CompTIA.

Cyberprovinces
2019 ™

The definitive
province-by-province
analysis of the
Canada tech industry
and tech workforce

Jobs / Tech concentration /
Business Establishments /
Industry sectors / Innovation /
Wage differential / Wages

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Cyberprovinces can be accessed online at CompTIA.org.

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ABOUT

ABOUT THIS REPORT

The Computing Technology Industry Association (CompTIA) presents the 2019 edition of *Cyberprovinces*. CompTIA designed this report to serve as a reference tool, making national and province-level data accessible to a wide range of users. *Cyberprovinces* quantifies the size and scope of the tech industry and the tech workforce across multiple vectors. To provide additional context, *Cyberprovinces* includes time-series trending, average wages, business establishments, job postings, emerging tech metrics, and more.

As with any sector-level report, there are varying interpretations of what constitutes the tech sector and the tech workforce. Some of this variance may be attributed to the objectives of the author. Is the goal to depict the broadest possible representation of STEM and digital economy fields, or a more narrowly defined technology subset? Is the goal to capture all possible knowledge workers, or a more narrowly defined technology subset? For the purposes of this report, CompTIA focuses on the more narrowly defined technology subset. See the methodology section for details of the specific NAICS codes and occupation codes CompTIA uses in its definitions of the tech sector and the tech workforce.

Due to periodic updates to industry and occupation categories by government agencies, as well as occasional revisions of historical data, direct comparisons to previous publications of *Cyberprovinces* is not always possible. Additionally, CompTIA adjusts its methodology at times to best reflect available data and the needs of users. For example, for the 2019 release, CompTIA included a segment of self-employed workers in the calculations for industry and occupation employment that was previously excluded. For these reasons, it is best to view the most recent release as the best representation of the state of the tech industry and workforce. If historical comparison data is required, requests can be submitted to research@comptia.org.

ABOUT COMPTIA

The Computing Technology Industry Association (CompTIA) is a leading voice and advocate for the $5 trillion global information technology ecosystem; and the more than 50 million industry and tech professionals who design, implement, manage, and safeguard the technology that powers the world's economy. Through education, training, certifications, advocacy, philanthropy, and market research, CompTIA is the hub for advancing the tech industry and its workforce.

Led by a network of member-led communities and councils, CompTIA brings together the entire tech ecosystem; from Fortune 500 companies to mid-market and small technology solution providers, software and service firms, consultants and innovators. Backed by a powerful portfolio of industry insight and research, education and events, business tools and resources, CompTIA's sole focus is to drive member success and industry growth in a rapidly evolving market place.

See CompTIA's Canadian Business Technology community for more: https://www.comptia.org/communities/canadian-business-technology

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BACKGROUND – KEY FORCES SHAPING THE TECH LANDSCAPE

Increasingly, the world is defined less as one 'next big thing,' and rather, the iterative fusion of technology building blocks coupled with a generous helping of people and process. This may entail the stacking of foundational infrastructure and enabling components with emerging general-purpose technologies, such as AI, and then rounded out with data, an 'as-a-service' user experience, and business process optimization. The implications are both exciting – the ingredients of innovation have never been more accessible, and trying, as users and technology providers work to understand an ever-growing set of building blocks and how the pieces fit to drive digital transformation. Against this backdrop, CompTIA's *IT Industry Outlook* explores the forces shaping the information technology industry, its workforce, and its business models in the year ahead. See www.comptia.org for full report.

Cloud, Edge and 5G Form the Modern Economic Infrastructure

The most recent waves of technological innovation – sometimes referred to as the "Fourth Industrial Revolution," are redefining business and society. This suggests not only a drastic change in the way work is done, but a new foundational infrastructure, starting with a holistic transition to cloud computing. Advances in edge computing and 5G networking will further extend computing, intelligence, and connectivity, rounding out the modern economic infrastructure.

IoT and AI Open New Possibilities in Ambient Computing

As the Internet of Things continues to grow, every imaginable object will have the potential to be a computing device, collecting data and providing new capabilities. With the wide spread of computing power, artificial intelligence will automate tasks to reduce complexity and scan the environment to understand context. The net result will be ambient computing, with activity that was once confined to a device now taking place seamlessly with minimal user interaction.

Hyper-personalization Takes Customer Experience to Next Level

Today's customers are more tech-savvy, more diverse, and more finicky than ever. From desiring seamless customer service to demanding myriad digital options for commerce, many buyers are no longer just looking for the right product, but also seeking a satisfying experience in attaining it. The catch word is "hyper-personalization." This model takes the time-honored concept of customer segmentation to the extreme.

Distributed Technology Models Challenge Existing Structures

The past year has not been especially kind to blockchain and other distributed ledger technologies (DLT). Cryptocurrency values have fallen precipitously, and killer apps have not yet emerged. Other types of distributed technology, such as distributed databases or the Tor browser, leverage distributed networks to extend established architectural concepts. DLT takes things a step further, introducing an entirely new architectural approach made possible by distributed networks and cryptography. In theory, DLT provides an improved method for recording many types of digital transactions.

Digital-Human Models Begin to Shape the Workplace of Tomorrow

While the dire warnings of "the robots are coming for our jobs" tend to draw the headlines, the reality of the situation is far more nuanced. Beyond the extreme positions, there is a hybrid model whereby humans leverage and act on technology; and intelligent technology proactively does the same to workers. The impact of digital-human models will likely be far-reaching and require ongoing investments in people and process.

Global Tech Hubs Put Spotlight on the Ingredients for Innovation

The ingredients of innovation have never been more accessible. With little more than a broadband connection and a credit card, a startup can spin up powerful, scalable compute and storage capacity with minimal investment. Add in open source code, stackable technologies, talent marketplaces, and creative financing and the ingredients are all there for innovation to flourish. The data bear this out as tech hubs have sprouted up across the globe

Technology Professionals Take the Lead in Anticipating Unintended Consequences

From the global economy to everyday activities, technology continues to change the world in profound ways. However, for those working in technology, this is not a chance to simply claim victory and reap rewards. Changes at the scale made possible by technology will inevitably cause ripple effects. Those effects have been coming to light over the past year, from security and privacy incidents to AI bias to technology that is not quite ready for prime time.

Persistent Tech-Worker Shortages Fuel New, Creative Solutions

The demand for tech talent routinely exceeds supply in many markets. Consequently, employers can no longer fall back on status quo approaches to developing, recruiting, and retaining talent. From rethinking screening criteria, such as eliminating the 4-year degree threshold, to further leveraging apprenticeships, partnerships, flexible training and work arrangements, and performance-based certifications, employers increasingly recognize the need for creative problem solving.

BACKGROUND – DEFINING NET TECH EMPLOYMENT

The Canadian tech workforce consists of two primary components, represented as a single figure by the 'net tech employment' designation. The foundation is the set of technology professionals working in technical positions, such as IT support, network engineering, software development and related roles. Many of these professionals work for technology compa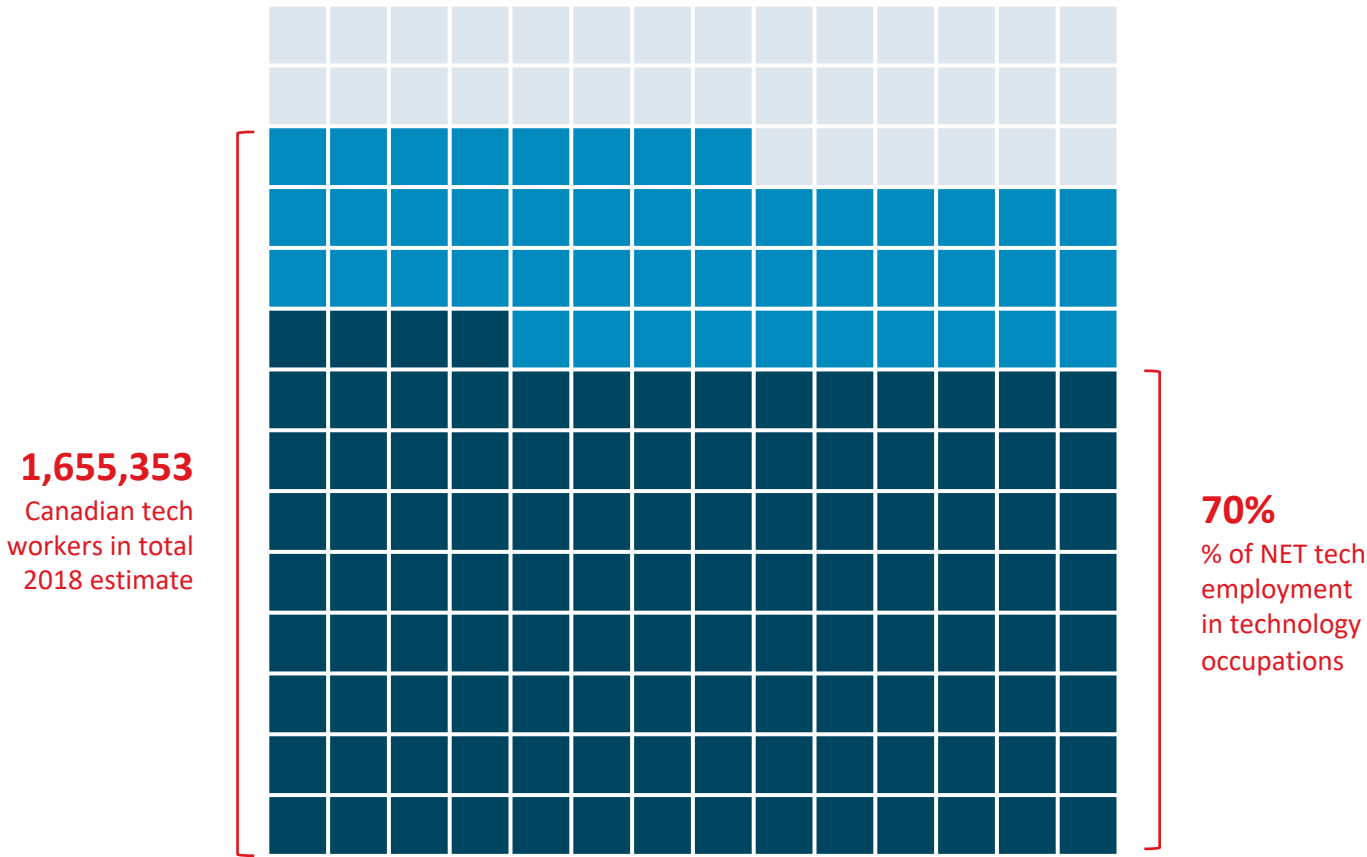nies (51.8 percent), but many others are employed by organizations across every industry sector in the Canadian economy (48.2 percent).

