Estate and Leasing

- "We will be adopting a new Human Resource Information System (HRIS) because the one we have is not meeting our needs. Once we implement the new system, we will increase our HR team by about two employees. There will certainly be in house training with about five HR employees." - Large-sized employer
- "We will be changing our claims systems. We will also be changing how we do our technological products across our group of companies with the goal of more streamlining. We will hire an additional 10 claims adjudicators and train about 15 existing staff. While I don't know the details of the job description changes yet, they will be happening." - Medium-sized employer
- "We will hire an additional person when we introduce our customer relations management system." - Medium-sized employer
- "Again, software use would allow us to hire additional insurance brokers and require us to train existing staff." - Small-sized employer
- "More new banking software should allow us to expand by another 10 banking advisors and will result in about 6 others getting trained." - Small-sized employer
- "We will be adding more self-service options for customers. These aren't technologies displacing employees, just helping customers. They would involve some training." - Small-sized employer
- "There will probably be an accounting systems change. Of our 40 employees in Calgary, I think about 30 of them will need the additional training." - Small-sized employer
- "There will be more software changes, which will involve training for our wealth management department." - Micro-sized employer
- "There will probably be more on software as things continue to change with computer technology. Management will need training as this occurs." - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	13	32%
Functional knowledge	11	27%
Adaptability/flexibility	9	22%
Willingness to learn/take training	8	20%
Communication	2	5%
Industry-specific knowledge and experience	2	5%
Attention to detail	2	5%
Note: 41 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Finance, Insurance, Real Estate and Leasing

- “Good communication skills are required because we're working with internal and external training. A willingness to adapt to new changes is needed because this is a very fast paced environment. Being able to keep up with the work and work with the team is key.” - Large-sized employer
- “I think right now it's adaptability. We have a lot of tenured employees here, so they've had to adapt to changes.” - Large-sized employer
- “I think probably just better adaptability to working on systems and faster response time.” - Medium-sized employer
- “They need to be willing to embrace the new technology.” - Small-sized employer
- “That's a difficult question. They need perseverance. The first days of anything new are very, very difficult.” - Small-sized employer
- “The ability to utilize it so we can get more efficiencies out of the changes.” - Small-sized employer
- “Staying computer savvy definitely helps.” - Small-sized employer
- “Having an open mind.” - Small-sized employer
- “I think just to be tech savvy, particularly with regards to computer applications.” - Micro-sized employer
- “I'm not sure if it's a skill or an attribute, but I would say the ability to deal well with change.” - Micro-sized employer

Health Care and Social Assistance

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**8%** (Below overall average of 9%)	**Net change in employment (+31)** Employment increase (+33) Employment decrease (-2)
A need for worker skills upgrading and training	**44%** (Above overall average of 35%)	**1,683 workers** (38% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**1 worker** (8% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Point of care kiosk	Court recorders and medical transcriptionists	20
Improved company website	Community and social service workers	10
Data management system	Specialists in human resources	1
Database system	Administrative officers	1
Integrated payroll and scheduling system	Payroll clerks	1
CAD/CAM technology	Dental technologists, technicians, laboratory bench workers	-2
Total		**31**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Maintenance requests system	Nurse aides, orderlies and patient service associates	500
Radiology information system	Medical radiation technologists	288
Point of care kiosk	Registered nurses	200
Electronic health records	Not specified	200
Internet learning program	Nurse aides, orderlies and patient service associates	70
Online document system	Not specified	55
Client relationship management software	Not specified	50
Organization WiFi	Not specified	49
New software for client information	Community and social service workers	40
Portable devices	Community and social service workers	24
Database management system	Community and social service workers	20
Internet learning program	Community and social service workers	20
Data management system	Community and social service workers	12
Internet learning program	Managers in health care	10
Customer relationship management software tool	Specialists in human resources	10
Systems changes	Administrative officers	10
Software upgrades	General office support workers	10
Payroll system	Payroll clerks	10
Portable work stations	Community and social service workers	10
Electronic medical record system	Not specified	10
Moved to an online server	Not specified	9
Applicant tracking system database	Specialists in human resources	5
Data management system	Specialists in human resources	5

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
HRIS System	Specialists in human resources	5
Software upgrades	Administrative officers	5
Dental technologies	Dental assistants	5
Use of Surfaces	Community and social service workers	5
Computer upgrades	General office support workers	4
Database changes	General office support workers	4
Computer upgrades	Receptionists and switchboard operators	4
ECRM systems	Managers in health care	3
Software upgrades	Medical secretaries	3
New website and increased social media activity	Health information management occupations	3
Reporting changes	Mathematicians, statisticians and actuaries	3
Computer technology for radiography and x-rays	Dental technologists, technicians and laboratory bench workers	3
Social media	Not specified	3
Upgraded database	Not specified	3
Accounting software changes	Financial auditors and accountants	2
Accounting system	Financial auditors and accountants	2
Timekeeping system	Specialists in human resources	2
Database system	Administrative officers	2
New software for booking service providers	Receptionists and switchboard operators	2
Going paperless	Other administrative services managers	1
Skyping in the workplace	Managers in health care	1
Integrated payroll and scheduling system	Payroll clerks	1
Total		**1,683**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Social media advertising	Administrative services managers	Business services managers	1
Total			**1**

Employer Comments: Health Care and Social Assistance

- "We have allowed our employees more mobility or connection when they're in the community through introducing portable work stations. They have tablets and iPads that facilitate this. There was some training in house for front line employees who needed it." - Large-sized employer
- "Our technological changes have been mostly in the clinical realm. We've implemented a point of care kiosk for our clinical teams where they can do documentation of care of residents as opposed to using paper charts, which has increased staffing needs by about 20 people and required training about 200 clinicians. Our Registered Nurses (RNs) now have another form of technician to support in documentation. Our maintenance protocol requirements and requests for maintenance are now on an electronic system, which required training of about 500 Health Care Assistants (HCAs)." - Large-sized employer
- "We just added a new client tracking database that required us to hire an additional person and train two existing people. We also got a new accounting system that resulted in some training for two other people." - Medium-sized employer
- "We upgraded our data management system for payroll and HR. This allowed for better tracking of employee information and better information storage. We have moved all paperwork for the performance review process to online so that our employees have easier access to that. We hired an additional HR support staff member. We provided training documents to all employees and offered in person training and step by step instruction to employees who needed assistance." - Medium-sized employer
- "We implemented an integrated payroll and scheduling system, which led to the hire of a new person. We are looking at our data differently, which led to training of a different person." - Small-sized employer
- "Technological changes that are directly related to the dental field were implemented. This resulted in employer training for about 5 dental assistants." - Small-sized employer

- “The use of different electronics. We have moved from laptops which can be heavy and cumbersome to Surfaces. The combination tablet and laptop allows us to be more mobile and to be able to work from wherever as long as we have internet access. Training was offered to our front line staff who needed it or requested it.” - Small-sized employer
- “We launched an electronic medical record system for our clinic. This resulted in everyone receiving some training.” - Small-sized employer
- “We now do more social media type advertising. Our former office manager is now our business manager almost solely focused on that task.” - Small-sized employer
- “We're going paperless. Our administrative manager has been responsible for learning the new technologies.” - Micro-sized employer
- “We implemented computer technology for our radiography and x-rays. The company that supplied the software offered training to three of our dental technicians.” - Micro-sized employer

Health Care and Social Assistance

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**4%** (Below overall average of 7%)	**Net change in employment (-6)** Employment increase (+20) Employment decrease (-26)
A need for worker skills upgrading and training	**23%** (Above overall average of 21%)	**735 workers** (22% of workforce)
A need for some workers to change job descriptions	**0%** (Below overall average of 2.0%)	**0 worker** (0% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Electronic documentation	Records management technicians	20
Various computer systems	Secretaries (except legal and medical)	-1
HRIS system	Community and social service workers	-25
Total		**-6**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
Client management system	Community and social service workers	280
Information and data management tools	Community and social service workers	143
Human relations management system	Not specified	99

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
HR and database management system	General office support workers	50
Client relationship management software	Not specified	50
Automation - apps for off site service delivery	Family, marriage and other related counsellors	25
Scheduling system	Managers in health care	20
Human resources management system	Specialists in human resources	20
Software applications	General office support workers	10
CRM tool	Managers in health care	5
Adding new software	Secretaries (except legal and medical)	5
Customer relations management systems	Customer service representatives - financial services	5
Database changes	General office support workers	4
New electronic medical records programs	Medical secretaries	3
Payroll system	Payroll clerks	3
Social media and electronic media	Not specified	3
Staff safety changes	Managers in health care	2
Accounting system	Financial auditors and accountants	2
Financial systems	Financial and investment analysts	2
Facebook videos for organizational promotion	Managers in health care	1
Payroll systems	Personnel and recruitment officers	1
New computer system	Registered nurses	1
E-learning training	College and other vocational instructors	1
Total		**735**

Employer Comments: Health Care and Social Assistance

- "Again it will probably all have to do with electronic documentation changes for our clinical staff, which could mean an increase of 20 documentation specialists. There may also be electronic systems changes, possibly including changes with our scheduling systems. We are getting a new electronic system to manage the scheduling for our staff members that will likely result in the need to train about 20 schedulers." - Large-sized employer
- "We will be getting better programming for HR and database management. Hopefully the HR and database management tools will lead to a decrease because we would be making better scheduling decisions and we would be able to access better information. We could fill more positions internally, thus we would hire less externally and utilize our casual staff better. This change will only affect the training of admin staff. All 50 admin staff would need to learn it. Someone externally would come walk us through it, then we would need to figure it out internally from there." - Large-sized employer
- "We are implementing a pilot project. We have met with the individual heading it and are working very closely with [insurance provider] and [government departments]. One staff member in health and safety took a certificate program. That employee will be able to help us with doing hazard assessments and looking at our policies to make sure they're updated." - Medium-sized employer
- "We will be digitizing our whole human relations department. Everything will be computerized as opposed to manual. All of our staff will have to be trained." - Medium-sized employer
- "Technology is changing so rapidly that I can really only see about six months on the horizon." - Medium-sized employer
- "We will be implementing some database and staff safety changes which will require targeted training." - Small-sized employer
- "Our electronic medical records provider is providing us with replacement programs. This will mean training for our clinical administration department." - Small-sized employer
- "We are looking at further automation. We're moving towards off site abilities with web apps for service delivery. All of our counsellors will need training when we implement that." - Small-sized employer
- "That's hard to say because the practicum students are very technology savvy. They come up with different ideas that we are planning to implement. I encourage staff to introduce their own ideas for technological advancement." - Micro-sized employer
- "We certainly are focusing on using more social media and electronic media. All of our staff will need to be trained on how to more effectively utilize those tools." - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	15	31%
Willingness to learn/take training	9	19%
Functional knowledge	7	15%
Industry-specific knowledge and experience	6	13%
Adaptability/flexibility	5	10%
Teamwork/collaboration	3	6%
Database/systems/information management	3	6%
Analytical	2	4%
Communication	2	4%
Data entry/keyboarding	2	4%
English language	2	4%
People skills/relationship-building	2	4%

Note: 48 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.

