

Canadian ICT Sector Report

June 2021

Contents

1 CANADIAN ICT SECTOR OVERVIEW

- Overview
- Ecosystem
- Recent Investments
- Impact of Covid-19

2 SUB-SECTOR ANALYSIS

- Cyber Security
- Internet of Things
- Fintech
- E-Health
- EdTech
- AI & Big Data
- Video Games
- Hardware

3 CONCLUDING REMARKS

- Key Takeaways
- Trade Shows

June 2021

1. Canadian ICT Sector Overview

Canadian ICT Sector

- Overview
- Ecosystem
- Recent Investments
- Impact of Covid-19



June 2021

Canadian ICT Sector Overview

The ICT Sector is currently transformed by the pandemic and an increased number of cyber threats.

The Canadian ICT Sector represents 15% of Canadian services exports.

55% of Canadian ICT workers have a University Degree.

666,540
workers

43,200
Companies

USD \$75B in
GDP

USD \$9B in
Good
Exports

USD \$9B in
Services
Exports

USD \$170B
in Revenue

99% of ICT products manufactured in Canada are exported.

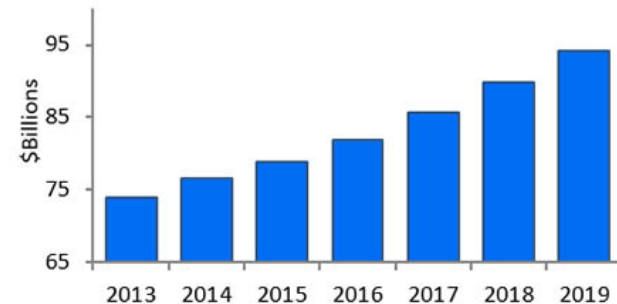
The Canadian ICT centres are Toronto, Montreal, and Vancouver.

Canadian ICT R&D spending represents 41.2% of all business R&D.

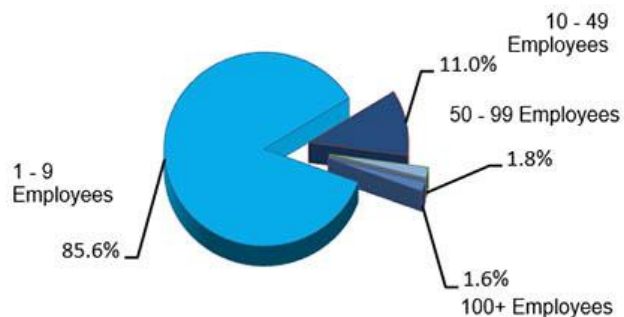
Canadian ICT Sector Overview

- The ICT market is led by Software & Computer Services
- Small startups form over 80% of the Industry.
- Toronto has the 2nd highest startup density in the world after Silicon Valley.

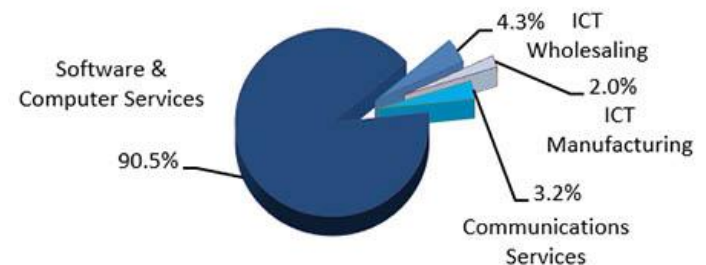
ICT Sector GDP 2012-2019



Companies by employee size, 2019



Companies by ICT sub-sector, 2019



An Ideal Ecosystem for Innovation



More than USD \$1.5 billion invested by the Canadian Government and the industry.

Source: <https://clustercollaboration.eu/news/canada-announces-winners-supercluster-initiative>

Superclusters

In 2018, the Canadian Government announced an initiative to create and invest in five Innovation Superclusters, including 3 in the ICT sector.

- The SCALE.AI Supercluster is based in Montreal.
- The Advanced Manufacturing Supercluster is in the Greater Toronto Area and is the connection between Canada's Technology and Manufacturing sectors.
- The Digital Technology Supercluster is based in Vancouver.

Sources: Invest in Canada (<https://www.investcanada.ca/industries/technology>)
<https://www.ic.gc.ca/eic/site/093.nsf/eng/home> & Picture Source: :
<https://clustercollaboration.eu/news/canada-announces-winners-supercluster-initiative>

An Ideal Ecosystem for Innovation



Federal Incentives - A multi-billion dollar strategy over the next decade to develop innovation Superclusters.