The second component consists of the business professionals employed by technology companies. These professionals – encompassing sales, marketing, finance, HR, operations and management, play an important role in supporting the development and delivery of the technology products and services used throughout the economy. Thirty-four percent of the net tech employment total consists of tech industry business professionals.

One final segment involves workers classified as self-employed. For the purposes of this report, only dedicated, full-time self-employed technology workers are counted towards net tech employment. Workers that are characterized as "gig" workers, which may entail working on the side for supplementary income, are excluded from this analysis due to a number of uncertainties with the data and to minimize the possibility of double counting.

N = Technology professionals employed by organizations across the Canadian economy
(e.g. software developers, network architects, database admins, etc.)

N = Support/business professionals employed by Canadian tech companies
(e.g. sales, marketing, finance, HR, etc.)

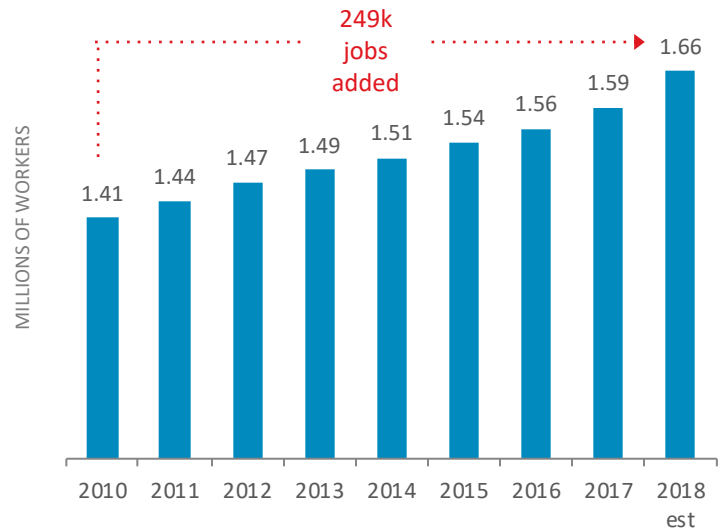**1,655,353**
Canadian tech workers in total 2018 estimate

70%
% of NET tech employment in technology occupations

= 10,000 workers   Sources: EMSI | Statistics Canada | CompTIA
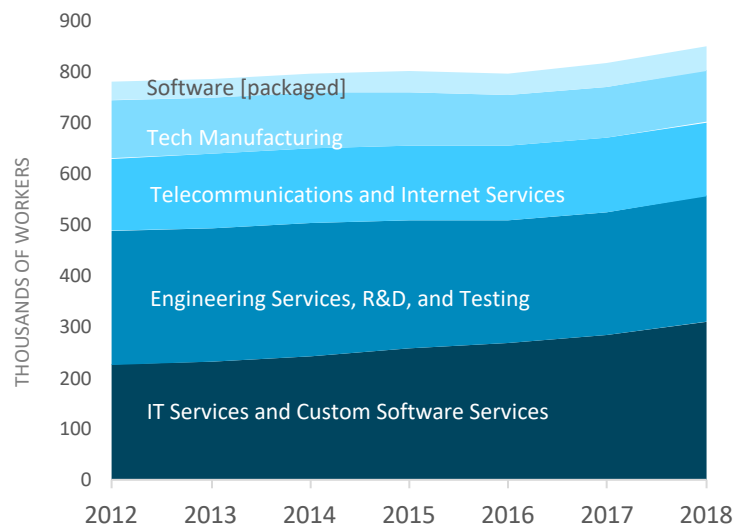Some numeric changes affected by rounding

KEY POINTS

→ Net tech employment in Canada– as described on the previous page, reached an estimated 1.66 million workers in 2018, an increase of nearly 61,400 new jobs and a growth rate of 3.8 percent.

→ Since 2010, net tech employment increased by an estimated 249,000 new jobs. Net tech employment growth has been steady during this span, averaging approximately 29,000 new jobs per year.

→ As the largest component of net tech employment (70 percent), technology occupations are the primary driver of job growth. Just 5 of 25 tech occupation categories accounted for the majority (70 percent) of job gains during the 2012-2018 time period.

→ Largest tech occupation contributors to job gains, 2012-2018:
  - → Systems analysts and consultants: +41,060
  - → Programmers and media developers: +26,886
  - → Information systems managers: +23,531
  - → User support technicians: +20,037
  - → Software engineers and designers: +17,657

→ On a percent change basis, the occupation category covering other professional engineers grew by +58% percent, the largest increase among tech occupations during 2012-2018. Software engineers (+55%) was next, followed by database analysts and administrators (+52%)

→ Most occupation categories experienced positive job gains during the 2012-2018 time period, although a few were negative. The category covering electronics service technicians lost 9,019 jobs while electronics assemblers, fabricators, inspectors, and testers lost-2518 jobs.

→ Largest tech industry contributors to job gains, 2012-2018:
  - → IT Services and Custom Software Services: +84,561
  - → Software [packaged]: +11,806
  - → Telecommunications carriers (wired + wireless): +466

→ The steepest decline occurred in the R&D, Testing, and Engineering Services where -15,686 jobs were shed during the 2012-2018 time period. The tech manufacturing category saw a drop of -10,580 jobs 2012-2018.

→ Looking ahead, the overall base of employment is projected to increase by nearly 10 percent between 2018 and 2026. The growth projections for many technology occupation categories exceed the national benchmark, and in some cases, by a significant amount. For example, database analysts and administrator roles are projected to grow at more than double the rate as the national average. Software, systems analysts, which includes cybersecurity roles, and user support technicians will also experience notable gains through 2026.

NET TECH EMPLOYMENT TRENDING

249k jobs added

2010	2011	2012	2013	2014	2015	2016	2017	2018 est
1.41	1.44	1.47	1.49	1.51	1.54	1.56	1.59	1.66

MILLIONS OF WORKERS

TECH INDUSTRY EMPLOYMENT TRENDING

THOUSANDS OF WORKERS

- Software [packaged]
- Tech Manufacturing
- Telecommunications and Internet Services
- Engineering Services, R&D, and Testing
- IT Services and Custom Software Services

2012   2013   2014   2015   2016   2017   2018

OCCUPATION OUTLOOK: 2018-2026

Database analysts / admins	24%
Software engineers	20%
Sys. analysts / consultants	20%
Health occupations	20%
User support technicians	18%
All occupations in Canada	10%
Natural res. / agriculture occ.	8%
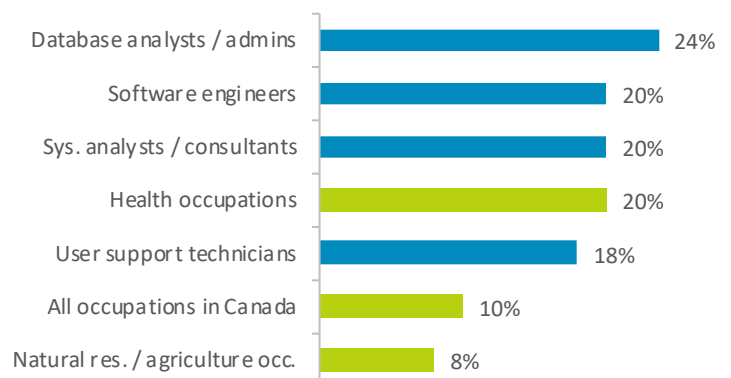
Sources: EMSI | Statistics Canada | CompTIA

BACKGROUND – FACTORS TO CONSIDER WHEN USING AVERAGE WAGE DATA

KEY POINTS

→ The average – also referred to as the mean – is a useful starting point in data analysis. However, it should not be used in isolation. Averages are affected by the distribution of data, especially points at the very high or very low end of the range.