Employer Comments: Health Care and Social Assistance

- "Critical thinking skills." - Large-sized employer
- "Proficiency with the English language." - Large-sized employer
- "Staff will need to be computer savvy and know how to manage and input information." - Large-sized employer
- "They need the skills to adapt their work to the technology. For instance, because of the new database and accounting systems they have to change what they were doing to work within new systems." - Medium-sized employer
- "Organizational and time management skills. Also these platforms are very specific so that requires technology training and for them to be computer savvy." - Medium-sized employer
- "Retaining the training they have. They go to training and then it seems to go in one ear and out the other. They just need to retain what they learn." - Medium-sized employer

TECHNOLOGICAL CHANGE

- “I think just being willing to let go of the old way of doing things and embracing the new one.” - Medium-sized employer
- “I guess just how to navigate in databases. They need to be technology savvy. All of our time sheets and vacation requests will be electronic, so the paper people will struggle.” - Medium-sized employer
- “They need to understand technology.” - Small-sized employer
- “In regards to teaching our volunteer Board of Directors and our contractors, it would be the individual following through on their designated tasks and responsibilities.” - Micro-sized employer
- “We require highly technical skills for the industry we're in.” - Micro-sized employer
- “They need good communications skills with patients.” - Micro-sized employer
- “Our employees need knowledge of emerging dentistry technology.” - Micro-sized employer
- “For me the most important skill for my staff is that they are open to supervision and learning how to work with clients, particularly difficult clients.” - Micro-sized employer
- “I still think no matter how you deliver services the ability to write is one of most important things, whether writing on paper or electronically. That skill is very lacking in today's society.” - Micro-sized employer
- “I would say that it's definitely ongoing training. Given the complexity of technology, people may quickly forget the initial training.” - Micro-sized employer

Manufacturing

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**14%** (Above overall average of 9%)	**Net change in employment (-28)** Employment increase (+37) Employment decrease (-65)
A need for worker skills upgrading and training	**40%** (Above overall average of 35%)	**534 workers** (23% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**6 workers** (3% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
ERP system	Glass forming, finishing machine operators, glass cutters	10
New machinery for automation	Labourers in food, beverage and tobacco processing	10
New machinery	Cabinetmakers	3
Dryhouse reliability and automation project	Stationary engineers and auxiliary equipment operators	3
Computer numerical control machining equipment	Sawmill machine operators	3
Robotics and drones	Industrial engineering, manufacturing technologists, technicians	2
Increased mechanization	Woodworking machine operators	2
Accounting system	Financial auditors and accountants	1
Synced online business platforms	Administrative officers	1
Payroll system	Payroll clerks	1

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Significant software upgrading	Computer network technicians	1
More efficient manufacturing processes	Printing press operators	-5
Streamlining process management	Other labourers in processing, manufacturing and utilities	-60
Total		**-28**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Automation through better controls	Other labourers in processing, manufacturing and utilities	75
Machining	Other labourers in processing, manufacturing and utilities	60
Streamlining process management	Other labourers in processing, manufacturing and utilities	60
New computer system	Not specified	50
Tracking software for work orders	Not specified	40
Quality control processes	Other labourers in processing, manufacturing and utilities	40
Appraisal system	Technical sales specialists - wholesale trade	25
Intranet	Manufacturing managers	20
Time and attendance management system	Other labourers in processing, manufacturing and utilities	20
New production equipment	Glass forming, finishing machine operators and glass cutters	12
ISO software	General office support workers	10
New machinery for automation	Labourers in food, beverage and tobacco processing	10
New computer software	Not specified	9
New software	Not specified	9

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
New machinery technologies	Machinists and machining and tooling inspectors	9
Software upgrades	General office support workers	7
Automation of operating facilities	Woodworking machine operators	6
Software upgrades	Farmers and farm managers	5
Automation through better controls	Manufacturing managers	5
Robotics	Mechanical engineers	5
More computerized equipment	Industrial engineering, manufacturing technologists, technicians	5
Updating information systems	Technical sales specialists - wholesale trade	5
Manufacturing processes	Printing press operators	5
ERP system	Glass forming, finishing machine operators and glass cutters	5
Upgraded computer network	General office support workers	4
Payroll and benefits software	Payroll clerks	4
New 3D printer	Industrial designers	4
New machinery	Machining tool operators	3
Operating upgrades	Labourers in metal fabrication	3
Computer operated machinery	Other labourers in processing, manufacturing and utilities	3
Labour management software	Specialists in human resources	2
New computer system	Administrative officers	2
Computer numerical control machining equipment	Sawmill machine operators	2
Accounting software	Financial managers	1
Labour management software	Human resources managers	1
Moved to cloud server	Manufacturing managers	1
Accounting software	Financial auditors and accountants	1

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Accounting system	Financial auditors and accountants	1
Admin	Administrative officers	1
CRM	Administrative officers	1
New telephones	General office support workers	1
Payroll system	Payroll clerks	1
Moved to cloud server	Labourers in food, beverage and tobacco processing	1
Total		**534**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Automation of operating facilities	Labourers in wood, pulp and paper processing	Woodworking machine operators	6
Total			**6**

Employer Comments: Manufacturing

- "There is more automation in our operating facilities. About six people needed to be trained. Those people will see their job description change from labourer to operator." - Large-sized employer
- "We implemented a new Customer Relationship Management system (CRM) and Business Intelligence, which required training of administration. We are exploring some robotics and drones, which required hiring a few people in technical roles." - Large-sized employer
- "We have looked to streamline process management. There has been a decrease of about 60 in production roles. There has been cross-training of about 60 others." - Large-sized employer
- "The technological change was just getting proper machinery to help the company to increase production. The new machinery in the shop increased the number of employees required to operate the machinery, but also increased our production." - Medium-sized employer

TECHNOLOGICAL CHANGE

- “We have implemented more automation through better controls. Our plant managers received third party training while all of our plant labourers received internal training.” - Medium-sized employer
- “We're always putting in new systems that better suit our needs. We upgraded our network and we bought a 3D printer. This resulted in training for about eight people.” - Medium-sized employer
- “We are a packaging company so we have added machinery that helps with packaging. Last year we hired about 10 more general labourers. While most of our employees are general labourers, they still require training because they need to know how to use equipment that leads to more automation.” - Medium-sized employer
- “We have new Computer Numerical Control (CNC) machining equipment. As a result, we have hired three machine operators and trained two more.” - Small-sized employer
- “The addition of more computerized equipment meant training for our equipment technicians.” - Small-sized employer
- “We are getting into more robotics technology, which means more training for our engineers.” - Small-sized employer
- “We have more computer operated machinery. Our production staff received training from both the employer and a contractor.” - Micro-sized employer

Manufacturing

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**11%** (Above overall average of 7%)	**Net change in employment (-18)** Employment increase (+28) Employment decrease (-46)
A need for worker skills upgrading and training	**21%** (Equal to the average of 21%)	**763 workers** (37% of workforce)
A need for some workers to change job descriptions	**4.0%** (Above overall average of 2.0%)	**16 workers** (3.8% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
New machine	Process control & machine operators, food & beverage processing	10
IT systems	Information systems analysts and consultants	5
Robotics & computer numerical control equipment	Forging machine operators	5
3D platform	Industrial designers	5
New tools for new process	Other labourers in processing, manufacturing, utilities	2
Building a new website	Information systems analysts and consultants	1
Automation of manufacturing processes	Labourers in food, beverage and tobacco processing	-6
Automation of production line	Labourers in wood, pulp and paper processing	-10
Automation for packaging	Labourers in wood, pulp and paper processing	-10
3D platform	Stationary engineers & auxiliary equipment operators	-20
Total		**-18**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
Online database	Other labourers in processing, manufacturing and utilities	600
IT software	Industrial designers	50
Robotics and computer numerical control equipment	Not specified	20
New manufacturing equipment	Other labourers in processing, manufacturing and utilities	16
New welding machines	Welders and related machine operators	12
New digital equipment	Graphic designers and illustrators	10
New machine	Process control & machine operators, food & beverage processing	10
New computer software	Not specified	9
Robotics	Mechanical engineers	5
Updating information systems	Technical sales specialists - wholesale trade	5
3D platform	Supervisors, plastic and rubber products manufacturing	5
New automated line	Woodworking machine operators	5
Drying technology	Woodworking machine operators	4
Automation of production line	Other labourers in processing, manufacturing and utilities	3
New automated line	Manufacturing managers	2
Labour management software	Specialists in human resources	2
Upgrading computer systems	General office support workers	2
Starting fabrication of quartz	Other labourers in processing, manufacturing and utilities	2
Labour management software	Human resources managers	1
Total		**763**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Automation of manufacturing processes	Labourers in food, beverage and tobacco processing	Process control and machine operators, food and beverage processing	6
New automated line	Labourers in wood, pulp and paper processing	Woodworking machine operators	5
3D platform	Supervisors, plastic and rubber products manufacturing	Industrial engineering and manufacturing technologists and technicians	5
Total			**16**

Employer Comments: Manufacturing

- “We're actually installing a brand new insulated unit to add an automated line to one of our departments. This will result in a decrease of about 10 positions and a change in job description for about five employees. Whenever new machinery is introduced, there needs to be training on its operation and maintenance.” - Large-sized employer
- “There is a new machine being installed at both plants. This will lead to an increase of at least 10 machine operators. We have people from Germany come and train us on these machines and then we will train any new staff ourselves from there.” - Large-sized employer
- “In the area of design, we are changing from a 2D to a 3D platform. This will affect the entire process, from design to machine programming to operations on the shop floor. Over time this will likely eliminate about 20 labourer jobs as a result. We will choose to keep some dedicated long term employees by putting them in new roles, so their job description would completely change.The full extent of training needed is not really know yet, until the new platform is in place. Also, in the IT area we are making changes by embracing new technology and software, which will lead to hiring of about five more in IT.” - Large-sized employer
- “There's some drying technology for drying our product that will add some efficiency. This will mean training for about four employees. There's some automation for our packaging coming that will mean a decrease of about 10 production labourers.” - Large-sized employer
- “We will automate our manufacturing welding processes. We are unsure of the extent of impacts for employment at this point.” - Large-sized employer
- “We will probably get some new digital equipment that our graphic designers will have to learn.” - Medium-sized employer