Gateway to the world - Canada has free-trade agreements with all other G7 countries and has preferential access to two-thirds of the world economy.

Job creation - More than 50,000 jobs expected to be created in tech Superclusters in the next decade.

Qualified workers - The most educated workforce in the world (OECD).

Foreign talent - Global Skills Strategy & Federal programs facilitating the immigration of skilled workers.

The Superclusters
unite more than
6,000 actors
across Canada.

Foreign Investments Dedicated to ICTs

461 Investment Projects (2015-2019)



mastercard
Global
Intelligence and
Cyber Centre in
Vancouver



Tripling its
Canadian
workforce & a
USD \$700 million
Data Centre in
Quebec



HSBC
Global Data &
Innovation Lab in
Toronto



Building a new
113,000 sq. ft.
office space in
Toronto



Has built a
360,000 servers
Data Centre in
Quebec



Building a new
Cloud Data
Centre in Toronto

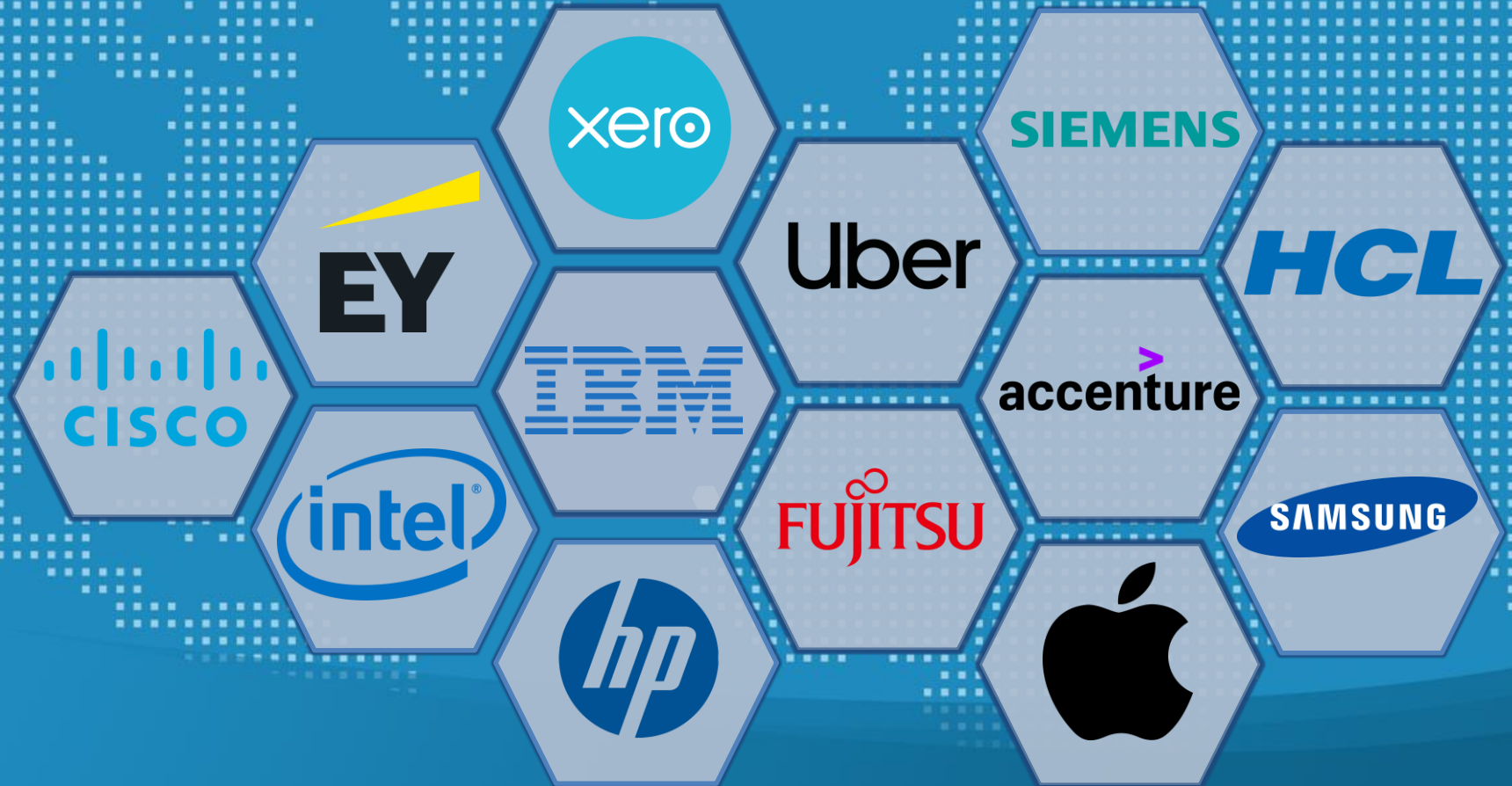


USD \$2 billion
investment in
Canadian
companies to
fuel innovation



Foreign Investments Dedicated to ICTs

461 Investment Projects (2015-2019)



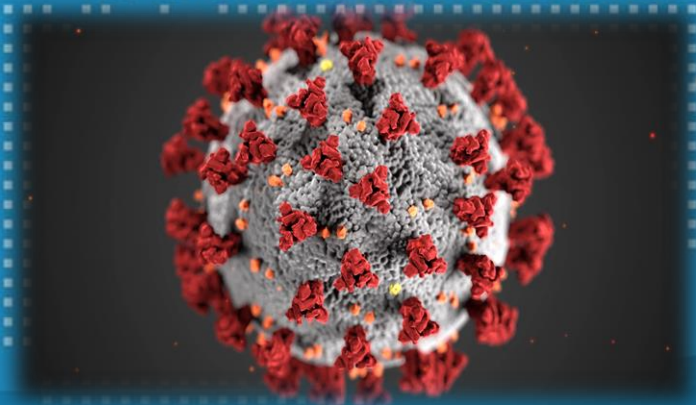
Source: Invest in Canada (<https://www.investcanada.ca/industries/technology>)

The Impact of the Covid-19 Pandemic

Accelerating Digitalization

The Covid-19 pandemic has accelerated ICT transitions and has exposed significant digitalization gaps in most Canadian Sectors. In 2018, it was assessed that the manufacturing and natural resources sectors had a low digitalization degree and that the Canadian government wasn't far ahead. Three years ago, even the ICT sector didn't fully qualify as a highly digitalized sector in Canada. Here are some of the most important consequences of the pandemic.

