RESEARCH REPORT

CompTIA

Cyberprovinces 2020

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 2020

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The Computing Technology Industry Association (CompTIA)

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Cyberprovinces can be accessed online at CompTIA.org.

CompTIA
3500 Lacey Road, Suite 100
Downers Grove, IL 60515
Phone: (630) 678-8300

ABOUT

ABOUT THIS REPORT

In an era when every individual is tech engaged and every organization is tech enabled, CompTIA is the leading destination for both. As an association dedicated to innovation, CompTIA unifies learning, advocacy and career networking in a welcoming, forward-thinking place. We are the connected global community of informed advocates, championing modern technology (and the people who advance it) one day, one deployment, one discovery at a time. CompTIA is tech forward.

CompTIA designed *Cyberprovinces* to serve as a reference tool, making national, state, and metropolitan area-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.

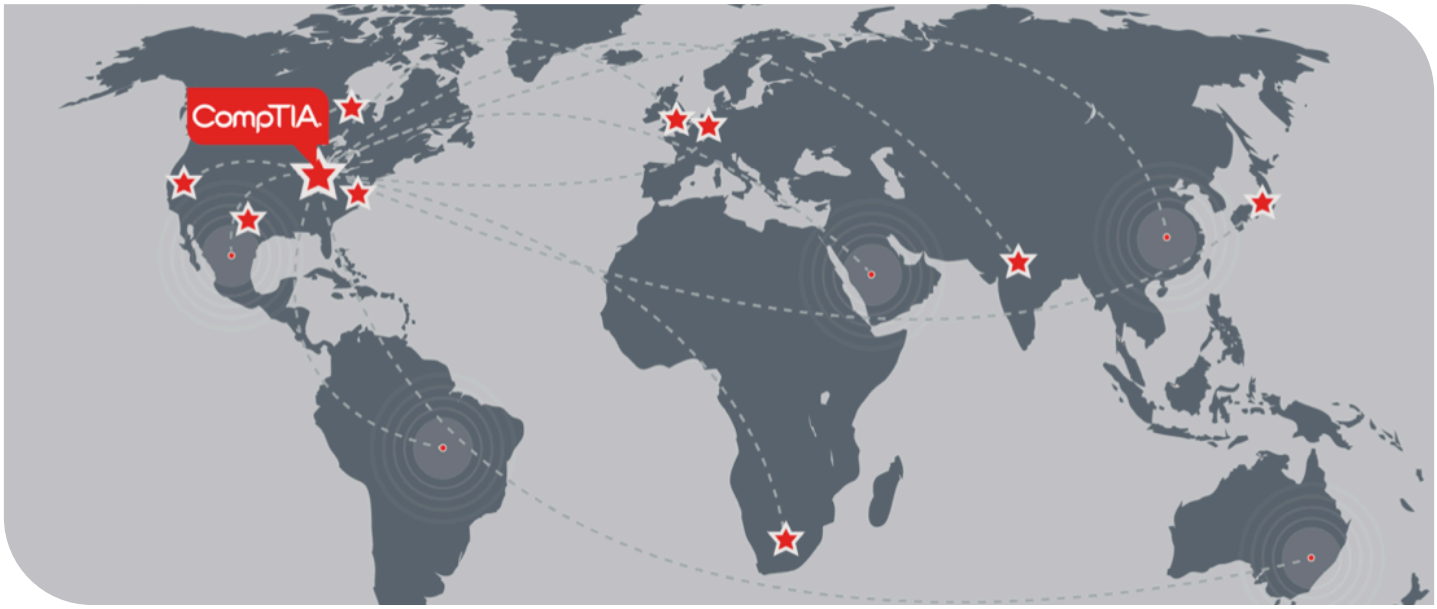
Cyberprovinces is a pre-COVID-19 report. The pandemic's impact on the Canadian tech workforce will not be fully understood until Statistics Canada – the government agency that compiles data, releases its complete 2020 labour market data sets. In the Appendix of this report, CompTIA provides preliminary analysis on some of the effects of COVID.

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 methodology section for details of the specific NAICS and SOC codes CompTIA uses in its definitions of the tech sector and the tech workforce.

Due to periodic updates to industry and occupation categories by the U.S. Bureau of Labour Statistics, 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 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 the tech-forward community of the $5.2 trillion global information technology ecosystem and the hub for the 75 million professionals who design, deploy, manage and secure the technology that powers the modern economy. Through collaboration, education, certifications, advocacy and market research, CompTIA advances the industries and careers that rely on tech.



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BACKGROUND – KEY FORCES SHAPING THE TECH LANDSCAPE

The iterative fusion of technology building blocks and emerging technology, coupled with a generous helping of people and process, will set the stage for the next wave of innovation. 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.

Artificial Intelligence Eats the World

When Marc Andreessen made his now-famous statement about software in 2011, he may not have even realized the extent to which the world would be consumed over the next decade. Cloud computing lowered both the barrier for developing software and the barrier for distribution, and mobile devices extended the reach of software to previously unreached corners. The net effect was an exponential increase in software's ability to drive activity. This created a new challenge in conducting said activity and acting on the data being collected. Enter artificial intelligence. With a foundation of software-driven routines and the compute resources to broadly run advanced algorithms, AI can push software to the next level. However, there's a fine line between "eating the world" and "global domination."

Cybersecurity Becomes More Operational

The theme of cybersecurity over the past decade was a shift from a purely defensive mindset to a proactive approach that combined technology, process, and education. Moving forward, the shift will be from cybersecurity as a component of IT to cybersecurity as a critical business function. When treated as part of IT, a proactive approach to cybersecurity may still struggle to get the proper budget allocation or properly demonstrate value to the business. As a result, organizations are beginning to treat cybersecurity as a dedicated function.

Internet of Things Continues to Redefine IT Architecture

As one of the two emerging technologies to be gaining significant traction, internet of things seems poised to join cloud computing and mobile devices as a permanent part of the modern technology landscape. Businesses are quickly discovering the value in digitizing their environment and their operations, collecting data that can help with future decision-making. The trend is also showing positive returns for companies that sell and support technology. Half of these firms report either major or minor levels of IoT-related sales in the last year, with others experimenting internally. Today, IoT as a managed services play is driving the most revenue in this category; but looking ahead to the next two years companies are predicting that analytics on data captured by IoT sensors – then shared with customers – holds the most financial promise.

Hype Meets Reality with Emerging Technology

Over the past several years, there has been a lot of excitement around emerging technologies. At an operational level, this has been a positive trend as it has helped businesses build better practices for evaluating early-stage topics and accelerating adoption. At a tactical level, though, it has created some chaos. Without the chance to wait and see which technologies prove their worth, companies have found themselves confronted with a bevy of options—a situation that exacerbates resource constraint and skill gaps. Heading into a new year, the hype around emerging technology remains high, especially among those firms selling and supporting technology

Demand for Integration Drives Demand for Automation

Businesses of all sizes recognize the need to better integrate disparate platforms, applications, and data. Whether integration is outsourced or being done in-house, the next step for many businesses will be automation. Internet of things implementations expand the ability to gather inputs from a variety of sources, and artificial intelligence can help drive actions based on those inputs. From there, the vast array of other emerging technologies allows companies to imagine and build complex automation. The goal of this automation, as with all technological advances, is to reduce the amount of routine work and to create breathing room for innovation.

Workforce Diversity Grows in Many Ways

In 2020, the call for improved diversity will continue to pay dividends, even if fully diverse and inclusive environments still lie further in the future. Going beyond efforts around common conceptions of diversity, there will also be a marked increase in the skill diversity that companies are seeking. Twenty years ago, the stereotypical IT worker had a heavy concentration in infrastructure skills and worked in relative isolation from the rest of the business. Today, companies are seeking expertise across all areas of CompTIA's IT framework—infrastructure, devices, software development, cybersecurity, data, operations, and emerging technology. Beyond technical skills, businesses are also looking for technology professionals that can speak the language of the business, collaborating with other departments in order to drive technology-fueled business results.