- “We are getting some new manufacturing equipment. There will be some training for our production staff who will be using that new equipment. I expect that will involve both employer and contractor training for 16 people.” - Medium-sized employer
- “We will be looking at more automation of manufacturing processes in the next two years. That hasn't been implemented yet. It will result in a decrease of six people. I'm hoping to redistribute six other people from labourer into shop roles, but I will have to wait to see what the economy does first.” - Medium-sized employer
- “We've got some new welding machines that will change the way we weld. We are unsure exactly how many people the change will impact, but we expect about a dozen welders will have to get new certifications.” - Medium-sized employer
- “We are transitioning from manual to computer controlled machines. We are making an active move in that direction. There's a high probability that our employment level will remain flat. The technological changes will serve to increase efficiencies and production levels. Training will really depend on the type of machines we bring in. For the most part the machines are very user friendly, but on occasion we will send someone for courses.” - Medium-sized employer
- “Absolutely there will be additions of robotics, Computer Numerical Control (CNC), and other technical equipment. We will need more people to operate those pieces of equipment, probably 5 in the next couple of years. Absolutely the training will be whatever is available, so I anticipate it will involve both employer and contractor training. The training will probably involve the whole staff.” - Small-sized employer
- “New tools for new processes will mean hiring additional labourers. We will be starting to manufacture quartz, which will also involve some training.” - Small-sized employer
- “We will focus on more robotics. There will be associated training as a result of technological changes.” - Small-sized employer
- “We will be getting a website put together, so we will need to temporarily hire someone in IT.” - Micro-sized employer
- “The changes will be similar to what we have already done, which is adopt new computer software and train all the staff on how to use it.” - Micro-sized employer
- “In the future we are working on some projects so that we can automate our production line to increase production. The number of workers will stay the same, only production will increase. At least three people will need some additional training.” - Micro-sized employer
- “The changes will largely be focused on a further expansion to labour management software and training resulting from that.” - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Willingness to learn/take training	11	25%
Technological literacy	10	23%
Industry-specific knowledge and experience	10	23%
Attitude	3	7%
Adaptability/flexibility	2	5%
Attention to detail	2	5%
Functional knowledge	2	5%
Patience	2	5%
Note: 44 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Manufacturing

- "The skills would be machine specific. Whoever would be operating that new machine needs to know the ins and outs as well as maintenance requirements of that particular machine." - Large-sized employer
- "Innovation is key for our business." - Large-sized employer
- "Attention to detail and patience." - Large-sized employer
- "Employees will most definitely have to have 3D capabilities in terms of design and drawing. Areas of the shop floor will need to understand microvelum wood design and rayon metal design. These new skills will be needed if they want to move ahead with the company." - Large-sized employer
- "I think their organizational skills as well as computer literacy skills." - Large-sized employer
- "Beyond learning to use the new technology, typically it's understanding how it fits into the whole and the reasons why we need it. That awareness allows employees to make the best use of the new technology." - Medium-sized employer
- "The right attitude. People have to be willing to learn it and use it." - Micro-sized employer
- "Troubleshooting." - Micro-sized employer
- "The biggest skill after learning the technology is the ability to converse with people. People skills are one of the most required skills in general." - Micro-sized employer

- “They need to have a quick learning ability.” - Micro-sized employer
- “I think production speed is the most important. It's not really complicated, it's a straightforward operation.” - Micro-sized employer
- “They need resilience.” - Micro-sized employer

Mining and Oil and Gas

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**6%** (Below overall average of 9%)	**Net change in employment (+11)** Employment increase (+14) Employment decrease (-3)
A need for worker skills upgrading and training	**18%** (Below overall average of 35%)	**151 workers** (15% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**1 worker** (2.0% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Revamped entire main structure and all servers	Information systems analysts and consultants	5
ERP system	Professional occupations in business services to management	4
Advanced geological software for data management	Geologists, geochemists and geophysicists	4
Improved IT infrastructure	Information systems analysts and consultants	1
New computer systems	General office support workers	-3
Total		**11**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
User software for employees working remotely	Not specified	50
SAP system	Professional occupations in business services to management	20
New computer systems for direct billing	Oil and gas well drilling workers & services operators	20
Cell phones and iPads in the field	Primary production managers (except agriculture)	12
Systems applications and products system	Administrative officers	12
Software changes	Not specified	10
ERP system	Administrative officers	6
Payroll system	Not specified	5
Advanced geological software for data management	Geologists, geochemists and geophysicists	4
New systems and software for housing document control	Construction managers	2
Scheduling and ERP system	Administrative officers	2
New systems to streamline processes	Personnel and recruitment officers	2
New software programs	General office support workers	2
3D CAD and laser scanning	Not specified	2
ERP system	Manufacturing managers	1
Payroll system	Payroll clerks	1
Total		**151**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
New systems and software for housing document control	Project Coordinator	Quality Manager	1
Total			**1**

Employer Comments: Mining and Oil and Gas

- "We put in an enterprise resource planning system in our company. Currently, there has been an increase of four business professionals as a result of the new system. Six people in administration have required more training." - Medium-sized employer
- "We implemented new computer systems. There was actually a decrease of three people as a result." - Medium-sized employer
- "We implemented an advanced geological software that allows us to do more data management and tracking of information. That led to an increase of four people on the geosteering software front. Secondly we're associated with a company in chemostratigraphy and we're trying to offer that service to clients. This required us to train four people." - Medium-sized employer
- "We implemented new systems and software for how we house our document control and we've updated our computer systems so we are now using Microsoft 365. The changes in document control led one project coordinator to become a quality manager." - Medium-sized employer
- "We have a few changes related to new computer systems in our trucks. This helps us direct bill on the site. There was some training involved for field staff, but that was all done in house." - Small-sized employer
- "We improved our IT infrastructure. We outsourced it to an IT company and hired someone." - Micro-sized employer
- "We have a new enterprise resource planning system and payroll system. This required training our staff." - Micro-sized employer
- "Due to the nature of my work, I have to stay current with all new updates to AutoCAD. I've implemented 3D CAD and laser scanning. All my staff needs to know how to use it." - Micro-sized employer

Mining and Oil and Gas

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**5%** (Below overall average of 7%)	**Net change in employment (+8)** Employment increase (+8) Employment decrease (0)
A need for worker skills upgrading and training	**14%** (Below overall average of 21%)	**80 workers** (10% of workforce)
A need for some workers to change job descriptions	**2.5%** (Above overall average of 2.0%)	**6 workers** (1.9% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
HRA database	Petroleum engineers	3
GIS software	Land surveyors	2
New computer software and upgrades	Information systems analysts and consultants	2
Further software advancements	Geologists, geochemists and geophysicists	1
Total		**8**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Smart technology for trucks	Truck drivers	30
Software changes	Not specified	10
New computer software and upgrades	Administrative officers	9
GIS software	Oil and gas well drilling workers and services operators	6
Oracle	Construction managers	4
Upgrading specialty equipment	Petroleum engineers	4
New accounting system	Financial auditors and accountants	3
ERP system	Financial and investment analysts	3
HRA database	Petroleum engineers	3
ERP system	Personnel and recruitment officers	2
Continuous upgrading of AutoCAD	Not specified	2
Oracle	Professional occupations in business services to management	1
Billing and timesheet system	Personnel and recruitment officers	1
Billing and timesheet system	Payroll clerks	1
Further software advancements	Geologists, geochemists and geophysicists	1
Total		**80**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Oracle	Construction managers	Computer programmers and interactive media developers	4
Oracle	Professional occupations in business services to management	Information systems analysts and consultants	1
Smart technology for trucks	Truck drivers	Heavy equipment operators (except crane)	1
Total			**6**

Employer Comments: Mining and Oil and Gas

- "We're implementing Oracle, which should streamline things. This change will result in a reduction of certain roles but not a reduction in total employment. With this change there will be requirements for different specialties of knowledge which will result in a change of job descriptions. Currently we have internal business analysts that support internal systems who would no longer be required for that role, but we would need people to have a grasp on Oracle. The same will occur on the reporting side, where we would need the people in project controls to turn their focus to different technical skills such as coding." - Large-sized employer
- "We will be making our trucks with more smart technologies, such as tracking devices and maps. All of our drivers will receive additional training. Some of our drivers will become operators." - Medium-sized employer
- "We're developing GIS software. How many people we will hire depends on if we get government funding, but it could be another two people within the next year. In addition, at least six field staff will receive training." - Medium-sized employer
- "We will be upgrading some specialty equipment to more newer technologies. There will not be any increase or decrease in staffing. However, there will possibly be training for engineering staff." - Micro-sized employer
- "There will be continuous upgrading of AutoCAD, which will mean more training for everyone." - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Adaptability/flexibility	10	43%
Technological literacy	8	35%
Willingness to learn/take training	7	30%
Functional knowledge	4	17%
Communication	2	9%
Note: 23 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Mining and Oil and Gas

- "Honestly, just the ability to accept change and be willing to upgrade their skills as technology changes." - Medium-sized employer
- "I would say the willingness to use it, patience and the ability to ask a question no matter how small it seems." - Medium-sized employer
- "Beyond the technological skills, I would say the ability to communicate and be resilient through constant change." - Medium-sized employer
- "I think just being open to trying new ways of getting things done." - Medium-sized employer
- "They just need to embrace the technological change." - Small-sized employer
- "They require continuous training." - Micro-sized employer
- "I would say an understanding of how technology fits with business processes. Technology is just a tool we use, so workers need to see how to use it in terms of the ways we do business." - Micro-sized employer

Other

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**11%** (Above overall average of 9%)	**Net change in employment (+9)** Employment increase (+23) Employment decrease (-14)
A need for worker skills upgrading and training	**34%** (Below overall average of 35%)	**402 workers** (7% of workforce)
A need for some workers to change job descriptions	**3.0%** (Above overall average of 2.0%)	**4 workers** (1.3% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
HRIS system	Specialists in human resources	5
Smart Boards and Smart TVs	Elementary school and kindergarten teachers	5
Point of sales terminal	Cashiers	5
IT systems	Information systems analysts and consultants	4
Database initiatives	Data entry clerks	2
Updated database	School principals & administrators, elementary & secondary education	1
New timesheet software	Farmers and farm managers	1
HRIS system	Human resources managers	-1
Accounting and payroll system	Payroll clerks	-1
Electronic record keeping	Administrative officers	-2

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Changes to broadcasting equipment	Support occupations in motion pictures, broadcasting & performing arts	-10
Total		**9**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
HRIS System	General office support workers	200
Smart Boards and Smart TVs	Secondary school teachers	35
Smart Boards	Elementary school and kindergarten teachers	20
Assistive technology on computers	Not specified	12
Upgraded all computers	Not specified	12
Systems changes	Administrative officers	10
New software	General office support workers	10
Changes to broadcasting equipment	Announcers and other broadcasters	10
New timesheet software	Farmers and farm managers	9
Payroll system	Payroll clerks	8
Point of sales terminal	Cashiers	6
Database initiatives	Managers in health care	5
Talent management system	Personnel and recruitment officers	5
Computer system	General office support workers	5
New software systems	General office support workers	5
Metering technology	Electrical & electronics engineering technologists & technicians	5

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Software use	Ministers of religion	5
Locating technology	Public works and maintenance labourers	5
Data storage online	Not specified	4
HRIS System	Personnel and recruitment officers	3
Remote document access	Sales, marketing and advertising managers	2
Child care software	Managers in health care	2
Point of sales system	Managers - publishing, motion pictures, broadcasting & performing arts	2
Accounting software	Financial auditors and accountants	2
Donor management tool	Professional occupations in advertising, marketing & public relations	2
Administrative software	Administrative officers	2
Payroll and HR data entry system	Personnel and recruitment officers	2
Office 365	General office support workers	2
Software upgrades	General office support workers	2
Payroll and HR data entry system	Payroll clerks	2
Booking system	Customer service, information and related clerks	2
CRM tool	Customer service, information and related clerks	2
HRIS System	Human resources managers	1
Social media for promoting the business	Other services managers	1
HR system	Specialists in human resources	1
HR system	Payroll clerks	1
Total		**402**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
New website	Professional occupations in advertising, marketing and public relations	Sales, marketing and advertising managers	3
Donor management and CRM tools	Information systems analysts and consultants	Computer and information systems managers	1
Total			**4**

