Cyberprovinces ™

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
ABOUT

ABOUT THIS REPORT

The Computing Technology Industry Association (CompTIA) presents the 2018 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.

ABOUT COMPTIA

With more than 1600 corporate members and 145,000 registered users, CompTIA is the global technology association for all who build, sell, distribute and influence the adoption of technology business solutions. 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.

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BACKGROUND – KEY FORCES SHAPING THE TECH LANDSCAPE

A scan of the horizon reveals an era that appears to be on the cusp of profound change. And yet, the closer a major leap forward seems, the more one is reminded of the last-mile challenges associated with next generation innovation. While there continues to be a sense of excitement for a future that is rapidly becoming reality, increasingly, questions and concerns are part of the mix as well. The trends unfolding will do so in an environment of higher expectations; namely, for business value, security, transparency, and equal access to opportunity. Against this backdrop, CompTIA explores the forces shaping the information technology industry, its workforce, and its business models in the year ahead. CompTIA’s IT Industry Outlook 2018 outlines the key trends in the tech sector and tech workforce in the year ahead. See www.comptia.org to access the full report.

**The Insights Economy Comes Into Focus**
The ongoing digitization of information, and more recently, the mass deployment of sensors, are ushering in what can be characterized as the insights economy. Enabled by machine learning, artificial intelligence and other emerging tools, raw data can more efficiently and effectively be converted into value, which may take the form of pattern recognition, predictive analytics, natural language processing, computer vision, or other output.

**Internet of Things Expands Technology Footprints**
IoT devices are rapidly making their way into corporate spaces. From gathering new data to automation of infrastructure, companies are finding many benefits from adding connectivity and intelligence to physical infrastructure. Adding digital capabilities to everyday components drastically increases the scope of IT responsibilities, which means new skills will be needed and the further refining of IoT strategies to ensure proper alignment with business needs.

**Businesses Race to Upgrade Digital Expertise in the Boardroom**
Increasingly, organizations recognize the importance of having a tech-savvy boardroom. This doesn’t necessarily mean having deep technical knowledge, but rather having a feel for the tech landscape, knowing the types of questions to ask, and being able to push back when necessary. Additionally, with the consequences of a single digital misstep becoming more severe, board-level engagement with cybersecurity and data governance is no longer optional.

**‘New Collar’ Jobs Mindset Gains Momentum, but Challenges Persist**
The concept of ‘new collar’ jobs is a call to action to recognize the changing nature of middle-skill jobs and the need for new approaches to training and preparing the workforce of tomorrow. This change is largely a function of the intersection of technology and just about everything in the economy, from products and workflows to supply chains and job roles. More alternatives to the traditional 4-year college degree are needed, especially skills-centered training and certification approaches resulting in a jobs-ready candidate.

**The Democratization of Technology Leads to Breakthrough Models**
The toolset for building technology has been steadily growing more accessible. In 2018, though, a tipping point will be reached. As software becomes the driving force of many solutions, open source concepts allow far more people to build applications around blockchain, natural language processing, or context-aware computing. Hardware is also more of an open toolbox, as makers explore novel use cases using drones, robotics, and 3D printing.

**Cloud Enters New Phase of Maturity**
Over the past decade, organizations of all sizes have steadily moved through the stages of the cloud adoption progression framework. Many are now reaching the final stage – transformed IT, where the architecture is rebuilt to maximize cloud characteristics. Unlike the first two stages, later-stage challenges are not primarily technical. Instead, companies must build or reconfigure the appropriate policies and workflow for a cloud-based approach.

**Artificial Intelligence Adds a New Layer to the Solution Stack**
Amid the wave of emerging technologies, artificial intelligence stands out as the one most likely to drive revolutionary changes to the technology ecosystem. AI requires significant compute resources (which can be procured in the cloud), various algorithms that allow learning (which can be baked into products or provided as a service), and contextual awareness (which can come from massive collections of data). By adding a layer of intelligence, companies are better positioned to solve a broader range of problems.