BACKGROUND – DEFINING NET TECH EMPLOYMENT

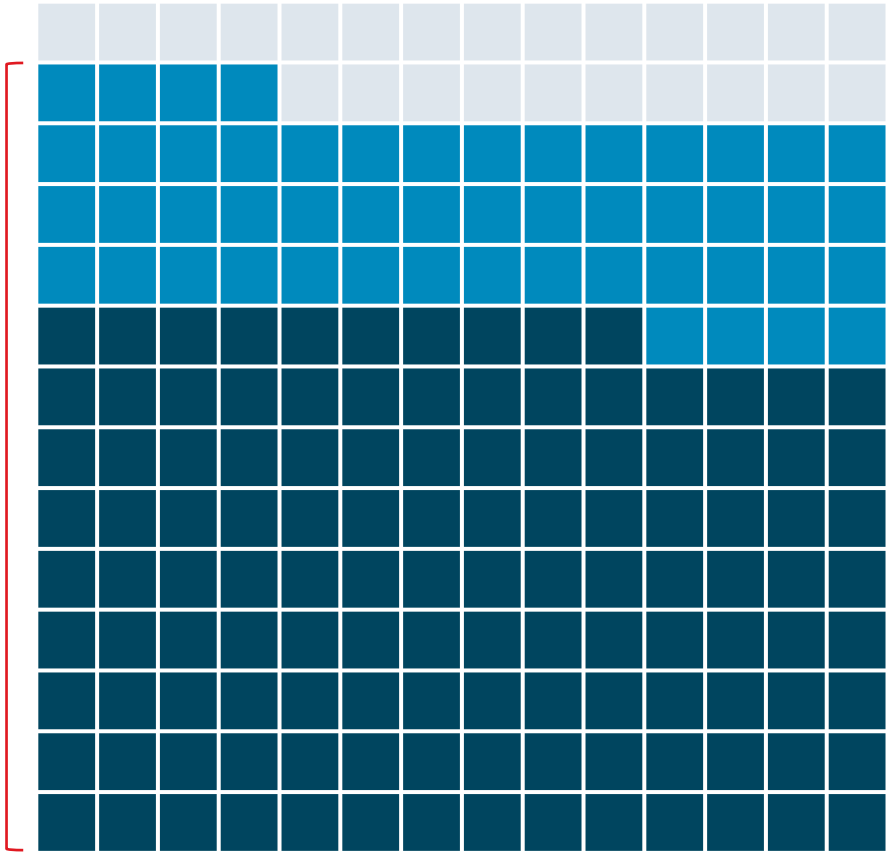
The Canadian tech workforce consists of two primary components, represented as a single figure by the 'net tech employment' designation. The foundation is the set of technology professionals working in technical positions, such as IT support, network engineering, software development and related roles.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

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



1,717,471
Canadian tech workforce, net of industry and occupation employment, 2019 estimate

71%
% of NET tech employment in technology occupations

= 10,000 workers

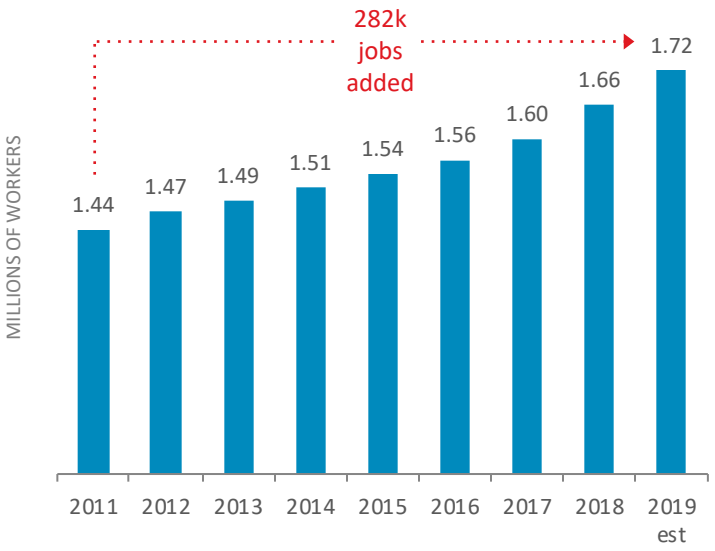
Sources: EMSI | Statistics Canada | CompTIA
Some numeric changes affected by rounding

BACKGROUND – HISTORICAL TRENDING AND OUTLOOK

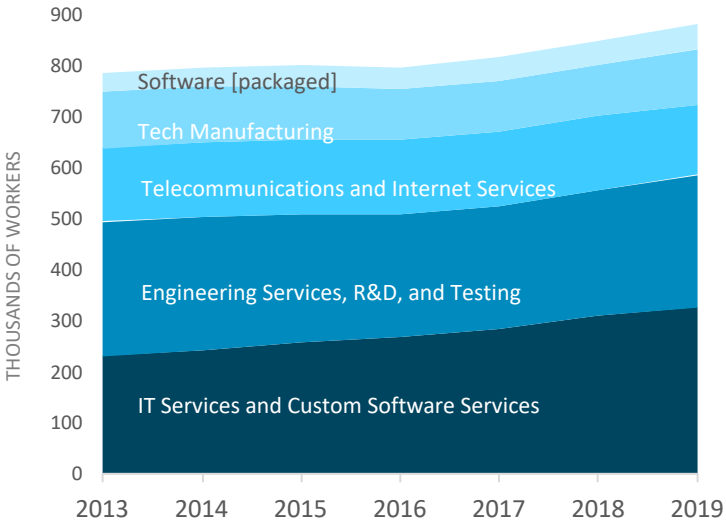
KEY POINTS

- Net tech employment in Canada – as described on the previous page, reached an estimated 1,717,471 workers in 2019, an increase of nearly 59,954 net new jobs and a growth rate of 3.6 percent over the previous year.
- Since 2011, net tech employment increased by an estimated 282,000 net new jobs. Net tech employment growth has been steady during this span, averaging approximately 34,600 new jobs per year.
- As the largest component of net tech employment (71 percent), technology occupations are the primary driver of job growth. Just 5 of 25 tech occupation categories accounted for the majority (74 percent) of job gains during the 2013-2019 time period.
- Largest tech occupation contributors to job gains, 2013-2019:
  - Systems analysts and consultants: +52,963
  - Programmers and media developers: +37,201
  - User support technicians: +26,465
  - Information systems managers: +22,576
  - Software engineers and designers: +20,320
- On a percent change basis, the occupation category covering other professional engineers grew by +62% percent, the largest increase among tech occupations during 2013-2019. Database analysts and administrators (60%) was next, followed by software engineers (+59%).
- Most occupation categories experienced positive job gains during the 2013-2019 time period, although a few were negative. The category covering electronics service technicians lost 10,133 jobs while electronics assemblers, fabricators, inspectors, and testers lost 1,543 jobs.
- Largest tech industry contributors to job gains, 2013-2019:
  - IT Services and Custom Software Services: +96,744
  - Software [packaged]: +11,597
- The steepest decline occurred in the R&D, Testing, and Engineering Services where -7,315 jobs were shed during the 2013-2019 time period. The tech manufacturing category saw a drop of -3,205 jobs 2013-2019. Telecommunications and internet services saw a drop of 3,644 jobs in this time period.
- Looking ahead, the overall base of employment is projected to increase by 6 percent between 2019 and 2027. 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 three times the rate as the national average. Software, systems analysts, which includes cybersecurity roles, and user support technicians will also experience notable gains through 2027.

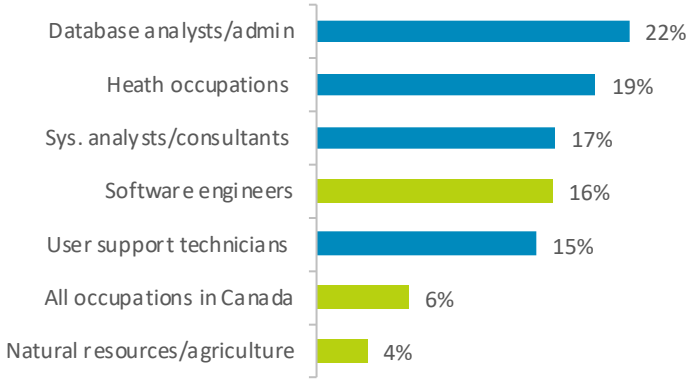
NET TECH EMPLOYMENT TRENDING



TECH INDUSTRY EMPLOYMENT TRENDING



OCCUPATION OUTLOOK: 2019-2027



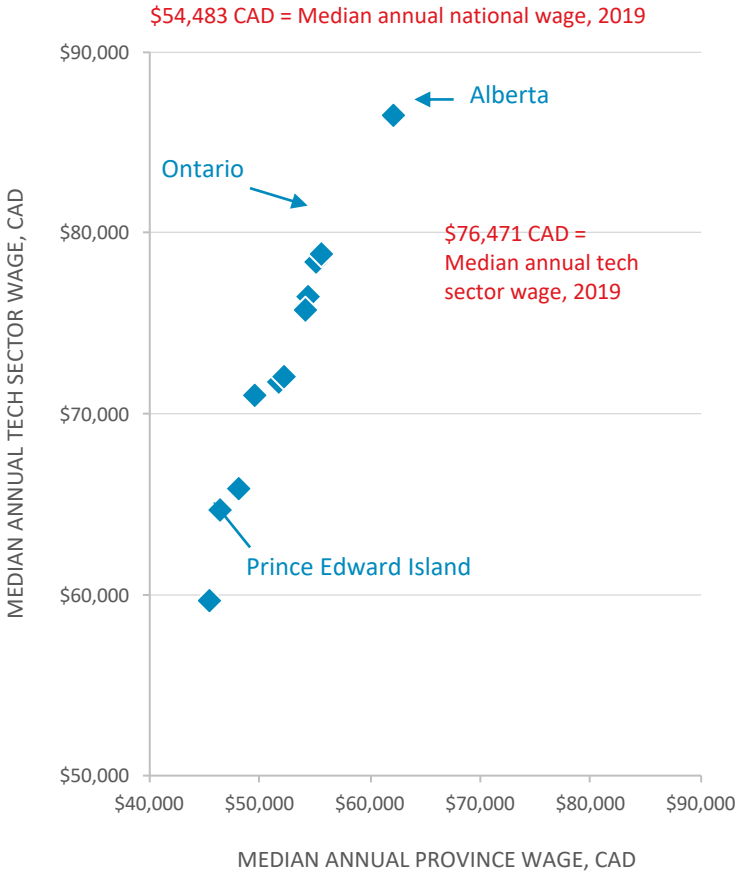
Sources: EMSI | Statistics Canada | CompTIA