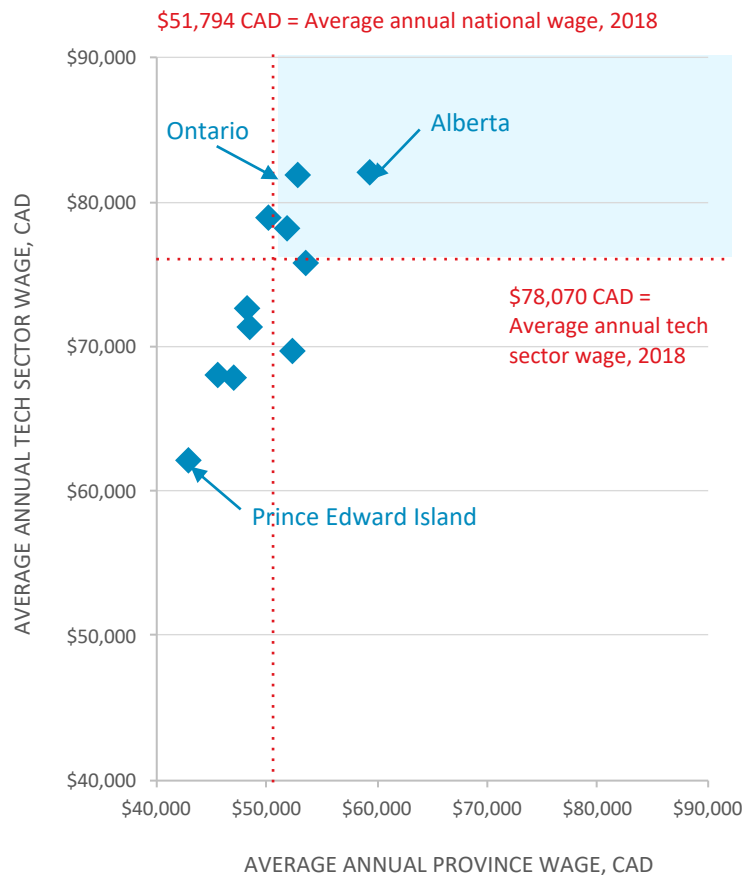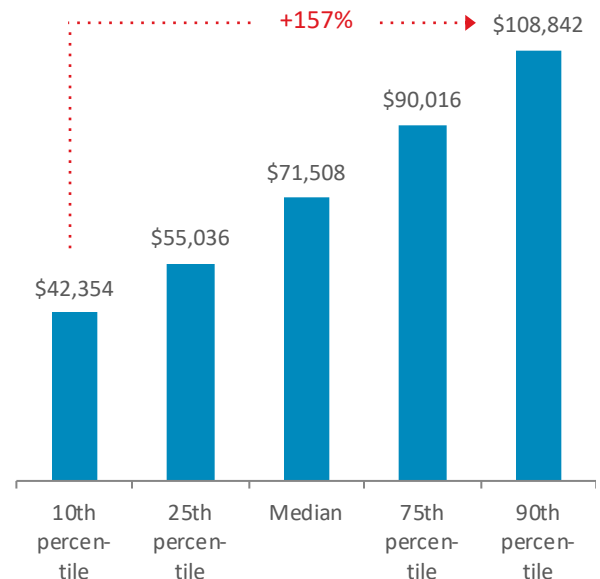→ In the case of tech sector and tech occupation wages, there are data points that fall into the category of being on the high end of the range, thereby affecting the average.

→ Ontario accounts for 46 percent of the national tech sector payroll and 45 percent of tech sector workers. The province is so large relative to the others, that it exerts a significant upward pull on tech sector wages. As depicted in the chart to the right, Ontario sits above the average tech sector wage of $78,070. Alberta and British Columbia are the other provinces with an average tech sector wage exceeding the national average.

→ The government agency, Statistics Canada, notes "in addition to regular remuneration, wages includes directors' fees, bonuses, commissions, gratuities, income in kind, taxable allowances, retroactive wage payments and stock options." The highest paid tech CEO in Canada in 2018 reportedly earned $24.6 million in total compensation, partially due to stock options. This is another example of an outlier data point that elevates average tech sector wage data.

→ Wages should always be viewed in the context of cost of living. The buying power of a salary in Toronto will vary greatly with the buying power in Lloydminster. According to the The Toronto Real Estate Board, the average selling price for all housing in Toronto (all types) during August 2019 was $792,611.

→ Beyond location, the other important variables to consider when reviewing wage data are job role, areas of expertise, job experience, industry sector, and company size. A skilled employee in a hot field such as machine learning, working for a Fortune 500 company, will earn on average far more than a tech worker in an established field such as IT support, working for a small non-profit museum.

→ Relatedly, the tech sector average wage reflects technical and non-technical positions. The average for technical roles tends to exceed non-technical roles when accounting for job level and experience. For example, a mid-tier software developer may earn substantially more than a mid-tier marketing professional or operations manager.

→ Within tech occupations, a comparison of workers at the 90th percentile of compensation and the 10th percentile yields a differential of 157 percent. The 10th and 25th percentile wages are often entry-level wages, while the 75th and 90th percentile wages may reflect seniority and significant expertise developed from years on the job.

TECH INDUSTRY AVERAGE WAGE VS. OVERALL AVERAGE WAGE MATRIX

$51,794 CAD = Average annual national wage, 2018

$78,070 CAD = Average annual tech sector wage, 2018

TECH OCCUPATION HOURLY WAGE DISTRIBUTION, CAD

+157% → $108,842

10th percentile	25th percentile	Median	75th percentile	90th percentile
$42,354	$55,036	$71,508	$90,016	$108,842

CANADIAN NET TECH EMPLOYMENT

→ Canadian net tech employment totaled an estimated 1.66 million in 2018, an increase of more than 61,000 workers over the 2017 base of 1.59 million. Net tech employment grew an estimated 3.8 percent year-over-year.

→ Net tech employment accounted for approximately 8.4 percent of the overall Canadian workforce in 2018. As noted previously, because of the blurring of lines across industries, there is likely a degree of undercounting in tech sector employment as a percentage of Canadian employment.

CANADIAN TECH INDUSTRY EMPLOYMENT

→ Canadian tech industry employment totaled an estimated 849,168 in 2018, an increase of 35,205 workers from 813,963 in 2017. Tech industry employment grew an estimated 4.3 percent year-over-year.

→ Tech manufacturing employment totaled an estimated 103,331 in 2018, a increase of more than 3,800 jobs when compared to the previous year. The sector that experienced a decline when compared to the previous year was Telecommunications and Internet Services which saw a decline of almost 5,800 jobs when compared to the previous year.

→ The IT services and custom software services subsector generated the largest numerical gain in employment, adding nearly 23,720 net-new jobs in 2018. This gain is a 8.3 percentage increase over 2017. This growth reflects the ongoing digital transformations occurring across the Canadian economy and the corresponding need for expertise in areas such as cloud computing migration, application integration, business process automation, data analytics, artificial intelligence, and cybersecurity.

CANADIAN TECH OCCUPATION EMPLOYMENT

→ Tech occupation jobs reached an estimated 1.03 million workers in 2018, an increase of 47,544 workers. On a percent change basis, it represents a 4.8 percent increase over 2017.

→ Since 2012, over 185,000 new tech occupation jobs were added; a function of the demand for tech talent across every industry sector in the Canadian economy.

→ The core IT occupations component of tech occupations accounts for 66 percent of the total. IT occupations added about 42,303 net-new jobs in 2018, a year-over-year growth rate of 6.6 percent. On a numeric basis, Information systems analysts and consultants and computer and information systems managers added the most jobs when compared to 2017.

TECH BUSINESS ESTABLISHMENTS, WAGES, AND EMPLOYER DEMAND

→ There are approximately 70,189 tech business enterprises with payroll located throughout Canada. This is supplemented by self-employed tech workers, which are classified separately by Canadian government sources.

→ Tech wages averaged $78,070 CAD in 2018, 51% higher than the average private sector wage of $51,794 CAD.

→ According to data from Burning Glass Technologies Labor Insights, the number of job postings by Canadian employers for tech occupations reached nearly 116,126 during 2018.

→ While still a relatively small subset of overall job postings, employer demand for emerging technology skills in areas such as machine learning, robotics, AR/VR, blockchain, internet of things, and related, increased 23 percent in 2018.

CANADA NET TECH EMPLOYMENT

	2017	2018 est.	Numeric Change
Tech employment net of industry, occupation, and self-employed	1,593,992	1,655,353	+61,362
Total	1,593,992	1,655,353	+61,362

CANADA TECH INDUSTRY EMPLOYMENT

	2017	2018 est.	Numeric Change
Tech Manufacturing	99,462	103,331	3,869
Telecommunications and Internet Services	148,149	142,371	-5,779
Software [packaged]	43,050	46,434	3,384
IT Services and Custom Software	285,668	309,382	23,715
Engineering Services, R&D, and Testing	237,634	247,649	10,015
Total	813,963	849,168	35,205

CANADA TECH OCCUPATION EMPLOYMENT

	2017	2018 est.	Numeric Change
IT Occupations	640,114	682,417	+42,303
Engineering and Technician Occupations	345,669	350,910	+5,241
Total	985,783	1,033,327	+47,544

TOP TECH OCCUPATION CATEGORIES

	2018 est.	% Change
Software and Web Developers	217,811	6.8%
Information systems analysts and consultants	165,079	8.4%
IT User support technicians	95,446	7.1%

Source: EMSI | Statistics Canada | CompTIA
Some numeric changes affected by rounding

PROVINCE NET TECH EMPLOYMENT

→ The top provinces when it comes to Net Tech Employment are Ontario and Quebec. The greatest number of jobs was added in Ontario when compared to 2017. Tech employment also represents about 10% of the total employment in these provinces.

→ When compared to the other provinces Ontario stands apart for the number of jobs in tech with 44.5 percent of Canadian net tech employment coming from this province. This is consistent with Ontario's population ratio (about 37 percent of the country), and economic impact (about 38 percent).

→ Anchored by Canada's most populous city, Toronto, the province of Ontario also accounted for a significant portion of tech employment gains during 2018.

PROVINCE AVERAGE TECH INDUSTRY WAGES

→ On average, tech industry wages are highest in Alberta, followed by Ontario and British Columbia. Figures below presented in CAD.

- → Alberta $81,967
- → Ontario $81,726
- → British Columbia $78,927
- → Newfoundland and Labrador $75,771
- → Quebec $72,592
- → Manitoba $71,237
- → Saskatchewan $69,692
- → Nova Scotia $67,923
- → New Brunswick $67,701
- → Prince Edward Island $62,130

BUSINESS LOCATIONS, ECONOMIC IMPACT, AND EMPLOYER DEMAND

→ Tech business establishments tend to be concentrated in population centers and in locations that are close to the customers they serve. Combined, Ontario and Quebec account for nearly two-thirds of the total tech business establishments with payroll in the country.

- → Ontario 32,539
- → Quebec 12,622
- → Alberta 10,447
- → British Columbia 9,349

→ Beyond numerical measures based on size, relative measures based on the size of the province economy reveal additional insight. Overall, an estimated 5.5 percent of Ontario's economy is attributed to the tech sector, as defined by this report. In comparison, approximately 1.8 percent of Saskatchewan's economy is attributed to the tech sector.

