RESEARCH

DIGITAL ECONOMY ANNUAL REVIEW 2019

The Information and Communications Technology Council

RESEARCH BY:

THE INFORMATION AND COMMUNICATIONS TECHNOLOGY COUNCIL (ICTC)

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PREFACE

This study was funded by the Government of Canada's Sectoral Initiatives Program. The authors made all reasonable efforts to ensure accuracy in compiling this document. The opinions and interpretations in this publication are those of the authors and do not necessarily reflect those of the Government of Canada.

ICTC's labour market research captures critical labour market and other economic indicators to inform competitive businesses as well as human resource strategy planning, decision-making, and career development in ICT, which together drive the development of a more prosperous Canadian ICT workforce and industry in a global digital economy.

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EXECUTIVE SUMMARY

The Information and Communications Technology Council (ICTC) is pleased to present the *Digital Economy Annual Review 2019*, exploring broad trends over the past year in Canada's digital economy with respect to economic impact, labour market, technology adoption, and more.

The report utilizes historical data starting from 2009 through to 2019.

ICT's contribution to GDP continues to rise

From 2013 onward, the ICT sector has consistently outperformed the overall economy. Real gross domestic product (GDP) produced by Canada's ICT sector between 2018 and 2019 increased by nearly $4.5 billion, reaching $94.2 billion.

Canada's ICT sector is a diverse, innovative and growing segment of the overall economy. Over the last five years, annual growth in Canada's ICT sector averaged 4.3%, with the latest innovative technologies such as Artificial Intelligence (AI), Big Data, 5G, and Blockchain fueling the growth in the sector as well as the overall economy.

Strong showing in the labour market

In 2019 1,664,700 people were employed in the Canadian digital economy, with a total of 1,466,500 ICT professionals employed across all industries in Canada. As of 2019, 66% of ICT workers were found to be working in non-ICT sectors of the economy, while 34% of ICT professionals were employed specifically in Canada's ICT sector.

Improved workforce diversity critical to Canada's future

Over the past 10 years, four significant trends can be observed in the composition of Canada's ICT workforce:

- Growth in the multi-generational workforce – 13% of today's ICT professionals are aged of 55-64, compared to 9% in 2009. By comparison, youth aged 15-24 comprised only 8.1% of all ICT employees.
- Multicultural - 37% of today's ICT workforce was born outside of Canada, compared to 26% in 2009.
- Male-dominated – The ratio of male to female ICT workers has varied only negligibly over the last ten years. Women make up around 25% of the ICT professionals working across all sectors of the Canadian economy.

Canada's digital economy has a lot to look forward to – in the long term

Greater technology adoption holds tremendous promise for the entire Canadian economy. While the ICT industry is a key pillar of Canada's economy and has seen substantial growth, its growth is only a small part of the economic impact of technology in Canada; roughly two thirds of Canada's ICT employees work outside the ICT sector. Technologies such as AI are being rapidly adopted to deliver value in sectors as diverse as Agriculture, Manufacturing, Retail, Resource Extraction, and Health.

Whether Canada can continue exploiting its digital potential will depend on whether Canadians are equipped with the skills to innovate new technologies and adopt existing ones to create value. Ensuring Canadian workers have the talent to create and use technologies is more critical than ever before. Partnership and communication between industry, government, and the education sector can be leveraged to ensure a smooth pipeline of talent that creates start-ups and satisfied the needs of established employers.

Interested readers are encouraged to review ICTC's recent research exploring the long-term labour market outlook, talent solutions, and the adoption of digital technology by Canadian enterprises of all sizes. These studies provide insight at the municipal, provincial

and federal level. This insight is designed to assist employers, policymakers and educators to optimize their contributions to the digital economy through appropriate policies and training programs.

Recent ICTC insights, studies, and solutions addressing these issues include:

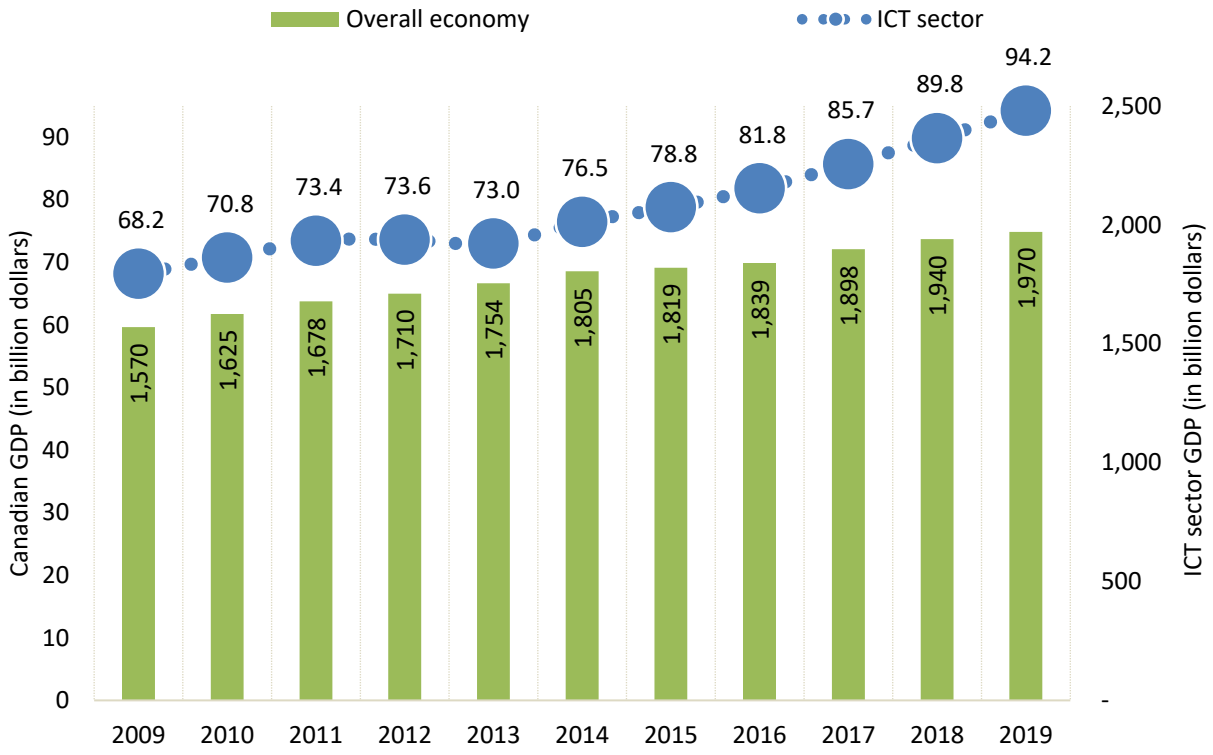
- On The Edge of Tomorrow: Canada's AI-Augmented Workforce
- Building Canadian Consensus: Our Maturing Blockchain Ecosystem
- Canada's Growth Currency: Digital Talent Outlook 2023
- Smart City Priority Areas and Labour Market Readiness for Canadians
- A Digital Future for Alberta
- Developing Cyber Talent for Canadian Critical Infrastructure – Road Transportation
- 5G Jumpstarting our Digital Future
- Enabling Change: Removing Barriers and Supporting Meaningful Employment of Ontarians with Disabilities in Information and Communications Technology (ICT)
- ICTC's Perspectives on a Data Economy Strategy: Empowering Canada's 4th Industrial Revolution