**Growing Up: Tech May No Longer Automatically Be Given the Benefit of the Doubt**
Signs point to changing expectations and a different environment unfolding for the tech industry. Questions surrounding security, privacy, screen time, and toxic corporate cultures continue to intensify. Concerns over market concentration, the power imbalances of gatekeepers, and the threat of automation loom. To be clear, technology will continue to overwhelmingly be viewed as a force for good, but the industry will need to spend more time looking at itself in the mirror to ensure this sentiment continues.
BACKGROUND – DEFINING NET TECH EMPLOYMENT

The tech workforce consists of two primary components. New to Cyberprovinces for 2018 is a single metric that encompasses both components, making it easier to describe the tech workforce. The foundation is the set of technology 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 (52.6 percent), but many others are employed by organizations across every industry sector in the Canadian economy (47.4 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-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.

1,035,610 = Technology professionals employed by organizations across the economy (e.g. software developers, network architects, database admins, etc.)

124,300 = Self-employed technology professionals (e.g. freelance developer, IT consultancy sole-proprietorship, etc.)

385,180 = Support/business professionals employed by tech companies (e.g. sales, marketing, finance, HR, etc.)

79,350 = Self-employed support/business professionals working in the tech industry (e.g. freelance graphic designer, channel program consultant, etc.)

1,624,440 workers in total 2017 estimate

71% % of NET tech employment in technology occupations

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 1.62 million workers in 2017, an increase of nearly 45,000 new jobs and a growth rate of 2.8 percent.

- Since 2010, net tech employment increased by an estimated 223,000 new jobs. Net tech employment growth has been steady during this span, averaging approximately 32,000 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 (67 percent) of job gains during the 2010-2017 time period.

- Largest tech occupation contributors to job gains, 2010-2017:
  - Systems analysts and consultants: +65,433
  - Programmers and media developers: +28,489
  - Information systems managers: +27,105
  - Software engineers and designers: +23,773
  - User support technicians: +17,814

- On a percent change basis, the occupation category covering industrial engineering and manufacturing technologists and technicians grew by +115% percent, the largest increase among tech occupations during 2010-2017. Software engineers (+75%) was next, followed by database analysts and administrators (+56%)

- Most occupation categories experienced positive job gains during the 2010-2017 time period, although a few were negative. The category covering electronics assemblers, fabricators, inspectors, and testers lost nearly -3,400 jobs, while electronics service technicians lost -3,324 jobs.

- Largest tech industry contributors to job gains, 2010-2017:
  - IT Services and Custom Software Services: +85,034
  - Engineering Services: +12,199
  - Software [packaged]: +11,773
  - Data processing, hosting, and related services: +5,010
  - Telecommunications carriers (wired + wireless): +4,015

- The steepest decline occurred in the communications equipment manufacturing category where -10,720 jobs were shed during the 2010-2017 time period. Other industry categories with notable drops in employment include, R&D services (-9,647 jobs) and computer and communications wholesalers (-4,212 jobs)

- Looking ahead, the overall base of employment is projected to increase by nearly 8 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 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 2026.

Sources: ESI | 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 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 average tech sector wage of $76,180. Alberta is the only other province 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 2016 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 Toronto Real Estate Board, the average selling price for all housing in Toronto (all types) during 2017 was $822,681.

→ 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 155 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.

Sources: EMSI | Statistics Canada | CompTIA
KEY FINDINGS – NATIONAL

CANADIAN NET TECH EMPLOYMENT

→ Canadian net tech employment totaled an estimated 1.62 million in 2017, an increase of more than 44,000 workers over the 2016 base of 1.58 million. Net tech employment grew an estimated 2.8 percent year-over-year.

→ Net tech employment accounted for approximately 8.4 percent of the overall Canadian workforce in 2017. 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 813,000 in 2017, an increase of 20,400 workers from 793,000 in 2016. Tech industry employment grew an estimated 2.6 percent year-over-year.

→ Tech manufacturing employment totaled an estimated 98,800 in 2017, a decrease of a little more than 2,000 jobs when compared to the previous year. The other sector that experienced a decline when compared to the previous year was Engineering Services, R&D, and Testing.