→ Employer demand for tech talent as measured by online job postings follows a similar pattern to tech employment with Ontario having approximately 59,030 postings in 2018. In second place is British Columbia with approximately 16,096 postings. Quebec and Alberta are third and fourth respectively in terms of tech job postings.

→ Growth in postings for emerging technology positions and skills:

- → Alberta +60%
- → Ontario +19%
- → Quebec +17%
- → British Columbia +17%

CYBERPROVINCES BY NET TECH EMPLOYMENT

1.	Ontario	736,178
2.	Quebec	396,392
3.	British Columbia	204,112
4.	Alberta	175,397
5.	Manitoba	40,363
6.	Nova Scotia	31,289
7.	Saskatchewan	27,936
8.	New Brunswick	22,178
9.	Newfoundland and Labrador	14,199
10.	Prince Edward Island	4,547

CYBERPROVINCES BY NET TECH EMPLOYMENT JOB GAINS

1.	Ontario	+36,698
2.	British Columbia	+10,840
3.	Quebec	+10,774
4.	Manitoba	+ 1,847
5.	Alberta	+ 1,213
6.	New Brunswick	+ 580
7.	Prince Edward Island	+ 62
8.	Nova Scotia	+ 27
9.	Saskatchewan	-319
10.	Newfoundland and Labrador	-412

CYBERPROVINCES BY NET TECH EMPLOYMENT AS % OF TOTAL JOBS

1.	Ontario	9.5%
2.	Quebec	9.2%
3.	British Columbia	7.4%
4.	Alberta	7.2%
5.	Nova Scotia	6.4%
6.	New Brunswick	6.0%
7.	Newfoundland and Labrador	5.9%
8.	Manitoba	5.6%
9.	Prince Edward Island	5.6%
10.	Saskatchewan	4.7%

Canada

STATE OF TECHNOLOGY SUMMARY

1,655,353	NET TECH EMPLOYMENT[1]
61,362	NET TECH JOB GAINS [2018 vs. 2017]
8.4%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
70,189	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
116,126	TECH OCCUPATION JOB POSTINGS [2018 total]
23.4%	EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

[1] net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

TECH INDUSTRY JOBS **849,168**

TECH OCCUPATION JOBS **1,033,327**

50% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 35,205 jobs
+4.3%

1,000,000

500,000

0

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
217,811
+6.8% YoY

Information Systems Analysts and Consultants
165,079
+8.4% YoY

IT User Support Technicians
95,446
+7.1% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

	2018	YoY % Change
IT Services + Custom Software Services	309,382	8.3%
R&D, Testing, and Engineering Services	247,649	4.2%
Telecommunications and Internet Services	142,371	-3.9%
Tech Manufacturing	103,331	3.9%
Software [packaged]	46,434	7.9%

ECONOMIC IMPACT

4.5%

Estimated direct contribution of the tech sector to the Canadian economy

TECH INDUSTRY AND OCCUPATION WAGES

National wages   Tech wages

Average Industry Wages
$51,794
$78,070

Median Occupation Wages
$52,825
$74,331

CAD

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables

Alberta

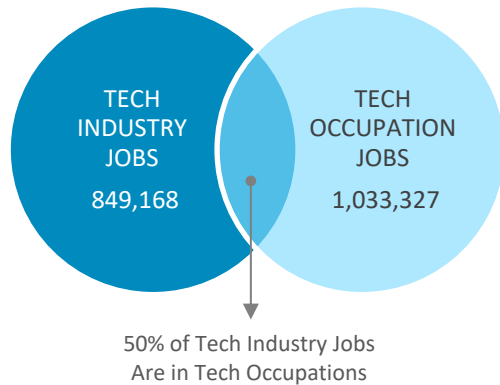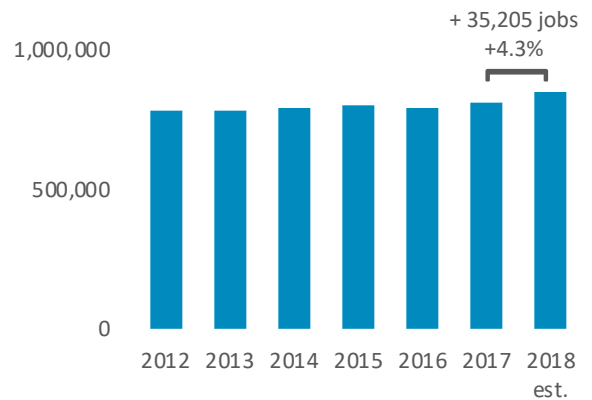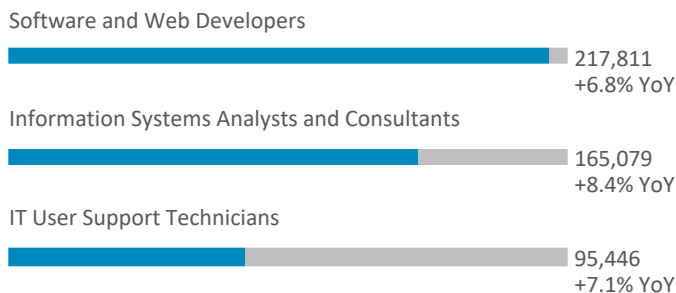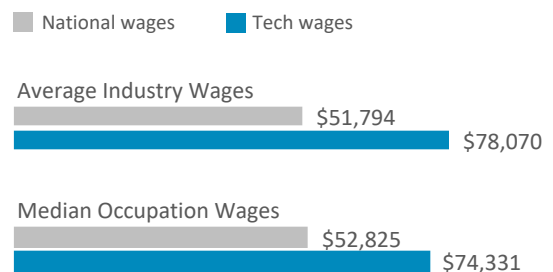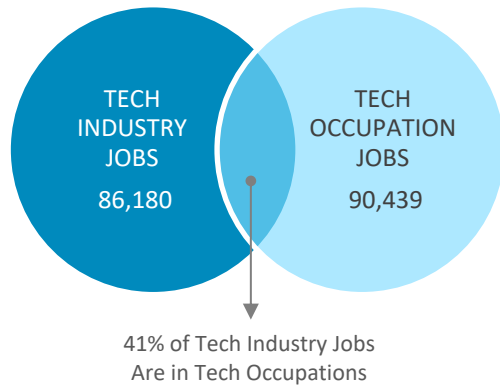## STATE OF TECHNOLOGY SUMMARY

175,397   NET TECH EMPLOYMENT[1]

1,213   NET TECH JOB GAINS [2018 vs. 2017]

7.2%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

10,,447   TECH BUSINESS ESTABLISHMENTS [firms with payroll]

11,282   TECH OCCUPATION JOB POSTINGS [2018 total]

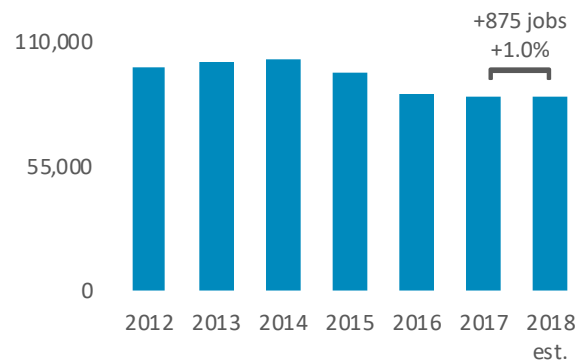60.2%   EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

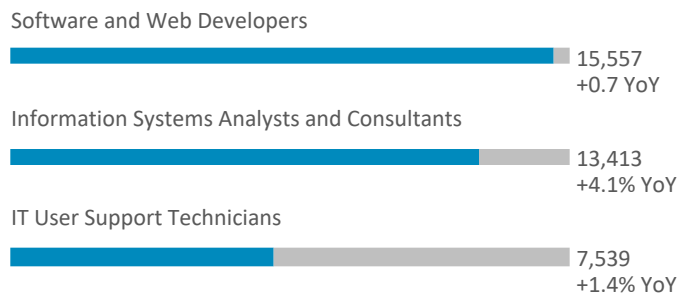[1]net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

4th   NET TECH EMPLOYMENT RANK

5th   NET TECH EMPLOYMENT JOBS ADDED RANK

4th   NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
86,180

TECH OCCUPATION JOBS
90,439

41% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+875 jobs
+1.0%

110,000

55,000

0

2012   2013   2014   2015   2016   2017   2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
15,557
+0.7 YoY

Information Systems Analysts and Consultants
13,413
+4.1% YoY

IT User Support Technicians
7,539
+1.4% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

	2018	YoY % Change
R&D, Testing, and Engineering Services	42,679	-1.1%
IT Services + Custom Software Services	24,556	1.5%
Telecommunications and Internet Services	13,467	6.4%
Tech Manufacturing	3,390	8.5%
Software [packaged]	2,087	-3.4%

ECONOMIC IMPACT

2.8%

Estimated direct contribution of the tech sector to the Alberta economy
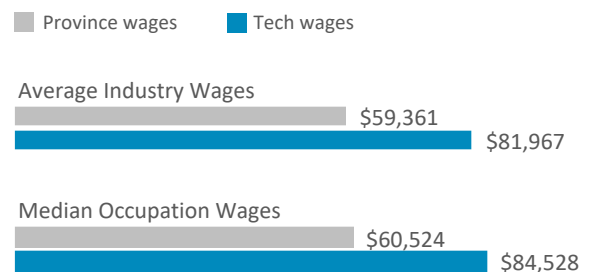
Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$59,361
$81,967

Median Occupation Wages
$60,524
$84,528
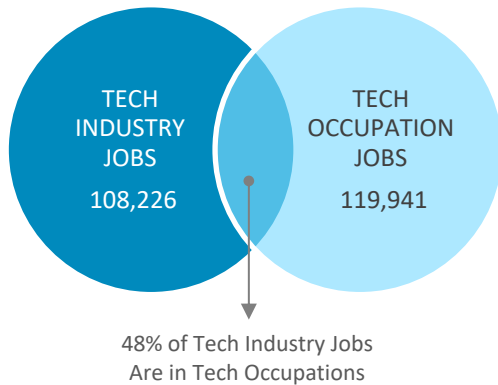
CAD