ECONOMIC GROWTH

CONTRIBUTION TO GDP

In 2019, the ICT sector continued to make a substantial contribution towards Canadian GDP, and over the last 5 years, the ICT sector's growth has outpaced the total growth of the Canadian economy. The ICT sector reached $94.2 billion[1] in 2019, accounting for 4.8% of Canada's total output of over $1,970 billion as of 2019. The ICT sector grew by nearly $4.5 billion (or by 4.9%). The ICT sector's growth rate was more than triple the rate across the total Canadian economy (1.6%).

Canadian and ICT sector GDP (in billion dollars)



Source: ICTC; Statistics Canada

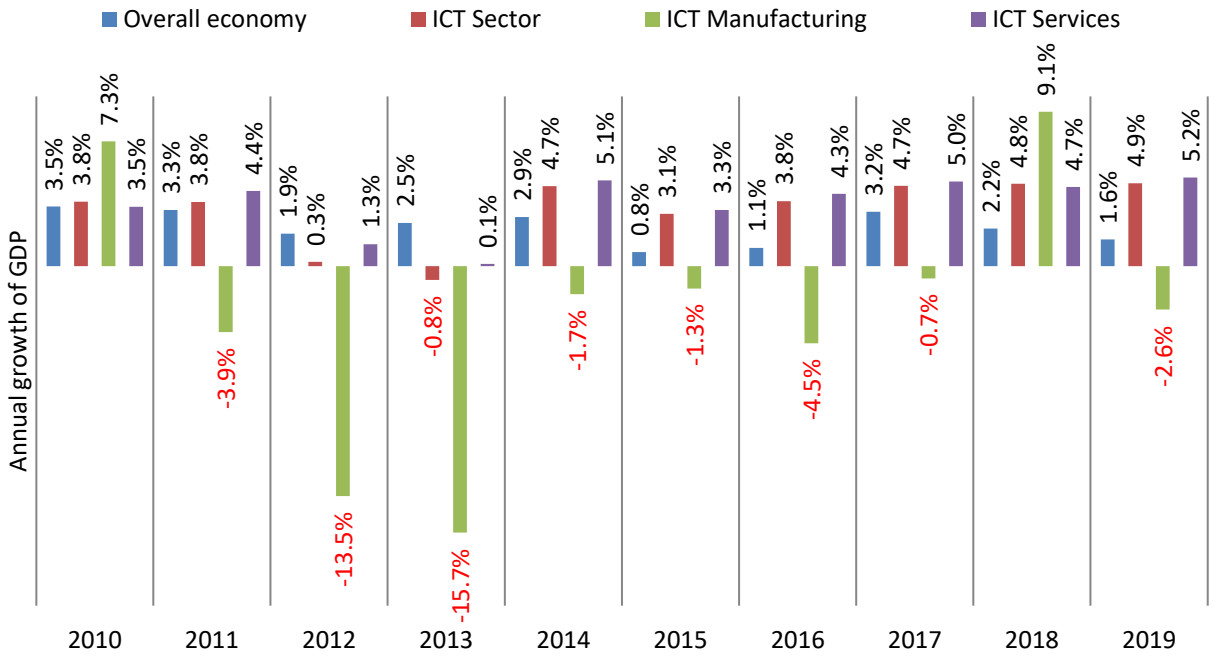
Although the ICT sector as a whole experienced strong growth, the two central ICT sub-sectors (manufacturing and services) experienced different growth trajectories. The ICT services[2] sub-sector –which represents 96% of the total Canadian ICT sector– grew by 5.2% or $4.5 billion. The ICT manufacturing[3] sub-sector – representing the other 4% – shrunk by 2.6%, or $100 million.

[1] In 2012 chained dollars. Chained dollars are real dollar amounts adjusted for inflation.

[2] This combines the North American Industry Classification System (NAICS) codes 4173, 5112, 517, 518, 5415, 8112. See Appendices

[3] This combines the North American Industry Classification System (NAICS) codes 3341, 3342, 3343, 3344, 3346. See Appendices

