

DIGITAL ECONOMY PULSE:

Productivity and Employment Trends in Canada

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RESEARCH BY

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PREFACE:

The Information and Communications Technology Council (ICTC) is a neutral, not-for-profit, national centre of expertise with the mission of strengthening Canada's digital advantage in the global economy. For more than 30 years, ICTC has delivered forward-looking research, practical policy advice, and capacity-building solutions for individuals and businesses. The organization's goal is to ensure that technology is utilized to drive economic growth and innovation and that Canada's workforce remains competitive on a global scale.

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ABBREVIATIONS

AI	Artificial intelligence
HR	Human resources
ICT	Information and communications technology
ICTC	Information and Communications Technology Council
NAICS	North American Industry Classification System
NOC	National Occupational Classification
OECD	Organisation for Economic Co-operation and Development
VAR	Vector autoregression

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EXECUTIVE SUMMARY

Canada's digital economy is a critical lever to boost the nation's overall productivity, innovation, and global competitiveness. This briefing, part of ICTC's Digital Economy Pulse series, provides an update on the state of Canada's digital economy as of 2025.

The information and communications technology (ICT) sector and the digital economy experienced significant growth during the pandemic. During this time, there was also a shift in the concentration of ICT workers, with more workers finding job opportunities outside the ICT sector as technology use and needs spread across the broader economy. However, a combination of factors, including economic uncertainty and over-hiring during the pandemic, led to a wave of layoffs in technology companies from 2022 to 2024. Despite these challenges, the digital economy continued to grow, though at a slower pace than during the pandemic's peak.

Canada's digital economy employs 2.4 million individuals, accounting for 11.7% of the national workforce, with 1.1 million working directly in the ICT sector. The digital economy has experienced strong employment growth outpacing the general economy, with digital economy employment rising by 51% from 2014 to 2024. Productivity remains a defining strength: the ICT sector's productivity reached $92.20 per hour in 2023, which is 45% above the national average.

ICT sector employers report looking for mid- and senior-career staff with specialized skills and business experience. Examples of in-demand ICT occupations include software engineers, data scientists, computer and information systems managers, and cyber security specialists.

Given the demand for higher levels of experience, Canada must place strategic emphasis on workforce development and retention strategies. Creating a supportive and inclusive talent pipeline will be a key part of Canada's broader strategies in the ICT sector, contributing to enhanced global competitiveness and helping to drive long-term prosperity.

KEY TAKEAWAYS

- **Companies in Canada's digital economy report stronger revenue and greater confidence in future growth compared to firms in the general economy.**
- **The most in-demand ICT roles include software engineers, data scientists, computer and information systems managers, and cyber security specialists.**

INTRODUCTION TO CANADA'S DIGITAL ECONOMY

In 2021, ICTC published its most recent labour market outlook for the digital economy—a report that assessed the impact of the COVID-19 pandemic on the Canadian economy, with a focus on the country's digital economy and its technology workers.

This briefing provides an update on the status of Canada's digital economy. It outlines the composition of the ICT sector and the ups and downs that have occurred since the previous report. In addition, this briefing evaluates key trends in Canada's digital economy, covering the economic status of the ICT sector and the digital economy, followed by an overview of in-demand jobs and skills in the digital economy in Canada.

CANADA'S ICT SECTOR VS. CANADA'S DIGITAL ECONOMY

The ICT sector refers to businesses that fit within industries closely associated with ICTs, such as computer and internet infrastructure. This includes ICT manufacturing, software and computer services, communications services, and ICT wholesaling.[1] A variety of occupations work within the ICT sector; for example, an IT consulting firm might have needs for both a software developer and a human resources (HR) generalist.

However, there are also many workers who hold ICT-related positions, but do not work in the ICT sector. For example, an HR consulting firm might hire both HR generalists and IT helpdesk professionals or data scientists. ICT workers are any people who hold an ICT-related occupation, no matter which sector employs them.

The ICT sector plays an important role in driving economic growth and job creation within Canada's economy. According to a recent analysis by Innovation, Science and Economic Development Canada, each ICT sector job "supports an additional 1.2 jobs within the general Canadian economy."[2] ICTC measures Canada's employment in the **digital economy** as the sum of ICT workers across all sectors of the economy and non-ICT workers within the ICT sector. In other words, an HR generalist employed by an IT consulting firm and a data scientist working for an HR firm are both part of the digital economy. For a complete list of occupations and industries that make up the digital economy, consult Appendix A.

1 ISED, "2023 Canadian ICT Sector Profile: Digital Technologies and Investment Branch," Government of Canada, 2024, https://ised-isde.canada.ca/site/digital-technologies-ict/en.
2 Ibid.

LABOUR PRODUCTIVITY IN THE ICT SECTOR

Research shows that digitally intensive sectors (such as software development, finance, and advanced manufacturing) are more productive than non-digitally intensive sectors.[3] From 2002–2019, labour productivity increased by 22.1% in digitally intensive sectors, more than three times higher than the 6.3% increase in the non-digitally intensive sectors.[4]

ICT sector findings further support this; the ICT sector's productivity reached $92.20 per hour in 2023, which is 45% above the national average. Although productivity growth in Canada has been a longstanding concern,[5] a year-to-year comparison of ICT sector productivity showed rises of 4.7% in 2022 and 7.0% in 2023.

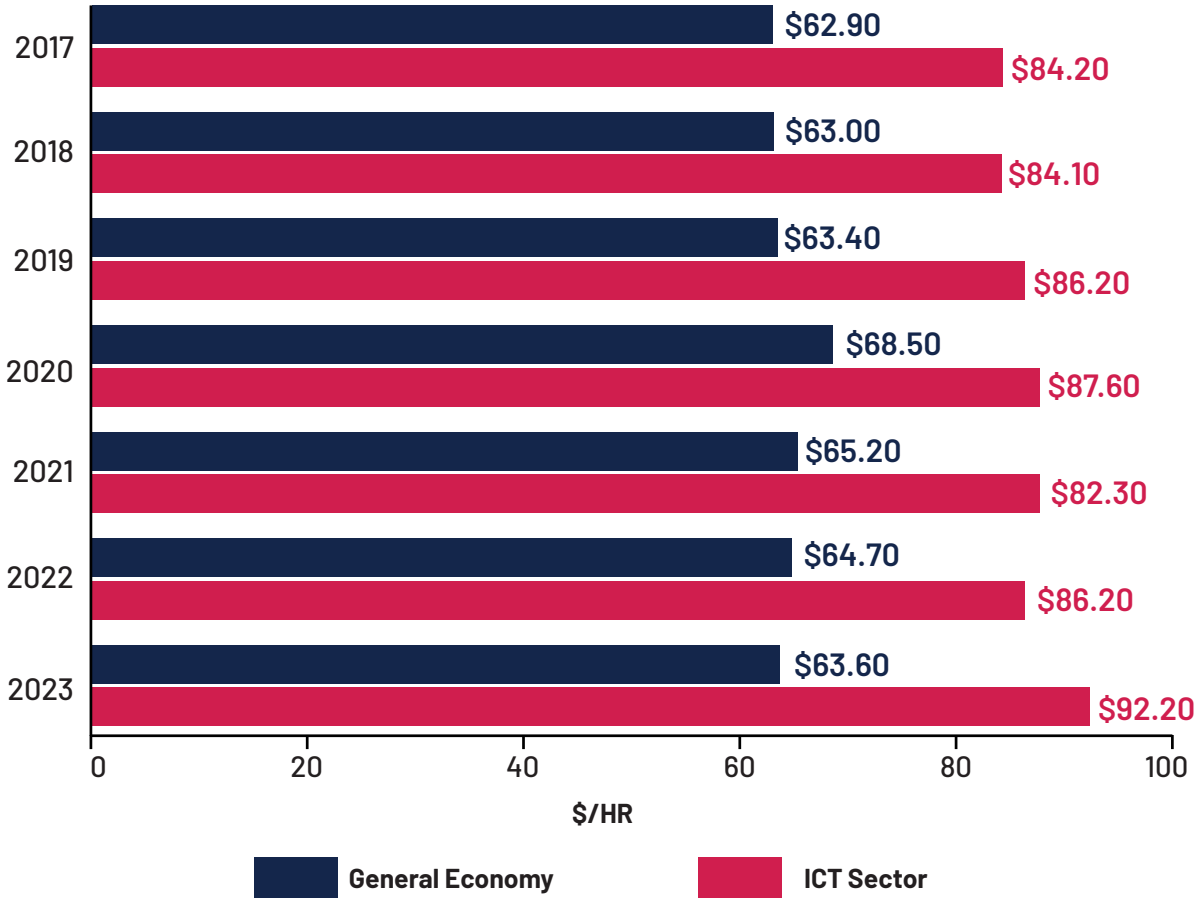


Figure 1: Labour Productivity, General Economy Versus the ICT Sector. Source: Data from Statistics Canada Table 36-10-0480-01, Labour productivity and related measures by business sector industry and by non-commercial activity consistent with the industry accounts.