BACKGROUND – FACTORS TO CONSIDER WHEN USING AVERAGE WAGE DATA

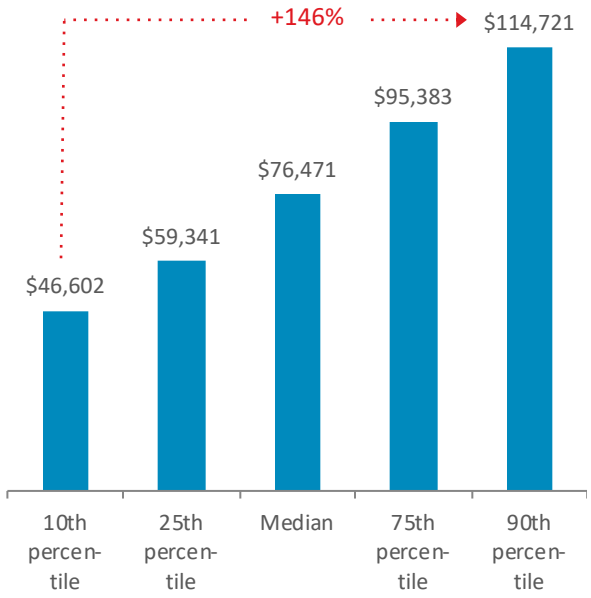
KEY POINTS

- 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. Wage percentiles, including the median, provide more granularity in understanding the nuances of earnings.
- Ontario accounts for 45 percent of the national tech sector payroll and 43 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 median tech sector wage of $76,471. Alberta and Saskatchewan are the other provinces with a median tech sector wage exceeding the national median.
- 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 median 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 146 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 MEDIAN WAGE VS. OVERALL MEDIAN WAGE MATRIX



TECH OCCUPATION WAGE DISTRIBUTION, CAD



Sources: EMSI | Statistics Canada | CompTIA

KEY FINDINGS – NATIONAL

CANADIAN NET TECH EMPLOYMENT

- As noted previously, net tech employment totaled an estimated 1.72 million in 2019, an increase of more than 59,900 workers over the 2018 base of 1.66 million. Net tech employment grew an estimated 3.6 percent year-over-year.
- Net tech employment accounted for approximately 8.5 percent of the overall Canadian workforce in 2019. 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 881,062 in 2019, an increase of 31,708 workers from 849,354 in 2018. Tech industry employment grew an estimated 3.7 percent year-over-year.
- Tech manufacturing employment totaled an estimated 108,910 in 2019, an increase of more than 5,500 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 4,400 jobs when compared to the previous year.
- The IT services and custom software services subsector generated the largest numerical gain in employment, adding nearly 17,248 net-new jobs in 2019. This gain is a 5.6 percentage increase over 2018. 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 1.08 million workers in 2019, an increase of 44,610 workers. On a percent change basis, it represents a 4.3 percent increase over 2018.
- Since 2012, over 215,000 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 67 percent of the total. IT occupations added about 43,354 net-new jobs in 2019, a year-over-year growth rate of 6.3 percent. On a numeric basis, software and web developers added the most jobs when compared to 2018.

TECH BUSINESS ESTABLISHMENTS, WAGES, AND EMPLOYER DEMAND

- There are approximately 73,154 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 $80,791 CAD in 2019, 52% higher than the average national wage of $53,181 CAD.
- According to data from Burning Glass Technologies Labor Insights, the number of job postings by Canadian employers for tech occupations reached nearly 134,801 during 2019.
- 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 36 percent in 2019.

CANADA NET TECH EMPLOYMENT

	2018	2019 est.	Numeric Change
Tech employment net of industry, occupation, and self-employed	1,657,517	1,717,471	+59,954
Total	1,657,517	1,717,471	+59,954

CANADA TECH INDUSTRY EMPLOYMENT

	2018	2019 est.	Numeric Change
Tech Manufacturing	103,331	108,910	+5,579
Telecommunications and Internet Services	142,371	137,971	-4,400
Software [packaged]	46,434	49,684	+3,250
IT Services and Custom Software	309,383	326,631	+17,248
Engineering Services, R&D, and Testing	247,835	257,865	+10,030
Total	849,354	881,062	+31,707

CANADA TECH OCCUPATION EMPLOYMENT

	2018	2019 est.	Numeric Change
IT Occupations	684,063	727,417	+43,354
Engineering and Technician Occupations	351,604	352,860	+1,255
Total	1,035,667	1,080,277	+44,610

TOP TECH OCCUPATION CATEGORIES

	2019 est.	% Change
Software and Web Developers	234,170	7.3%
Information systems analysts and consultants	179,514	8.5%
IT User support technicians	101,870	6.4%

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

KEY FINDINGS – PROVINCES

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 2018. 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 44.8 percent of Canadian net tech employment coming from this province. This is consistent with Ontario's population ratio (about 39 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 2019.

PROVINCE MEDIAN TECH INDUSTRY WAGES

- On average, tech industry wages are highest in Alberta, followed by Saskatchewan, Ontario, and British Columbia. Figures below presented in CAD.
    - Alberta $86,488
    - Saskatchewan $78,765
    - Ontario $78,329
    - British Columbia $75,626
    - Quebec $71,992
    - Newfoundland and Labrador $71,681
    - Manitoba $71,032
    - Nova Scotia $65,819
    - New Brunswick $64,581
    - Prince Edward Island $59,570

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 34,106
    - Quebec 13,706
    - Alberta 10,498
    - British Columbia 9,641
- Beyond numerical measures based on size, relative measures based on the size of the province economy reveal additional insight. Overall, an estimated 5.8 percent of Ontario's economy is attributed to the tech sector, as defined by this report. In comparison, approximately 2.0 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 65,069 postings in 2019. In second place is Quebec with approximately 21,703 postings. British Columbia and Alberta are third and fourth respectively in terms of tech job postings.
- Growth in postings for emerging technology positions and skills:
    - Alberta +61%
    - British Columbia +38%
    - Ontario +32%
    - Quebec +27%

CYBERPROVINCES BY NET TECH EMPLOYMENT

1.	Ontario	769,033
2.	Quebec	412,536
3.	British Columbia	216,700
4.	Alberta	173,759
5.	Manitoba	40,715
6.	Nova Scotia	32,253
7.	Saskatchewan	27,957
8.	New Brunswick	22,918
9.	Newfoundland and Labrador	13,978
10.	Prince Edward Island	4,706

CYBERPROVINCES BY NET TECH EMPLOYMENT JOB GAINS

1.	Ontario	+ 31,735
2.	Quebec	+ 15,937
3.	British Columbia	+ 12,323
4.	Nova Scotia	+ 735
5.	New Brunswick	+ 659
6.	Manitoba	+ 280
7.	Prince Edward Island	+ 155
8.	Saskatchewan	+ 4
9.	Newfoundland and Labrador	-334
10.	Alberta	-1,608

CYBERPROVINCES BY NET TECH EMPLOYMENT AS % OF TOTAL JOBS

1.	Ontario	9.7%
2.	Quebec	9.3%
3.	British Columbia	7.6%
4.	Alberta	7.1%
5.	Nova Scotia	6.4%
6.	New Brunswick	6.1%
7.	Newfoundland and Labrador	5.8%
8.	Manitoba	5.6%
9.	Prince Edward Island	5.6%
10.	Saskatchewan	4.6%

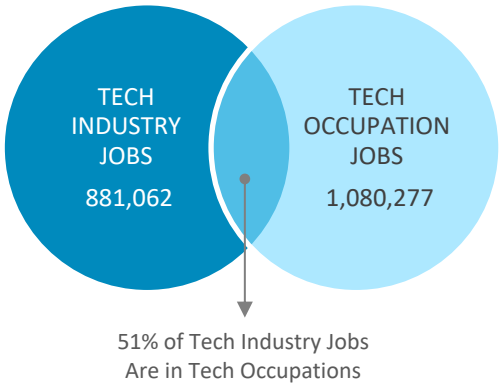
Source: EMSI | Statistics Canada | CompTIA
Some numeric changes affected by rounding