British Columbia

STATE OF TECHNOLOGY SUMMARY

204,112   NET TECH EMPLOYMENT[1]

10,840   NET TECH JOB GAINS [2018 vs. 2017]

7.4%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

9,349   TECH BUSINESS ESTABLISHMENTS [firms with payroll]

16,096   TECH OCCUPATION JOB POSTINGS [2018 total]

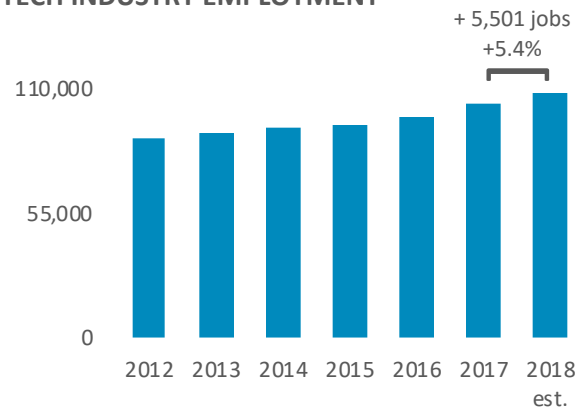16.9%   EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

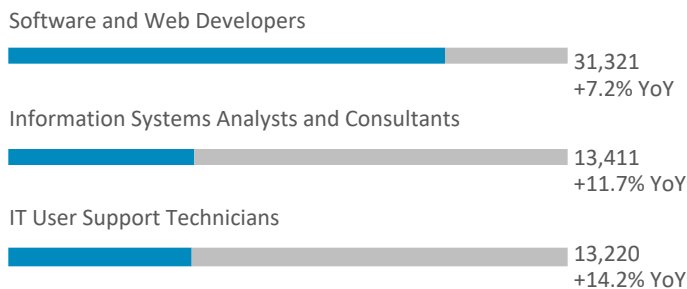[1] net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

3rd   NET TECH EMPLOYMENT RANK

2nd   NET TECH EMPLOYMENT JOBS ADDED RANK

3rd   NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
108,226

TECH OCCUPATION JOBS
119,941

48% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 5,501 jobs
+5.4%

110,000

55,000

0

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
31,321
+7.2% YoY

Information Systems Analysts and Consultants
13,411
+11.7% YoY

IT User Support Technicians
13,220
+14.2% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

	2018	YoY % Change
R&D, Testing, and Engineering Services	36,567	1.0%
IT Services + Custom Software Services	32,987	2.3%
Telecommunications and Internet Services	22,405	24.2%
Software [packaged]	9,167	3.7%
Tech Manufacturing	7,100	-4.0%

ECONOMIC IMPACT

4.3%

Estimated direct contribution of the tech sector to the British Columbia economy
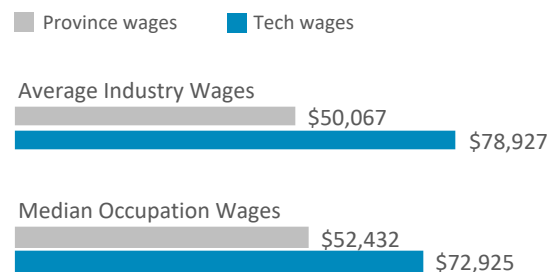
Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.
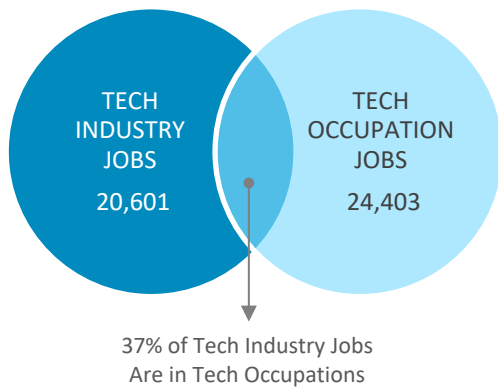
TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

CAD

Average Industry Wages
$50,067
$78,927

Median Occupation Wages
$52,432
$72,925

Manitoba

STATE OF TECHNOLOGY SUMMARY

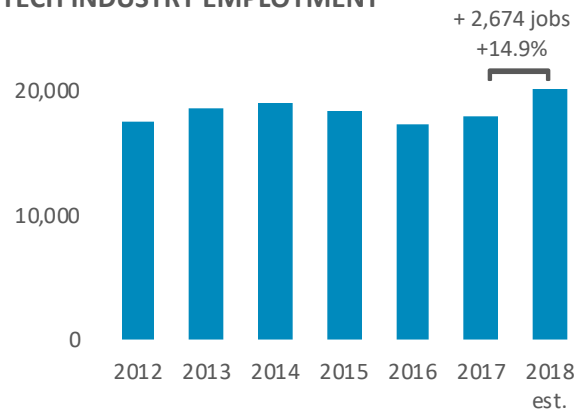|	
40,363	NET TECH EMPLOYMENT[1]
1,847	NET TECH JOB GAINS [2018 vs. 2017]
5.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,185	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
1,588	TECH OCCUPATION JOB POSTINGS [2018 total]
166.7%	EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

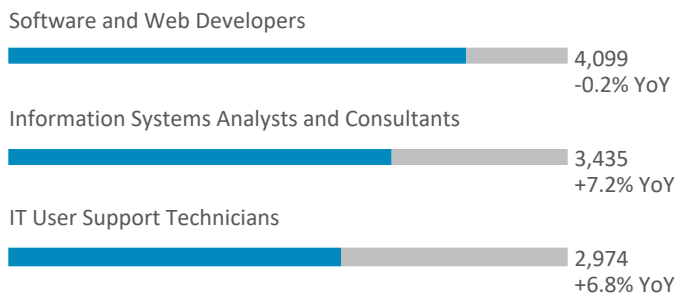[1] net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

5th	NET TECH EMPLOYMENT RANK
4th	NET TECH EMPLOYMENT JOBS ADDED RANK
8th	NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
20,601

TECH OCCUPATION JOBS
24,403

37% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 2,674 jobs
+14.9%

Bar chart showing tech industry employment from 2012 to 2018 est., values ranging around 17,000–20,000.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
4,099
-0.2% YoY

Information Systems Analysts and Consultants
3,435
+7.2% YoY

IT User Support Technicians
2,974
+6.8% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

	2018	YoY % Change
Telecommunications and Internet Services	7,492	32.5%
Tech Manufacturing	4,543	5.3%
R&D, Testing, and Engineering Services	4,468	6.9%
IT Services + Custom Software Services	3,624	8.2%
Software [packaged]	471	9.7%

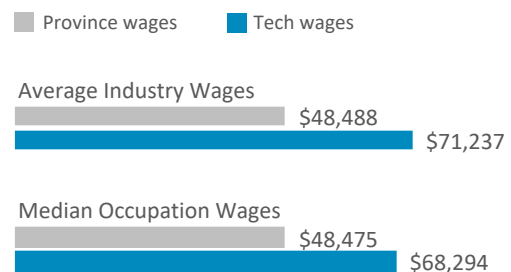## ECONOMIC IMPACT

3.1%

Estimated direct contribution of the tech sector to the Manitoba economy

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$48,488
$71,237

Median Occupation Wages
$48,475
$68,294

CAD

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.
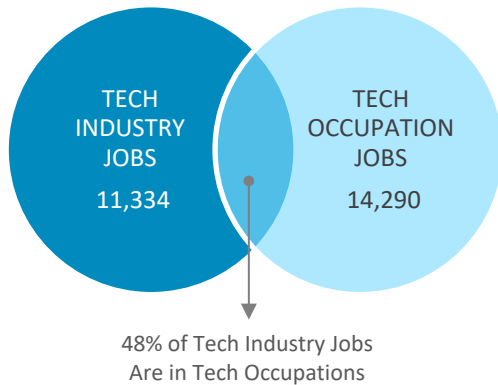
New Brunswick

STATE OF TECHNOLOGY SUMMARY

22,178   NET TECH EMPLOYMENT[1]

580   NET TECH JOB GAINS [2018 vs. 2017]

6.0%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

835   TECH BUSINESS ESTABLISHMENTS [firms with payroll]

1,687   TECH OCCUPATION JOB POSTINGS [2018 total]

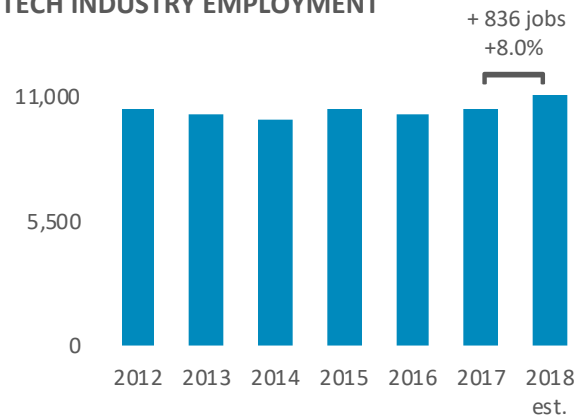39.5%   EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

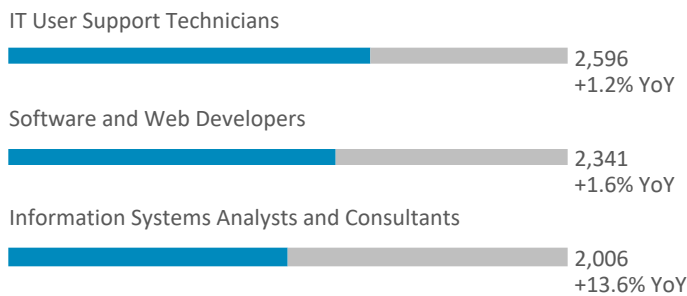[1] net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