Employer Comments: Other

- "We adopted a new human resources information system. That involved an increase of about five HR workers and additional training for about 200 office workers." - Large-sized employer
- "We've made changes to our broadcasting equipment that meant a decreased need for 10 people and training for 10 others." - Large-sized employer
- "We have begun improving our donor management and customer relationship management tools. We've also moved to a more remote friendly work environment to go along with our flexible scheduling. People can now access critical documents outside of the office. We did provide some training to about six people. Also, one individual had a specific skill set that allowed for us to establish a more specific information systems manager role for them." - Medium-sized employer
- "We've added SMART Boards and SMART TVs to our classrooms, which has allowed us to hire 5 more part time teachers. It has also required us to train about 35 existing part time teachers. We have updated our database as well, so we hired 1 more administrator." - Small-sized employer
- "We have smart boards in all of our classrooms now. We trained about 20 teachers through an online program." - Small-sized employer
- "Because we serve a certain population, we have implemented assistive technology onto our computers. For example, in our training rooms we're using screens that are more friendly for those who are vision impaired and we are using Skype more for meetings. We have also upgraded all of our computers. Every person working for us needs to know how to use the assistive technology in order to help our clients." - Small-sized employer
- "We have a new point of sales terminal. As a result, we were about to hire five more employees." - Micro-sized employer

Other

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**9%** (Above overall average of 7%)	**Net change in employment (-9)** Employment increase (+11) Employment decrease (-20)
A need for worker skills upgrading and training	**19%** (Below overall average of 21%)	**1,678 workers** (52% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**10 workers** (4.0% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Accounting system	Financial auditors and accountants	6
Management information system process	Administrative officers	1
Office 365	Information systems analysts and consultants	1
Database development software	Ministers of religion	1
Database development software	Business development officers, marketing researchers & consultants	1
Customized enterprise resource planning program	Other instructors	1
Automated ticket machine	Cashiers	-10
Self-serve stations	Operators and attendants in amusement, recreation and sport	-10
Total		**-9**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
Employee system	Program leaders and instructors in recreation, sport & fitness	1,225
Updating main software	Program leaders and instructors in recreation, sport & fitness	260
Automated ticket machine	Customer service, information and related clerks	40
Customized enterprise resource planning program	Not specified	25
Updating main software	Recreation, sports and fitness program and service directors	20
Remote and mobile access to information	Professional occupations in advertising, marketing & public relations	20
Management information system process	Not specified	13
Latest version of Windows	Not specified	12
Upgrades to assistive technologies	Not specified	12
Software programs	Administrative officers	10
Automated ticket machine	Customer and information services supervisors	10
Booking system at recreation facilities	Customer service, information and related clerks	10
Database development software	Ministers of religion	6
New computer systems	General office support workers	5
New payroll system	Payroll clerks	4
Child care software	Managers in social, community and correctional services	2
Training management software system	College and other vocational instructors	2
Database development software	Senior managers - financial, communications & other business services	1
Database development software	Human resources managers	1
Total		**1,678**

Impact of Technological Changes on Job Descriptions in Past Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Automated ticket machine	Cashiers	Customer service, information and related clerks	10
Total			**10**

Employer Comments: Other

- "We have no set number in terms of reduction of staff as a result of automated ticket machines, but I would say there will be a decrease of at least 10 people depending on the success of the new system. Both employer and contractor training will be required. I would say strictly as a guess it would be in the 50 employee range. I think in some cases there would definitely be a change in job description, maybe for 10 people. Once the automated ticket machines have been introduced, some cashiers would be needed as customer service representatives instead." - Large-sized employer
- "We are bringing in self-serve stations, which will cause a decrease in 10 operational staff." - Medium-sized employer
- "We will continue with a couple of additional phases of the same projects and will also be looking at additional projects that can make everyone's life easier around mobile and remote access. We are looking at enabling people to do their jobs without necessarily being on site. I would say this will involve most of our administrative organization, so about 20 people." - Medium-sized employer
- "We are looking at adopting database development software. There will be two new positions created and orientation to new software training needed for 8 employees." - Small-sized employer
- "We are in the initial stages of planning to work with another organization to help us come up with our own organizational ecosystem, everything from customer relations to sales to marketing. This would be an Enterprise Resource Planning (ERP) program customized for us. The resulting increase of revenue will require us to add staff, but we don't know how many people yet. The resulting program change would mean training for all staff." - Small-sized employer
- "We'll continue to upgrade our assistive technology for clients with disabilities. We will probably have more video recording equipment and that type of thing. We plan to upgrade all of our computers to go onto latest version of Windows. We are transitioning to laptops and tablets versus desktop computers for both our staff and our clients. This will mean technology and software training." - Small-sized employer
- "I'm looking at implementing a training management software system. Two instructors will require training once that is in place." -Small-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Willingness to learn/take training	14	35%
Technological literacy	12	30%
Functional knowledge	7	18%
Communication	5	13%
People skills/relationship-building	4	10%
Problem solving skills	3	8%
Customer service	2	5%
Analytical	2	5%
Adaptability	2	5%
Teamwork/collaboration	2	5%

Note: 40 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.

Employer Comments: Other

- “Getting used to a paperless environment.” - Large-sized employer
- “Willingness to learn and people skills. Both are critical for our business.” - Large-sized employer
- “Honestly it's the ability to multitask and work under pressure. I don't know if the skills they've learned in school in our industry would change, but there needs to be a shift to being accepting of and having the acumen to do more than one job.” - Large-sized employer
- “I think just understanding. It's important that they can pick up what they're learning and be able to teach others.” - Large-sized employer
- “Personally I think they need to share the knowledge. They need to be able to collaborate and discuss because it's an educational learning process.” - Small-sized employer
- “I think it's important to answer the question, "How is this new technology helping me in my job?" because people need to know and understand how to use it effectively and independently.” - Small-sized employer
- “The ability to effectively use and implement that technology.” - Small-sized employer

Professional, Scientific and Technical Services

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**10%** (Above overall average of 9%)	**Net change in employment (+21)** Employment increase (+29) Employment decrease (-8)
A need for worker skills upgrading and training	**36%** (Above overall average of 35%)	**321 workers** (13% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**2 workers** (2.0% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Applicant tracking system	Information systems analysts and consultants	5
New technology development	Software engineers and designers	5
Non-revenue generating customer service work	Customer service, information and related clerks	5
Developing a weather app	Computer programmers & interactive media developers	4
Developing fan manual for fan control	Computer programmers & interactive media developers	4
Developing automatic fan control	Computer programmers & interactive media developers	4
Benefits and recruitment module	Personnel and recruitment officers	1
Booking appointments electronically	Information systems analysts and consultants	1
Payroll and accounting system	Payroll clerks	-1
Changes in data entry processes	Data entry clerks	-7
Total		**21**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Systems changes	Graphic designers and illustrators	95
Apps in programs	Professional occupations in business services to management	70
Accounting and document control software	General office support workers	14
Upgrading processes	Industrial designers	12
Accounting and document control software	Lawyers and Quebec notaries	11
Systems changes	Administrative officers	10
Automation of call centre activities	Customer service, information and related clerks	10
Booking appointments on computer instead of paper or phone	General office support workers	7
New surveying and mapping technology	Not specified	7
New training management system	Manufacturing managers	5
Expense reimbursement system	Financial auditors and accountants	5
New training management system	Specialists in human resources	5
HRIS System	Personnel and recruitment officers	5
Payroll system	Personnel and recruitment officers	5
Software upgrades	General office support workers	5
Implementing new software	Civil engineers	5
Upgrades to equipment	Land surveyors	5
Dictation technology	Lawyers and Quebec notaries	5
Software upgrades	Administrative officers	3
Using social media for promotion	Health policy researchers, consultants and program officers	3
Computer software programs	Senior managers - goods production, utilities, transportation and construction	2

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
HRIS System	Human resources managers	2
Online hiring process	Engineering managers	2
Payroll solutions upgrade	Financial auditors and accountants	2
ADP system	Specialists in human resources	2
HRIS System	Specialists in human resources	2
Performance management system	Personnel and recruitment officers	2
CRM software and database	General office support workers	2
Upgraded time billing package	Accounting and related clerks	2
ADP system	Payroll clerks	2
HRIS System	Payroll clerks	2
Payroll solutions upgrade	Payroll clerks	2
Applicant tracking system	Information systems analysts and consultants	2
Upgraded printers	Architectural technologists and technicians	2
Micrograde technology for power systems modernization	Engineering managers	1
Upgraded computers	Engineering managers	1
New job board	Computer and information systems managers	1
Upgraded to Windows 10	Legal secretaries	1
Upgraded to Windows 10	Lawyers and Quebec notaries	1
Equipment changes from computers to tablets	Interior designers	1
Total		**321**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Implementing new software	General office support workers	Records management technicians	2
Total			**2**

Employer Comments: Professional, Scientific and Technical Services

- "Our products are technology based, so the new products require us to bulk up on our teams. This is true of our company globally, so it's not just Calgary related. The bulk of positions resulting from a new technology are in the research development and innovation group, so they would be mainly software developers." - Large-sized employer
- "We introduced a new payroll and accounting system, which did result in decreased need for one person in the payroll department." - Large-sized employer
- "We are implementing new software to replace old processes. For sure there was some training involved for our technical staff. There was also a change in job description where two of our office staff took over records management." - Medium-sized employer
- "We are upgrading our industrial design processes, so about a dozen staff had to upgrade their skills." - Medium-sized employer
- "We are implementing automation through online chat services. We're actually doing a lot of non-revenue generating customer service work right now. We have hired five additional people in the call centre and provided more training to about 10 people in the call centre." - Medium-sized employer
- "We have added new features to our technological applications to make the lives of our customers easier. This required us to hire 4 new developers." - Small-sized employer
- "We are now booking appointments on the computer instead of paper or phone. We hired an IT person to help us with that." - Small-sized employer
- "We moved our data entry to the Philippines, which resulted in 7 positions terminated in Calgary. Part of the reason we moved our data entry was the higher cost of minimum wage in Alberta." - Small-sized employer
- "We have upgraded our software, more specifically our dictation technology. The lawyers used to record on cassette which was an old technology, but now we use Big Hand. They can record right into the telephone and computer." - Small-sized employer

TECHNOLOGICAL CHANGE

- “We are using a new accounting and document control software called ProLaw. This is a software package specifically for lawyers that deals with the front and back office, including the accounting and trusts as well as all of our documents, court dates, clients and word processing. Everyone in the office got trained on it, including the lawyers and associates.” - Small-sized employer
- “We have a new job board and we are heavily using our applicant tracking system. We hired five new SAP consultants and implemented a new training program as a result.” - Micro-sized employer
- “We've started using Micrograde technology for power systems modernization.” - Micro-sized employer
- “We're all about technology here and we're implementing new surveying and mapping technology on an ongoing basis. We access relevant training in house and through a third party.” - Micro-sized employer
- “We've had some equipment changes with tablets that led to increased training.” - Micro-sized employer