Canada

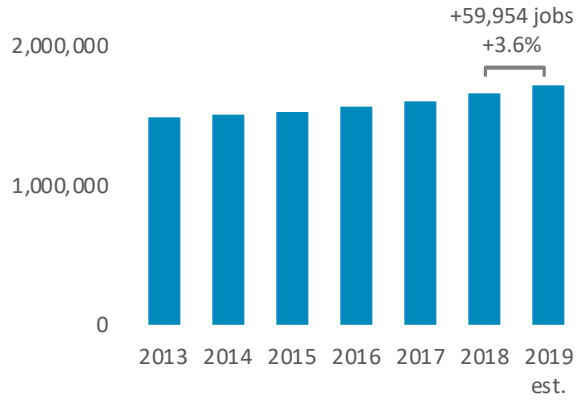
STATE OF TECHNOLOGY SUMMARY

1,717,471	NET TECH EMPLOYMENT[1]
59,954	NET TECH JOB GAINS [2019 vs. 2018]
8.5%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
73,154	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
134,801	TECH OCCUPATION JOB POSTINGS [2019 total]
36.3%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

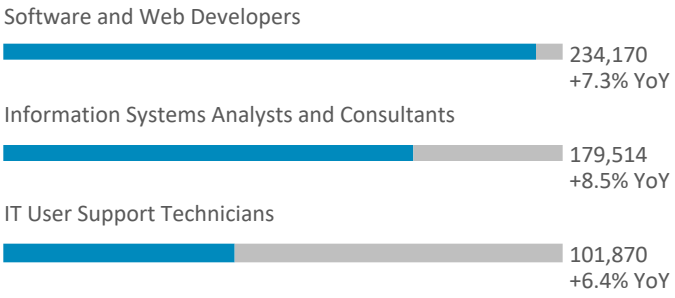
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



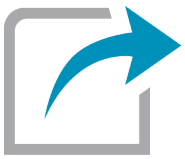
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
IT Services + Custom Software Services	326,631	5.6%
R&D, Testing, and Engineering Services	257,865	4.0%
Telecommunications and Internet Services	137,971	-3.1%
Tech Manufacturing	108,910	5.4%
Software [packaged]	49,684	7.0%

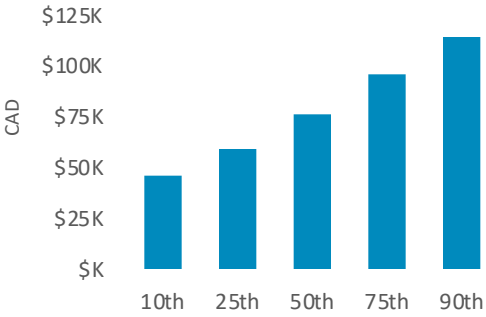
ECONOMIC IMPACT



4.7%

Estimated direct contribution of the tech sector to the Canadian economy

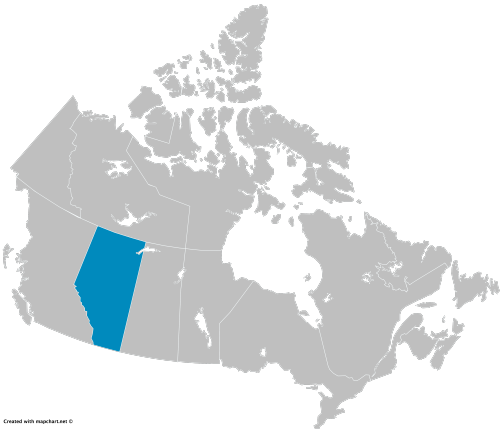
TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $76,471 is 40% higher than the median national wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

Alberta

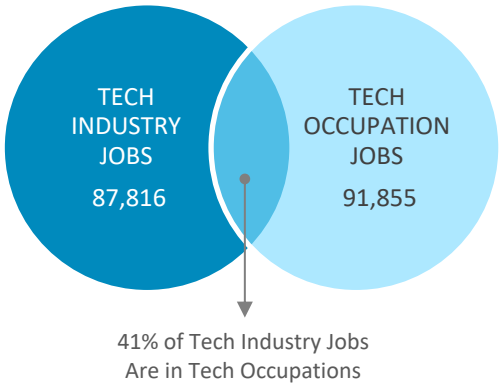


STATE OF TECHNOLOGY SUMMARY

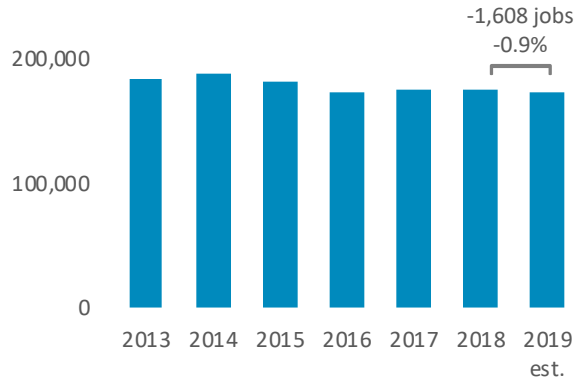
173,759	NET TECH EMPLOYMENT[1]
-1,608	NET TECH JOB GAINS [2019 vs. 2018]
7.1%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
10,498	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
14,919	TECH OCCUPATION JOB POSTINGS [2019 total]
61.2%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

4th	NET TECH EMPLOYMENT RANK
10th	NET TECH EMPLOYMENT JOBS ADDED RANK
4th	NET EMPL AS % OF WORKFORCE RANK

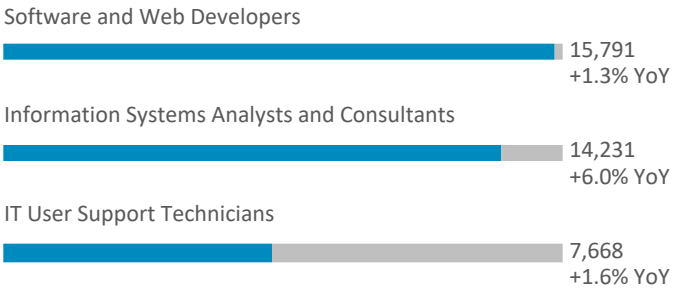
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



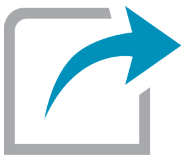
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
R&D, Testing, and Engineering Services	42,846	0.4%
IT Services + Custom Software Services	26,188	6.7%
Telecommunications and Internet Services	12,768	-5.2%
Tech Manufacturing	3,846	13.8%
Software [packaged]	2,167	3.8%

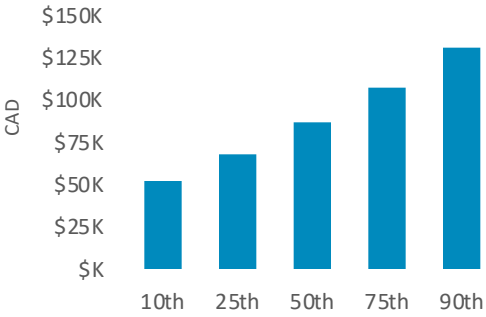
ECONOMIC IMPACT



3.1%

Estimated direct contribution of the tech sector to the Alberta economy

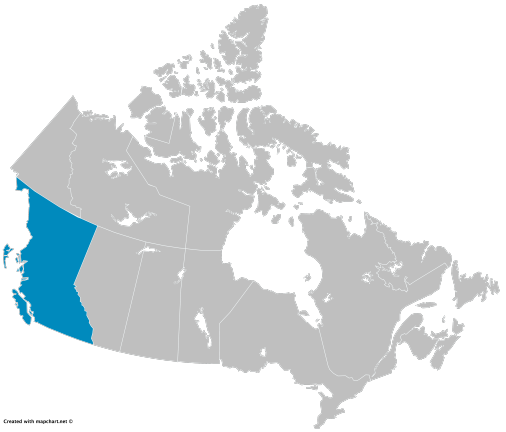
TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $86,488 is 39% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

British Columbia

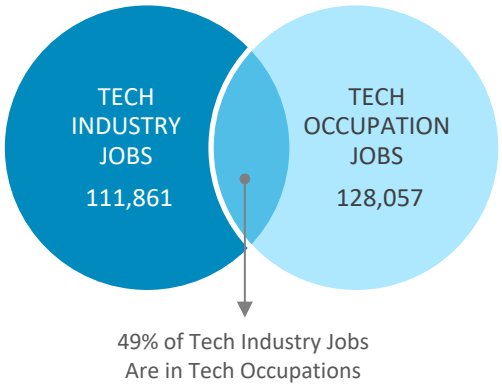


STATE OF TECHNOLOGY SUMMARY

216,700	NET TECH EMPLOYMENT[1]
12,323	NET TECH JOB GAINS [2019 vs. 2018]
7.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
9,641	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
18,894	TECH OCCUPATION JOB POSTINGS [2019 total]
38.2%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

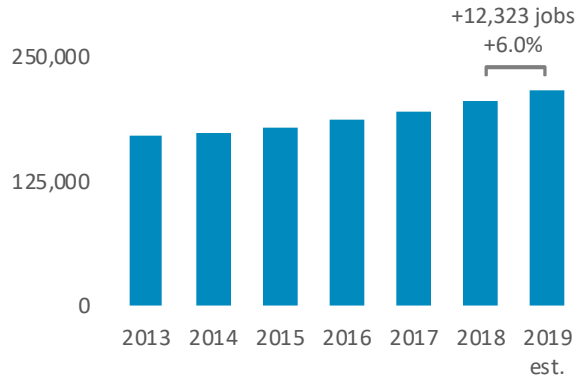
3rd	NET TECH EMPLOYMENT RANK
3rd	NET TECH EMPLOYMENT JOBS ADDED RANK
3rd	NET EMPL AS % OF WORKFORCE RANK