→ The IT services and custom software services subsector generated the largest numerical gain in employment, adding nearly 19,700 net-new jobs in 2017. This gain is a 7.4 percentage increase over 2016. 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 1.04 million workers in 2017, an increase of 47,700 workers. On a percent change basis, it represents a 4.8 percent increase over 2016.

→ Since 2011, over 200,000 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 46,900 net-new jobs in 2017, a year-over-year growth rate of 7.2 percent. On a numeric basis, Information systems analysts and consultants and computer and information systems managers added the most jobs when compared to 2016.

TECH BUSINESS ESTABLISHMENTS, WAGES, AND EMPLOYER DEMAND

→ There are approximately 69,000 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 $76,200 CAD in 2017, 51% higher than the average private sector wage of $50,400 CAD.

→ According to data from Burning Glass Technologies Labor Insights, the number of job postings by Canadian employers for tech occupations reached nearly 114,000 during 2017. This figure was roughly in line with the rate from the previous year.

→ 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 nearly 44 percent in 2017.
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 were also added in these provinces when compared to 2016. 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 44.6 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 39 percent).

Anchored by Canada’s most populous city, Toronto, the province of Ontario also accounted for a significant portion of tech employment gains during 2017.

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 $80,630
- Ontario $79,400
- British Columbia $76,040
- Newfoundland and Labrador $72,380
- Saskatchewan $71,920
- Quebec $71,260
- Manitoba $68,690
- New Brunswick $68,500
- Nova Scotia $65,490
- Prince Edward Island $62,760

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 31,660
- Quebec 12,460
- Alberta 10,560
- British Columbia 9,210

Beyond numerical measures based on size, relative measures based on the size of the province economy reveal additional insight. Overall, an estimated 5.4 percent of Ontario’s economy is attributed to the tech sector, as defined by this report. In comparison, approximately 2.5 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 60,700 postings in 2017. In second place is British Columbia with approximately 17,460 postings. Quebec and Alberta are third and fourth respectively in terms of tech job postings.

Growth in postings for emerging technology positions and skills:

- Ontario +40%
- Quebec +128%
- Alberta +26%
- British Columbia +4%

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

STATE OF TECHNOLOGY SUMMARY

1,624,440  NET TECH EMPLOYMENT
44,770  NET TECH JOB GAINS [2017 vs. 2016]
8.4%  NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
68,970  TECH BUSINESS ESTABLISHMENTS [firms with payroll]
113,630  TECH OCCUPATION JOB POSTINGS [2017 total]
43.6%  EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

52% of Tech Industry Jobs Are in Tech Occupations

LEADING TECH OCCUPATION CATEGORIES

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Jobs</th>
<th>YoY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Systems Analysts and Consultants</td>
<td>173,460</td>
<td>+8.7%</td>
</tr>
<tr>
<td>Computer Programmers and Interactive Media Developers</td>
<td>146,400</td>
<td>+6.7%</td>
</tr>
<tr>
<td>User Support Technicians</td>
<td>98,010</td>
<td>+4.6%</td>
</tr>
</tbody>
</table>

LEADING TECH INDUSTRY SECTORS [by employment]

<table>
<thead>
<tr>
<th>Sector</th>
<th>Jobs</th>
<th>YoY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Services + Custom Software Services</td>
<td>286,460</td>
<td>7.4%</td>
</tr>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>237,630</td>
<td>-0.7%</td>
</tr>
<tr>
<td>Telecommunications and Internet Services</td>
<td>148,150</td>
<td>1.2%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>98,770</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>41,860</td>
<td>7.2%</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT

4.4%
Estimated direct contribution of the tech sector to the Canadian economy

TECH INDUSTRY WAGES

<table>
<thead>
<tr>
<th>Wage Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average National Wage</td>
<td>$50,430</td>
</tr>
<tr>
<td>Average Tech Industry Wage</td>
<td>$76,180</td>
</tr>
</tbody>
</table>