Professional, Scientific and Technical Services

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**15%** (Above overall average of 7%)	**Net change in employment (-3)** Employment increase (+17) Employment decrease (-20)
A need for worker skills upgrading and training	**28%** (Above overall average of 21%)	**242 workers** (20% of workforce)
A need for some workers to change job descriptions	**2.5%** (Above overall average of 2.0%)	**23 workers** (16% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
New technology development	Computer programmers and interactive media developers	5
Developing new data technology for clients	Computer network technicians	3
Digitizing records	Information systems analysts and consultants	2
Accounting system	Financial auditors and accountants	1
Phone system	General office support workers	1
Computer systems	Information systems analysts and consultants	1
Converting paper files to electronic record	Information systems analysts and consultants	1
New software applications	Information systems analysts and consultants	1
CAD and architectural programs	Architectural technologists and technicians	1
Point of sales system	Retail salespersons	1
Document control management system	Records management technicians	-2
Automation of call centre activities	Customer service, information and related clerks	-8

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Automating manufacturing processes	Labourers in chemical products processing and utilities	-10
Total		**-3**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
IT systems	Not specified	80
Videos to email	Professional occupations in business services to management	70
CRM	Technical sales specialists - wholesale trade	12
Systems changes	Administrative officers	10
New computer systems	General office support workers	10
Litigation software package	Lawyers and Quebec notaries	10
Automation of call centre activities	Customer service, information and related clerks	10
Converting paper files to electronic record	General office support workers	7
New innovations in mapping equipment	Not specified	7
3D printer	Architecture and science managers	5
New software	Administrative officers	5
Document control management system	Records management technicians	3
Developing new data technology for clients	Computer network technicians	3
Accounting and payroll system	Engineering managers	2
Point of sales system	Retail and wholesale trade managers	2
Micrograde technology for power systems modernization	Engineering managers	1

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
New software applications	Information systems analysts and consultants	1
Software for design	Software engineers and designers	1
CAD and architectural programs	Architectural technologists and technicians	1
Software changes	Interior designers	1
Upgrade computers	Stationary engineers and auxiliary equipment operators	1
Total		**242**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Field surveying technology	Drafting technologists & technicians	Graphic arts technicians	10
Automation of call centre activities	Customer service, information & related clerks	User support technicians	8
Field surveying technology	Land survey technologists & technicians	Other business services managers	5
Total			**23**

Employer Comments: Professional, Scientific and Technical Services

- "New technological developments will lead us to hire at least five more software developers. Layoffs in the company are unrelated to technological change." - Large-sized employer
- "I think we will get a new document control management system. If we get that in place we will probably reduce that department from five people to three people, so we will lose two positions. We will have to train the remaining people in that department up." - Large-sized employer
- "We will be changing from manual to automated processes where possible and going from physical to digitized records. In the Calgary region, automating processes will lead to a decrease in 10 people while digitizing records will result in an increase of 2 people." - Medium-sized employer

- “We will be making improvements to our IT systems and improvements to field surveying technology. The training will involved at least 60 people, but it could involve upwards of 80 people. There will be changes in job description throughout the organization. For example, generally people who are CAD technologist might be doing more 3D modelling.” - Medium-sized employer
- “We’re developing some new data technology for clients. We will need to hire a few people for this. A few other people will need some training. Possibly some people will change their job descriptions, but that's too soon to tell at this point.” - Medium-sized employer
- “There will be further automation of our call centre activities. This will result in a decrease of about eight people and another eight people changing their job description to online chat. There will be training required as well.” - Medium-sized employer
- “We are looking into converting our paper files to electronic records. We require a temporary IT person to do that. Once that is implemented, we will need to train 7 office staff.” - Small-sized employer
- “There are more software programs coming. We are currently using Summation which is a litigation software package. We will be updating that program we're using because it is not being supported any longer. This will result in additional software training for about 10 lawyers.” - Small-sized employer
- “We may be purchasing a 3D printer. If we do, management would need training on how to use it effectively.” - Small-sized employer
- “Right now we do handwritten invoices. We are looking at a point of sales system that will result in hiring for one casual, temporary position. We are also looking at online tracking of merchandise, which would mean training for us owners.” - Micro-sized employer
- “We are adopting new software applications. This will result in hiring of some new consultants and training of some other existing consultants.” - Micro-sized employer
- “We expect some new innovations in equipment to come on board, so we'll be doing new and different things in the mapping industry. Along with that there will be more training requirements for staff.” - Micro-sized employer
- “We're looking at quite a few technological changes to our accounting and payroll system and our phone system. We hope that the new phone system will lead to an increase in office workers. As the owners, we will have to learn the new system.” - Micro-sized employer
- “With the CAD and architectural programs, people have to learn them when they join me. My new hire will have to learn that.” - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	10	24%
Industry-specific knowledge and experience	9	21%
Adaptability/flexibility	8	19%
Willingness to learn/take training	6	14%
Communication	4	10%
Attention to detail	4	10%
Attitude	2	5%
Functional knowledge	2	5%
People skills/relationship-building	2	5%
Problem solving	2	5%
Trouble shooting	2	5%

Note: 42 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.

Employer Comments: Professional, Scientific and Technical Services

- "Due to the nature of the positions, research and innovation skills." - Large-sized employer
- "The most important skills are technological literacy, analytical capabilities, and problem solving skills." - Large-sized employer
- "They're going to need to be savvy and troubleshoot. For us right now it's more interpersonal skills. We can train people on technical and we can send them to courses. The teamwork, attitudinal, and communication skills, those are critical and not easy to teach." - Large-sized employer
- "The skill is about how to utilize and apply the technology to designing new buildings. We need people to be able to apply the technical knowledge to actually use it for what we do." - Large-sized employer
- "Adaptability, patience and a good sense of humour." - Medium-sized employer
- "I would say curiosity, being able to troubleshoot and computer skills." - Medium-sized employer

- “A willingness to learn new technology because sometimes old school people just can't move forward. People need to want to stay on top of technology.” - Small-sized employer
- “In our case they still need the work ethic. In our business they need to work hard. The skill sets change and come and go with technology, for example the advent of GPS technology. However, they still have to have the smarts and the ability to work with the new tools and change their methods to adapt to them. Right now people need systems management and computer skills because that's the tool of the day, but the most important thing is having people with good work ethic.” - Micro-sized employer
- “It's probably technical drawing skills.” - Micro-sized employer
- “I would say engineering and computer skills for my company.” - Micro-sized employer
- “I think it's a combination of technical and soft skills.” - Micro-sized employer
- “My employees just have to be careful and immaculate in their work.” - Micro-sized employer

Transportation and Warehousing

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**9%** (Equals overall average of 9%)	**Net change in employment (+19)** Employment increase (+23) Employment decrease (-4)
A need for worker skills upgrading and training	**34%** (Below overall average of 35%)	**804 workers** (32% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**2 workers** (2.0% of workforce)
n=80		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Benefits and payroll system	Payroll clerks	10
New software programs	General office support workers	4
Software changes	Software engineers and designers	3
Upgraded phones/computers to switchboards within dispatch centre	Dispatchers and radio operators	2
Software content management systems	Information systems analysts and consultants	2
Boost Google rankings	Computer programmers & interactive media developers	2
Applicant tracking system	Specialists in human resources	-2
Automation of internal processes	Dispatchers and radio operators	-2
Total		**19**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Computer systems	Not specified	500
Office 365 and Slack	General office support workers	50
New accounting system	Not specified	45
Payroll and benefits system	General office support workers	30
Android tablets for e-logs	Truck drivers	29
Upgraded computers	Not specified	18
Electronic logs	Truck drivers	13
Electronic payroll	Truck drivers	12
Payroll and benefits system	Managers in transportation	10
Upgraded internal systems	Managers in transportation	10
Apps for booking	Dispatchers and radio operators	10
Electronic airway bills	Not specified	10
GPS technology	Truck drivers	9
Upgraded phones/computers to switchboards within a dispatch centre	General office support workers	6
Applicant tracking systems	Personnel and recruitment officers	5
Apps for booking	General office support workers	5
New computer programs	General office support workers	5
Online dispatch system	General office support workers	5
Digital dispatch system	Dispatchers and radio operators	5
Software content management systems	Information systems analysts and consultants	5
Computer programming changes	Not specified	4
New software programs	General office support workers	3
Paperless office	General office support workers	3

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Warehouse management software	Shippers and receivers	3
Electronic logs	Managers in transportation	2
Cyber security improvements	Not specified	2
Online marketing	Managers in transportation	1
Smartphone	Managers in transportation	1
Performance management system	Personnel and recruitment officers	1
Apps for ongoing business	General office support workers	1
Online marketing	Truck drivers	1
Total		**804**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
Warehouse management software	Shippers and receivers	Supervisors, recording, distributing and scheduling occupations	2
Total			**2**

Employer Comments: Transportation and Warehousing

- “Automation of our internal processes led us to decrease by two people in dispatch.” - Large-sized employer
- “Moving from paper logs to AutoCAD was a significant shift that increased usability and is a little less time consuming resource wise.” - Large-sized employer
- “We implemented a new warehouse management software system. I think three workers required training through the employer and two of them changed their job description.” - Large-sized employer

- “There have been lots of internal software changes, which led us to hire three people in application development.” - Medium-sized employer
- “We now use android tablets for e-logs. At least half of our workforce required training when we made the switch.” - Medium-sized employer
- “We implemented a digital dispatch system that our dispatchers had to be trained on.” - Medium-sized employer
- “We've added some new software programs that led us to hire four more office staff and train three existing office staff.” - Medium-sized employer
- “We're looking more at driver safety, so we have installed cameras inside the trucks to watch what happens on the road and gauges to watch for speeding. These changes didn't impact employment beyond added safety.” - Medium-sized employer
- “We have upgraded our phones and computers to switchboards within a dispatch centre. We have hired two dispatchers and are training a half dozen office workers.” - Small-sized employer
- “Our new performance management system led to training in HR.” - Small-sized employer
- “We have implemented electronic airway bills, but we were forced to do so by the industry. All of our staff required training.” - Small-sized employer
- “We have started hiring consulting SEOs (Search Engine Optimization) to boost our rankings on Google.” - Micro-sized employer
- “All our drivers needed to learn how to use the new GPS technology.” - Micro-sized employer
- “The industry is introducing electronic log devices in all trucks and we've had to change our log book system to accommodate that. We now use tablets and phone apps instead of paper. The owners and the drivers all got the training.” - Micro-sized employer
- “Yes, lots of workers needed training for the new electronic logs.” - Micro-sized employer