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

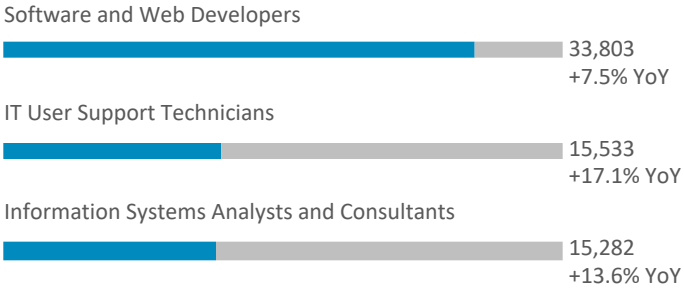


49% of Tech Industry Jobs Are in Tech Occupations

NET TECH EMPLOYMENT



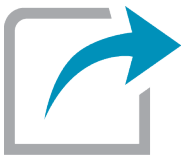
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
R&D, Testing, and Engineering Services	38,678	5.8%
IT Services + Custom Software Services	34,617	4.9%
Telecommunications and Internet Services	21,556	-3.8%
Software [packaged]	9,420	2.8%
Tech Manufacturing	7,591	6.9%

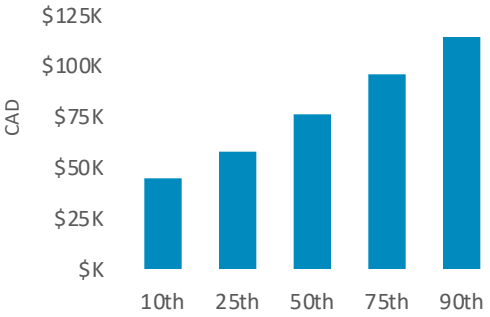
ECONOMIC IMPACT



4.5%

Estimated direct contribution of the tech sector to the British Columbia economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $75,626 is 40% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

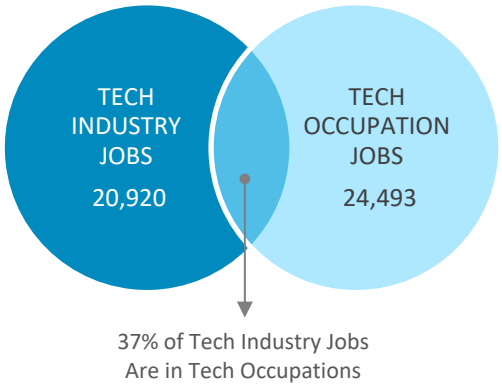
Manitoba

STATE OF TECHNOLOGY SUMMARY

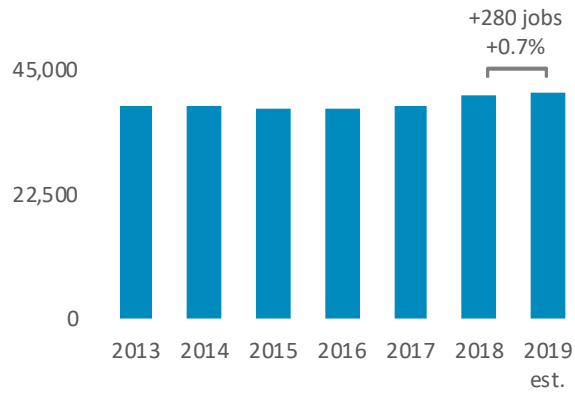
40,715	NET TECH EMPLOYMENT[1]
280	NET TECH JOB GAINS [2019 vs. 2018]
5.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,166	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
3,536	TECH OCCUPATION JOB POSTINGS [2019 total]
111.0%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

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

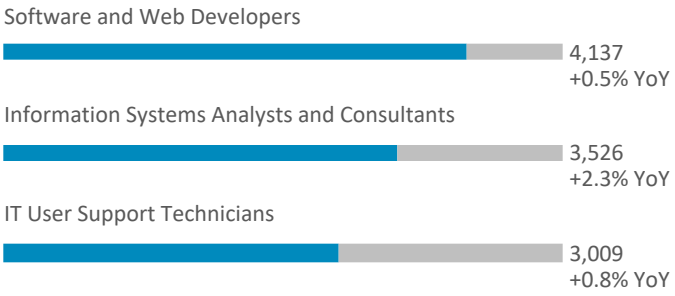
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



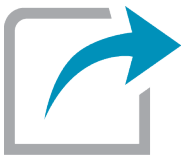
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
Telecommunications and Internet Services	7,698	2.7%
R&D, Testing, and Engineering Services	4,602	3.0%
Tech Manufacturing	4,470	-1.6%
IT Services + Custom Software Services	3,761	3.8%
Software [packaged]	384	-18.4%

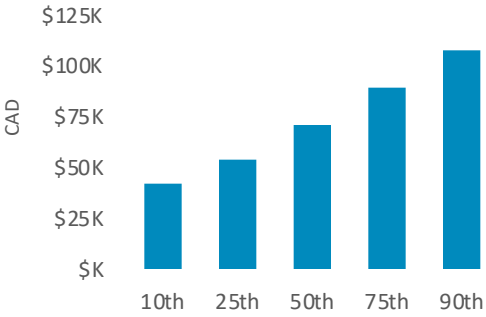
ECONOMIC IMPACT



3.3%

Estimated direct contribution of the tech sector to the Manitoba economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $71,032 is 43% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

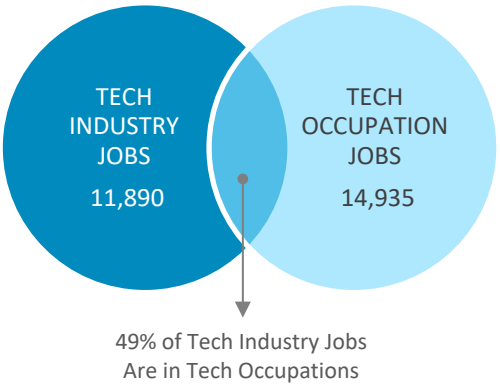
New Brunswick

STATE OF TECHNOLOGY SUMMARY

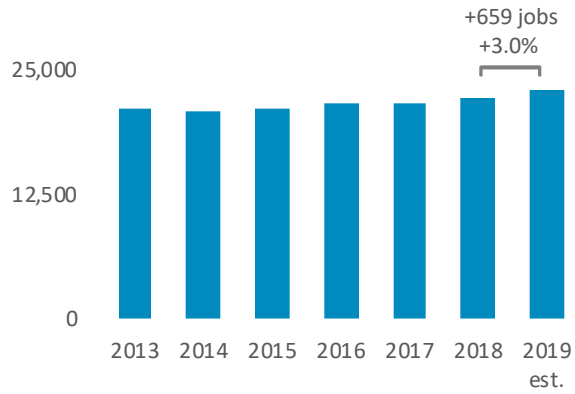
22,918	NET TECH EMPLOYMENT[1]
659	NET TECH JOB GAINS [2019 vs. 2018]
6.1%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
837	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
2,115	TECH OCCUPATION JOB POSTINGS [2019 total]
36.7%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

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

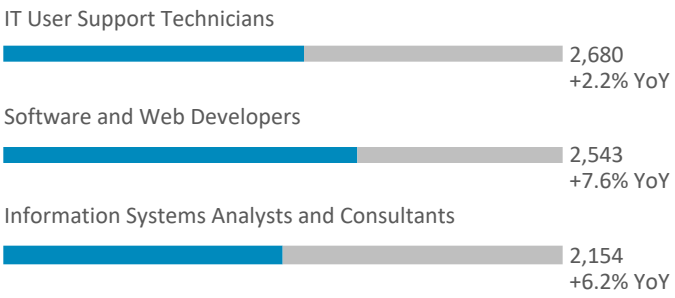
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

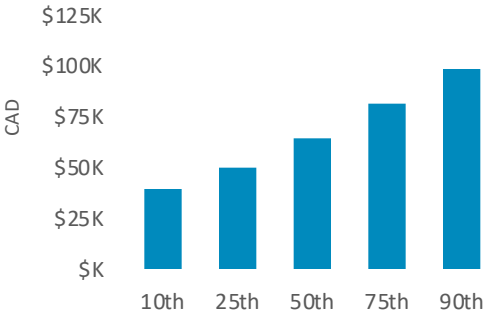
	2019	YoY % Change
IT Services + Custom Software Services	3,716	15.1%
R&D, Testing, and Engineering Services	3,608	0.5%
Telecommunications and Internet Services	3,454	-3.0%
Software [packaged]	562	25.4%
Tech Manufacturing	543	10.8%

ECONOMIC IMPACT

3.6%

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

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $64,581 is 39% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