8th   NET TECH EMPLOYMENT RANK

6th   NET TECH EMPLOYMENT JOBS ADDED RANK

6th   NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
11,334

TECH OCCUPATION JOBS
14,290

48% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 836 jobs
+8.0%

11,000

5,500

0

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

IT User Support Technicians
2,596
+1.2% YoY

Software and Web Developers
2,341
+1.6% YoY

Information Systems Analysts and Consultants
2,006
+13.6% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

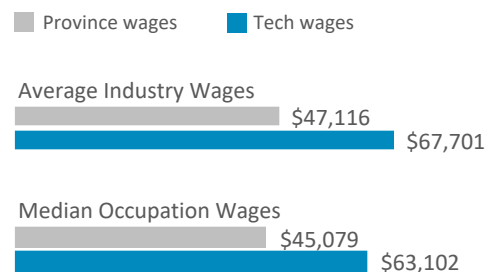|	2018	YoY % Change
R&D, Testing, and Engineering Services	3,592	10.7%
Telecommunications and Internet Services	3,561	-11.5%
IT Services + Custom Software Services	3,230	25.0%
Tech Manufacturing	494	15.8%
Software [packaged]	450	110.8%

ECONOMIC IMPACT

3.2%

Estimated direct contribution of the tech sector to the New Brunswick economy

TECH INDUSTRY AND OCCUPATION WAGES

■ Province wages   ■ Tech wages

CAD

Average Industry Wages
$47,116
$67,701

Median Occupation Wages
$45,079
$63,102

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables
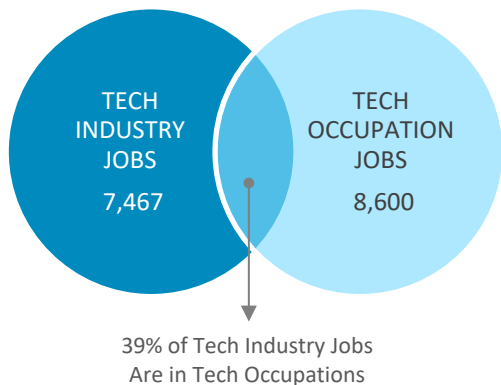
Newfoundland and Labrador
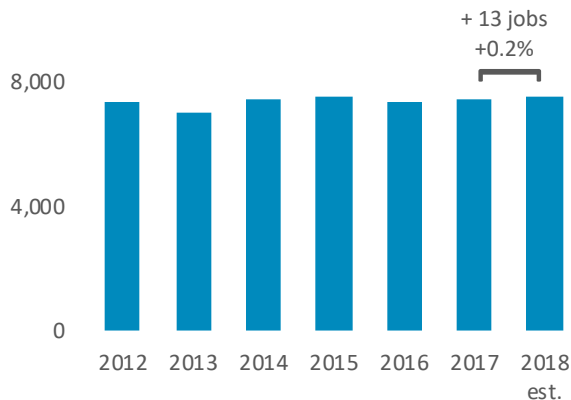
STATE OF TECHNOLOGY SUMMARY

14,199 NET TECH EMPLOYMENT[1]

-412 NET TECH JOB GAINS [2018 vs. 2017]

5.9% NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

623 TECH BUSINESS ESTABLISHMENTS [firms with payroll]

559 TECH OCCUPATION JOB POSTINGS [2018 total]

33.3% EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

[1] net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

9th NET TECH EMPLOYMENT RANK

10th NET TECH EMPLOYMENT JOBS ADDED RANK

7th NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS 7,467

TECH OCCUPATION JOBS 8,600

39% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 13 jobs
+0.2%

8,000	
4,000	
0	

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
1,129 -0.4% YoY

Software and Web Developers
1,117 +0.7% YoY

IT User Support Technicians
1,058 -3.2% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

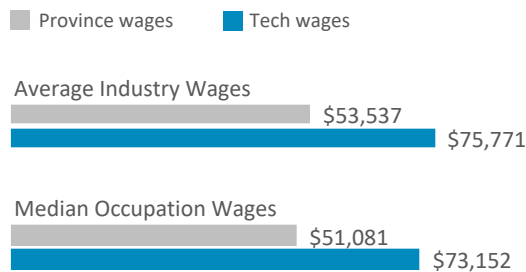|	2018	YoY % Change
Telecommunications and Internet Services	3,189	-4.9%
R&D, Testing, and Engineering Services	2,924	5.9%
IT Services + Custom Software Services	1,084	-5.7%
Software [packaged]	142	60.2%
Tech Manufacturing	124	31.8%

ECONOMIC IMPACT

2.5%

Estimated direct contribution of the tech sector to the Newfoundland and Labrador economy

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$53,537
$75,771

Median Occupation Wages
$51,081
$73,152

CAD

Nova Scotia

STATE OF TECHNOLOGY SUMMARY

31,289	NET TECH EMPLOYMENT[1]
27	NET TECH JOB GAINS [2018 vs. 2017]
6.4%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,143	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
3,031	TECH OCCUPATION JOB POSTINGS [2018 total]
90.3%	EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

[1] net of tech industry + tech occupation + self-employed [see methodology for details]

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6th	NET TECH EMPLOYMENT RANK
8th	NET TECH EMPLOYMENT JOBS ADDED RANK
5th	NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS 15,332

TECH OCCUPATION JOBS 19,602

45% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

-71 jobs
-0.5%

16,000

8,000

0

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
3,716
+2.4% YoY

IT User Support Technicians
2,525
+3.8% YoY

Information Systems Analysts and Consultants
2,419
+4.1% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

	2018	YoY % Change
IT Services+ Custom Software Services	5,121	8.6%
Telecommunications and Internet Services	4,084	-12.8%
R&D, Testing, and Engineering Services	3,481	2.4%
Tech Manufacturing	2,292	-0.6%
Software [packaged]	347	13.7%

ECONOMIC IMPACT

4.4%

Estimated direct contribution of the tech sector to the Nova Scotia economy
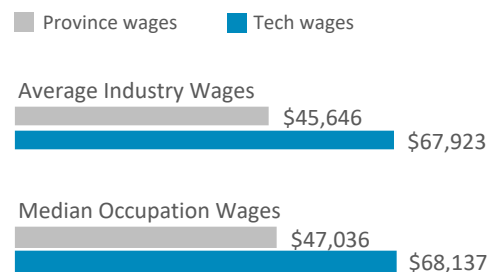
Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables
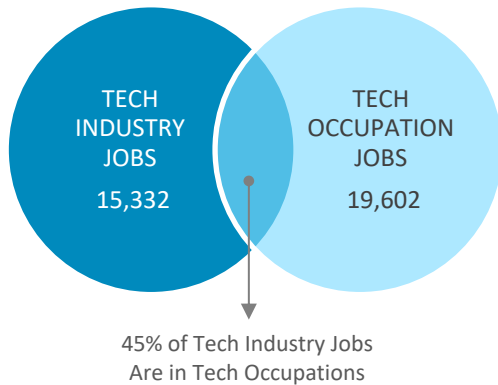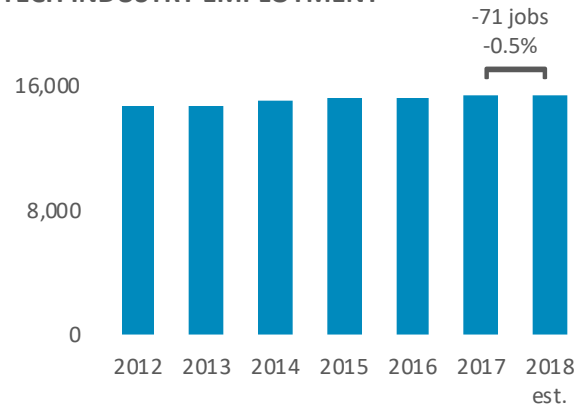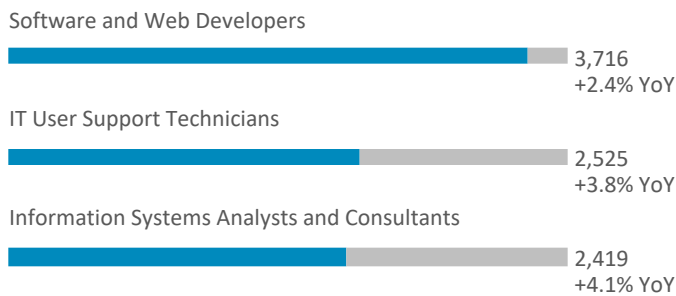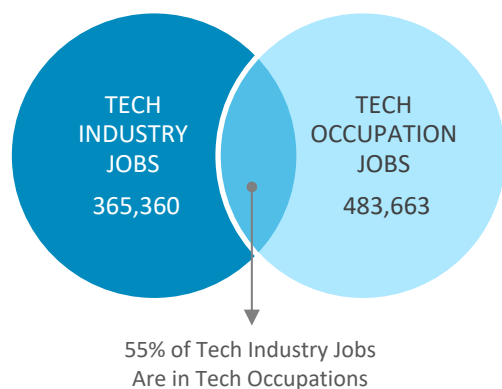
TECH INDUSTRY AND OCCUPATION WAGES

■ Province wages ■ Tech wages

Average Industry Wages
$45,646
$67,923

Median Occupation Wages
$47,036
$68,137

CAD

Ontario

STATE OF TECHNOLOGY SUMMARY

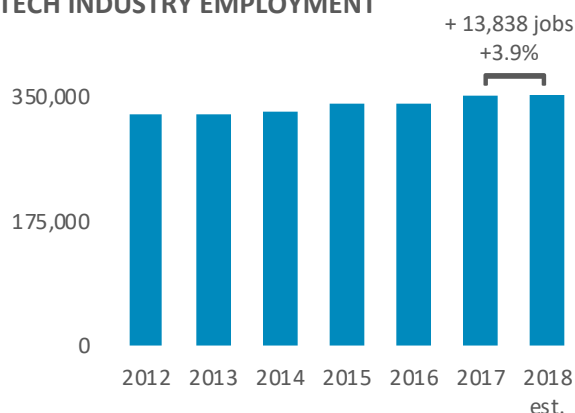|	
736,178	NET TECH EMPLOYMENT[1]
36,698	NET TECH JOB GAINS [2018 vs. 2017]
9.5%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
32,539	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
59,030	TECH OCCUPATION JOB POSTINGS [2018 total]
19.0%	EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