3 Liu Huju, "Economic performance associated with digitalization," Statistics Canada, February 24, 2021,https://www150.statcan.gc.ca/n1/en/pub/36-28-0001/2021002/article/00001-eng.pdf?st=R0vsu0Lm.

4 Ibid.

5 Carolyn Rogers, "Time to break the glass," Bank of Canada, March 26, 2024, https://www.bankofcanada.ca/2024/03/time-to-break-the-glass-fixing-canadas-productivity-problem/.

EMPLOYMENT TRENDS

In December 2024, the digital economy employed 2.4 million Canadians, 1.1 million of whom were in the ICT sector (see Figure 2). In December 2024, 11.7% of Canadians were employed in the digital economy. The share of Canadian employment attributable to the digital economy has substantially increased since 2006, when it accounted for 8.8% of total employment.

Employment in the digital economy comprises a mix of people employed by the ICT sector and people in ICT-related jobs. As the Canadian economy digitalizes, more Canadians with technological skills and interest in related roles are working in organizations outside of the ICT sector, taking positions as digital marketing specialists or software developers across many sectors (e.g., in post-secondary institutions).

The employment rates of ICT workers both in and outside of the ICT sector are growing in Canada (see Figure 2). As of 2024, the composition of the digital economy is as follows:

- 822,040 (34%) were ICT workers in the ICT sector.
- 1,287,900 (54%) were ICT workers outside the ICT sector.
- 281,860 (12%) were non-ICT workers in the ICT sector.

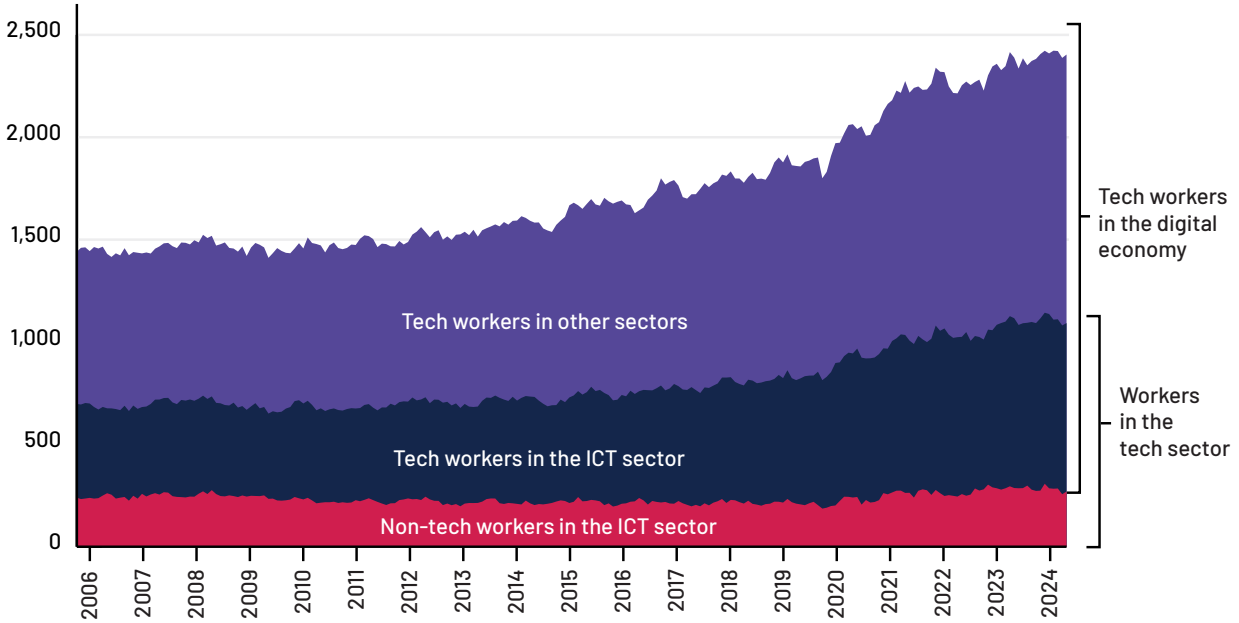


Figure 2: Canadian Digital Economy January 2006–December 2024: Components of Employment. Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey.

Between 2014 to 2024, the digital economy experienced strong (51%) employment growth (i.e., an increase in the number of employed individuals). This growth was even more evident in the latter half of the decade, with a 29% rise from 2019–2024. During the lockdowns and restrictions in 2020, which resulted in significant declines across the Canadian economy and labour market, employment in the digital economy saw a 5% increase.

In comparison, the general economy's employment growth was considerably more modest, expanding by 15% over the ten-year period and 7% in the last five years. In December 2024, digital economy employment grew by 5.0% year over year, 3.2% greater than the change seen in the general economy. Employment specific to the ICT sector experienced even higher growth: 5.5% year over year in December 2024, representing the highest growth across all industries of the economy (Figure 3).

Sector	**Employment** December 2024	**5-Year Trend** 2020-2024	**Annual Growth Rate** Year Over Year	**Unemployment Rate** December 2024
Digital economy	2,404,000		5.0%	4.4%
Total, All industries	20,671,900		1.8%	6.2%
Accommodation and Food Services	1,166,300		-0.3%	5.8%
Agriculture	220,000		-4.4%	7.9%
Business, Building, and Other Support Services	703,800		-0.2%	5.8%
Construction	1,571,800		2.3%	6.1%
Educational Services	1,657,100		3.4%	1.4%
Finance and Insurance	1,046,600		3.4%	1.5%
Forestry, Fishing, and Hunting	44,000		-5.3%	22.8%
Health Care and Social Assistance	2,850,700		2.6%	1.4%
Information and Communication Technologies (ICT) Sector	1,092,400		5.5%	5.8%
Information, Culture, and Recreation	813,300		1.7%	7.6%
Manufacturing	1,797,100		1.1%	3.8%
Mining, Quarrying, Oil and Gas	282,500		2.1%	3.5%
Other Services	776,100		0.1%	3.8%
Professional, Scientific and Technical Services	1,964,800		4.7%	3.5%
Public Administration	1,196,300		3.9%	1.7%
Real Estate and Leasing	396,500		2.3%	1.5%
Wholesale and Retail Trade	2,957,100		0.3%	3.7%
Transportation and Warehousing	1,073,900		0.9%	3.2%
Utilities	154,000		3.3%	1.4%

Figure 3: Employment in the Digital Economy and Other Industries, December 2024. Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey.

2020–2021: COVID-19, YEARS OF ROBUST GROWTH

In 2020, at the start of the COVID-19 pandemic, the digital economy demonstrated remarkable resilience. At 9.6%, the ICT sector recorded one of the highest employment growth rates for ICT professionals. This increase can largely be attributed to increased reliance on and investment in digital technologies to support remote work.