Transportation and Warehousing

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**6%** (Below overall average of 7%)	**Net change in employment (-1)** Employment increase (+5) Employment decrease (-6)
A need for worker skills upgrading and training	**20%** (Below overall average of 21%)	**795 workers** (53% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**1 worker** (5.9% of workforce)
n=80		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Software changes	Software engineers and designers	3
Electronic records	Administrative officers	1
New warehousing software program	Shippers and receivers	1
Office management system	General office support workers	-2
Supply chain management system	Shippers and receivers	-2
More efficiencies	Dispatchers and radio operators	-2
Total		**-1**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
Computer systems	Other service supervisors	500
Software changes	Not specified	99
Electronic logging device	Bus drivers, subway operators and other transit operators	45
E-logs	Not specified	40
New engine technology	Automotive service technicians, truck and bus mechanics and mechanical repairers	35
E-logs	Truck drivers	27
Software and management systems	Managers in transportation	10
Upgrading internal systems	Managers in transportation	10
E-logs	Receptionists and switchboard operators	5
New operating system for dispatch	Dispatchers and radio operators	5
Systems upgrades	Receptionists and switchboard operators	4
Systems upgrades	Managers in transportation	3
New accounting system	Financial auditors and accountants	2
Workday (financial and capital management cloud-based software)	Financial and investment analysts	2
Workday (financial and capital management cloud-based software)	Specialists in human resources	2
New warehousing software program	Shippers and receivers	2
E-logs	Senior managers - goods production, utilities, transportation and construction	1
Online marketing	Managers in transportation	1
Boost Google rankings	General office support workers	1
Online marketing	Truck drivers	1

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to be Trained**
Total		**795**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Electronic logs	General office support workers	Records management technicians	1
Total			**1**

Employer Comments: Transportation and Warehousing

- “We will be getting a new office management system that may result in a decrease of two office workers. We are also getting a new supply chain management system that may result in a decrease of two warehouse staff. They are going to centralize the company database, so it's not going to result in training for our Calgary location.” - Large-sized employer
- “When there is new engine technology relevant to what we do, our technicians all have to go for specialized training to keep current. We anticipate this will be happening soon.” - Medium-sized employer
- “We are only partway through the software changes. I expect to increase by another three employees in application implementation. All staff will need training from our application team.” - Medium-sized employer
- “We are moving over to e-logs instead of paper logs. Our drivers have to learn how to do it and we in the office have to learn how to operate the software, so eventually everyone will require additional training.” - Medium-sized employer
- “We will be introducing a new whole operating system for dispatch and a new accounting package, both of which will require training in those respective departments.” - Transportation & Warehousing
- “We're adding some new software programs for warehousing. We will be hiring and training more people in the warehouse as a result.” - Medium-sized employer

- "We're updating our whole system for electronic records and we're moving to electronic logs. We will hire an administrator for the new system and have one office staff become our document control specialist. In addition, about 15 of our drivers will receive training." - Small-sized employer
- "We are working on it. Because of the US, we are moving into electronic logs. The general manager will be trained on those." - Small-sized employer
- "We are working on electronic logs. Our main transportation lanes run into the US and theoretically as of December 18 electronic logs will be mandatory for all heavy commercial trucks. We've always had satellite tracking but we are upgrading to meet the US Department of Transportation requirements. All of our employees will be trained." - Small-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	12	32%
Willingness to learn/take training	9	24%
Functional knowledge	8	21%
Industry-specific knowledge and experience	3	8%
Adaptability/flexibility	3	8%
Attitude	3	8%
Customer service	2	5%
Problem solving	2	5%
Note: 38 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.		

Employer Comments: Transportation and Warehousing

- "Ability to learn new processes." - Large-sized employer
- "I would say probably change management and training." - Large-sized employer
- "It's really basic technological knowledge. We had to show them how to go on the internet and print their pay stubs." - Medium-sized employer
- "Problem solving and critical thinking skills." - Medium-sized employer

- “I would say just refreshing their knowledge because a lot of our employees are older so they're not tech savvy.” - Medium-sized employer
- “This may seem generalized but the best skill a worker can bring is their focus and motivation on the job. As time has gone by, technology has become something everyone needs to learn. I would say almost everyone has training on computers through the school systems now. They also all have a smartphone, laptop and iPad so they are very proficient on those.” - Medium-sized employer
- “We're hoping most of our drivers can understand how to use an electronic system. I think the skill will be just an understanding of how the technology works.” - Medium-sized employer
- “A lot of our employees are a bit older and I really think it's general acceptance of something new that's the biggest challenge when it comes to technology.” - Small-sized employer
- “I think employees need to be driven. I think there's a massive focus on entitlement that needs to change.” - Small-sized employer
- “They have to be willing to adapt to it. Our workers are old school people who don't like change, so it can be challenging.” - Micro-sized employer
- “I'm going to be blunt and say they need some common sense.” - Micro-sized employer

Wholesale and Retail Trade

Past Technological Changes

Implemented or adopted technological changes in the past 2 years that resulted in....	% of Employers	Workers affected
A change in the number of workers needed	**10%** (Above overall average of 9%)	**Net change in employment (-21)** Employment increase (+6) Employment decrease (-27)
A need for worker skills upgrading and training	**33%** (Below overall average of 35%)	**2,638 workers** (21% of workforce)
A need for some workers to change job descriptions	**4.0%** (Above overall average of 2.0%)	**65 workers** (0.6% of workforce)
n=81		

Impact of Technological Changes on Employment in Past Two Years

Net Change in Employment Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**Net Change in Employment**
Upgrading computer systems	General office support workers	2
Capital management system	Financial managers	1
Applicant tracking system	Personnel and recruitment officers	1
Computer systems upgrades	Information systems analysts and consultants	1
New software system	Information systems analysts and consultants	1
Purchasing system	Retail and wholesale trade managers	-1
Point of sale systems	Retail and wholesale trade managers	-1
Updating ERP system	General office support workers	-1
Finance program	Other financial officers	-2
Sales program	Technical sales specialists - wholesale trade	-2
Self-checkout implementation	Grocery clerks and store shelf stockers	-20
Total		**-21**

Impact of Technological Changes on Training in Past Two Years

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Point of sales system	Retail salespersons	1,900
ERP system	Retail and wholesale trade managers	102
Sales program	Technical sales specialists - wholesale trade	100
New software	Technical sales specialists - wholesale trade	90
SAP ERP system	Not specified	89
Phone system	Retail salespersons	60
ERP system	Technical sales specialists - wholesale trade	45
New digital formats and computers	Not specified	40
Upgrading computer systems	Not specified	40
Finance program	Administrative officers	25
New computer system	Not specified	25
Online tire system	Automotive service technicians, truck & bus mechanics & mechanical repairers	20
New computer systems	Cashiers	12
SAP ERP system	Managers in transportation	10
Self-serve checkouts	Cashiers	10
Vehicle technology	Automotive service technicians, truck & bus mechanics & mechanical repairers	10
Finance system	Other financial officers	8
HRIS System	Personnel and recruitment officers	7
System programming for inventory and purchasing	Technical sales specialists - wholesale trade	6
New montiors and computers	Not specified	6
Capital management system	Retail and wholesale trade managers	5

Worker Skills Upgrading and Training Due to Technological Changes Implemented in the Past Two Years		
Technology	**Occupation**	**# of Workers Trained**
Updated cash registers	Cashiers	5
Shift to online operations	Technical sales specialists - wholesale trade	4
Online marketing tools	Professional occupations in advertising, marketing & public relations	3
ERP system	Administrative officers	3
System programming for inventory and purchasing	Purchasing managers	2
POS system	Retail and wholesale trade managers	2
Updating ERP system	Retail and wholesale trade managers	2
System programming for inventory and purchasing	Supervisors, recording, distributing & scheduling occupations	2
CRM	Technical sales specialists - wholesale trade	2
New management system	Retail and wholesale trade managers	1
Online ordering system	Retail and wholesale trade managers	1
Updated accounting system	Administrative officers	1
Total		**2,638**

Impact of Technological Changes on Job Descriptions in Past Two Years

Workers that Changed Job Descriptions Due to Technological Changes Implemented in the Past Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers Affected**
IT roles adapting to change	Information systems analysts & consultants	Computer programmers and interactive media developers	50
Point of sale system	Retail salespersons	Retail and wholesale trade managers	13
ERP system	Receptionists & switchboard operators	Technical sales specialists - wholesale trade	2
Total			**65**

Employer Comments: Wholesale and Retail Trade

- “We implemented new system programming for capturing inventory and purchasing and that kind of thing. This required extensive training for some staff. Our sales are now a little bit more streamlined.” - Large-sized employer
- “We have been increasing use of self-serve checkouts. We never want to decrease the colleagues in the store for any reason. In order to provide the customer service experience we want, we need more people working in the store regardless of the number of self-serve checkouts here. We've had to train more staff on customer service for our automated services.” - Large-sized employer
- “The new point of sales system required training for 2,000 in sales. Our IT roles had to adapt to the change, so the job descriptions of about 50 staff changed.” - Large-sized employer
- “We have adopted many technological changes. Our new purchasing and point of sale systems led to a decrease in two managers. New independent device implementation for self-checkout resulted in a reduction of 20 clerks.” - Large-sized employer
- “We have implemented a capital management system and a new enterprise resource planning system. There was an increase in one finance manager in the Calgary area. Training involved everybody in the company. Two of our receptionists became technical support specialists.” - Medium-sized employer
- “We're a car dealership, so whenever new vehicle technology comes out we need to do more training with the shop staff.” - Medium-sized employer
- “We've implemented an applicant tracking system that required us to hire an additional recruiter.” - Medium-sized employer

TECHNOLOGICAL CHANGE

- “We are making technological changes all the time, so that's happening continuously. In the last two years, updating our Enterprise Resource Planning (ERP) system resulted in reduction of one office staff member and training for two managers.” - Small-sized employer
- “We've changed over our whole digital format and replaced all of our computers. Everyone was trained when the change happened.” - Small-sized employer
- “All of us have changed our job from retail sales in store to online retail supervisors from home.” - Small-sized employer
- “We have focused on technology that allows more orders coming in online and more communication with contractors online. As the owner, I had to get some training.” - Micro-sized employer
- “We've updated our cash registers, so our cashiers needed additional training.” - Micro-sized employer

Wholesale and Retail Trade

Future Technological Changes

Plan to implement or adopt technological changes in the next 2 years that will result in....	% of Employers	Workers to be affected
A change in the number of workers needed	**2%** (Below overall average of 7%)	**Net change in employment (+3)** Employment increase (+3) Employment decrease (0)
A need for worker skills upgrading and training	**27%** (Above overall average of 21%)	**619 workers** (40% of workforce)
A need for some workers to change job descriptions	**1.0%** (Below overall average of 2.0%)	**13 workers** (100% of workforce)
n=81		

Impact of Technological Changes on Employment in Next Two Years

Anticipated Net Change in Employment Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**Net Change in Employment**
Software upgrades	General office support workers	2
Warehouse and stocking technology	Shippers and receivers	1
Total		**3**

Impact of Technological Changes on Training in Next Two Years

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Apps to shop in different formats	Retail salespersons	100
New onboarding system	Not specified	99
Point of sales system	Not specified	99
Payroll system	Not specified	97