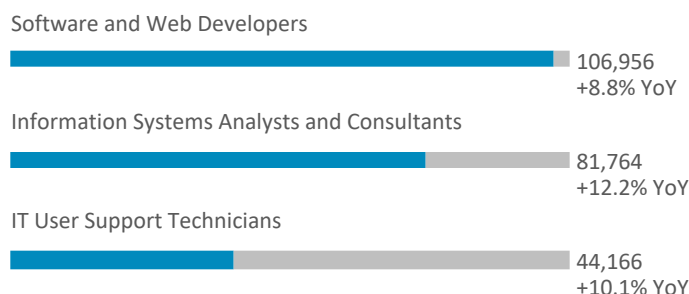[1]net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

1st	NET TECH EMPLOYMENT RANK
1st	NET TECH EMPLOYMENT JOBS ADDED RANK
1st	NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
365,360

TECH OCCUPATION JOBS
483,663

55% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 13,838 jobs
+3.9%

Bar chart with values at 350,000 and 175,000 gridlines, years 2012, 2013, 2014, 2015, 2016, 2017, 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
106,956 +8.8% YoY

Information Systems Analysts and Consultants
81,764 +12.2% YoY

IT User Support Technicians
44,166 +10.1% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

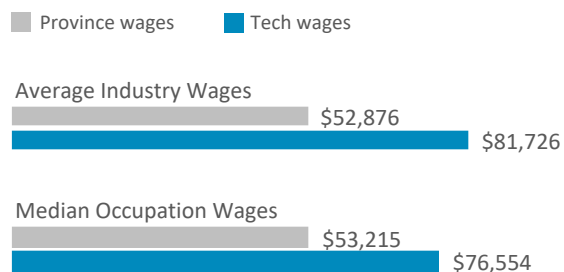|	2018	YoY % Change
IT Services + Custom Software Services	153,512	9.7%
R&D, Testing, and Engineering Services	91,968	6.6%
Telecommunications and Internet Services	52,667	-15.6%
Tech Manufacturing	43,988	5.1%
Software [packaged]	23,225	10.5%

ECONOMIC IMPACT

5.5%

Estimated direct contribution of the tech sector to the Ontario economy

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$52,876
$81,726

Median Occupation Wages
$53,215
$76,554

CAD

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.
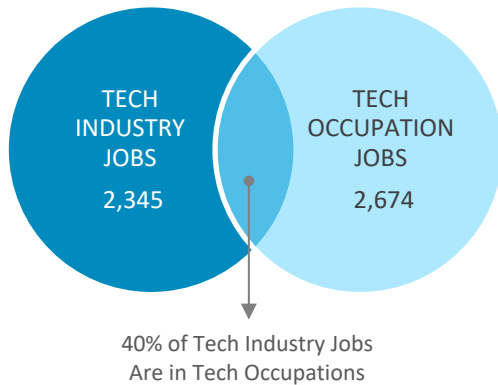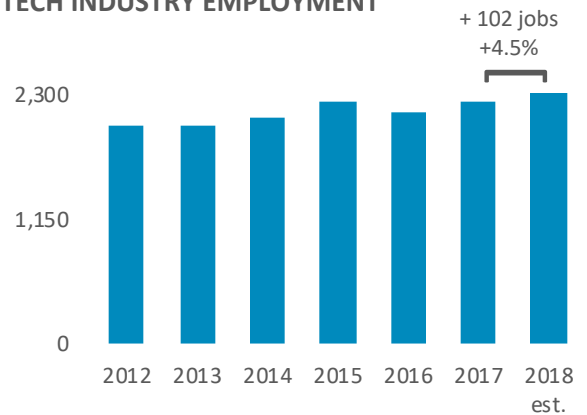
Prince Edward Island

STATE OF TECHNOLOGY SUMMARY

4,547	NET TECH EMPLOYMENT[1]
62	NET TECH JOB GAINS [2018 vs. 2017]
5.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
190	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
326	TECH OCCUPATION JOB POSTINGS [2018 total]
281.8%	EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

[1]net of tech industry + tech occupation + self-employed [see methodology for details]

Created with mapchart.net ©

10th	NET TECH EMPLOYMENT RANK
7th	NET TECH EMPLOYMENT JOBS ADDED RANK
9th	NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS 2,345

TECH OCCUPATION JOBS 2,674

40% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 102 jobs
+4.5%

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
644
+4.6% YoY

IT User Support Technicians
482
-3.8% YoY

Information Systems Analysts and Consultants
376
+3.0% YoY
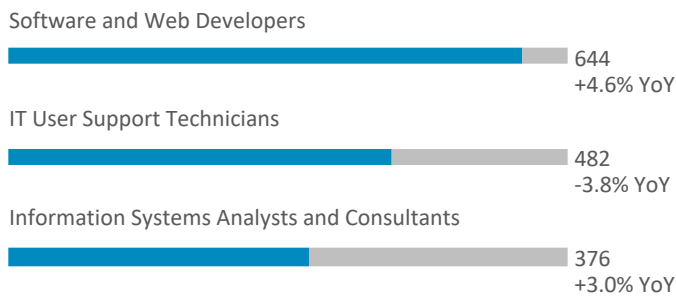
LEADING TECH INDUSTRY SECTORS [by employment]

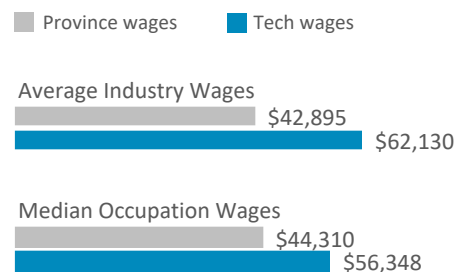|	2018	YoY % Change
Tech Manufacturing	661	6.8%
IT Services + Custom Software Services	620	8.4%
Telecommunications and Internet Services	463	3.4%
R&D, Testing, and Engineering Services	438	-6.9%
Software [packaged]	132	24.7%

ECONOMIC IMPACT

3.5%

Estimated direct contribution of the tech sector to the Prince Edward Island economy

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$42,895
$62,130

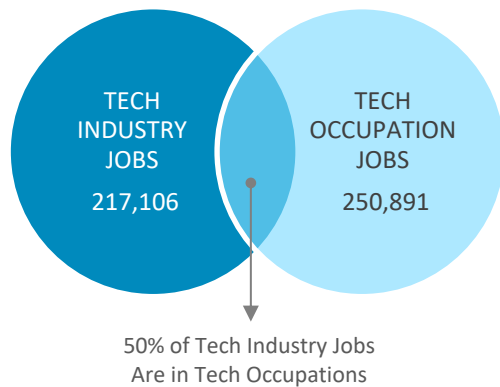Median Occupation Wages
$44,310
$56,348
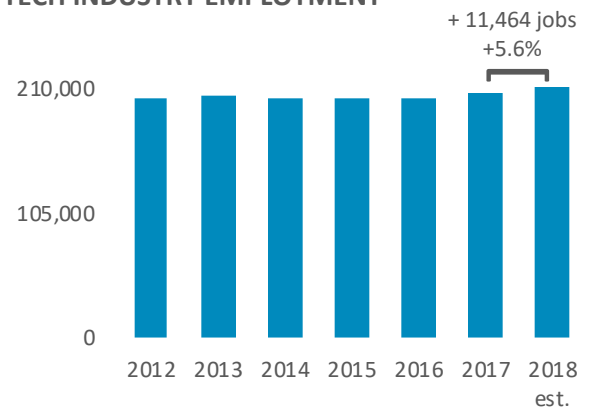
CAD

Quebec

STATE OF TECHNOLOGY SUMMARY

396,392 NET TECH EMPLOYMENT[1]

10,774 NET TECH JOB GAINS [2018 vs. 2017]

9.2% NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

12,622 TECH BUSINESS ESTABLISHMENTS [firms with payroll]

19,705 TECH OCCUPATION JOB POSTINGS [2018 total]

17.5% EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

[1]net of tech industry + tech occupation + self-employed [see methodology for details]

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2nd NET TECH EMPLOYMENT RANK

3rd NET TECH EMPLOYMENT JOBS ADDED RANK

2nd NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
217,106

TECH OCCUPATION JOBS
250,891

50% of Tech Industry Jobs
Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

+ 11,464 jobs
+5.6%

210,000

105,000

0

2012 2013 2014 2015 2016 2017 2018 est.

LEADING TECH OCCUPATION CATEGORIES

Software and Web Developers
49,310
+5.9% YoY

Information Systems Analysts and Consultants
44,161
+2.5 YoY

IT User Support Technicians
19,175
+1.6% YoY
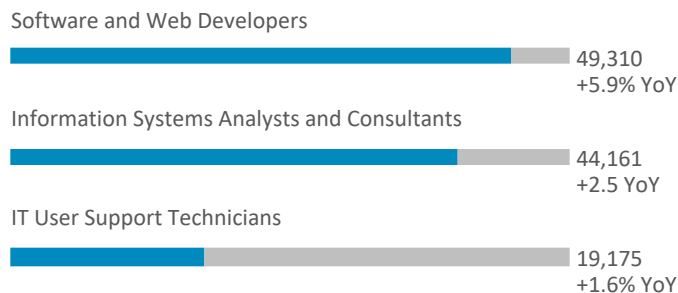
LEADING TECH INDUSTRY SECTORS [by employment]

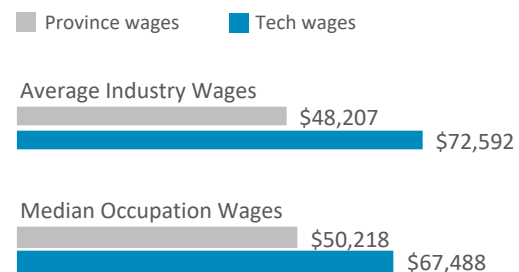|	2018	YoY % Change
IT Services + Custom Software Services	81,600	10.2%
R&D, Testing, and Engineering Services	56,084	6.6%
Tech Manufacturing	40,003	3.6%
Telecommunications and Internet Services	29,302	-4.6%
Software [packaged]	10,116	4.6%

ECONOMIC IMPACT

5.0%

Estimated direct contribution of the tech sector to the Quebec economy

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables.