The Big Five - The Covid-19 pandemic has also accelerated the dominance of the Big Five tech giants (the FAAMG), especially due to their cloud service capacities. When countries and companies faced unprecedented challenges during the pandemic, companies like Google or Microsoft were often the only ones with capacities to help, especially in areas as overarching as learning and health. Those large tech companies were especially involved in the rapid and unprecedented transition to work from home.



The Impact of the Covid-19 Pandemic



E-Learning - The rapid switch to e-learning platforms is increasing dependence on large companies and cloud computing. It is affecting learning like no other event in recent history and is necessitating the rethinking of every aspect of the school environment. Apart from demanding a complete shift towards home schooling, the pandemic has also accelerated the development of tech tools to improve learning and its impact will show for years to come.

Cyber Security- In many ways, Cyber Security is the overarching ICT sub-sector, and as such has been overwhelmingly affected by the pandemic. As changes take place at an unprecedented pace, security is often neglected and it is safe to say that cyber threats are more present than ever.

Fintech - As Canadians find themselves alone at home, Fintech is revolutionizing investing. It is estimated that “the adoption of financial technology advanced by 3 to 5 years due to the pandemic, surpassing the U.S. adoption rate.” The pandemic has also accelerated the shift to digital payments and has obliged companies of all size to rely more and more on online purchases.

2. Sub-Sector Analysis

Cyber Security

- Overview
- National Cyber Security Action Plan
- Cyber Security in the Federal Government
- Cyber Security in the Private Sector
- Upcoming opportunities



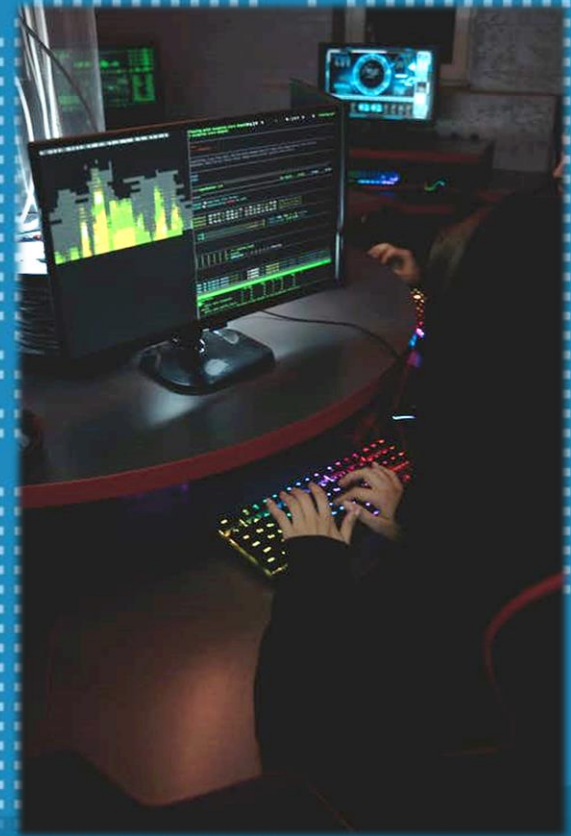
June 2021

Cyber Security

Overview - The Canadian Government defines Cyber Security as “the protection of digital information stored within your cyber threat environment against cyber threats and cyber threat actors. [...] It is the protection of data, information, computers, devices and networks.”