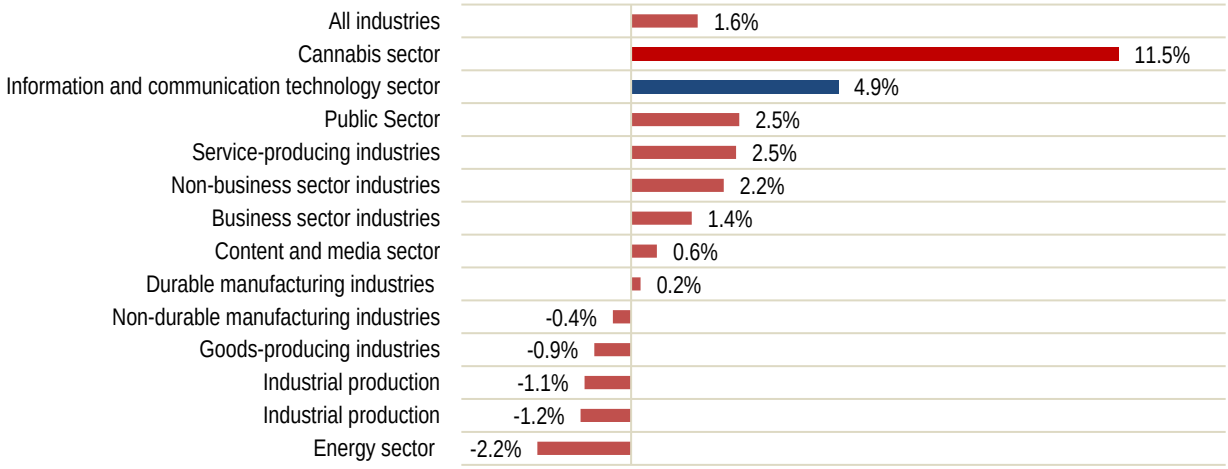
Annual growth of GDP



Source: ICTC; Statistics Canada

Average annual growth in Canada's ICT sector has totaled 4.3% over the last five years; this was supported by substantial growth in the ICT services sub-sector, which experienced an average annual growth of 4.5% over that period. Services linked to emerging technologies such as Artificial Intelligence (AI), Big Data, 5G, and Blockchain have been growing at an even more advanced rate, fueling economic growth in Canada's ICT sector as well as the overall economy. By comparison, the ICT manufacturing sub-sector stagnated over the last five years, experiencing an average annual decline of 0.01%.

Average annual growth by sector/industry – 2019



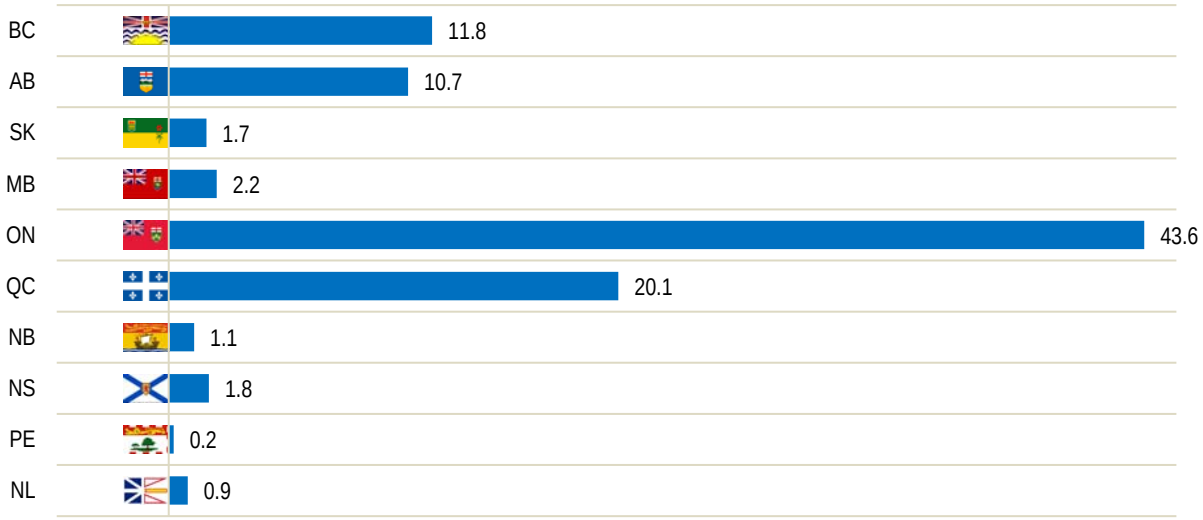
Source: ICTC; Statistics Canada

The ICT sector's growth of 4.9% in 2019 was not as high as that of the rapidly emerging cannabis sector, but ICT far outpaced the growth in all other key sectors of the Canadian economy. Overall, the ICT sector grew at over triple the rate of the total Canadian economy in 2019.

GDP GROWTH BY PROVINCE

The province of Ontario remains Canada's ICT leader and is estimated to have contributed $43.6 billion to the total Canadian ICT economic output in 2019[4]. Canada's other key provinces for ICT output were Quebec ($20.1 billion), British Columbia ($11.8 billion), and Alberta ($10.7 billion).

ICT sector output by province (in billion dollars) — 2019



Source: ICTC; Statistics Canada

The ICT sector in Ontario (⬆6.5%), Nova Scotia (⬆4.8%), Quebec (⬆4.6%), and Manitoba (⬆4.6%) grew the fastest in 2018, while the ICT sector in Saskatchewan (⬇0.3%) saw a small decline in 2018. Quebec and British Columbia are the only provinces which maintained positive ICT sector growth for all of the last seven years.

ICT sector GDP by province (annual percentage change)

	2012	2013	2014	2015	2016	2017	2018
Newfoundland and Labrador	-0.3%	-4.6%	1.4%	5.9%	4.7%	0.6%	1.6%
Prince Edward Island	1.9%	-0.5%	3.7%	5.5%	4.8%	3.8%	3.8%
Nova Scotia	0.5%	-4.7%	5.4%	7.1%	4.8%	2.6%	4.8%
New Brunswick	-0.7%	-6.7%	1.5%	1.9%	4.6%	2.6%	2.3%
Quebec	0.0%	5.8%	0.4%	0.7%	4.3%	5.2%	4.6%
Ontario	-1.0%	-0.7%	3.4%	5.1%	4.3%	5.0%	6.5%
Manitoba	0.8%	-2.3%	-0.4%	-0.7%	5.3%	1.0%	4.6%
Saskatchewan	6.9%	-1.2%	2.6%	3.1%	6.3%	1.1%	-0.3%
Alberta	1.9%	-0.9%	8.4%	-1.5%	0.3%	3.5%	2.6%
British Columbia	2.7%	0.2%	6.9%	3.7%	4.5%	6.2%	3.3%

Source: ICTC; Statistics Canada

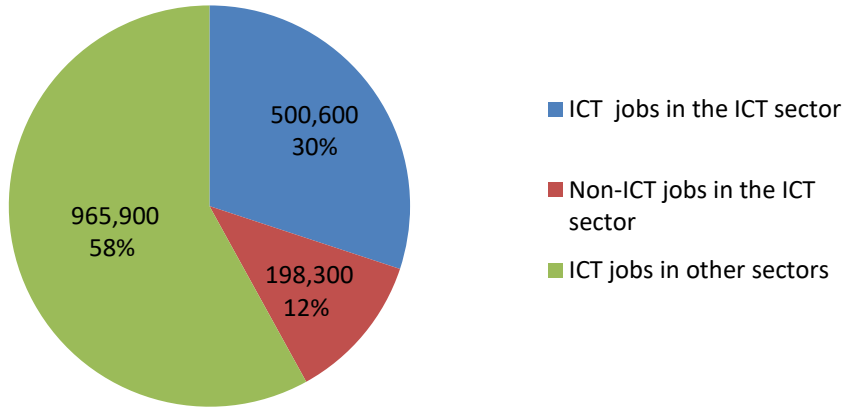
[4] 2019 ICT sector GDP data across province is estimated

LABOUR MARKET

EMPLOYMENT AND UNEMPLOYMENT

In 2019, 1,664,700 professionals were employed in the Canadian *digital economy*, a figure that is 3.8% higher than in 2018. The digital economy includes 500,600 ICT professionals working in the ICT sector; 965,900 ICT professionals working in other sectors of the economy; and 198,300 non-ICT professionals working in the ICT sector.