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
Alberta

STATE OF TECHNOLOGY SUMMARY

173,460 NET TECH EMPLOYMENT
540 NET TECH JOB GAINS [2017 vs. 2016]
7.2% NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
10,560 TECH BUSINESS ESTABLISHMENTS [firms with payroll]
10,650 TECH OCCUPATION JOB POSTINGS [2017 total]
26.0% EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

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

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
- 15,900
  +27.4% YoY

Computer Programmers and Interactive Media Developers
- 9,470
  -7.6% YoY

User Support Technicians
- 7,980
  +19.2% YoY

LEADING TECH INDUSTRY SECTORS [by employment]

<table>
<thead>
<tr>
<th>Industry</th>
<th>2017</th>
<th>YoY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>43,170</td>
<td>-4.9%</td>
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<tr>
<td>IT Services + Custom Software Services</td>
<td>24,200</td>
<td>1.1%</td>
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<tr>
<td>Telecommunications and Internet Services</td>
<td>12,660</td>
<td>2.7%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>2,900</td>
<td>-6.3%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>2,100</td>
<td>-4.2%</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT

3.1%
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 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
British Columbia

STATE OF TECHNOLOGY SUMMARY

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>36,210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ 5,150 jobs</td>
</tr>
<tr>
<td>IT Services + Custom Software Services</td>
<td>32,240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunications and Internet Services</td>
<td>18,030</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Software [package]</td>
<td>8,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>7,400</td>
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</tr>
</tbody>
</table>

50% of Tech Industry Jobs Are in Tech Occupations

LEADING TECH OCCUPATION CATEGORIES

- Computer Programmers and Interactive Media Developers: 16,880 -2.4% YoY
- Information Systems Analysts and Consultants: 13,840 +7.6% YoY
- User Support Technicians: 12,510 -0.9% YoY

LEADING TECH INDUSTRY SECTORS (by employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2017</th>
<th>YoY % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>36,210</td>
<td>0.5%</td>
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<tr>
<td>IT Services + Custom Software Services</td>
<td>32,240</td>
<td>5.2%</td>
</tr>
<tr>
<td>Telecommunications and Internet Services</td>
<td>18,030</td>
<td>15.6%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>8,590</td>
<td>7.1%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>7,400</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

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 2017 time period, unless specified as earlier. See Appendix for full methodology and data tables.
Manitoba

STATE OF TECHNOLOGY SUMMARY

39,400 NET TECH EMPLOYMENT
1,510 NET TECH JOB GAINS [2017 vs. 2016]
5.6% NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,190 TECH BUSINESS ESTABLISHMENTS [firms with payroll]
1,710 TECH OCCUPATION JOB POSTINGS [2017 total]
13.5% EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

37% of Tech Industry Jobs Are in Tech Occupations

LEADING TECH OCCUPATION CATEGORIES

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2017 Jobs</th>
<th>YoY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Systems Analysts and Consultants</td>
<td>3,900</td>
<td>+17.6%</td>
</tr>
<tr>
<td>User Support Technicians</td>
<td>3,680</td>
<td>+37.0%</td>
</tr>
<tr>
<td>Computer Programmers and Interactive Media Developers</td>
<td>2,870</td>
<td>-2.3%</td>
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LEADING TECH INDUSTRY SECTORS (by employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2017 Jobs</th>
<th>YoY %</th>
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<tbody>
<tr>
<td>Telecommunications and Internet Services</td>
<td>5,760</td>
<td>8.6%</td>
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<tr>
<td>Tech Manufacturing</td>
<td>4,310</td>
<td>-6.4%</td>
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<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>4,180</td>
<td>0.1%</td>
</tr>
<tr>
<td>IT Services + Custom Software Services</td>
<td>3,350</td>
<td>11.3%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>420</td>
<td>13.9%</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT

3.0%
Estimated direct contribution of the tech sector to the Manitoba economy

TECH INDUSTRY WAGES

<table>
<thead>
<tr>
<th>Description</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Wage</td>
<td>$47,070</td>
</tr>
<tr>
<td>Tech Industry Wage</td>
<td>$68,680</td>
</tr>
</tbody>
</table>