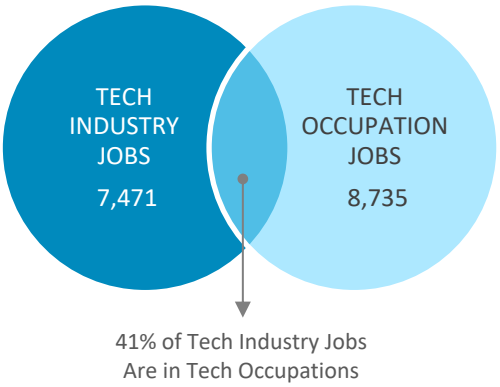
Newfoundland and Labrador

STATE OF TECHNOLOGY SUMMARY

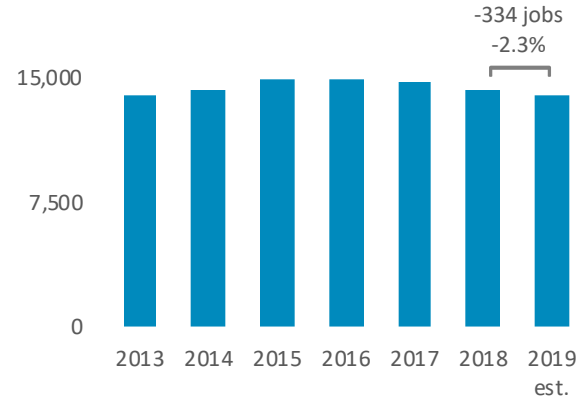
13,978	NET TECH EMPLOYMENT[1]
-334	NET TECH JOB GAINS [2019 vs. 2018]
5.8%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
594	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
761	TECH OCCUPATION JOB POSTINGS [2019 total]
103.7%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

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

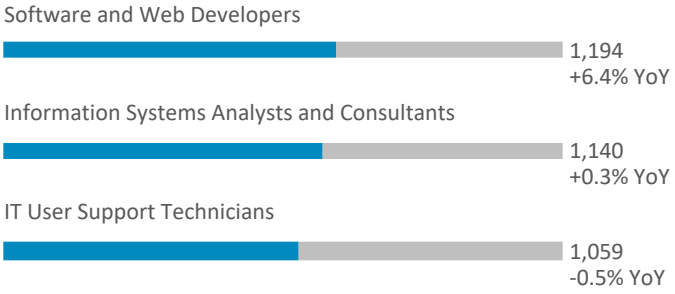
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



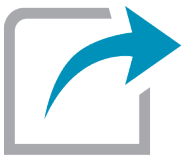
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
Telecommunications and Internet Services	3,108	-2.6%
R&D, Testing, and Engineering Services	2,759	-8.1%
IT Services + Custom Software Services	1,302	20.3%
Software [packaged]	179	22.9%
Tech Manufacturing	107	-25.3%

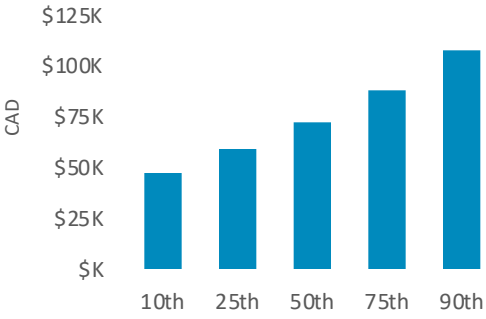
ECONOMIC IMPACT



2.6%

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

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $71,681is 38% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

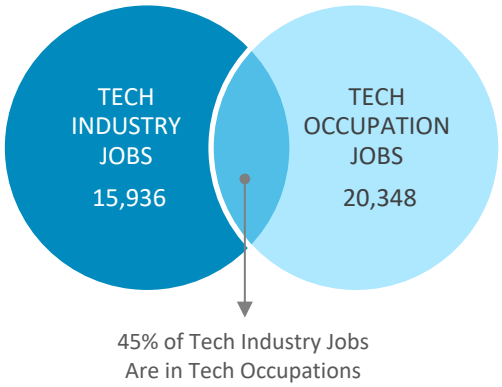
Nova Scotia

STATE OF TECHNOLOGY SUMMARY

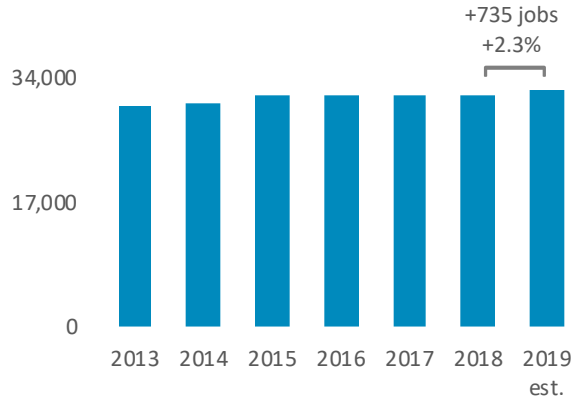
32,253	NET TECH EMPLOYMENT[1]
735	NET TECH JOB GAINS [2019 vs. 2018]
6.4%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,126	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
3,587	TECH OCCUPATION JOB POSTINGS [2019 total]
64.5%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

6th	NET TECH EMPLOYMENT RANK
4th	NET TECH EMPLOYMENT JOBS ADDED RANK
5th	NET EMPL AS % OF WORKFORCE RANK

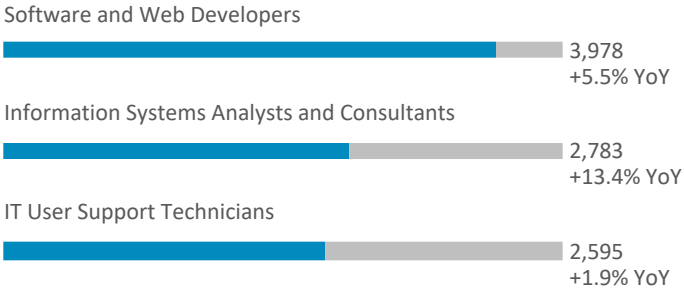
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



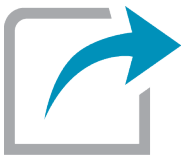
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
IT Services+ Custom Software Services	5,234	2.2%
Telecommunications and Internet Services	4,143	1.4%
R&D, Testing, and Engineering Services	3,779	8.6%
Tech Manufacturing	2,375	3.7%
Software [packaged]	398	15.2%

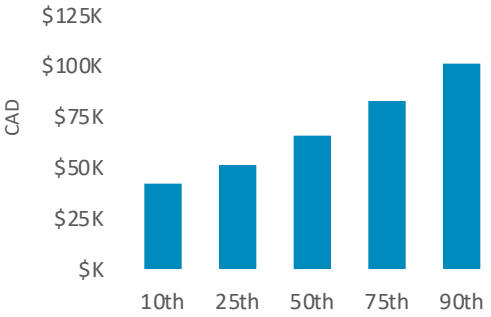
ECONOMIC IMPACT



4.6%

Estimated direct contribution of the tech sector to the Nova Scotia economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $65,819 is 37% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

Ontario

STATE OF TECHNOLOGY SUMMARY

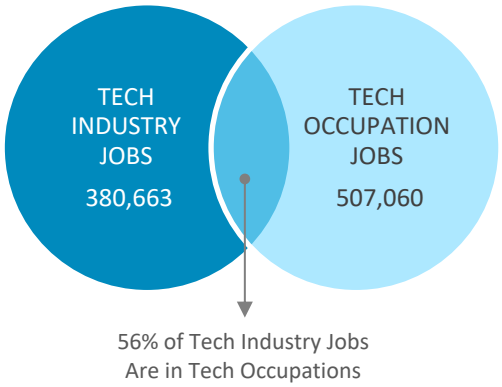
769,033	NET TECH EMPLOYMENT[1]
31,735	NET TECH JOB GAINS [2019 vs. 2018]
9.7%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
34,106	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
65,069	TECH OCCUPATION JOB POSTINGS [2019 total]
32.0%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

1st NET TECH EMPLOYMENT RANK

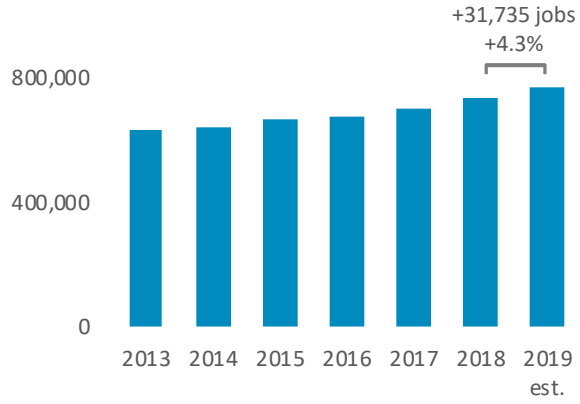
1st NET TECH EMPLOYMENT JOBS ADDED RANK

1st NET EMPL AS % OF WORKFORCE RANK

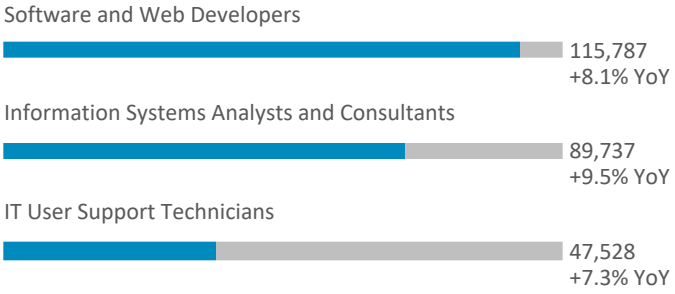
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