Cyber Security encompasses and supersedes every other technological sector because the quick proliferation of ICTs increases vulnerability to cyber attacks.

Economic Impact - Every year, it is estimated that cybercrime bring about economic losses amounting to more than **USD \$2.5 billion**.



Cyber Security

National Cyber Security Action Plan (2019-2024)

National Cyber Security Action Plan (2019-2024)

This plan results from a comprehensive Cyber Review begun in 2016. It includes investments of more than USD \$1 billion a year and aims at enforcing the government's defenses as well as private security.

3 Goals

- 1- Secure and Resilient Canadian Systems
- 2- An Innovative and Adaptive Cyber Ecosystem
- 3- Effective Leadership, Governance and Collaboration

Key Takeaways

- Massive investment in R&D and partnership with the private sector in order to profit from its capacities. Private companies working in cyber security are eligible for significant government help.
- Adjustment of the legislation to international standards.
- Small Canadian businesses represent 71% of Cyber Security breaches and the Plan provides pathways to close the skills and knowledge gap.

Cyber Security

Cyber Security in the Federal Government: Who Deals with What

Canadian Anti-Fraud Centre

Repository of Canadian data & intelligence and assists citizens

Public Safety Canada

Policy Lead for cyber Security

Communication Security Establishment

Technical authority for cyber security

Royal Canadian Mounted Police

Investigates suspected criminal cyber incidents

Defence Research and Development Canada

Develops military security technologies

Department of National Defence

Responsible of Canada's threat assessments

Canadian Security Intelligence Service

Conducts investigations on national security matters

Government of Canada
Gouvernement du Canada

Canada 

The Canadian Centre for Cyber Security is the chief agency in charge of threat assessment and informing citizens.

Source: <https://www.publicsafety.gc.ca/cnt/ntnl-scrct/cbr-scrct/fdrl-gvrnmnt-en.aspx> & <https://cyber.gc.ca/en/>



Cyber Security

Cyber Security in the Private Sector

Increasing Consumer Confidence

The growing complexity of cyber threats, especially in the financial sector, is damping consumer confidence. As an obstacle to trust, cyber security is becoming a significant threat to growth and is addressed correspondingly.

Developing a cyber risk management program

Businesses are increasingly working with governments to harmonize cyber strategies and implement nationwide plans to block cyber threats.

CEOs are relying more than ever on outside expertise to assess the needs of digital transformation and to understand how new technologies represent new threats.

It is estimated that **75% of CEOs don't think that governmental efforts are helping to restore trust.**

Small Businesses are particularly vulnerable

Even if most companies don't have unbreachable systems, it is safe to affirm that small to medium sized businesses are far more vulnerable. The Federal Government is working to close that gap, but most companies don't have the energy, nor the resources to fight cyber crime on their own. They at least have to rely on outside expertise.

Cyber Security

Rip & Replace: Huawei and potential forthcoming opportunities

Huawei's unique position

Since 2009, Huawei has imposed itself as one of the largest telecommunication players in Canada. It now boasts more than 24,000 cell phone towers all over the country and is closely linked to major universities. The company now tries to win contracts to build the Canadian 5G network.