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Different accounting program	Technical sales specialists - wholesale trade	60
New email system	Not specified	25
Spark System	Retail and wholesale trade managers	20
Automated stock room	Shippers and receivers	20
Self checkout system	Cashiers	20
New phones and electronic devices	Cashiers	12
Vehicle technology	Automotive service technicians, truck and bus mechanics and mechanical repairers	10
Update computer programs & phone system	Not specified	10
New automotive technologies	Not specified	7
Internal customer relations system	Technical sales specialists - wholesale trade	6
New systems	Administrative officers	5
Software upgrades	General office support workers	5
Computer system for storing data	Technical sales specialists - wholesale trade	5
Additional tills	Customer service, information and related clerks	3
Point of sales software	Retail and wholesale trade managers	2
Updating company website	Retail and wholesale trade managers	2
Updating ERP system	Retail and wholesale trade managers	2
HR database	Personnel and recruitment officers	2
New payroll programs	Payroll clerks	2
Payroll system	Payroll clerks	2
Online timeclock system	Financial managers	1
New website with employee portal	General office support workers	1
Online timeclock system	Payroll clerks	1

Anticipated Worker Skills Upgrading and Training Due to Technological Changes Planned in the Next Two Years		
Technology	**Occupation**	**# of Workers to beTrained**
Warehouse and stocking technology	Shippers and receivers	1
Total		**619**

Impact of Technological Changes on Job Descriptions in Next Two Years

Anticipated Workers Changing Job Descriptions Due to Technological Changes Planned in the Next Two Years			
Technology	**Old Occupation**	**New Occupation**	**# of Workers to be Affected**
Shopping cart for e-commerce	Retail salespersons	Retail sales supervisors	13
Total			**13**

Employer Comments: Wholesale and Retail Trade

- “We're getting a new cash register with a self-checkout system. This will require training for existing cashiers, but won't cause a reduction in staffing levels. There's also some kind of technological improvement with the warehouse and stocking which may actually require an additional person. We have someone in place who is good to go on that but we may have to hire one more person.” - Large-sized employer
- “Increasingly the generation we target are all about technology. We're introducing apps in the store to allow them to shop in different formats on their phone. We're launching that in the next couple months. There will be training for all of our retail salespeople and we're providing the training.” - Large-sized employer
- “We are going to go to an automated stock room. Right now everything is manually done, but that will change. It won't result in job loss, but it will change how we do things. We will be providing training to all of our warehouse staff and all of that training will be in house.” - Medium-sized employer
- “We have a big technological change coming as soon as [parent company] rolls out its new computer program. We thought that would be happening at the beginning of 2018, but we're hearing now it could happen closer to the end of the year. There will be in house training and it will involve everyone learning a new computer program. We will need to update all of our computers and our phone system.” - Small-sized employer

- "We are getting a new Point of Sale (POS) system. Two managers will be trained on that." - Small-sized employer
- "We are replacing our retail locations with online shopping. This will result in all of our employees becoming their own supervisor from home, rather than being a salesperson in a store." - Small-sized employer
- "We may be doing a few things probably more to do with computer systems and storing data. Our technical sales staff will need additional training." - Micro-sized employer
- "As new automotive technologies become standard in the industry we will need to train our technicians accordingly." - Micro-sized employer

Technological Change and Most Important Skills Workers Need

Skills/Attributes	# of Employers	% of Employers
Technological literacy	16	39%
Willingness to learn/take training	13	32%
Customer service	5	12%
Functional knowledge	5	12%
Analytical	3	7%
Sales	3	7%
Industry-specific knowledge and experience	2	5%
Adaptability/flexibility	2	5%
Project management	2	5%

Note: 41 employers reported a technological change in the past 2 years and/or in the next 2 years. Some employers provided more than one skill/attribute. Only skills/attributes with 2 or more responses are shown in the table.

Employer Comments: Wholesale and Retail Trade

- "An understanding and some training in the new system. With tech knowledge it improves the testing of the vehicle and the knowledge of the industry. Keeping up with technology is important." - Large-sized employer
- "I think we just all really needed an IT guy able to train our employees." - Large-sized employer

TECHNOLOGICAL CHANGE

- “I would say being good with technology, such as phones and apps. They need to know how to use it and understand it.” - Large-sized employer
- “I think they're going to need to be more computer literate. That is the biggest thing. As we move towards more automation, things will be done more and more with computers. Some positions that previously never or rarely used computers will see their use increase more and more.” - Medium-sized employer
- “I'm going to say that the skills we require don't really change. On the retail side it's customer service skills and on the wholesale side it's also customer service skills. For those people in our sales positions, it will be sales ability.” - Medium-sized employer
- “The most important thing for any of our employees is attitude. I'll take them without training if they come with the right attitude and work ethic.” - Small-sized employer
- “For [shippers/receivers] it's just computer literacy and comfort with learning new processes. That's one group of employees that seem not to love change and the world is about change. When it comes to new technologies, it doesn't end.” - Small-sized employer
- “Repetition and keeping up with the movement of technology.” - Small-sized employer
- “The most important skills following a change are decision making skills and problem solving skills.” - Small-sized employer
- “The most important skill is interpersonal skills.” - Micro-sized employer
- “They don't need any skills to work here or learn technology because we offer so much on the job training.” - Micro-sized employer

Technological Change Resources

New technologies and innovations are quickly changing the way organizations do business. Many new implementations of technology can improve an organization's efficiency, productivity, communication and overall competitiveness. In fact, according to a recent Business Development Bank of Canada (BDC) survey of over 1,400 Canadian business leaders[12], 49 per cent of respondents who are already embracing digital technologies in their businesses saw an improved customer experience, 45 per cent enjoyed better productivity, 36 per cent experienced lower costs and enhanced efficiencies, and 34 per cent experienced higher revenue growth.

Planning, implementing, and managing technological change can be a daunting task. It is important, however, that organizations follow best practices when investigating various technologies and put together a solid implementation plan, which involves clearly explaining the benefits on the new technologies to staff and providing timely training.

"Canada is well positioned to tackle the challenges presented by increased automation, including building upon the Canada Jobs Grant, which helps transition workers over the course of their working careers. The combination of strong public educational institutions, a highly skilled workforce and existing policy to assist displaced workers during the transition between jobs is a solid foundation upon which Canada can build. By encouraging the adoption of new technologies and putting in place the appropriate support for workers, Canada can minimize both skills shortages and technological unemployment."

C.D. Howe Institute, Future Shock? The Impact of Automation on Canada's Labour Market, Mar 2017

There are many resources available to employers and job seekers wanting to learn more about technological change and how to manage it.

- **Alberta Economic Development and Trade:** Provides information on the Alberta government's economic development efforts and access to information and support for businesses and investors. The Science and Innovation Division works to position Alberta as a leader in research, innovation and bringing new technologies to market. www.alberta.ca/ministry-economic-development-trade.aspx
- **Alberta Small Business Resources:** The Government of Alberta's directory of business resources is for new and established entrepreneurs. www.smallbusiness.alberta.ca
- **Business Development Bank of Canada (BDC):** The government-owned BDC supports entrepreneurs in all industries and at all stages of development from more than 100 business centres across Canada and online. BDC, its subsidiary BDC Capital, and BDC Advisory Services offers financing and securitization, specialized financing such as venture capital and growth and transitional capital, as well as non-finance related consulting services. BDC's Technology Advisory Services offers guidance with technology investment plans, technology action plans, system selection support and technology contract review. www.bdc.ca

[12] Business Development Bank of Canada (BDC), Future Proof Your Business: Adapting to Technology and Demographic Trends, October 2017, p.2.

- **Business Link:** Business Link is a non-profit organization funded by the provincial and federal governments helping Alberta small business owners. Services include advice and research, training and webinars, specialized support to Aboriginal communities and entrepreneurs, small business events and networking opportunities and various other small business tools and resources. www.businesslink.ca
- **Calgary Economic Development (CED):** CED is a not-for-profit corporation funded by the City of Calgary, community partners, other orders of government and the private sector through the Action Calgary program. CED works with business, government and community partners for the purpose of attracting business investment, fostering trade and growing Calgary's workforce. www.calgaryeconomicdevelopment.com
- **Calgary Employment Services:** The Government of Alberta's Calgary Employment Services website is available to help Albertans in the Calgary area explore career and training options and find jobs. The site includes an Employment, Training and Career Services directory and provides employment and training programs, including computer skills training, offered through a network of community organizations, non-profit agencies, colleges, private schools, businesses and employer organizations. Career and employment workshops, including various technology workshops, and Calgary labour market information are also available on the site. www.alberta.ca/calgary-employment-services.aspx
- **Canada-Alberta Job Grant (CAJG):** The Canada-Alberta Job Grant is an employer-driven training program. Employers and government share the cost of training new and existing workers to increase their knowledge and skills to meet the needs of the province's changing economy. www.albertacanada.com/employers/train/jobgrant.aspx
- **Concierge:** Concierge is delivered by the National Research Council of Canada Industrial Research Assistance Program (NRC-IRAP) in collaboration with federal and provincial partners. The service is a single access point to funding, expertise, facilities, and global opportunities for small- and medium-sized businesses seeking to grow through innovation. Concierge offers free, one-on-one assistance from expert advisors who provide customized guidance in selecting the most relevant programs and services to help businesses grow, including technical and business advisory services. www.concierge.innovation.gc.ca
- **Startup Calgary:** Part of Calgary Economic Development, Startup Calgary supports the city's early-stage entrepreneurs through local programs and events. www.startupcalgary.ca
- **Western Canada Business Service Network (WCBSN):** Delivered by Western Economic Diversification Canada (WD), the WCBSN consists of several integrated organizations that provide entrepreneurs with services and resources to help Western Canadians start, grow and expand their businesses. This network of more than 100 offices across the West, includes the following organizations: www.wd-deo.gc.ca/eng/99.asp

- **Canada Business:** Canada Business is a government information service for businesses and start-up entrepreneurs and provides a single point of access for federal and provincial/territorial government services, programs and regulatory requirements for business. Resources include information on developing a website, using technology in the workplace, and digital literacy. www.canadabusiness.ca

- **Community Futures:** There are 90 Community Futures non-profit corporations across western Canada delivering a variety of services including strategic economic planning, technical and advisory services to businesses, loans to small and medium-sized businesses, self-employment assistance programs, and services targeted to youth and entrepreneurs with disabilities. The Community Futures Network of Canada website is a gateway to 268 Community Economic Development Centres across Canada. This network works together to foster entrepreneurship and community economic development in rural areas of western Canada. www.communityfuturescanada.ca

- **Entrepreneurs with Disabilities Program**: Western Canadian entrepreneurs with a disability can access business information, including information on technology, training and development, mentoring, and one-on-one counseling services. www.wd-deo.gc.ca/eng/13643.asp
Momentum delivers the Entrepreneurs with Disabilities Program in Calgary. www.momentum.org

- **Women's Enterprise Initiative (WEI):** These non-profit centres, with offices in each of the four western provinces, provide a variety of services for women entrepreneurs including advisory services, training options, networking opportunities, business loans and referrals to complementary services. www.wd-deo.gc.ca/eng/256.asp
Alberta Women Entrepreneurs is the WEI office in Alberta. www.awebusiness.com

- **Francophone Economic Development Organizations (FEDO):** These independent regional organizations, with offices in each of the four western provinces, provide services to Francophone entrepreneurs including training, business and community economic development, access to capital, information services, marketing advice, networking and mentoring. www.wd-deo.gc.ca/eng/257.asp
Conseil de développement économique de l'Alberta is the FEDO office in Alberta. www.lecdea.ca

- **Indigenous Business Development Services (IBDS):** Provides early stage entrepreneurship support for new and existing Indigenous entrepreneurs and business organizations in Western Canada.
Business Link - Indigenous Services is the IBDS provider in Alberta. http://businesslink.ca/what-we-do/indigenous-services

Summary and Conclusions

The extent to which technological changes have and will disrupt the workforce is a growing concern for organizations, workers, policy makers and educational institutions alike. Popular cited studies[13] estimate that due to technological change over the coming decades, around 2 per cent to 9 per cent of occupations are likely to become entirely automated and that 35 per cent to 60 per cent of occupations are projected to be transformed in some way. When applying these estimates to the Canadian workforce, the Canadian Chamber of Commerce estimates that between 390,000 and 1.7 million people could see their jobs eliminated, and between 6.6 million and 11.4 million people could see their jobs transformed in the next 10 to 20 years.[14]

"Occupations high in abstract, complex-decision-making skills with a strong focus on creativity, critical thinking and interpersonal social skills have a relatively low risk of being automated. An increase in demand for these skills is likely over the near and medium term."