Employment segmentation of the digital economy - 2019



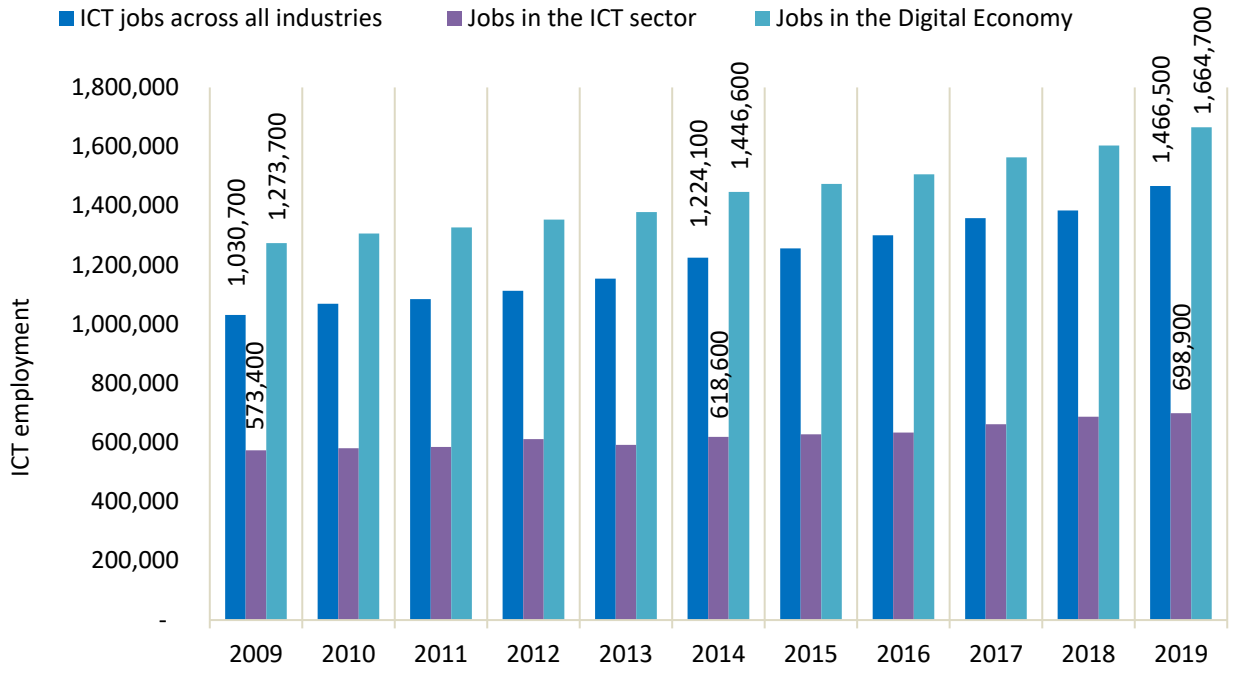
Source: ICTC; Statistics Canada

In 2019, there were 698,900 professionals employed across the *ICT sector*, accounting for 3.7% of the Canada's total employment. Driven by rapidly expending digital technologies and developments, employment in the ICT sector grew in 2019 by 1.8%, adding 12,200 new jobs. The lower job growth in the ICT sector in 2019 relative to previous years was attributable to a massive shedding of non-ICT professionals from the ICT sector. Over just one year, the number of non-ICT professionals working in the ICT sector dropped by 10% to 198,300 – its lowest level after a decade of staggered decline; there were roughly 243,100 non-ICT professionals working in the ICT sector in 2019. The number of ICT professionals working in the ICT sector, however, grew by 7.1% in 2019. The number of ICT professionals across the entire economy increased by 6.0% or 82,600 jobs during this period. The drop of non-ICT jobs in the ICT sector is consistent with the overarching narrative of digital transformation of the workplace. Technology that expedites the completion of rote administrative tasks is decreasing the need for administrative employees in tech companies, and money is instead being invested in technical roles across the economy.

Perhaps no sector is as disrupted by technological change as the ICT sector itself. Between 2018 and 2019, there was decline the number of employed workers in 10 of 30 ICT National Occupation Codes (NOCs). Several roles, primarily concentrated in telecommunications installation and technician roles, saw steep declines; employment of Telecommunications Line and Cable Workers (NOC 7245) fell by 49% to 6,800. Employment of Corporate Sales Managers (NOC 0601) fell by 37% to 13,500. Employment of Information Systems Testing Technicians (NOC 2283) fell by 37% to 8,600. Employment of Graphic Arts Technicians (NOC 5223) fell by 25% to 6,500. One of the largest numerical drops in employment was seen among User Support Technicians (NOC 2282), in which 4,700 jobs were lost. However, this was a small percentage decrease (4.5%).

By contrast, employment in several ICT occupations grew precipitously in 2019. The top growth areas were Data and Information Analytics, Programming, Media Development, and Electrical Engineering/Installation. Employment of Database Analysts and Data Administrators (NOC 2172) grew by 47% to 53,400. Employment of Electrical and Electronics Engineering Technologists (NOC 2241) grew by 20% to 35,600. Employment of Industrial electricians (NOC 7242) grew by 19% to 36,900. There were also large numerical increases in employment among Information Systems Analysts and Consultants (NOC 2171 - gain of 26,900 jobs), and Computer Programmers and Interactive Media Developers (NOC 2174 – gain of 14,500 jobs).