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
New Brunswick

STATE OF TECHNOLOGY SUMMARY

22,140  NET TECH EMPLOYMENT\(^1\)  
20  NET TECH JOB GAINS [2017 vs. 2016]  
6.0%  NET EMPLOYMENT AS A % OF OVERALL WORKFORCE  
810  TECH BUSINESS ESTABLISHMENTS [firms with payroll]  
1,890  TECH OCCUPATION JOB POSTINGS [2017 total]  
264.1%  EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

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

LEADING TECH OCCUPATION CATEGORIES

User Support Technicians  
Information Systems Analysts and Consultants  
Computer Programmers and Interactive Media Developers

LEADING TECH INDUSTRY SECTORS [by employment]

Telecommunications and Internet Services 4,140 -1.8%  
R&D, Testing, and Engineering Services 3,240 13.0%  
IT Services + Custom Software Services 2,580 3.1%  
Tech Manufacturing 260 -13.9%  
Software [package] 210 10.5%

ECONOMIC IMPACT

3.3%  
Estimated direct contribution of the tech sector to the New Brunswick economy

TECH INDUSTRY WAGES

CAD $45,700  
$68,490

Average State Wage  
Average Tech Industry Wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
Newfoundland and Labrador

**STATE OF TECHNOLOGY SUMMARY**

- **13,150** NET TECH EMPLOYMENT
- **-780** NET TECH JOB GAINS \(2017 \text{ vs. } 2016\)
- **5.3%** NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
- **610** TECH BUSINESS ESTABLISHMENTS [firms with payroll]
- **600** TECH OCCUPATION JOB POSTINGS \(2017 \text{ total}\)
- **140.0%** EMERGING TECH JOB POSTINGS % CHANGE \(2017 \text{ vs. } 2016\)

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

**LEADING TECH OCCUPATION CATEGORIES**

- **User Support Technicians**
  - 1,300
  - -2.3% YoY
- **Information Systems Analysts and Consultants**
  - 1,070
  - +7.1% YoY
- **Computer Programmers and Interactive Media Developers**
  - 650
  - +55.1% YoY

**LEADING TECH INDUSTRY SECTORS** (by employment)

<table>
<thead>
<tr>
<th>Industry</th>
<th>2017</th>
<th>YoY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecommunications and Internet Services</td>
<td>3,340</td>
<td>5.3%</td>
</tr>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>2,880</td>
<td>-5.0%</td>
</tr>
<tr>
<td>IT Services + Custom Software Services</td>
<td>1,120</td>
<td>15.4%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>100</td>
<td>-24.3%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>70</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

**ECONOMIC IMPACT**

2.6%

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

**TECH INDUSTRY WAGES**

- **Average State Wage**
  - CAD $52,930
- **Average Tech Industry Wage**
  - CAD $72,380

**TECH WAGES ARE 37% HIGHER**

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables

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Nova Scotia

STATE OF TECHNOLOGY SUMMARY

32,800  NET TECH EMPLOYMENT
90  NET TECH JOB GAINS [2017 vs. 2016]
6.7%  NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,080  TECH BUSINESS ESTABLISHMENTS [firms with payroll]
2,180  TECH OCCUPATION JOB POSTINGS [2017 total]
368.6%  EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

48% of Tech Industry Jobs Are in Tech Occupations

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
- 2,590
- -5.9% YoY
User Support Technicians
- 2,460
+11.5% YoY
Computer Programmers and Interactive Media Developers
- 2,340
+5.7% YoY

LEADING TECH INDUSTRY SECTORS (by employment)

Telecommunications and Internet Services
- 4,520
- -2.7%
IT Services + Custom Software Services
- 4,710
+ 10.7%
R&D, Testing, and Engineering Services
- 3,400
- -1.0%
Tech Manufacturing
- 2,490
- -2.7%
Software [package]
- 440
+ 0.2%