In 2021, a shift occurred in the employment of ICT professionals. For the first time, ICT workers in other sectors experienced higher growth compared to those within the ICT sector. This trend was driven by a surge in digitization across all industries of the economy. The employment of technology professionals in non-ICT sectors of the economy grew by 9.5%, while technology workers within the ICT sector saw slightly lower employment growth at 8.8% in 2021 (Figure 4). This suggests a broader adoption of technology across the economy, which increased demand for technology professionals beyond the ICT sector.

2022–2024: THE TECHNOLOGY LAYOFF WAVE

From 2022 to 2024, the Canadian ICT job market experienced greater volatility than in previous years, with layoffs, restructuring, and ongoing demand for specialized skills and experience.[6]

Throughout 2022, the demand for ICT workers in Canada's digital economy remained strong. The employment growth rates both for ICT workers in the ICT sector and those outside of it were nearly identical, at 6.1% and 5.9%, respectively. Although the ICT sector saw growth and optimism in early 2022, a wave of layoffs across North America created uncertainty in Canada's labour market.[7] Many technology companies had over-hired during the pandemic when demand for their products and services peaked.[8] Furthermore, economic uncertainty and rising interest rates contributed to a correction in the labour market.[9]

Large international companies (e.g., Amazon, Alphabet, IBM, Microsoft) and Canadian firms (e.g., Shopify, Skip, BlackBerry, Lightspeed Commerce, Hootsuite, BenchSci) carried out significant layoffs during the 2023–2024 period.[10] Employment data reflect this trend. Despite the layoffs, overall employment in ICT roles continued to grow in 2023, albeit at much lower rates. Specifically, in 2023, employment increased modestly both for ICT workers within the ICT sector and for those outside of it (by 1.6% and 1.8%, respectively, compared to 2022—see Figure 4).

6 Sarah White, "Layoffs, AI Demand Create Mismatched Talent Market for IT Skills" CIO, October 23, 2024, https://www.cio.com/article/3578757/layoffs-ai-demand-create-mismatched-talent-market-for-it-skills.html; Robert Half,"2025 CanadaJob Market: Tech Hiring Trends," Robert Half, February 7, 2025, https://www.roberthalf.com/ca/en/insights/research/data-reveals-which-technology-roles-are-in-highest-demand.

7 Nick Routley, "Visualizing Tech Company Layoffs in 2022," Visual Capitalist, December 8, 2022, https://www.visualcapitalist.com/visualizing-tech-company-layoffs-in-2022;"A Comprehensive List of 2024 and 2025 Tech Layoffs" TechCrunch, accessed January 30, 2025, https://techcrunch.com/2025/01/23/tech-layoffs-2024-list/.

8 Knowlton Thomas, "Shopify Loses Bet on Future of Commerce, Axes 10% of Staff," Fintech.ca, July 26, 2022, https://www.fintech.ca/2022/07/26/shopify-future-commerce-axes-staff/.

9 Rand Ghayad, "State of the Labor Market: September 2023," LinkedIn, November 2, 2023, https://economicgraph.linkedin.com/blog/september-2023-update-labor-markets-continue-to-lose-steam-but-no-signs-of-an-imminent-recession-yet.

10 The Canadian Press, "These Companies Have Laid off Canadian Workers in 2024," CityNews Everywhere, December 4, 2024, https://toronto.citynews.ca/2024/12/04/these-companies-have-laid-off-canadian-workers-in-2024-10/.

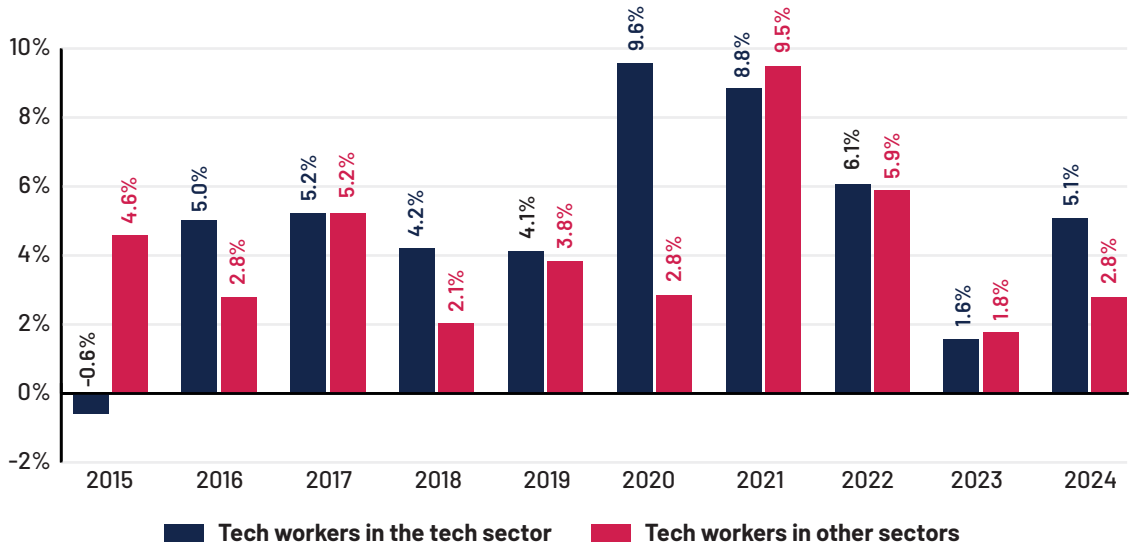


Figure 4: Annual Employment Growth Rate in the Digital Economy, 2015–2024. Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey.

Employment growth data indicate that layoffs have effectively returned technology talent growth rates to pre-pandemic levels (see Figure 4). In 2024, the employment growth rate for ICT workers in the ICT sector was 5.1%. Outside the ICT sector, it was 2.8%.

From 2022 to 2024, ICT workers outside the ICT sector experienced slightly higher employment growth rates than their ICT sector counterparts.

This indicates that layoffs in the ICT sector created opportunities for non-ICT businesses to acquire ICT talent. Those laid off from technology companies successfully found jobs in other sectors.[11] Unemployment data supports this trend: in 2023, the unemployment rate for technology workers outside the ICT sector was 2.6%, which is 1.3% lower than the rate for ICT workers within the sector (Figure 5).

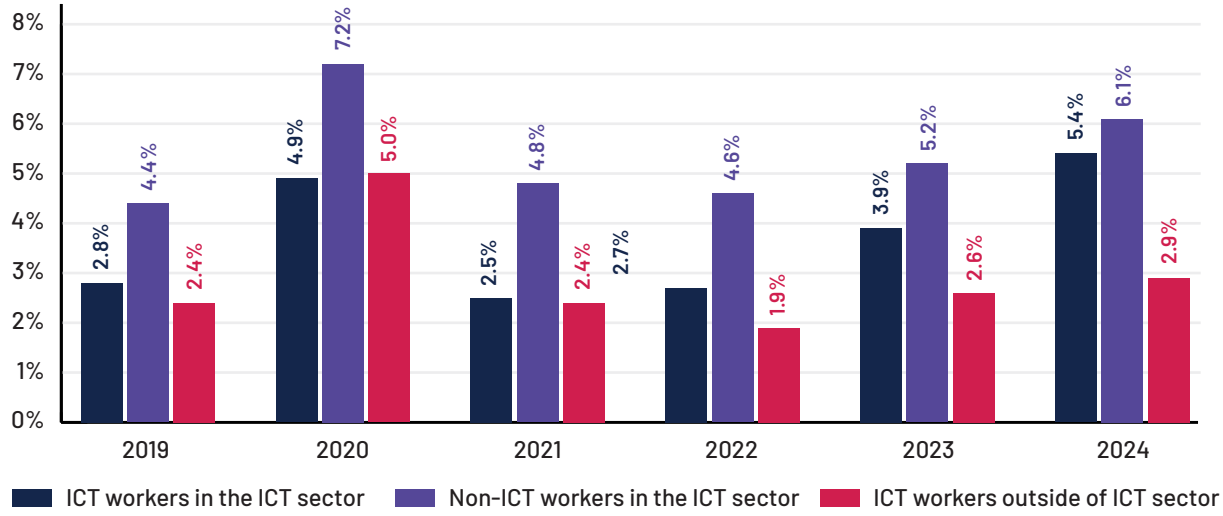


Figure 5: Annual Unemployment Rate in the Digital Economy, 2019–2024. Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey.