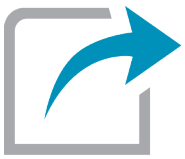
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
IT Services + Custom Software Services	162,181	5.6%
R&D, Testing, and Engineering Services	96,380	4.8%
Telecommunications and Internet Services	52,849	0.3%
Tech Manufacturing	44,180	0.4%
Software [packaged]	25,073	8.0%

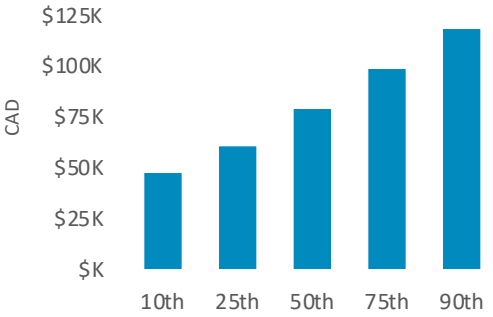
ECONOMIC IMPACT



5.8%

Estimated direct contribution of the tech sector to the Ontario economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $78,329 is 42% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

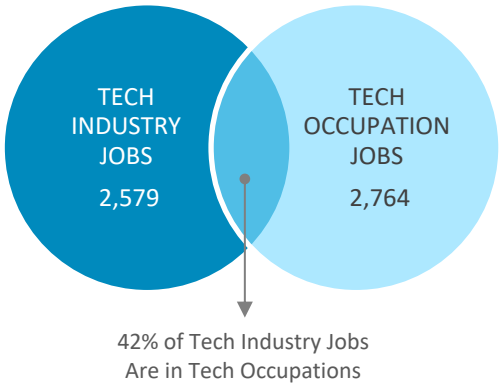
Prince Edward Island

STATE OF TECHNOLOGY SUMMARY

4,706	NET TECH EMPLOYMENT[1]
155	NET TECH JOB GAINS [2019 vs. 2018]
5.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
210	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
387	TECH OCCUPATION JOB POSTINGS [2019 total]
0.0%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

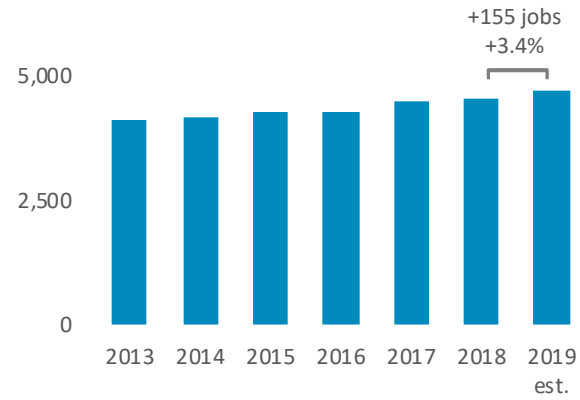
10th	NET TECH EMPLOYMENT RANK
7th	NET TECH EMPLOYMENT JOBS ADDED RANK
9th	NET EMPL AS % OF WORKFORCE RANK

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

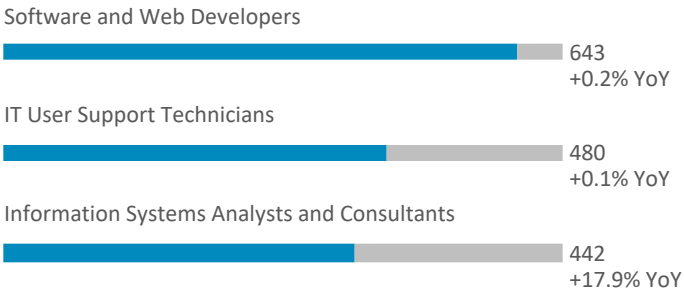


42% of Tech Industry Jobs Are in Tech Occupations

NET TECH EMPLOYMENT



LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

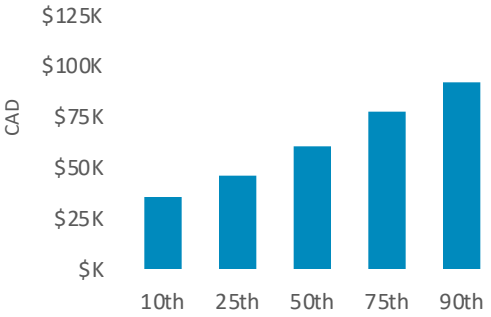
	2019	YoY % Change
IT Services + Custom Software Services	816	31.5%
Tech Manufacturing	616	-5.7%
R&D, Testing, and Engineering Services	501	6.6%
Telecommunications and Internet Services	470	1.8%
Software [packaged]	144	8.1%

ECONOMIC IMPACT

3.7%

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

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $59,570 is 31% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

Quebec

STATE OF TECHNOLOGY SUMMARY

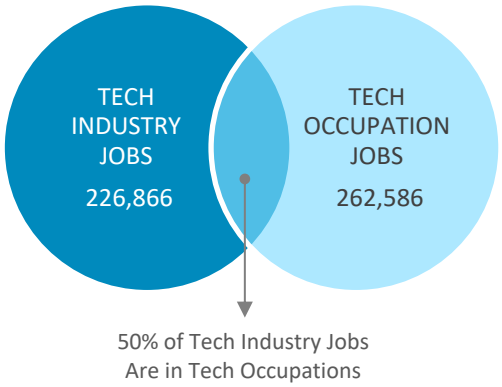
412,536	NET TECH EMPLOYMENT[1]
15,937	NET TECH JOB GAINS [2019 vs. 2018]
9.3%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
13,706	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
21,703	TECH OCCUPATION JOB POSTINGS [2019 total]
26.5%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

2nd NET TECH EMPLOYMENT RANK

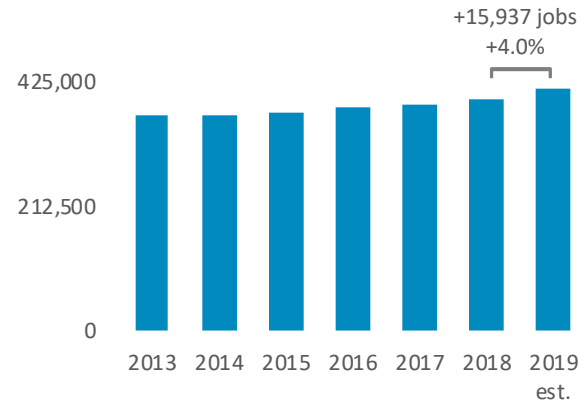
2nd NET TECH EMPLOYMENT JOBS ADDED RANK

2nd NET EMPL AS % OF WORKFORCE RANK

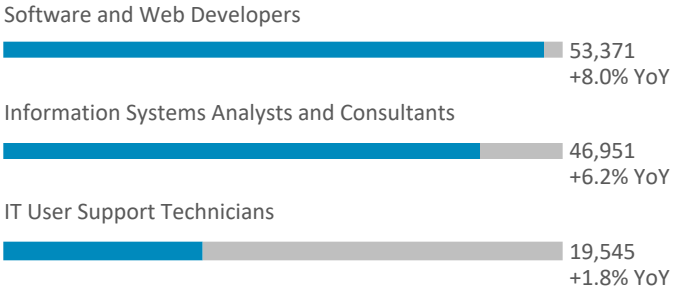
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

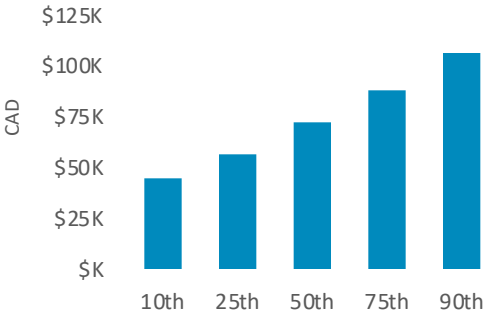
	2019	YoY % Change
IT Services + Custom Software Services	85,950	5.3%
R&D, Testing, and Engineering Services	59,105	5.4%
Tech Manufacturing	44,384	11.0%
Telecommunications and Internet Services	26,526	-9.5%
Software [packaged]	10,902	7.8%

ECONOMIC IMPACT

5.3%

Estimated direct contribution of the tech sector to the Quebec economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $71,992 is 38% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