ECONOMIC IMPACT

4.2%
Estimated direct contribution of the tech sector to the Nova Scotia economy

TECH INDUSTRY WAGES

CAD

Average State Wage
$44,770

Average Tech Industry Wage
$65,490

TECH WAGES ARE 46% HIGHER

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
Ontario

STATE OF TECHNOLOGY SUMMARY

723,950   NET TECH EMPLOYMENT
32,860   NET TECH JOB GAINS (2017 vs. 2016)
9.6%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
31,660   TECH BUSINESS ESTABLISHMENTS (firms with payroll)
60,700   TECH OCCUPATION JOB POSTINGS (2017 total)
40.2%   EMERGING TECH JOB POSTINGS % CHANGE (2017 vs. 2016)

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

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
87,630
+12.5% YoY

Computer Programmers and Interactive Media Developers
71,710
14.3% YoY

User Support Technicians
47,950
+16.6% YoY

LEADING TECH INDUSTRY SECTORS (by employment)

<table>
<thead>
<tr>
<th>Industry</th>
<th>2017</th>
<th>YoY % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Services + Custom Software Services</td>
<td>140,740</td>
<td>8.0%</td>
</tr>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>86,260</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Telecommunications and Internet Services</td>
<td>62,440</td>
<td>-2.7%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>41,170</td>
<td>0.9%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>20,430</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT

5.4%
Estimated direct contribution of the tech sector to the Ontario economy

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables

TECH INDUSTRY WAGES

CAD

Average State Wage: $51,350
Average Tech Industry Wage: $79,390

TECH WAGES ARE 55% HIGHER
Prince Edward Island

STATE OF TECHNOLOGY SUMMARY

4,670 NET TECH EMPLOYMENT

600 NET TECH JOB GAINS [2017 vs. 2016]

5.9% NET EMPLOYMENT AS A % OF OVERALL WORKFORCE

190 TECH BUSINESS ESTABLISHMENTS [firms with payroll]

240 TECH OCCUPATION JOB POSTINGS [2017 total]

211.1% EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

10th NET TECH EMPLOYMENT RANK

5th NET TECH EMPLOYMENT JOBS ADDED RANK

7th NET EMPL AS % OF WORKFORCE RANK

LEADING TECH OCCUPATION CATEGORIES

Computer Programmers and Interactive Media Developers

580 +9.4% YoY

Information Systems Analysts and Consultants

480 +8.2% YoY

User Support Technicians

450 -4.4% YoY

LEADING TECH INDUSTRY SECTORS (by employment)

Telecommunications and Internet Services

480 -1.2%

IT Services + Custom Software Services

570 13.0%

Tech Manufacturing

500 5.7%

R&D, Testing, and Engineering Services

410 5.4%

Software [package]

80 -8.5%

ECONOMIC IMPACT

3.3%

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 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables

TECH INDUSTRY EMPLOYMENT

+ 110 jobs +5.4%

0 1,150 2,300


TECH INDUSTRY WAGES

CAD $41,970

$62,760

Average State Wage

Average Tech Industry Wage

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
Quebec

STATE OF TECHNOLOGY SUMMARY

389,850  NET TECH EMPLOYMENT\(^1\)
6,270   NET TECH JOB GAINS [2017 vs. 2016]
9.2%   NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
12,460  TECH BUSINESS ESTABLISHMENTS [firms with payroll]
14,830  TECH OCCUPATION JOB POSTINGS [2017 total]
128.6%  EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

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

LEADING TECH OCCUPATION CATEGORIES

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2017</th>
<th>YoY % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Systems Analysts and Consultants</td>
<td>42,560</td>
<td>-3.7% YoY</td>
</tr>
<tr>
<td>Computer Programmers and Interactive Media Developers</td>
<td>38,020</td>
<td>+2.7% YoY</td>
</tr>
<tr>
<td>Computer Network Technicians</td>
<td>17,270</td>
<td>+1.4% YoY</td>
</tr>
</tbody>
</table>

LEADING TECH INDUSTRY SECTORS (by employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2017</th>
<th>YoY % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Services + Custom Software Services</td>
<td>74,070</td>
<td>8.9%</td>
</tr>
<tr>
<td>R&amp;D, Testing, and Engineering Services</td>
<td>52,600</td>
<td>1.9%</td>
</tr>
<tr>
<td>Tech Manufacturing</td>
<td>38,600</td>
<td>-5.1%</td>
</tr>
<tr>
<td>Telecommunications and Internet Services</td>
<td>30,700</td>
<td>0.9%</td>
</tr>
<tr>
<td>Software [package]</td>
<td>9,400</td>
<td>-2.2%</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT