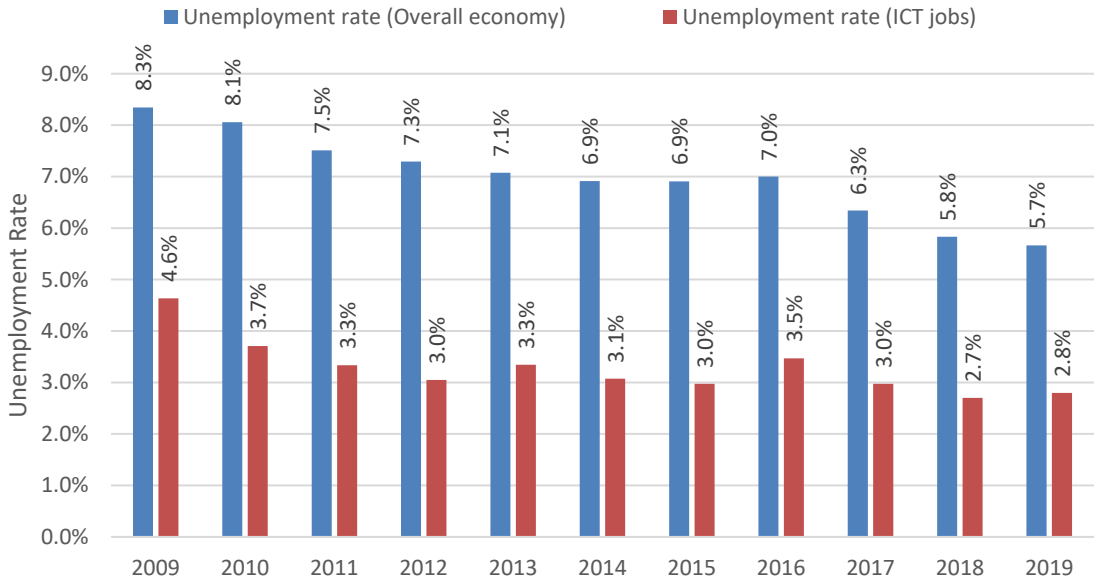
Employment in ICT and the Digital Economy – 2009 - 2019



Source: ICTC; Statistics Canada

The unemployment rate for ICT professionals in 2019 increased slightly to 2.8%. This was less than half the employment rate for the overall economy, which was 5.7% in 2019.

Unemployment rates – 2009 - 2019

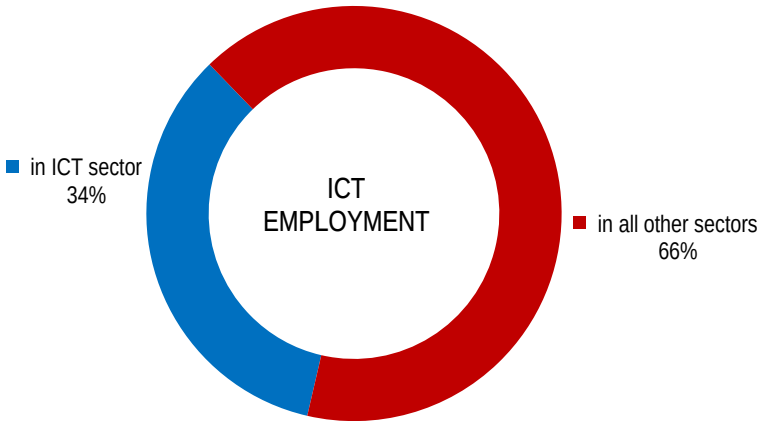


Source: ICTC; Statistics Canada

EMPLOYMENT BY SECTOR

All major sectors of the Canadian economy need ICT workers. In 2019, 66% of ICT workers worked in non-ICT sectors, while 34% worked in the ICT sector. These proportions were unchanged from 2018, and have been remarkably stable in the last ten years; in 2009, 33% of ICT workers worked in the ICT sector, while 67% worked in other sectors.

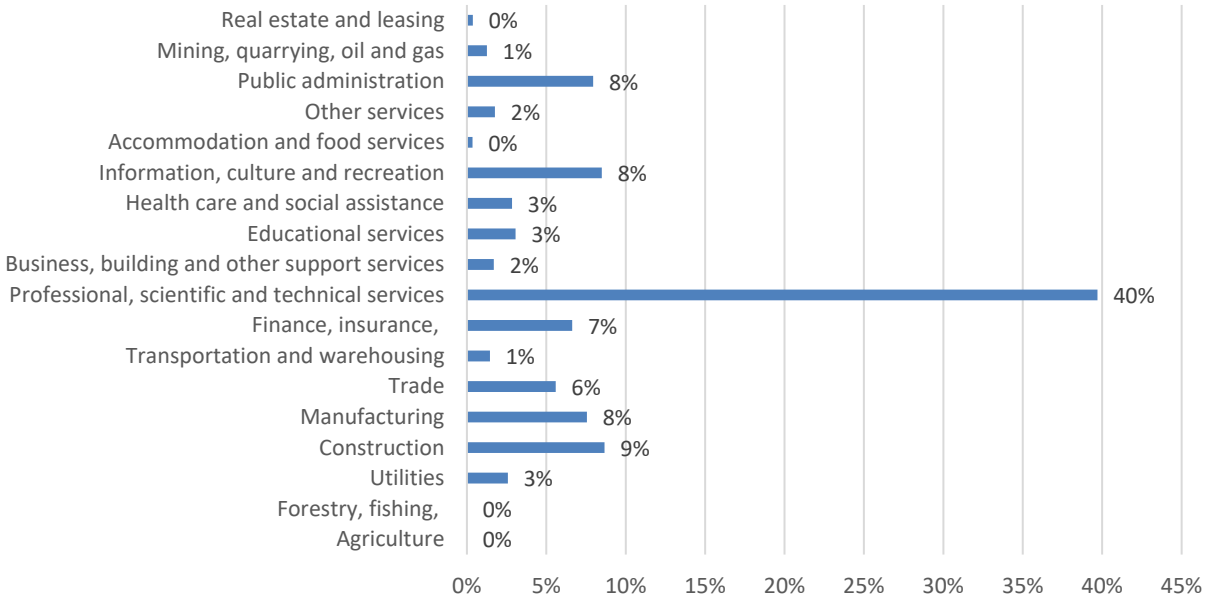
ICT employment - 2019



Source: ICTC; Statistics Canada

Businesses in the professional, scientific and technical services industry employed 40% of all ICT professionals in Canada in 2019. The next top industries employing ICT workers were: construction (9%), manufacturing (8%), information, culture, and recreation (8%), public administration (8%), and finance/insurance (7%). The remaining 20% of ICT professionals worked in other sectors.