C.D. Howe Institute, Future Shock? The Impact of Automation on Canada's Labour Market, Mar 2017

For most organizations and employees today, the more important concern should be how technology is changing work and the skills they will need to be successful in the future.

While uncertainty remains regarding the impact of existing and emerging technologies on Calgary businesses and their workforces, the greatest impacts in the near future, according to our survey of over 800 Calgary and area employers, are likely to be on training and skills upgrades.

Overall, Calgary and area employers that have implemented technological changes in the past two years have not experienced a significant disruption in levels of employment. Only 9 per cent of the 803 Calgary and area employers surveyed said they implemented technological changes in the past two years that resulted in a change in employment. Large-sized employers with 100+ employees (16 per cent) and manufacturing employers (14 per cent) were more likely to have implemented technological changes that resulted in a change in employment.

The net change in employment has overall been positive. While results varied by company size and by industry, overall Calgary and area employers reported technological changes implemented in the past two years resulted in a net employment increase of 63 workers. Large-sized employers with 100+ employees (net decrease of 30 workers) as well as wholesale and retail trade employers (net decrease of 21 workers) and manufacturing employers (net decrease of 28 workers) were more negatively affected in terms of overall employment levels by technological changes.

[13] From Employment and Social Development Canada (ESDC), the OECD, Brookfield, CD Howe, RBC and McKinsey.

[14] The Canadian Chamber of Commerce, Skills for an Automated Future, March 2018.

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Overall, Calgary and area employers that plan to implement technological changes in the next two years do not anticipate a significant disruption in levels of employment. Only 7 per cent of the Calgary and area employers surveyed said they plan to implement technological changes in the next two years that will result in a change in employment. Large-sized employers (12 per cent) and professional, scientific and technical services employers (15 per cent) are more likely to implement technological changes that will result in a change in employment.

Overall, the net change in employment is anticipated to be slightly positive. While results varied by company size and by industry, overall Calgary and area employers anticipate technological changes in the next two years will result in a net employment increase of 5 workers. Large-sized employers (net anticipated decrease of 20 workers) as well as manufacturing employers (net anticipated decrease of 18 workers) anticipate more negative impacts in terms of overall employment levels by technological changes.

Technological changes have had the greatest impact on training. Overall, 35 per cent of the Calgary and area employers surveyed said they implemented technological changes in the past two years that resulted in a need to upgrade nearly 8,000 workers' skills with additional training. Large-sized employers (41 per cent) and employers in the finance, insurance, real estate and leasing and health care and social assistance industries (44 per cent each) were more likely to have implemented technological changes that resulted in a need for worker skill upgrading and training.

Looking ahead, technological changes are expected to have the greatest impact on training. Overall, 21 per cent of the Calgary and area employers surveyed plan to implement technological changes in the next two years that will result in a need to upgrade nearly 5,400 workers' skills with additional training. Medium-sized employers with 50 - 99 employees (26 per cent) and employers in the professional, scientific and technical services and wholesale and retail trade industries (27 per cent each) are more likely to implement technological changes that will result in a need for worker skill upgrading and training.

Very few employers overall implemented technological changes that resulted in workers having to change job descriptions. Only 2 per cent of the Calgary and area employers surveyed said they implemented technological changes in the past two years that required 95 workers to change job descriptions. Employers in the finance, insurance, real estate and leasing (6 per cent) and wholesale and retail trade industry (4 per cent) were more likely to have implemented technological changes that resulted in a need for workers to change job descriptions.

Over the next two years, very few employers overall have plans to implement technological changes that will result in workers having to change job descriptions. Only 2 per cent of the Calgary and area employers surveyed anticipate implementing technological changes in the next two years that will require 72 workers to change job descriptions. Employers in the manufacturing industry (4 per cent) are slightly more likely to implement technological changes that will resulted in changes to worker job descriptions.

Along with technological literacy, soft skills and personal attributes such as willingness to learn and take training and adaptability and flexibility, are important skills identified by employers when it comes to technological change. Of the employers that have implemented or have plans to implement technological changes, 28 per cent said technological literacy is the most important skill employees need or will need, followed by willingness to learn and take training (26 per cent), functional knowledge (14 per cent), and adaptability/flexibility (13 per cent). Overall, 11 of the top 15 most important skills mentioned by Calgary and area employers fall into the 'soft skills' category.

These findings are consistent with other recent studies emphasizing the important of soft skills:

- **Future Work Skills 2020**[15] - Outlines six drivers of change and ten key skills needed in the future workforce including social intelligence, novel and adaptive thinking, cross cultural competency, and virtual collaboration.
- **Humans Wanted**[16] - Despite projected job displacement in a variety of industries and occupations, the Canadian economy is expected to add 2.4 million jobs over the next four years, all of which will require a new mix of skills, including complex problem solving, active listening, critical thinking and social perceptiveness. Digital fluency/literacy is expected to be essential to all new jobs, as are competencies such as cultural awareness, adaptability and judgement and decision making.
- **The Future of Jobs**[17]- By 2020, it is estimated that 35 per cent of skills considered important in 2015 will have changed as a result of advances in technology. The top 10 skills considered important in 2020 are complex problem solving; critical thinking; creativity; people management; coordinating with others; emotional intelligence; judgement and decision making; service orientation (actively looking for ways to help others); negotiation; and cognitive flexibility.
- **Jobs Lost, Jobs Gained**[18] -It is anticipated that workers of the future will spend more time on activities such as managing people, applying expertise, and communicating with others, and less time on physical activities and collecting and processing data. According to the study, the skills required will also shift, requiring more social and emotional skills and more advanced cognitive capabilities, such as logical reasoning and creativity.

[15] Anna Davies, Devin Fidler, Marina Gorbis, Institute for the Future for the University of Phoenix Research Institute.

[16] RBC, Humans Wanted, How Canadian youth can thrive in the age of disruption, March 2018.

[17] World Economic Forum, The Future of Jobs, Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, January 2016.

[18] McKinsey Global Institute, Jobs Lost, Jobs Gained: Workforce Transitions in a time of Automation, December 2017.

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To be successful in the years to come, organizations, workers and job seekers will increasingly need to reassess the skills they have and the skills they need to keep up with technological change. There are a variety resources available to employers and job seekers wanting to learn more about technological change and how to manage it. Many Calgary and area employers are looking ahead and have made the commitment to implement new technologies into their workplace and train their workers. Planning, implementing, and managing technological change can be a daunting task, but organizations that follow best practices, making sure all workers understand the benefits of the new technologies and provide timely training, will no doubt reap the benefits of a more engaged, efficient and productive workforce.

Appendix A: Survey Methodology

The Q1 2017 Calgary and Area Employer Survey[19] is based on responses to a telephone questionnaire conducted in January, February and March 2017 of Calgary and area employers with 100+ employees (large-sized employers). Following are the number of respondents from each industry sector.

Industry	Number of Respondents
Mining & Oil & Gas	20
Construction	20
Manufacturing	20
Wholesale & Retail Trade	21
Transportation & Warehousing	20
Professional, Scientific & Technical Services	20
Health Care & Social Assistance	20
Accommodation & Food Services/Arts & Entertainment	20
Finance, Insurance, Real Estate & Leasing	20
Other	20
Total	**201**

The Q2 2017 Calgary and Area Employer Survey is based on responses to a telephone questionnaire conducted in April, May and June 2017 of Calgary and area employers with 50 - 99 employees (medium-sized employers). Following are the number of respondents from each industry sector.

Industry	Number of Respondents
Mining & Oil & Gas	20
Construction	20
Manufacturing	20
Wholesale & Retail Trade	20
Transportation & Warehousing	20
Professional, Scientific & Technical Services	20
Health Care & Social Assistance	20
Accommodation & Food Services/Arts & Entertainment	20
Finance, Insurance, Real Estate & Leasing	20
Other	20
Total	**200**

[19] https://open.alberta.ca/publications/5452042

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The Q3 2017 Calgary and Area Employer Survey is based on responses to a telephone questionnaire conducted in July, August and September 2017 of Calgary and area employers with 10 - 49 employees (small-sized employers). Following are the number of respondents from each industry sector.

Industry	Number of Respondents
Mining & Oil & Gas	20
Construction	20
Manufacturing	20
Wholesale & Retail Trade	20
Transportation & Warehousing	20
Professional, Scientific & Technical Services	20
Health Care & Social Assistance	20
Accommodation & Food Services/Arts & Entertainment	20
Finance, Insurance, Real Estate & Leasing	21
Other	20
Total	**201**

The Q4 2017 Calgary and Area Employer Survey is based on responses to a telephone questionnaire conducted in October, November and December 2017 of Calgary and area employers with <10 employees (micro-sized employers). Following are the number of respondents from each industry sector.

Industry	Number of Respondents
Mining & Oil & Gas	20
Construction	20
Manufacturing	20
Wholesale & Retail Trade	20
Transportation & Warehousing	20
Professional, Scientific & Technical Services	20
Health Care & Social Assistance	20
Accommodation & Food Services/Arts & Entertainment	20
Finance, Insurance, Real Estate & Leasing	21
Other	20
Total	**201**

The 'Other' industry category includes a variety of employers from the remainder of the industry categories: Agriculture, Utilities, Information & Culture, Management of Companies, Administrative & Support Services, Educational Services, Other Services and Public Administration.

The Calgary Region boundaries include the city of Calgary, communities west to Lake Louise, including Banff, Canmore and Cochrane, east to Chestermere, north to Crossfield, including Airdrie, and south to Cayley, including High River and Okotoks.