5.0%
Estimated direct contribution of the tech sector to the Quebec economy

TECH INDUSTRY WAGES

<table>
<thead>
<tr>
<th>Measure</th>
<th>2017</th>
<th>CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average State Wage</td>
<td>$46,670</td>
<td></td>
</tr>
<tr>
<td>Average Tech Industry Wage</td>
<td>$71,260</td>
<td></td>
</tr>
</tbody>
</table>

Primary data sources: EMSI | Statistics Canada | CompTIA | Burning Glass Technologies Labour Insights. All data are estimates covering the 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
Saskatchewan

STATE OF TECHNOLOGY SUMMARY

28,340  NET TECH EMPLOYMENT¹
370  NET TECH JOB GAINS [2017 vs. 2016]
4.7%  NET EMPLOYMENT AS A % OF OVERALL WORKFORCE
1,090  TECH BUSINESS ESTABLISHMENTS [firms with payroll]
3,180  TECH OCCUPATION JOB POSTINGS [2017 total]
146.3%  EMERGING TECH JOB POSTINGS % CHANGE [2017 vs. 2016]

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

LEADING TECH OCCUPATION CATEGORIES

Information Systems Analysts and Consultants
3,060  +12.8% YoY
Computer Programmers and Interactive Media Developers
1,810  +5.7% YoY
User Support Technicians
1,710  -13.0% YoY

LEADING TECH INDUSTRY SECTORS  (by employment)

Telecommunications and Internet Services
5,540  0.4%
R&D, Testing, and Engineering Services
4,740  2.2%
IT Services + Custom Software Services
2,750  8.9%
Tech Manufacturing
680  2.4%
Software [package]
110  11.9%

ECONOMIC IMPACT

2.5%
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 2017 time period, unless specified as earlier | See Appendix for full methodology and data tables
APPENDIX – METHODOLOGY
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. New to Cyberprovinces for 2018 is a single metric that encompasses both components, making it easier to describe the tech workforce. The foundation is the set of technology occupation professionals working in technical positions, such as IT support, network engineering, software development and every related role. Many of these professionals work for technology companies (53 percent), but many others are employed by organizations across every industry sector in the Canadian economy (47 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-four 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 18 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 INDUSTRY DEFINITION BY NAICS

For more details on the North American Industry Classification System (NAICS), visit https://www.statcan.gc.ca/eng/subjects/standard/naics/2017/index

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

5171  Wired telecommunications carriers
5172  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
## TECH OCCUPATIONS DEFINITION BY NOC

For more detail on the National Occupational Classification (NOC) system, see: [https://www.statcan.gc.ca/eng/subjects/standard/noc/2016/index](https://www.statcan.gc.ca/eng/subjects/standard/noc/2016/index)

### IT OCCUPATIONS

<table>
<thead>
<tr>
<th>Code</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>213</td>
<td>Computer and information systems managers</td>
</tr>
<tr>
<td>2147</td>
<td>Computer engineers (except software engineers and designers)</td>
</tr>
<tr>
<td>2171</td>
<td>Information systems analysts and consultants</td>
</tr>
<tr>
<td>2172</td>
<td>Database analysts and data administrators</td>
</tr>
<tr>
<td>2173</td>
<td>Software engineers and designers</td>
</tr>
<tr>
<td>2174</td>
<td>Computer programmers and interactive media developers</td>
</tr>
<tr>
<td>2175</td>
<td>Web designers and developers</td>
</tr>
<tr>
<td>2281</td>
<td>Computer network technicians</td>
</tr>
<tr>
<td>2282</td>
<td>User support technicians</td>
</tr>
<tr>
<td>2283</td>
<td>Information systems testing technicians</td>
</tr>
</tbody>
</table>

### ENGINEERING AND OTHER OCCUPATIONS

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