ICT employment by industry – 2019



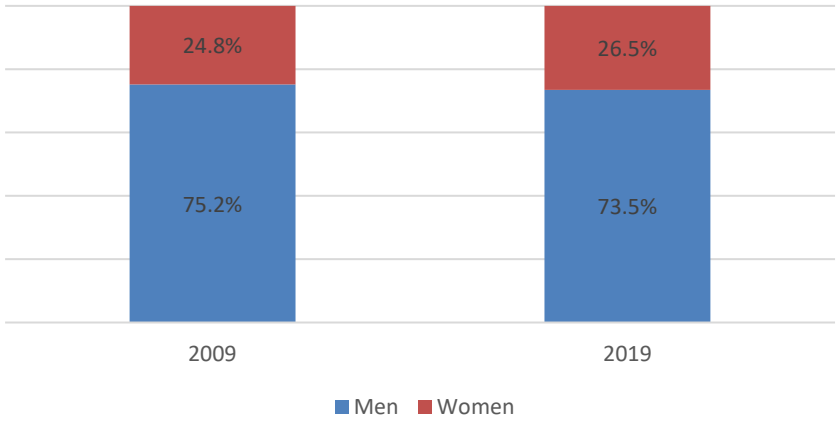
Source: ICTC; Statistics Canada

TALENT SUPPLY

WOMEN IN ICT

Women made up 26.5% of ICT professionals across all sectors of the Canadian economy in 2019. While women are under-represented at all levels in ICT, their representation in managerial and executive positions is particularly low. However, the representation of women is now slightly higher than it was in 2009 (24.8%).

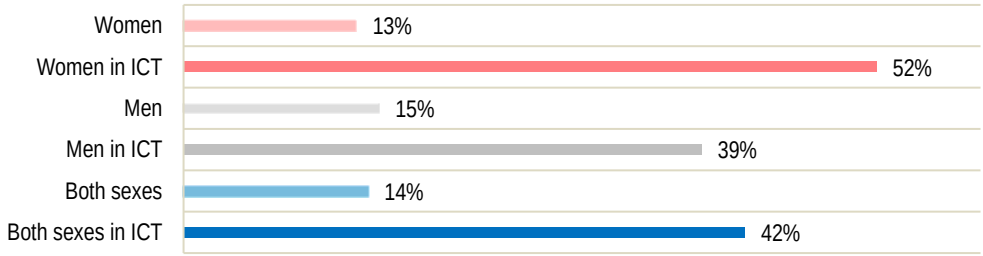
ICT employment by gender – 2009 and 2019



Source: ICTC; Statistics Canada

Since 2009, the employment of women grew by 13% across all sectors of the economy, compared to a 15% growth in employment among men. Moreover, during that time, ICT employment for women increased by 52%, compared to 39% for men.

Employment growth by gender and type of job 2009 - 2019

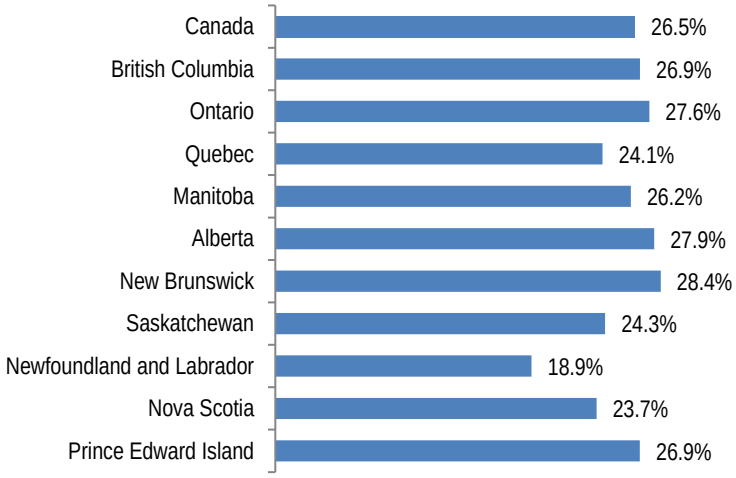


Source: ICTC; Statistics Canada

The unemployment rate for women in ICT professions was 2.5% in 2019, less than half of the unemployment rate for women throughout the entire Canadian economy (5.3%).

The representation of women in the ICT workforce also fluctuates across provinces. In 2019, women made up the largest share of ICT professionals in New Brunswick (28.4%), Alberta (27.9%), and Ontario (27.6%). The representation of women among ICT professionals was lowest in Newfoundland and Labrador (18.9%), Nova Scotia (23.7%), and Quebec (24.1%).

Proportion of women in ICT positions by province - 2019

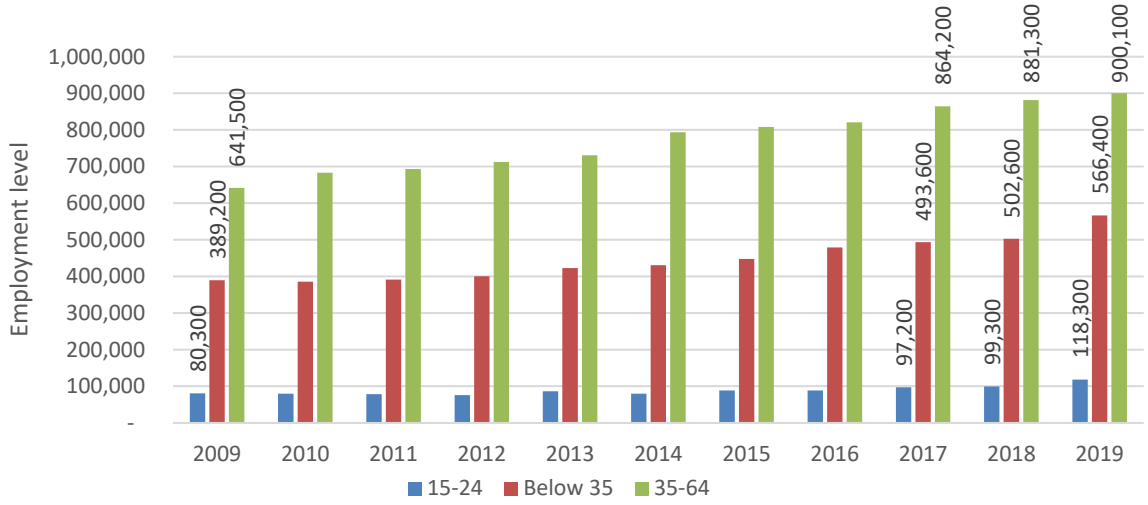


Source: ICTC; Statistics Canada

YOUTH IN ICT

Youth (those aged 15 to 24 years old) represented 8.1% of all ICT workers in Canada in 2019. Between 2009 and 2019, the number of youth employed in ICT grew from 80,300 to 118,300 (47% growth). The share of youth working in the ICT sector is slightly higher than it was in 2009 – it was 7.8% then. Between 2009 and 2019, the share of older workers (aged 55 to 64) working in the ICT sector increased from 9% to 13%.