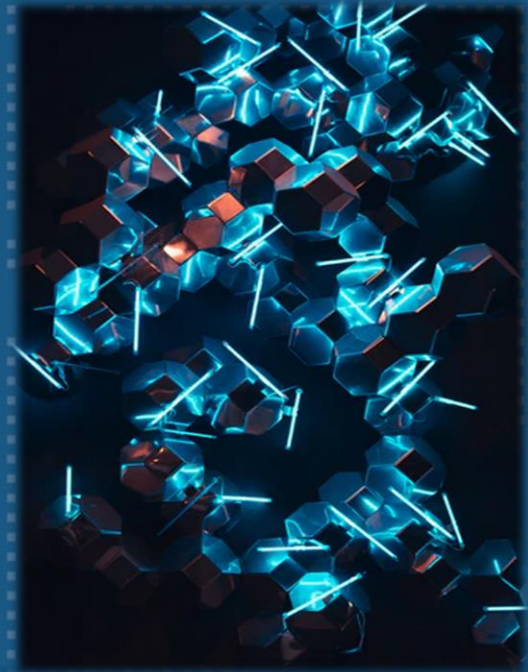
Cyber Security and Telecommunications

Over the last few years, concern has arisen concerning the close links between the Chinese government and Huawei and the UK, the US, Australia and Sweden have proceeded to ban Huawei from acquiring new contracts. In the US, concerns for national security have led to a *Rip & Replace* policy. In Canada, the government has yet to take an official position, but more and more key players are speaking against Huawei. The ex-director of Canada's secret services has recently said that all Huawei's infrastructures should be taken down and reporters are revealing more troubling news about the Chinese giant every day. If a general *Rip & Replace* policy were to take place in Canada, significant opportunities would arise for foreign investment and it's a matter worth following closely.

2. Sub-Sector Analysis

Internet of Things

- Overview
- Industry 4.0
- Key Trends



June 2021



CIDEP
IDENTIFY QUALIFY CONNECT

VEDP

Internet of Things

Overview

–The Canadian Government defines the Internet of Things (IoT) as “the network of everyday web-enabled objects that can connect and exchange information. These “smart objects” include [...] personal fitness trackers, TVs, thermostats, or cars.”

–The Canadian Centre for Cyber Security estimates that there will be a **39% increase** in the IoT market by 2025.



Uses and Relationship with other ICTs

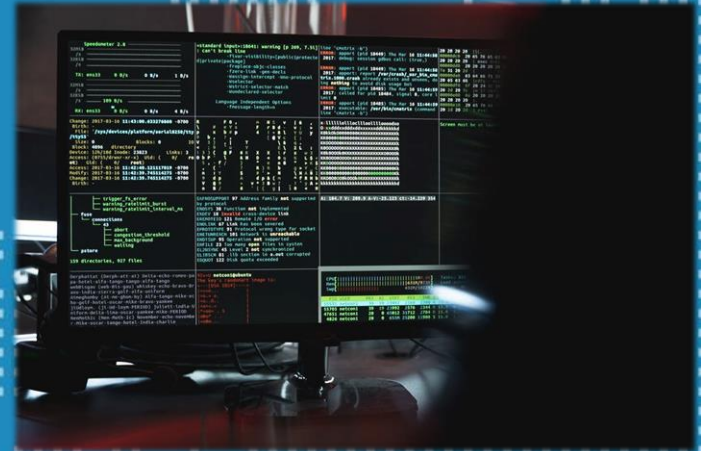
The IoT is closely linked with cyber security and the more it becomes widespread, the more it is subject to cyber attacks and necessitates new innovation to keep the new technology safe. IoT is also intertwined with PropTech, and data management, both of which will be explored in detail below. Internet of Things devices are also helping to enhance security, and widespread tech like smart boards or smart meters for electricity and water are already transforming the way we live.

Internet of Things

Industry 4.0

The Fourth Industrial Revolution

At the core of IoT resides the notion that we are living the fourth industrial revolution (and maybe the fifth). This revolution is taking place relatively rapidly in Canada with **over half** of all manufacturing businesses having begun to integrate IoT in their activities.



Opportunities & Work to be Done

While Canada has been one of the leading countries in the 4.0 transition, it is still adopting new technologies at a lower pace than other industrial powers. In any given year, more than 75% of manufactured industrial robots go to either Japan, South Korea, the US and Germany, while Canada buys only about 1%. Nevertheless, most Canadian governmental agencies, Chambers of Commerce and private actors are now uniting to make a significant push towards 4.0 and major steps are bound to take place in the foreseeable future. The next couple of years promise to present many opportunities in this area.

Internet of Things

Key Trends

Home Automation – In Canada, it is estimated that 2021 will see revenues in the Smart Home market reach **USD \$2.2 billion**, and that number is expected to grow to **USD \$3.4 billion** by 2025. The number of households using some kind of automation is expected to be around 7.8 million in 2025. Like most IoT technologies, home automation is mostly popular among young and high income people. Smart Home tech is now an integral part of PropTech and large real estate owners are counting on them to manage their properties more efficiently.



Data – As the IoT takes more place, it is always generating more data and is henceforth closely linked with big data management and processing. IoT is the most important drive for the development of cloud and edge computing. The creation of massive data infrastructure is a direct consequence of the emergence of the IoT.