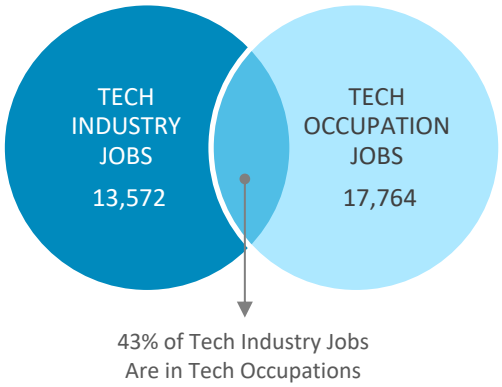
Saskatchewan

STATE OF TECHNOLOGY SUMMARY

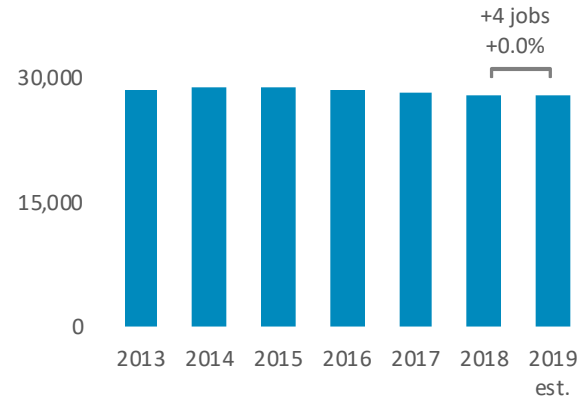
27,957	NET TECH EMPLOYMENT[1]
4	NET TECH JOB GAINS [2019 vs. 2018]
4.6%	NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,132	TECH BUSINESS ESTABLISHMENTS [firms with payroll]
3,532	TECH OCCUPATION JOB POSTINGS [2019 total]
118.6%	EMERGING TECH JOB POSTINGS % CHANGE [2019 vs. 2018]

7th	NET TECH EMPLOYMENT RANK
8th	NET TECH EMPLOYMENT JOBS ADDED RANK
10th	NET EMPL AS % OF WORKFORCE RANK

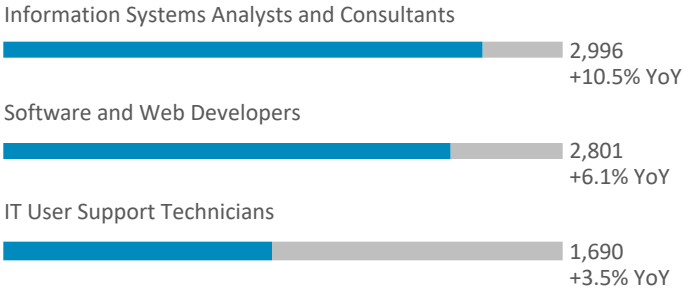
[1]net of tech industry + tech occupation + self-employed [see methodology for details]



NET TECH EMPLOYMENT



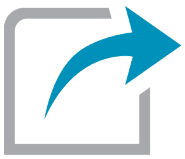
LEADING TECH OCCUPATION CATEGORIES



LEADING TECH INDUSTRY SECTORS [by employment]

	2019	YoY % Change
R&D, Testing, and Engineering Services	4,833	0.6%
Telecommunications and Internet Services	4,789	-6.7%
IT Services + Custom Software Services	2,763	-6.4%
Tech Manufacturing	745	5.2%
Software [packaged]	433	55.3%

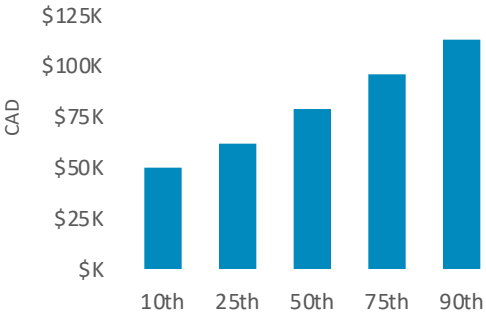
ECONOMIC IMPACT



2.0%

Estimated direct contribution of the tech sector to the Saskatchewan economy

TECH OCCUPATION WAGES [by percentile]



The estimated median tech wage of $78,765 is 42% higher than the median province wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2019 time period, unless specified as earlier | See Appendix for full methodology and data tables

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 17 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
5415 Computer systems design and related services
8112 Electronic and precision equipment repair and maintenance

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

CORE INFORMATION TECHNOLOGY OCCUATIONS

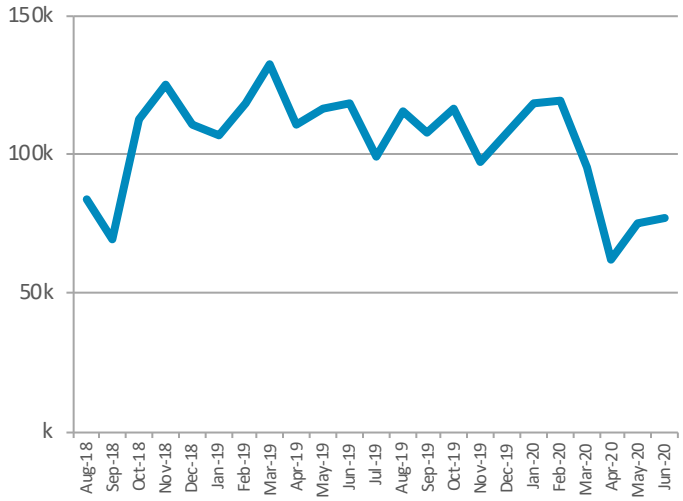
213	Computer and information systems managers
2147	Computer engineers (except software engineers and designers)
2171	Information systems analysts and consultants
2172	Database analysts and data administrators
2173	Software engineers and designers
2174	Computer programmers and interactive media developers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

TECHNICIAN, TECHNOLOGIST, 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

Canadian government labour market data (StatCan) is not sufficiently granular on a monthly basis to comment on the impact of COVID-19 to the information technology workforce. Job posting data provides more real-time visibility into employer hiring practices, but that too has limitations given the near unprecedented nature of the global pandemic.

TECH OCCUPATION JOB POSTINGS



TECH JOB POSTINGS COUNT BY PROVINCE

PROVINCES	Q1-Q2 2020	vs. Q1-Q2 2019
Ontario	26,452	-7,222
Quebec	8,528	-3,408
British Columbia	7,926	-1,630
Alberta	5,504	-2,384
Saskatchewan	1,822	-56
Nova Scotia	1,751	-108
Manitoba	1,545	-216
New Brunswick	769	-395
Newfoundland and Labrador	261	-159
Prince Edward Island	167	-64
SUB TOTAL	**54,726**	**-15,530**

TECH JOB POSTINGS COUNT BY INDUSTRY

TOP 10 INDUSTRIES	Q1-Q2 2020	vs. Q1-Q2 2019
Professional Services	7,666	-3,704
Finance and Insurance	5,188	-613
Manufacturing	4,885	-1,043
Information	3,234	-275
Retail Trade	2,224	-54
Educational Services	1,113	-261
Health Care and Social Assistance	862	-144
Administrative and Support	852	-653
Public Administration	850	-1,605
Transportation and Warehousing	779	-299
STATE SUBTOTAL	**26,874**	**-8,352**

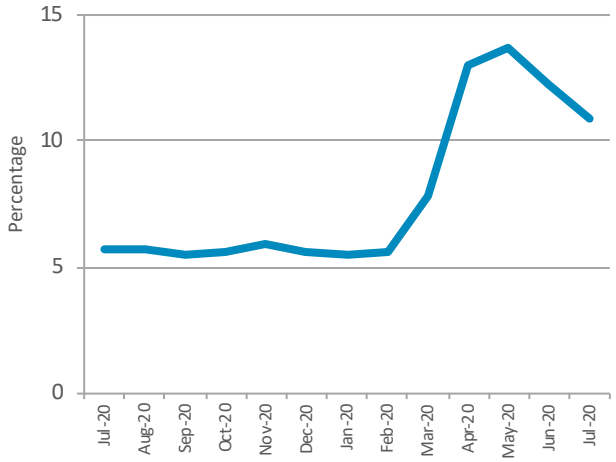
TECH JOB POSTINGS COUNT BY METRO AREA

TOP 10 METRO AREAS	Q1-Q2 2020	vs. Q1-Q2 2019
Toronto	18,620	-4,136
Vancouver	6,138	-1,439
Montreal	5,713	-1,065
Ottawa - Gatineau	3,611	-1,185
Calgary	3,039	-1,527
Edmonton	2,013	-578
Halifax	1,585	-46
Winnipeg	1,440	-186
Kitchener - Cambridge - Waterloo	1,262	-385
Quebec	1,060	-479
STATE SUBTOTAL	**44,481**	**-11,026**

TECH JOB POSTINGS SPECIFYING WFH

TOP 10 STATES	Q1-Q2 2020	vs. Q1-Q2 2019
User support technicians	904	-164
Software engineers/designers	893	+115
Information systems analysts	648	+66
Web designers	318	+78
Computer network technicians	293	-65
Computer systems managers	252	+60
Computer engineers	240	+3
Database analysts	209	+45
Computer programmers	124	+81
IS testing technicians	116	+3
STATE SUBTOTAL	**3,997**	**+222**

OVERALL CANADIAN UNEMPLOYMENT RATE %



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