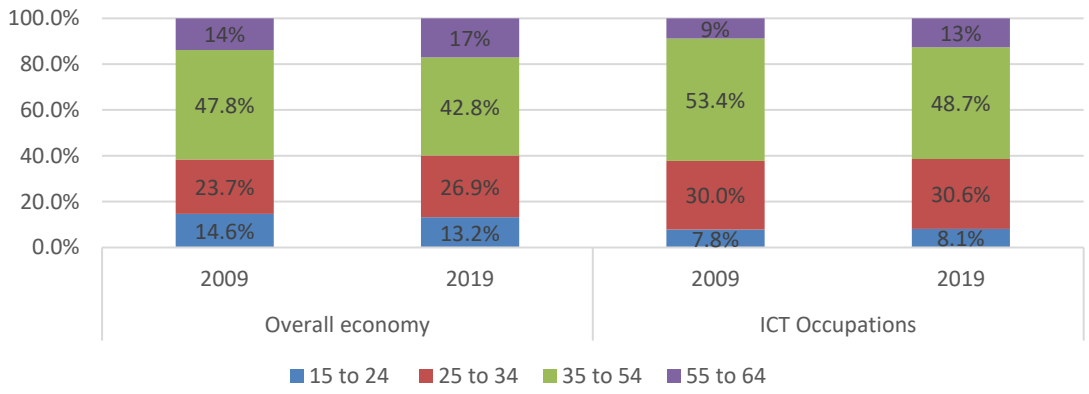
ICT employment by age groups 2009 - 2019



Source: ICTC; Statistics Canada

Between 2009 and 2019, ICT employment among those aged 15 to 34 and under grew from 389,200 to 566,400 (46% growth). This corresponded to a small increase in the share of these workers among the ICT workforce, from 37.8% to 38.7%. Over the same time, the 35 to 54 age group saw a decline which was counterbalanced by a substantial rise in the 55 to 64 category, from 9% to 13% of total ICT industry. Compared to the wider Canadian economy, the ICT sector continues to overrepresent people in the 25 to34 and 35 to 54 age groups, while underrepresenting youth and older workers.

ICT employment breakdown by age 2008 vs 2018



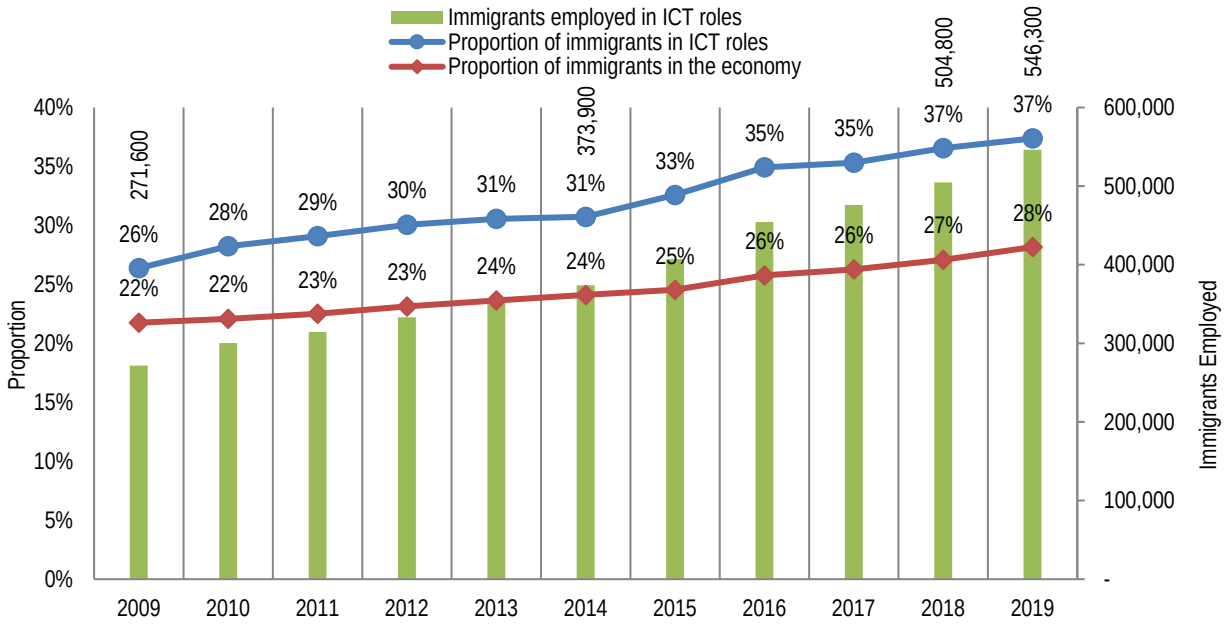
Source: ICTC; Statistics Canada

The unemployment rate for youth in ICT professions averaged 5.4% in 2019. By comparison, the unemployment rate for youth in the overall Canadian economy during 2018 was more than double that, averaging 11.0%.

IMMIGRANTS IN ICT

546,300 of Canada's ICT jobs were held by immigrants in 2019.[5] Overall, the share of Canada's ICT positions occupied by immigrants has grown from 26% in 2009 to 37% in 2019. In the same period, the share jobs in the wider economy held by immigrants grew from 22% to 28%. The elevated share of immigrants in ICT professions is evidence of the strong demand for ICT talent throughout the Canadian economy.