11 Peter Armstrong, "Tech Layoffs Mount — but Skilled Workers Are Still Hard to Find," CBC News, January 21, 2023, https://www.cbc.ca/news/business/tech-jobs-layoffs-google-amazon-microsoft-1.6721163.

EMPLOYMENT: A PROVINCIAL SNAPSHOT

The digital economy represents a significant portion of employment across Canadian provinces. Ontario is at the forefront, with 14% of Ontarians working in the digital economy (followed by British Columbia at 11.5% and Quebec at 11.2%). Additionally, British Columbia and Nova Scotia boast the fastest average annual employment growth rates in the digital economy, at 4.4% and 4.2%, respectively (followed by Ontario at 4.1% and Saskatchewan at 4%). In terms of digital economy representation within their overall provincial economies, Ontario ranks highest and is followed by British Columbia, Quebec, Nova Scotia, and Alberta. This ranking highlights the presence of technology hubs, technology companies, innovation centres, and digital infrastructure in these provinces.

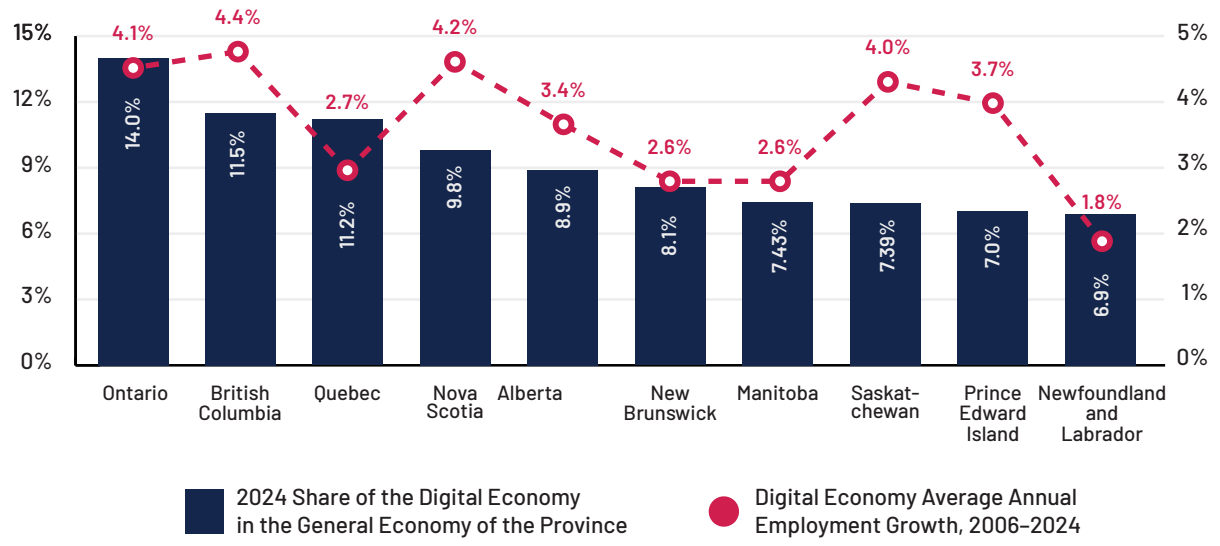


Figure 6: 2024 Digital Economy Employment, Provincial Breakdown. Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey. Note: Data is not available for the three Canadian territories (suppressed).

TALENT DEMAND

Demand for talent in the digital economy is growing, but Canadian employers are still making adjustments to their workforce.

In ICTC's 2024 Digital Economy Employer Survey, 41% of respondents reported an increase in the number of technology employees over the past year. Just under one in five (17%) saw a decrease in the number of technology employees, while 42% remained constant (Figure 7). Accordingly, while many enterprises are expanding their technology workforces, others are laying off staff—who are subsequently re-entering the workforce and competing with new entrants. Employment in the digital economy continues to grow in Canada, but as it matures, it is also becoming more competitive.

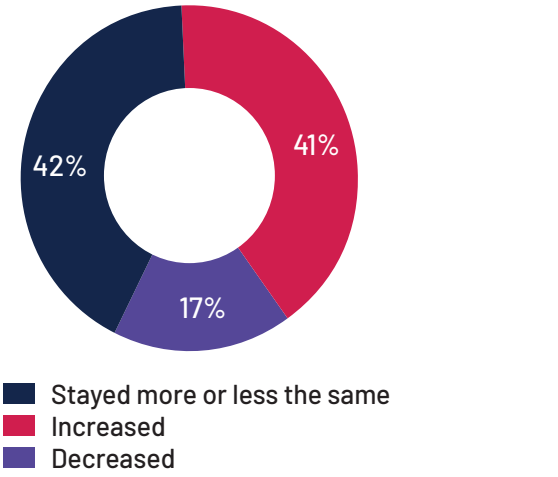


Figure 7: Change in Number of Tech Employees Vs. Previous Year. Source: ICTC's 2024 Digital Economy Employer Survey.

WHAT MAKES A JOB "IN-DEMAND?"

An "in-demand job" is one that employers post frequently or struggle to fill. Importantly, employers may post jobs in a manner that varies seasonally or aligns with different projects and trends in the digital economy. An "in-demand" occupation possesses some key characteristics: numerous employers have posted jobs with related titles; the number of job postings and/or individuals employed in the field is increasing or remaining steady; and, generally, the unemployment rate for this occupation is lower than the Canadian average.

ICTC examined the issue of in-demand occupations by analyzing labour market data and conducting interviews with major employers in the digital economy, leading to the identification of several in-demand occupations in Canada:

Software Engineers and Designers	This category includes roles such as back-end engineers, cloud engineers, DevOps engineers, and software architects. People in these positions often lead the design, assessment, or upkeep of software applications and systems for IT companies.

Software Development and Programming	This employment area may serve as an entry point into software engineering, but the scope of work between these role categories varies: while software developers tend to focus narrowly on a specific application, software engineers may lead a team, system, and/or strategy. Employers highlight their need for software engineering and development specialists—such as site reliability engineers and DevOps engineers—who are knowledgeable in technologies like Terraform. One large employer in the Canadian digital economy mentioned, "Software engineers in general… we have a constant recruiting push within that role." However, another major employer noted that a surge of investment in software development training during the pandemic "flooded the market" with developers, causing employers to seek candidates with more experience.
Business Systems Specialists	Employees in this category may also be called IT business analysts. They work with teams in both business and IT to improve efficiency and provide customised IT solutions. One major employer, a company with a large international hiring strategy, said that their organisation recruits business systems analysts alongside project managers, programme managers, and other strategic positions in Canada. Another interviewee mentioned that business systems specialists can be hard to find because they can take on multiple roles and have valuable skills in understanding business needs and translating them for technical teams.
Data Scientists	These individuals may use predictive modelling, machine learning, artificial intelligence (AI) techniques, and various other tools to gather and clean data and analyze data trends. Job titles in this field may include data architect, data scientist, and machine learning engineer. Large employers interviewed in this study noted the challenge of hiring experienced personnel in AI engineering, given that some in-demand skills in this area are new. Consequently, "niche or new roles do get harder to recruit for versus just general software development." Another interviewee remarked, "Data science has always been important for us, but has become even more important as we look into AI research and accelerating that."
Information Systems Specialists	This category includes roles such as quality assurance analyst, technical project manager, and others associated with IT planning, consulting, and monitoring. Similar to business systems analysts, employers interviewed in this study expressed appreciation for these professionals due to their multi-domain skills that bridge business and product knowledge. One subject matter expert noted that some of these roles were becoming increasingly specialized: "QA professionals need to do automation now, so it's becoming more technical in that role."