TECH INDUSTRY AND OCCUPATION WAGES

⬜ Province wages   🟦 Tech wages

Average Industry Wages
$48,207
$72,592

CAD

Median Occupation Wages
$50,218
$67,488

Saskatchewan

STATE OF TECHNOLOGY SUMMARY

27,936   NET TECH EMPLOYMENT[1]

-319   NET TECH JOB GAINS [2017 vs. 2016]

4.7%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

1,124   TECH BUSINESS ESTABLISHMENTS [firms with payroll]

2,626   TECH OCCUPATION JOB POSTINGS [2017 total]

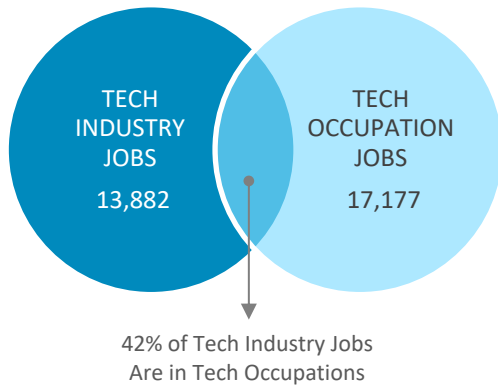53.2%   EMERGING TECH JOB POSTINGS % CHANGE [2018 vs. 2017]

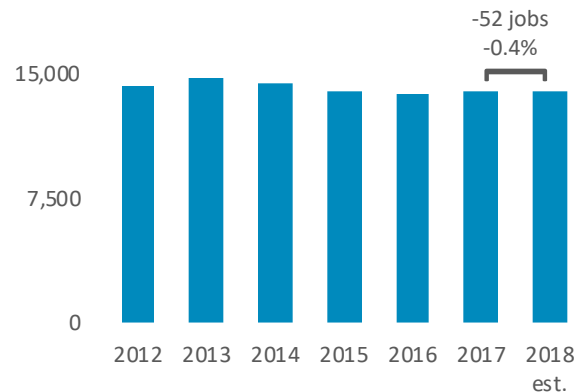[1]net of tech industry + tech occupation + self-employed [see methodology for details]

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7th   NET TECH EMPLOYMENT RANK

9th   NET TECH EMPLOYMENT JOBS ADDED RANK

10th   NET EMPL AS % OF WORKFORCE RANK

TECH INDUSTRY JOBS
13,882

TECH OCCUPATION JOBS
17,177

42% of Tech Industry Jobs Are in Tech Occupations

TECH INDUSTRY EMPLOYMENT

-52 jobs
-0.4%

Year	
2012	
2013	
2014	
2015	
2016	
2017	
2018 est.	

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
2,698 +14.1% YoY

Software and Web Developers
2,630 +3.5% YoY

IT User Support Technicians
1,627 -0.7% YoY
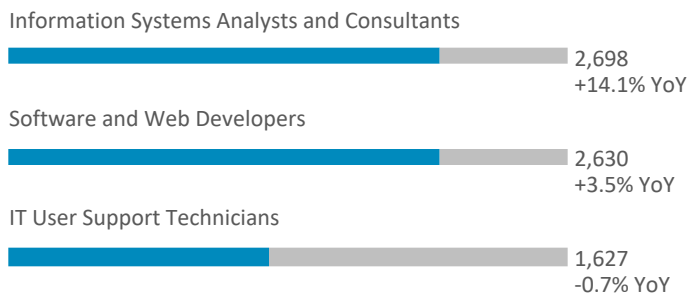
LEADING TECH INDUSTRY SECTORS [by employment]

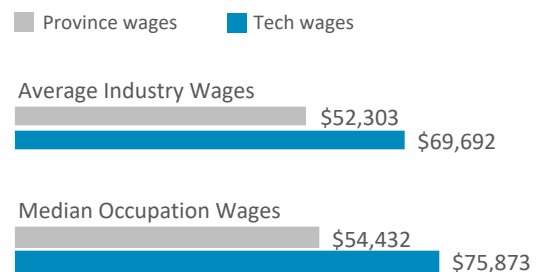|	2018	YoY % Change
Telecommunications and Internet Services	5,131	-7.4%
R&D, Testing, and Engineering Services	4,805	1.4%
IT Services + Custom Software Services	2,955	7.6%
Tech Manufacturing	709	4.1%
Software [packaged]	280	26.6%

ECONOMIC IMPACT

1.8%

Estimated direct contribution of the tech sector to the Saskatchewan economy

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2018 time period, unless specified as earlier | See Appendix for full methodology and data tables

TECH INDUSTRY AND OCCUPATION WAGES

Province wages   Tech wages

Average Industry Wages
$52,303
$69,692

Median Occupation Wages
$54,432
$75,873

CAD

APPENDIX – METHODLOGY

CLASSIFICATION SYSTEM

Cyberprovinces utilizes the North American Industrial Classification System (NAICS) to define the tech industry. The NAICS is a hierarchical system, with six-digit numbers assigned to the most specific industries. The NAICS is constructed around the concept of production and is able to reflect advances in technology, including many new service-oriented businesses. Economic units with similar production processes are classified in the same industry. Because *Cyberprovinces* analyzes the tech industry by using industry classifications, the report in general focuses on companies and sectors, not individual occupations.

NAICS was devised by the United States, Canada, and Mexico to allow industry analysis across all three nations. NAICS codes are revised periodically to reflect the emergence of new industry sectors or sub-sectors. The *Cyberprovinces'* NAICS definition of the tech industry has evolved over the years to reflect these changes. Consequently, the data in this report may not be entirely comparable with previous reports.

For occupation analysis, *Cyberprovinces* utilizes National Occupational Classification (NOC) System, which is a standard used by federal agencies to classify workers into occupational categories.

NET TECH EMPLOYMENT

The tech workforce consists of two primary components.. The foundation is the set of technology occupation professionals working in technical positions, such as IT support, network engineering, software development and every related roles. Many of these professionals work for technology companies (52 percent), but many others are employed by organizations across every industry sector in the Canadian economy (48 percent).

The second component of the discussion consists of the business professionals employed by technology companies. These professionals play an important role in supporting the development and delivery of the technology products and services used throughout the economy. Thirty percent of the net tech employment total consists of tech industry business professionals.

See page 6 of this report for more details on the concept of Net Tech Employment.

TECH INDUSTRY DEFINITION

There are a number of considerations when developing a definition of the technology industry. In some cases, NAICS codes do not perfectly reflect industry dynamics. This can be especially challenging in times of rapid innovation, when new tech sectors emerge in a short period of time. More recently, the degree to which technology has become core to so many industry sectors poses new questions. For example, a technology platform designed to facilitate the online sale of goods may have traditionally been viewed as a retailer, although given the intense use of technology, an argument could be made to classify it as a technology firm.

Conceptually, *Cyberprovinces* focuses on the sectors involved in making, creating, enabling, integrating, or supporting technology, whether as a product or service. At this time, *Cyberprovinces* does not include industry sectors categorized primarily as users of technology.

Cyberprovinces includes 16 NAICS codes in its definition of the tech industry. Broadly these can be thought of in two broad categories: tech manufacturing and tech services. These industries sufficiently represent the technology industry within the framework provided under the NAICS system.

TECH OCCUPATION DEFINITION

The occupations covered by *Cyberprovinces* are broadly categorized into core information technology (IT) positions and then engineering, repair, technician, and assembly positions. In total, 25 distinct NOCs are used to define the tech occupations found across every industry sector of the economy.

TECH MANUFACTURING

3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3343	Audio and video equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, medical and control instruments manufacturing
3346	Manufacturing and reproducing magnetic and optical media
3364	Aerospace product and parts manufacturing

IT SERVICES

4173	Computer and communications equipment and supplies merchant wholesalers
8112	Computer systems design and related services

TELECOMMUNICATIONS AND INTERNET SERVICES

5173	Wired and wireless telecommunications carriers (except satellite)
5174.	Satellite telecommunications
5179	Other telecommunications
5182.	Data processing, hosting, and related services

SOFTWARE

5112	Software publishers

R&D, TESTING, AND ENGINEERING SERVICES

5413	Architectural, engineering and related services
5417	Scientific research and development services

NATIONAL OCCUPATIONAL CODES INCLUDED IN COMPTIA'S DEFINITION OF TECH OCCUPATIONS

IT OCCUATIONS

213	Computer and information systems managers
2147	Computer engineers (except software engineers and designers)
2171	Information systems analysts and consultants
2172	Database analysts and data administrators
2173	Software engineers and designers
2174	Computer programmers and interactive media developers
2175	Web designers and developers
2281.	Computer network technicians
2282	User support technicians
2283	Information systems testing technicians

ENGINEERING AND OTHER OCCUPATIONS

131	Telecommunication carriers managers
0211	Engineering managers
2132	Mechanical engineers
2133	Electrical and electronics engineers
2141.	Industrial and manufacturing engineers
2146	Aerospace engineers
2148.	Other professional engineers, n.e.c.
2232	Mechanical engineering technologists and technicians
2233.	Industrial engineering and manufacturing technologists and technicians
2241	Electrical and electronics engineering technologists and technicians
2242.	Electronic service technicians (household and business equipment)
5224.	Broadcast technicians
5225.	Audio and video recording technicians
7246.	Telecommunications installation and repair workers
9523.	Electronics assemblers, fabricators, inspectors and testers

CompTIA.

CompTIA.org