Internet of Things

Key Trends

Blockchain – The emergence and widespread of the IoT is creating massive trust and security problems and Blockchain is now seen as one of the most efficient ways to keep information safe in a decentralized way. As Blockchain is trending, governments are having more and more difficulty to legislate and to ensure privacy for individuals. Blockchain is also enabling the widespread of Crypto currencies and NFTs, creating further legislation problems for authorities. This aspect of both IoT and Fintech, is generating major environmental concerns because of energy consumption and this is a fact to take into account when trying to assess the future of big data and Blockchain.

Contradictions – The IoT is home to many core contradictions. It at once enhances security and endangers it; it aims at helping the environment but by producing such amounts of data as to be an environmental hazard. Surmounting those contradictions is one of the many opportunities presented by the IoT.



2. Sub-Sector Analysis

Fintech

- Overview
- Key Trends
- Digital Payments
- Proptech and the Toronto Region
- Overview of the Ecosystem and Recent
- Investments



Fintech

Overview

- The Canadian Government defines Fintech as “technology-led innovation in the financial services sector”.
- “In Canada, the adoption of financial technology advanced by **3 to 5 years** due to the pandemic, surpassing the U.S. adoption rate.”
- Many Canadian cities rank amongst the world’s most important Fintech hubs: **Toronto (12th), Vancouver (36th), Montreal (48th), Calgary (84th), and Ottawa (90th).**

There are more than **1000 Fintech companies** in Canada (More *per capita* than in the US and the UK).

In Canada, the big banks enjoy a high level of customer trust when compared to similar countries. Accordingly, fintech companies are trying to collaborate with traditional institutions instead of competing with them.

The Canadian banking system is highly concentrated and, according to the World Economic Forum, it is the soundest financial system in the world. It’s dominated by the Big Five Banks, which combine assets of USD 3,000 billion and serve more than two-thirds of Canadians.

Fintech

Key Trends

RegTech

Management of Risk, whether it be insurance or financial security. RegTech represents more than 10% of new Fintech Companies in Canada.

PropTech

Collaboration between the real estate industry and new financial technologies. Proptech (Lending & Mortgages) represents about 13% of new Canadian Fintech companies.

WealthTech

WealthTech is the combination of all personal finance related technologies. It can be used to encompass such innovations as Crypto and Blockchain. Taken together, those areas comprise about 30% of new Canadian Fintech companies.

Venture Capital

2020 saw Canada gain its first private venture Fintech fund of more than USD \$1 Billion (OMERS Ventures). More and more, traditional institutions are backing Fintech startups, and despite a decrease in Venture Capital investments during the Pandemic, the future looks bright.

Brain Gain

Toronto & Vancouver dominate the North American scene in terms of Fintech brain gain (2nd and 3rd after Silicon Valley).

Fintech

Digital Payments

A Very Recent Trend

While a 2016 report by Payments Canada could still boast that “Cash is king”, it is certainly not the case anymore with electronic payments representing 77% of all transactions in 2020. For the first time in 2020, Credit Card transactions surpassed debit and the disappearance of cash was accelerated by the pandemic with cash transactions drowning by 9%. Like most ICTs, digital payments represent a unique challenge for cyber security which can at once produce opportunities and major threats.

Key Advantages

Canadians, albeit adopting digital payment slower than many countries, are showing a preference for the rapidity and flexibility procured by the rejection of paper-based payments. Digital payments are permitting a shift to online purchasing with nearly 90% of Canadians shopping online. Digital payments are now a key part of IoT devices and more than 20% of Canadians regularly make in-app purchases.

Major Players



mastercard



Fintech

PropTech and the Toronto Region

Toronto, Fintech & PropTech

The city of Toronto has long been a North American Centre of finance, software development, and mining finance. As such, it is understandable that the less flashy PropTech (property technology) has staid under the radar, but this often forgotten sector is booming in the Greater Toronto Area. The fact that the GTA is home to a third of North America's cranes is a testimony to that state of affair.

Overview & Trends

- **297** companies.
- More than USD **\$3 billion** raised by the **Canadian PropTech Collective** alone.
- More than 500 investors.
- PropTech is impacting the Canadian scene across **36 industries**, and this number is growing every year.
- Strongly linked to the development of the **Internet of Things**



Fintech

PropTech and the Toronto Region

Ecosystem

Canada's PropTech ecosystem is growing rapidly and recognition by academic institutions as well as governments is stimulating venture capital investments. International companies are now turning to Toronto for leadership and talent in PropTech and the City of Toronto is actively collaborating with PropTech Collective, Alate Partners, and Colliers PropTech Accelerator to attract foreign investments.

PropTech

Toronto's real estate scene is booming in large part due to the growth of PropTech and related software platforms and property management hardware. Now, large real estate owners can monitor the state of infrastructures in order to manage future renovations and maintenance work.