Cyber Security Specialists	This group may include security operations centre analysts, pentesters, and other roles focused on protecting organizations from cyber security threats. One employer interviewed for this study, from a large organization that hires for many technology roles, noted, "We're fully expecting that that's going to be a tough recruit because that's such a specialized skill set." Similarly, a major IT employer remarked that, in the field of cyber security, the quality of applicants varies significantly: "It's only one in 100 security people who can actually get their hands dirty, write some code, and do some penetration tests… Those are the rare ones."

Employers interviewed for this project also described hiring for other ICT-intensive roles, such as user-interface/user-experience professionals, experienced web developers, and creative technologists.

Figure 8 illustrates 10 of the most sought-after core ICT occupations in Canada. Each position experiences a high volume of job postings and lower unemployment rates compared to the Canadian average. Many of these occupations have experienced year-over-year growth, including between November 2023 and November 2024.

However, other measures indicate a cooling in demand (Figure 8): fewer job postings compared to the previous year and, in some cases, fewer people employed in 2024 than in 2023.

In 2021 Canada saw immense investment in the ICT sector, resulting in a race for senior talent due to increased demand for products and services. By mid-2022, with demand cooling, limited venture capital funding, and rising interest rates coming into effect across a leveraged technology ecosystem, there was a notable rise in layoffs—a trend that was observed globally in the sector.

Employers interviewed for this research expressed that they, along with organizations like them, had successfully brought on mid-career and experienced staff from multinational enterprises due to these layoffs. Furthermore, some data suggests that about 13 of 100 laid-off technology personnel in North America have started their own companies.[12] These workers may have undergone job title changes, which means their experiences could not be captured in data like that collected in Figure 8. The long-term impact of this trend remains unclear.

12 Jared Lindzon, "Where Canadian Tech Workers Are Landing after Being Let Go The Globe and Mail, August , 2023, https://www.theglobeandmail.com/business/careers/article-where-canadian-tech-workers-are-landing-after-being-let-go/.

Occupation (NOC Code)	**Count Within ICT Sector** (Nov. 2023-2024)	**Job Post Count Across All Sectors** (Nov. 2023-2024)	**Employment All Sectors** (Nov 2024)	**Job Post Growth All Sectors** (Nov. 2023-2024)	**Employment Growth All Sectors** (Nov. 2023-2024)	**Unemployment Rate All Sectors** (2024 Average)	**Modal Years of Experience Within ICT Sector**	**Modal Years of Experience Across All Sectors**
Software engineers and designers (21231)	2,186	4,316	143,600	6.1%	24.5%	3.1%	5–6	5–6
Software developers and programmers (21232)	940	6,204	220,400	-10.0%	25.6%	4.0%	5–6	5–6
Business systems specialists (21221)	1,373	9,969	34,200	-8.4%	-2.2%	3.7%	5–6	3–4
Information systems specialists (21222)	720	4,840	215,700	-15.8%	-3.2%	2.9%	5–6	3–4
Database analysts and data administrators (21223)	625	5,041	44,300	-15.6%	-6.9%	3.5%	5–6	2–3
Data scientists (21211)	380	2,180	41,400	2.8%	17.6%	1.6%	5–6	5–6
Computer and information systems managers (20012)	371	3,797	161,000	-6.8%	19.2%	3.8%	5–6	5–6
Computer network and web technicians (22220)	315	3,174	36,300	-26.8%	0.8%	2.0%	5–6	1–2
Cyber security specialists (21220)	229	1,302	27,600	-23.3%	4.8%	3.5%	5–6	5–6
User support technicians (22221)	191	3,910	123,400	-6.5%	6.0%	4.8%	2–3	1–2

Figure 8: Top 10 In-Demand Core ICT Occupations. Source for Job Post Count, Modal Years of Experience, Job Post Growth: Vicinity Jobs. Source for Employment, Employment Growth, Unemployment Rate: Statistics Canada Labour Force Survey. "Modal" refers to the most common number of years of experience being asked for.

In Figure 8, the Modal Years of Experience column shows the most common number of years of experience requested in job postings for each role. From the data, the demand for ICT workers is shifting towards a preference for experienced personnel. Employers are listing many jobs for ICT professionals with five to six years of experience, while junior positions are becoming less common. In discussions with major employers in the digital economy, several confirmed this trend, noting that although they continued to actively seek a range of skilled ICT professionals, their demand increasingly favoured seasoned and specialized workers:

> "Senior software developers who specialize in areas like cloud computing, platform engineering, DevOps and site reliability engineering are much more in-demand than those with more traditional software development skills. We are seeing frontend [work becoming] less important than back-end [work]: everything close to and around the data is important, [and] every company needs a data strategy and needs to be using data."

> "The biggest unmet need seems to be in mid-career. If you want to get a cyber security analyst or an AI person with three to five years of experience, that is the bigger challenge."

Interviewees in the ICT sector indicated that the demand for mid-career talent continues to grow, while entry-level workers face competition from mid-career professionals in the job market, even for positions with modest experience requirements. For certain occupations, job postings outside the ICT sector may offer better opportunities for early-career workers. Positions for computer network and web technicians, business systems specialists, information systems specialists, database analysts and data administrators, and user support technicians generally require fewer years of experience in non-ICT industries.

TOP TECHNICAL SKILLS IN THE DIGITAL ECONOMY

Technology jobs are often highly specialized and the required skills quickly evolve as new tools are released and advancements occur. ICTC used job posting analysis, and interviews with employers in the digital economy, to identify the skills emerging across a diverse range of job titles and how they relate to enduring competencies. Interviewees identified the following cross-cutting skills as essential to technology roles:

Ability to Build Useful Tools	Employers indicated that they seek evidence of candidates' capacity to "hit the ground running" and use multiple programming languages to build practical solutions. They also look for a passion for software engineering and development by reviewing contributions to open-source projects. Many open-source tools "are used by huge technology companies, even if it's just some person who built the tool," one employer in software explained. This interviewee also added, "and that's really compelling to us: you decided to do this on your own time, and maybe now you're getting sponsorships through GitHub. That's obviously someone we are keen to hire."
Ability to Design Systems that Automate Routine Tasks	Employers expressed a desire for staff who could assist in implementing AI in their daily operations and enhance team productivity. Some mentioned consulting experts for related services because "it's a little chicken and egg [situation]: do we invest in a whole role for this if we don't know it's going to pay off?"
Ability to Manipulate and Understand Data	Employers have reported facing significant competition for data scientists. One mentioned that they had "hired more junior than we would have liked to across data roles" in the past two years. Another employer noted that anyone in a data science role must possess "a foundational understanding of machine learning and neural networks."
Ability to Work in Multiple Cloud Environments	Interviewees indicated that they seek cloud-computing specialists capable of operating in multiple cloud environments. One leading technology employer stated they look for individuals who are "using open tools like Terraform, Helm... someone who is flexible in their skills, is portable, and has the background to be able to adapt to whatever platform they happen to end up being on." Another employer noted that they aim to "find the people that have actually implemented cloud skills in real-life situations."

Ability to Work on Both Product and Business Teams

Interviewees emphasized the need for individuals who possess both complementary product experience and business management skills: "Critical thinking, being able to put opportunity analysis together, and deep product experience and project management."

Employers also express their skill preferences through job postings. Below are the top 15 technical skills, tools, and technologies listed in job postings for technology roles from December 2023 to December 2024. Given the comments of interviewees, it is not surprising that platforms and tools for data analysis, visualization, and automation rank highly on this list.