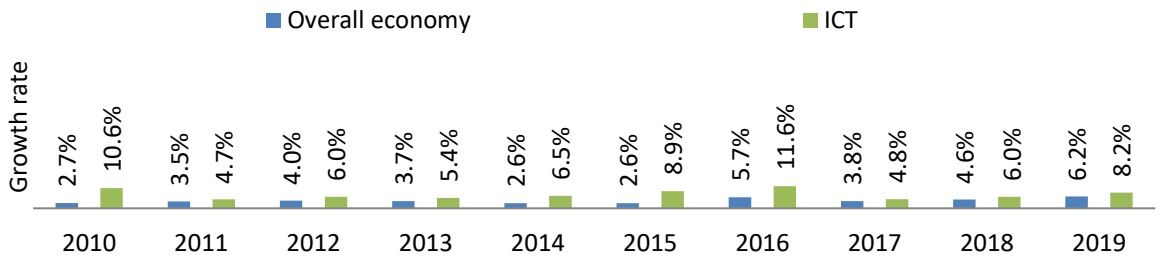
Employment for immigrants 2009 - 2019



Source: ICTC; Statistics Canada

From 2009 to 2019 the number of immigrants employed in ICT roles more than doubled from 271,600 to 546,300. Between 2010 and 2019, ICT employment of immigrants grew at an average rate of 7% a year, compared to 4% for employment of immigrants in the wider economy.

Growth in employment among immigrants 2010-2019

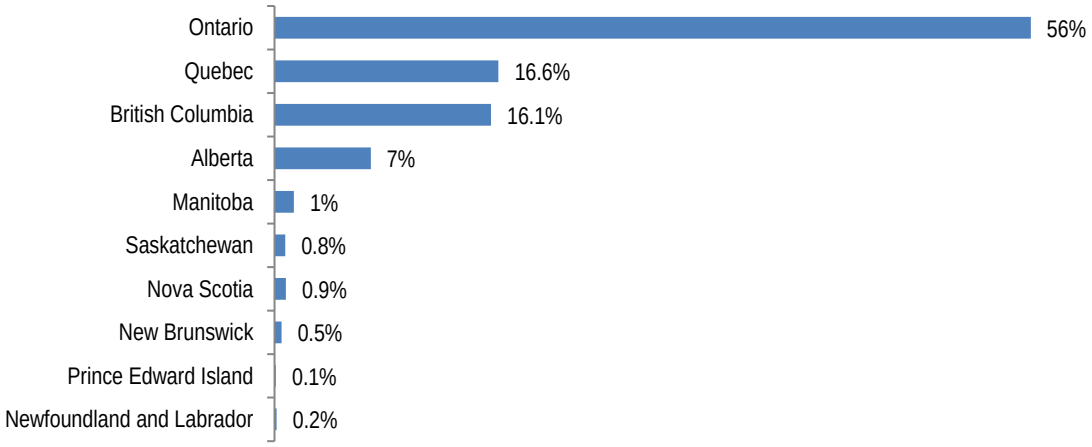


Source: ICTC; Statistics Canada

[5] Refers to people who were born outside of Canada

Unemployment amongst ICT immigrant professionals was consistently low at 2.7% in 2019 and has remained relatively steady over the past five years. By contrast, the unemployment rate among immigrants in the overall Canadian economy was 6.2%.

Proportion of immigrants in ICT positions by province - 2019



Source: ICTC; Statistics Canada

In 2019, Ontario employed 307,100 immigrants in ICT and accounted for 56% of Canada's immigrant ICT workforce. Quebec employed 90,900 immigrants in ICT roles; BC employed 87,900; and Alberta employed 39,100. In total, 95.7% of Canada's immigrant ICT workforce worked in one of the four most populous provinces.

APPENDICES

ICTC's labour market research captures critical economic and labour market indicators to inform competitive business and human resource strategy planning, decision-making and career development in ICT, thereby driving the development of a more prosperous Canadian ICT workforce and industry in a global digital economy.

The sum total of workers (workers that are employed in these occupations as well as workers that are currently unemployed, but actively looking for work) in these occupations and workers in all other (non-ICT) occupations in the ICT sector is the total digital economy labour force in Canada. The table below summarizes the core ICT occupations:

Index	National Occupation Classification (NOC)	Occupation Title
1	0015	Senior managers - trade, broadcasting and other services, n.e.c.
2	211	Engineering managers
3	213	Computer and information systems managers
4	601	Corporate sales managers
5	1123	Professional occupations in advertising, marketing, and public relations
6	1253	Records management technicians
7	2133	Electrical and electronics engineers
8	2147	Computer engineers (except software engineers and designers)
9	2148	Other professional engineers, n.e.c.
10	2161	Mathematicians, statisticians and actuaries
11	2171	Information systems analysts and consultants
12	2172	Database analysts and data administrators
13	2173	Software engineers and designers
14	2174	Computer programmers and interactive media developers
15	2175	Web designers and developers
16	2241	Electrical and electronics engineering technologists and technicians
17	2281	Computer Network Technicians
18	2282	User support technicians
19	2283	Information systems testing technicians
20	4163	Business development officers and marketing
21	5223	Graphic arts technicians
22	5224	Broadcast technicians
23	5241	Graphic designers and illustrators
24	7241	Electricians (except industrial and power system)
25	7242	Industrial electricians
26	7243	Power system electricians
27	7244	Electrical power line and cable workers
28	7245	Telecommunications line and cable workers
29	7246	Telecommunications installations and repair workers
30	7247	Cable television service and maintenance technicians

ICT SECTOR

The table below summarizes the ICT sector:

Index	North American Industry Classification System (NAICS)	ICT Sub-sector
1	3333	Commercial & service industry machinery manufacturing
2	3341	Computer & peripheral equipment manufacturing
3	3342	Communications equipment manufacturing
4	3343	Audio & video equipment manufacturing
5	3344	Semiconductor & other electronic component manufacturing
6	3345	Navigational, medical & control instruments manufacturing
7	3346	Manufacturing and reproducing magnetic and optical media
8	4173	Computer & communications equipment & supplies wholesale distribution
9	5112	Software publishers
10	5121	Motion picture and video industries
11	5171	Wired telecommunications carrier
12	5172	Wireless telecommunications carrier (except satellite)
13	5174	Satellite telecommunications
14	5179	Other telecommunications
15	5182	Data processing, hosting, and related services
16	5191	Other information services
17	5415	Computer systems design & related serv.
18	7115	Independent artists, writers and performers
19	8112	Electronic & precision equipment repair & maintenance