Numeric Transition and Security

Whereas most real estate companies have adopted a plan for technological transitions, most of them acknowledge a lack of security in their new systems and complain about a low level of system integration. Hence, most opportunities in PropTech will lie in those areas.

Fintech

Overview of the Ecosystem and Recent Investments

Traditional Institutions are playing a major role in Fintech

BMO has recently partnered with Google Pay to be one of eight launch partners for Google Plex.

Power Corporation is investing massively in fintech startups like Wealthsimple, Koho & Personal Capital.

Top 10 FinTech Deals in Canada, 2017 - Q1 2021

COMPANY	LOCATION	SECTOR	FUNDING TYPE	QUARTER	AMOUNT RAISED
 VERAFIN	St. John's, NF	RegTech	Private Equity	Q3 2019	\$388m
 nuvei	Montreal, QC	P2P Payments	Private Equity	Q4 2019	\$270m
 fraction	Vancouver, BC	PropTech	Venture round	Q1 2021	\$228m
 1Password	Toronto, ON	RegTech	Series A	Q4 2019	\$200m
 lightspeed	Montreal, QC	Point of sale	Series D	Q4 2017	\$166m
 HIVE	Vancouver, BC	Blockchain	Post-IPO Equity	Q4 2017	\$161m
 Wealthsimple	Toronto, ON	Robo Advisor	Private Equity	Q4 2020	\$87m
 FLEXITI	Toronto, ON	Personal Finance	Debt Financing	Q3 2018	\$80m
 PROPERLY	Toronto, ON	Real Estate	Debt Financing	Q3 2020	\$75m
 Wealthsimple	Toronto, ON	Robo Advisor	Venture round	Q2 2019	\$74m

Source: FinTech Global

Fintech

Overview of the Ecosystem and Recent Investments

Traditional Institutions are joining forces with large ICT companies to incorporate Fintech.

CIBC is launching a business platform with Xero.

TD is partnering with Fidelity to develop PFM tools.

RBC is collaborating with NVIDIA and Red Hat to develop Fintech AI.

Canadian Accelerator and Incubator Program (CAIP)

The CAIP “ is an initiative of the Government of Canada’s Venture Capital Action Plan and was conceptualized and designed by Finance Canada”. The CAIP distributes up to USD \$100 million a year for the development of 16 accelerators and incubators which creates an ideal ecosystem for the flourishing of small fintech companies. Toronto, like in other ICT sectors, is recognized all over the world as a leading tech hub and continues to attract talents in fintech due to programs like the CAIP.

2. Sub-Sector Analysis

E-Health

- Overview
- Important Players
- Telemedicine
- Opportunities



E-Health

Overview

The Canadian Government defines e-health as: “an overarching term used today to describe the application of information and communications technologies in the health sector. It encompasses a whole range of purposes from purely administrative through to health care delivery”.



Canadian Health System

- In Canada, health is a provincial competence. As such, e-health developments and initiatives vary significantly from one province to the other.
- Still, the Canadian Government has invested in e-health initiatives since the 1997 Federal Budget and supports provincial initiatives to implement electronic health records.
- The bulk of Canada’s health system is in southern cities, making it particularly difficult for northern regions and Indigenous communities to receive adequate health care.

E-Health

Important Players

General Remarks

Although many companies are actively working towards the digitalization of health records and e-health, governments are slow to act on such matters and much is still to be done. Opportunities on the next page will show that the playground is still wide-open.

Digital Health Canada (DHC)

Although TELUS dominates the scene, there is plenty of space for other players and health digitalization is far from reality for most people. DHC is the largest non-profit organization trying to make the transition happen.

Members include public organizations and tens of private companies such as Accenture, Amazon Web Services, CGI, KPMG, Microsoft, and Google. Those companies, through DHC, work closely with Universities and Governments alike to create the future of Canadian e-health.

TELUS Health

The telecommunication company TELUS is now the number one provider or virtual care solutions in Canada. Its Akira platform, EQ care, and Babylon smartphone application are used by more than 10 million Canadians. In 2021, TELUS announced that its corporate health platforms would integrate electronic medical records (EMR) to provincial online records.



E-Health

Telemedicine – The Example of *Maple* and Indigenous Communities

General Remarks

Although the Covid-19 pandemic has accelerated the development and necessity of telemedicine, its advancement is poised to help some isolated communities and is seen as one of the main ways to close the healthcare gap between Indigenous communities and the rest of Canada.