Top 15 Technical Skills, Tools, and Technologies Across ICT Job Posts in All Sectors

1. Microsoft Office Suite
2. Structured Query Language (SQL) tools
3. Cloud computing
4. Python
5. Microsoft Azure
6. AI
7. Java
8. Amazon Web Services
9. JavaScript
10. Linux
11. Client relationship management (CRM) software
12. PowerBI
13. Adobe Systems
14. Atlassian JIRA
15. Git

Source: Vicinity Jobs. Skills reflect one year of data as of December 17, 2024.

TOP HUMAN SKILLS IN THE DIGITAL ECONOMY

Human skills, sometimes called "soft" or "transferable" skills, are crucial to leveraging technical skills effectively in the workplace. They benefit teamwork and support priority management. Employers list in-demand human skills in job posts, and interviewees for this project described what they looked for in applicants. The following list outlines the top results from this research:

Growth Mindset	One prominent digital economy employer remarked that, "the biggest thing we look at is evidence of a growth mindset versus a fixed mindset—so, not someone who says, 'I don't know how to do this thing, I can't do it,' but 'I don't know how to do this thing yet, let me figure it out.'" Another major employer characterized this quality as "independent, creative thinking," which encourages staff to adopt tools and technologies. "Ten years of generative AI experience just doesn't exist," they continued. "You can't have that. So, curiosity is really the thing: the ability to learn and understand tech and work with other people."
Interest in Leadership and People Management	As one major digital economy employer noted, there are common challenges with succession planning: "There is less interest in people management in the younger generation coming up behind us."
Collaborative Problem Solving	One large ICT company representative commented that they needed their developers to be able to "present an idea, discuss how a problem should be solved, and deal with businesspeople—understand their incentives." Employers value workers who can gather relevant stakeholders, manage group dynamics, and harness the combined talents of a group of people to undertake a larger project.
Emotional Self-Awareness and Social Perceptiveness	An interviewee who works in software development remarked that, in their opinion, a deficiency in emotional self-awareness was "the single biggest barrier to human productivity, because it gets in the way of people collaborating." They sought open-mindedness and a lack of defensiveness when hiring new employees and selecting candidates for promotion.
Storytelling and Clear Communication	Interviewees appreciated staff who could present their ideas as solutions to business problems, both internally and to clients, through engaging business storytelling. Clear verbal and written communication were regarded as highly significant, even for the most technical roles.

Top 15 Human Skills Across ICT Occupations in All Sectors (December 2023 to December 2024)

1. Teamwork
2. Communication
3. Attention to detail
4. Organizational skills
5. Writing
6. Interpersonal skills
7. Flexibility
8. Leadership
9. Problem solving
10. Planning
11. Customer service
12. Project management
13. Decision making
14. Self-starter/self-motivated
15. Analytical skills

Source: Vicinity Jobs. Skills reflect one year of data as of December 17, 2024.

HIRING AND RETENTION IN THE DIGITAL ECONOMY

As the demand for technology workers shifts toward job openings that require several years of experience, employers are adjusting their recruitment and retention practices.

Hiring and Recruitment

Employers interviewed in this study described taking their time to hire for in-demand roles and designing challenging technical interviews. For example, an interviewee responsible for hiring software engineers described pair programming interviews wherein a candidate would share their screen, read through a problem for the first time, and solve it live.

In ICTC's Digital Economy Employer Survey, finding staff with the necessary skills or experience was the primary recruitment challenge faced by respondents (23.9%—see Figure 9).

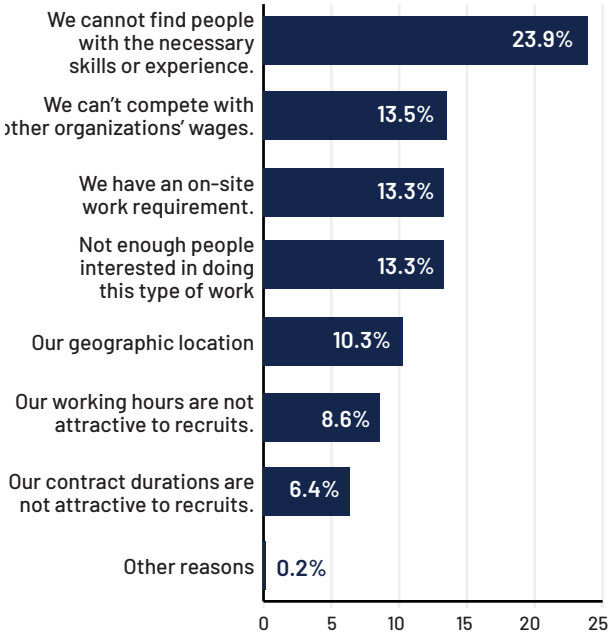


Figure 9: Challenges in Recruiting Technology Employees Over the Last 12 Months. Source: ICTC's 2024 Digital Economy Employer Survey.

As Figure 9 illustrates, wage competition also poses a challenge for some digital economy employers in Canada, with 13.5% of survey respondents acknowledging this issue.[13] However, in interviews, employers noted that wage competition is not as pronounced as it was during the pandemic. One interviewee from the health technology sector observed that, during the pandemic, employers were offering high salaries and bonuses as hiring incentives. But they added, "I have noticed it seems easier for us to hire people since digital e-commerce crashed a little bit post-pandemic."

When hiring, it can be strategic for some companies to develop talent pipelines that help promising new graduates to acquire in-demand skills and gain experience. Many interviewees had strategies in place for hiring recent graduates and early-career workers. Several had internship or co-op programs designed to foster a talent pipeline, through which new recruits received training.

However, many interviewees also described that there is now "a higher bar for younger candidates" than what existed during the pandemic. Some employers sought recruits who could demonstrate that they had acquired relevant experience outside of school through "self-led projects—so not a capstone project—in addition to work experience." Others mentioned looking for "extracurricular activities related to the discipline in addition to the course load." One large employer put it succinctly: "When it comes to junior talent, their GitHub is their best resume, right? The top talent is already hacking, they're already developing. They're involved in open-source projects."

Overall, employers also expressed a desire for early-career recruits to gain exposure to workplaces and develop essential soft skills: "Building people up has been challenging… We've hired a subset of people in data roles who were just coming out of school in the pandemic and they never got to experience a workplace environment."

Another common problem is finding mid- to senior-career talent. Notably, many newcomers to Canada with ICT training are underemployed, despite the fact that hiring internationally educated professionals is one way employers can access the mid- to senior-career talent they need. One major employer reported seeking assistance from an immigrant services association to conduct webinars for their team on unconscious biases in hiring and performance evaluations. The goal was to better position the organization to secure internationally educated professionals. Several interviewees reported making significant efforts to hire newcomers, but noted they especially valued bridging programs that educated newcomers about Canadian workplace contexts, as well as English communication and the professional relationship-building norms found here. Furthermore, some interviewees employed career transitioners, although most preferred to hire candidates with a foundational level of relevant experience or education versus investing in upskilling for an external recruit from a different industry.

13 See Appendix A for wage growth tables covering digital economy roles.

Retention and Investment in Existing Staff

Compared to the general economy, surveyed digital economy employers are less concerned about business obstacles related to inflation, insurance, real estate, and rising input costs; however, they are more likely to be concerned about the challenge of retaining skilled employees.

Experienced staff are in demand, and certain roles (particularly those for data scientists and senior software professionals) face competition from other employers seeking skilled workers. Furthermore, with the rise of remote work, international companies can now compete with Canadian employers for these personnel.

ICTC inquired about strategies employers use to retain their top talent. Most employers believed they were providing competitive salaries in the Canadian context, along with benefits such as Registered Retirement Savings Plan matching. Interviewees mentioned offering remote and flexible work arrangements, career advancement opportunities, and options for lateral career moves. Additionally, employers noted offering mentorship, skills development, and the opportunity to do engaging, meaningful work.

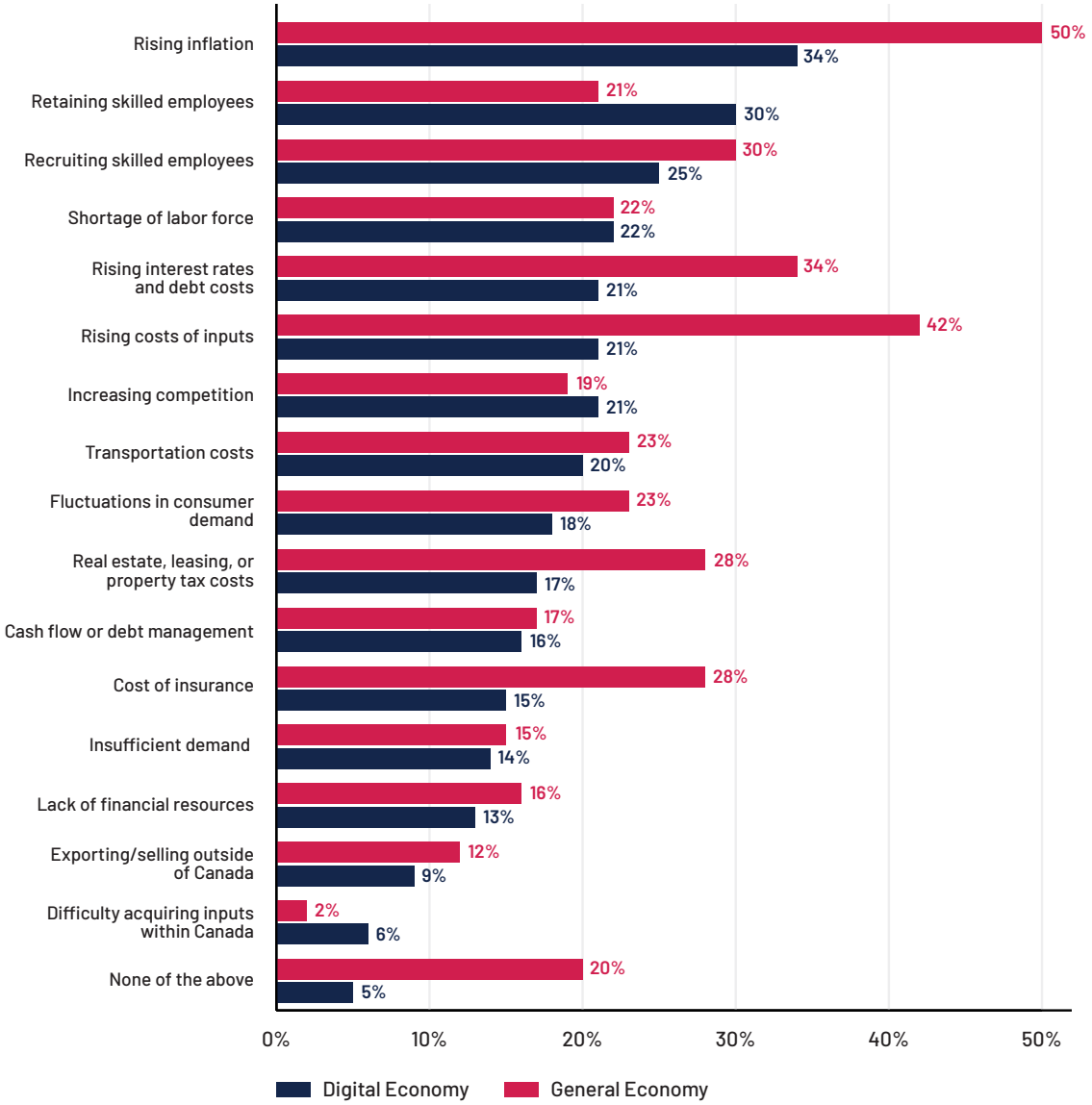


Figure 10: Expected Business Obstacles Over Next Three Months. Source: ICTC's 2024 Digital Economy Employer Survey and Statistics Canada's Survey on Business Conditions, 2024.

CONCLUSION

In 2021 ICTC projected that, in an optimistic scenario, 2.3 million workers would be employed in Canada's digital economy by 2025. That estimate has since been slightly exceeded: as of December 2024, there were 2.4 million Canadians employed in the digital economy.

This briefing offers an update on Canada's digital economy as of 2025. The digital economy has continued to experience growth, but the rate has returned to pre-pandemic levels. However, businesses in the digital economy experienced better outcomes in terms of growth and productivity than those in the general economy. In addition, changes in the broader economy have affected where ICT workers are finding employment. Trends like digitalization, widespread technology adoption to support remote work, and layoffs within the technology sector have increased the number of ICT workers employed outside the ICT sector.

This briefing also offers insights into in-demand occupations in the digital economy as well as the hard and soft skills desired by industry. Canada's digital economy has demonstrated economic resilience in the face of global challenges. However, significant hurdles remain to ensure long-term growth and global competitiveness. Employers report challenges finding talent with the right skills and experience, and the sector is struggling to make use of knowledge brought to Canada by newcomers with internationally acquired credentials. Canada must address these issues and bridge the gaps to ensure a stable and sustainable ICT workforce for the future.

APPENDIX A: ADDITIONAL TABLES AND FIGURES

NATIONAL OCCUPATIONAL CLASSIFICATION (NOC) CODES FOR THE DIGITAL ECONOMY

00014	Senior managers (trade, broadcasting and other services)
10022	Advertising, marketing and public relations managers
10030	Telecommunication carriers managers
11202	Professional occupations in advertising, marketing and public relations
12111	Health information management occupations
12112	Records management technicians
20010	Engineering managers
20012	Computer and information systems managers
21210	Mathematicians, statisticians and actuaries
21211	Data scientists
21220	Cybersecurity specialists
21221	Business systems specialists
21222	Information systems specialists
21223	Database analysts and data administrators
21230	Computer systems developers and programmers
21231	Software engineers and designers
21232	Software developers and programmers
21233	Web designers
21234	Web developers and programmers
21310	Electrical and electronics engineers
21311	Computer engineers (except software engineers and designers)
21399	Other professional engineers
22220	Computer network and web technicians
22221	User support technicians
22222	Information systems testing technicians
22302	Industrial engineering and manufacturing technologists and technicians
22310	Electrical and electronics engineering technologists and technicians
22311	Electronic service technicians (household and business equipment)
52110	Film and video camera operators
52111	Graphic arts technicians
52112	Broadcast technicians
52113	Audio and video recording technicians
52120	Graphic designers and illustrators
53111	Motion pictures, broadcasting, photography and performing arts assistants and operators
62100	Technical sales specialists (wholesale trade)
72011	Contractors and supervisors, electrical trades and telecommunications occupations
72201	Industrial electricians
72202	Power system electricians
72203	Electrical power line and cable workers
72204	Telecommunications line and cable installers and repairers
72205	Telecommunications equipment installation and cable television service technicians
92021	Supervisors, electronics and electrical products manufacturing
94201	Electronics assemblers, fabricators, inspectors and testers

CODES FOR THE DIGITAL ECONOMY IN THE NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS)

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

3359 Other electrical equipment and component manufacturing

4173 Computer and communications equipment and supplies merchant wholesalers

5121 Motion picture and video industries

5132 Software publishers

5162 Media streaming distribution services and other media networks and content providers

5173 Wired and wireless telecommunications carriers (except satellite)

5174 Satellite telecommunications

5179 Other telecommunications

5182 Data processing, hosting, and related services

5192 Web search portals, libraries and archives, and all other information services

5415 Computer systems design and related services

5417 Research and development in the physical, engineering and life sciences

8112 Electronic and precision equipment repair and maintenance

EMPLOYMENT GROWTH AND MEDIAN WAGE BY NOC

Digital Economy National Occupational Classification (NOC) codes	Employment (2024)	Employment Growth (CAGR, 2020–2024)	Median Annual Wage (2024)	Wage Growth (CAGR, 2020–2024)
11202 Professional occupations in advertising, marketing and public relations	251,900	8.8%	$70,113	3.6%
21222 Information systems specialists	220,900	-0.9%	$ 91,977	2.3%
21232 Software developers and programmers	195,000	7.8%	$ 96,751	3.3%
20012 Computer and information systems managers	146,000	12.4%	$ 134,548	3.2%
21231 Software engineers and designers	139,400	14.5%	$ 116,215	2.8%
62100 Technical sales specialists (wholesale trade)	132,800	0.3%	$ 76,159	2.6%
22221 User support technicians	126,500	4.4%	$ 63,788	2.7%
52120 Graphic designers and illustrators	84,300	3.0%	$ 64,716	3.0%
10022 Advertising, marketing and public relations managers	56,500	7.8%	$ 109,583	3.6%
21223 Database analysts and data administrators	48,500	-1.3%	$ 78,753	0.7%
21399 Other professional engineers	43,000	9.3%	$ 103,671	2.7%
21211 Data scientists	42,000	61.0%	$ 95,948	3.9%
22311 Electronic service technicians	41,300	-2.3%	$ 55,356	1.4%
22220 Computer network and web technicians	40,900	-7.2%	$ 71,815	1.9%
21310 Electrical and electronics engineers	40,100	1.7%	$ 104,158	2.1%

Digital Economy National Occupational Classification (NOC) codes	Employment (2024)	Employment Growth (CAGR, 2020–2024)	Median Annual Wage (2024)	Wage Growth (CAGR, 2020–2024)
20010 Engineering managers	39,500	11.1%	$ 146,500	3.9%
72201 Industrial electricians	38,100	3.8%	$ 89,132	2.4%
22310 Electrical and electronics engineering technologists and technicians	35,300	0.7%	$ 72,600	0.8%
21221 Business systems specialists	34,400	0.6%	$ 90,710	2.8%
21311 Computer engineers (except software engineers and designers)	33,900	12.8%	$ 107,445	1.7%
72011 Contractors and supervisors, electrical trades and telecommunications occupations	32,900	–0.2%	$ 95,991	2.2%
21220 Cybersecurity specialists	32,300	12.6%	$ 102,335	3.9%
21230 Computer systems developers and programmers	25,900	–17.4%	$ 86,693	3.5%
22302 Industrial engineering and manufacturing technologists and technicians	23,600	0.7%	$ 64,081	1.7%
22222 Information systems testing technicians	23,600	10.1%	$ 71,446	4.1%
21234 Web developers and programmers	22,600	–1.2%	$ 79,717	4.0%
94201 Electronics assemblers, fabricators, inspectors and testers	18,500	4.0%	$ 43,567	3.5%
72205 Telecommunications equipment installation and cable television service technicians	17,700	–9.0%	$ 65,409	2.1%
52113 Audio and video recording technicians	16,500	13.4%	$ 65,003	5.3%
21210 Mathematicians, statisticians and actuaries	14,900	0.2%	$ 106,407	5.3%
72203 Electrical power line and cable workers	13,900	–0.6%	$ 92,910	1.0%
12112 Records management technicians	11,000	5.7%	$ 61,978	3.6%
10030 Telecommunication carriers managers	10,500	0.1%	$ 101,218	2.1%
21233 Web designers	9,800	–5.0%	$ 71,730	3.8%
72204 Telecommunications line and cable installers and repairers	8,600	1.0%	$ 74,039	5.3%
52111 Graphic arts technicians	7,700	–0.5%	$ 52,057	–2.9%
12111 Health information management occupations	7,100	15.3%	$ 61,351	1.8%
53111 Motion pictures, broadcasting, photography and performing arts assistants and operators	5,700	1.4%	$ 68,110	5.5%
52110 Film and video camera operators	5,500	6.1%	$ 30,366	–7.7%
92021 Supervisors, electronics and electrical products manufacturing	4,100	–5.6%	$ 69,287	4.2%
72202 Power system electricians	4,000	–14.4%	$ 104,319	2.5%
52112 Broadcast technicians	2,100	–5.3%	$ 68,967	6.7%

Figure 11: Employment, Employment Growth, Median Annual Wage, and Wage Growth (by NOC) in the Digital Economy (2020–2024). Source: ICTC calculations using Statistics Canada Monthly Labour Force Survey (monthly data annualized).

APPENDIX B: RESEARCH METHODS AND TOOLS

ICTC employs a mixed-methods approach to collect and analyze both primary and secondary research. Its key research tools are listed below.

Literature Review and Secondary Data

The secondary research component of this study focused on analyzing existing data and literature. This included qualitative reviews of the sectors under consideration as well as reviews of key events occurring in the global and Canadian economies from 2022 onward. This research also relied heavily on secondary data obtained from other organizations, including Statistics Canada, the Bank of Canada, and the Organisation for Economic Co-operation and Development (OECD).

Digital Economy Employer Survey

In summer 2024, ICTC conducted a survey via the market research vendor Leger. The survey targeted technology companies and businesses that employ technology talent, aiming to gain insight into their current business conditions, expectations, labour challenges, and the skills and competencies they seek in new hires. Through this research, ICTC also sought information about the strategies respondents implemented to address labour gaps. The survey was designed based on Statistics Canada's Canadian Survey on Business Conditions, enabling a meaningful comparison of metrics between the general economy and digital economy when the Statistics Canada dataset was used as a control group and responses from the digital economy survey as a treatment group.

Representatives from 406 companies completed the survey. All respondents were senior executives with significant influence on key decisions related to hiring and business strategy. These included founders, executives, and managers with oversight of operations, finance, or HR. The survey was targeted at digital businesses across Canada, which were screened for eligibility based on whether they employ technology professionals or produce, design, manufacture, or sell technology.

Limitations: Overall, the quality of survey responses was very high, with most respondents completing all questions. However, low response rates in certain regions and sectors remain a limitation. While the survey received 406 responses, there were no participants from Nunavut or the Yukon. Additionally, several questions included in the survey pertained to workforce challenges and skills, but are absent from the Statistics Canada business conditions survey. This intentional misalignment in question sets was carried out because ICTC has a primary interest in workforce development issues and seeks tailored insights from technology companies and organizations that hire technology talent. However, this approach also has the drawback of limiting comparability with the results from Statistics Canada's business conditions survey.

Key Informant Interviews

From July 2024 to October 2024, ICTC conducted 26 semi-structured key informant interviews with a mix of subject matter experts and large employers from industries across Canada. A diverse group of participants and organizations were chosen to ensure a wide range of perspectives and input for the report. The interviewed organizations varied in size, location, business maturity level, revenue, and employment needs. ICTC aimed to identify trends in the digital economy while seeking context for developments in digital adoption, investment, hiring and workforce needs, talent availability, in-demand roles and skills, as well as challenges, opportunities, and weaknesses.

Limitations: ICTC aimed to engage a sample of participants who could address hiring and adoption trends across the economy. However, due to the vast number of sectors undergoing digitalization, representation from industries outside of technology was limited.

Job Posting Data

ICTC uses Vicinity Jobs services to analyze job postings in the digital economy and ICT sector, employing NOC and North American Industry Classification System (NAICS) codes. Vicinity Jobs provides real-time labour market information by leveraging advanced text-scraping and machine learning technologies to extract and organize data from publicly available online job postings. This method provides insights into in-demand jobs and skills, locations, and education and experience requirements as outlined by employers.

Advisory Committee

A project advisory committee was established to guide this study and assess and validate the results. The advisory committee consisted of 12 members from industry, industry associations, government, and academia, all with connections to the digital economy and/or innovation areas covered in this study. The committee convened three times throughout the duration of this study. The committee was consulted during the production of this report to discuss the digital economy labour market, its talent needs, and the level of adoption of emerging technologies in the Canadian digital economy.

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