E-Health at the Service of Indigenous People

The Toronto-based telehealth leader *Maple* has recently partnered with Indigenous organizations to create *Maple Maskawâhtik*, centred around the goal to provide equal service to isolated communities. *Maple* is partnering with *Shoppers Drug Mart* in order to insure that Indigenous people have access to the drugs they need, however far their community is located. All those players are working together with the support of Health Canada to insure that technology is helping to provide the care of the future and to close existing gaps.

E-Health

Opportunities



Ontario – Like Quebec, Ontario has digitalized partly over time, but now integration is the key problem. A significant number of partners are involved in Ontario's e-health initiatives and focus is on linking their efforts together. The last official assessment of HER connectivity in Ontario dates from 2015.

Quebec - After many unsuccessful attempts to digitalize Quebec medical records in an integrated way, the Government announced in February 2021, a USD \$3 billion investment in the *Dossier de Santé Numérique*.

General Opportunities -While governments are trying to digitalize, lack of organization and leadership has opened a large space for private companies to fill. Many are developing software to manage every aspect of e-health from managing line-ups to online medical records. Although provinces are trying to fill the gap they opened, opportunities in this area can be expected to exist in the foreseeable future.

2. Sub-Sector Analysis

EdTech

- Overview
- Important Players
- Online Classes
- Challenges
- Opportunities



EdTech

Overview

- Until recently, online learning was seldom found in Canada where education usually can be found at relatively low cost and students didn't see the necessity to enrol in less expensive online classes. Still some noteworthy initiatives have been made to create free online courses available to all and *Massive Open Online Courses* (MOOC) are frequent in Canada.
- Before 2020, most investments in online learning were made to create online platforms for students. However, the pandemic has changed the scene and is bound to create opportunities for years to come.

Impact of the Covid-19 Pandemic

- As is the case for most ICT sectors, the pandemic has accelerated the transition to new technologies while institutions rely more and more on large tech companies (Google, Microsoft, Skype, Zoom).
- The pandemic has also put forth the importance of cybersecurity in education and the need for institutions to have strong infrastructures.



EdTech

Important players in the past & present

Online Platforms

- Post secondary schools have made large investments in the past to create online platforms where students can access their grades, pay their fees and see documents posted by teachers.
- In the absence of platforms like those Universities have had for a decade or so, primary schools have quickly transitioned to Google Classroom, Meet, and Microsoft Teams.

Skytech is a Canadian leader when it comes to online platforms (Omnivox, Léa, Mia)



Oracle's Peoplesoft has had large contracts in the past like the University of Montreal's platform Synchro.

The Google logo, consisting of the word "Google" in its multi-colored font.

The Microsoft logo, featuring the four-colored square icon followed by the word "Microsoft" in a grey sans-serif font.

EdTech

Online Classes

New but Old

While the pandemic has accustomed us to a new style of learning, distance education wasn't born in 2020 and *Massive Open Online Courses* (MOOC) have been around for over a decade. In Canada, somewhat of a parallel education system has developed, stewarded by the private companies as well as Universities themselves.



A Slow Adoption

This major trend in education is not uniquely Canadian and it could even be said that its less Canadian than American or European. Observers agree that MOOCs are slow to be adopted by Canadians who have a marked preference for live classes, in part due to low education costs. This unpopularity is shown by the fact that most platforms used by Canadian Universities to propose MOOCs are either European or American. The Covid-19 pandemic, even if it has accustomed Canadians to online education, is poised to the progress of MOOCs, because studies show that Canadians are tired of isolation and are eager to come back to the school benches.

EdTech

Challenges

Quality of Learning

In Canada, the wide spread of e-learning has been decried has a significant lowering of the quality of education. Students and teachers alike have complained that online learning does not offer the necessary support nor the quality of a classroom as a place of learning.



Sources: <https://www.cbc.ca/radio/thehouse/canada-pandemic-education-system-1.6037580> & <https://www.cbc.ca/news/canada/hamilton/student-teacher-mental-health-1.6014463>

Mental Health

-The pandemic, along with the toll of online learning, has exercised an unprecedented strain on Canada's students and teachers.

-The isolation and poor quality of **e-learning is affecting the mental health of more than 70% of students** and it is affecting disproportionately poor persons who don't have access to a room of their own.

-More educators than ever are quitting the profession, most of them feeling that online learning has **doubled their work load**.

EdTech

Opportunities

Using Tech to Learn

While the quality of education has been notoriously poor during the pandemic, efforts have been made for over a decade to introduce technology in the classroom and those efforts are bound to continue. In this area, many schools are adopting Microsoft and Apple products for their students, but software opens more opportunities. Indeed, more institutions are looking to use new apps to help students assimilate information or to practice some complicated notion.

Mental Health

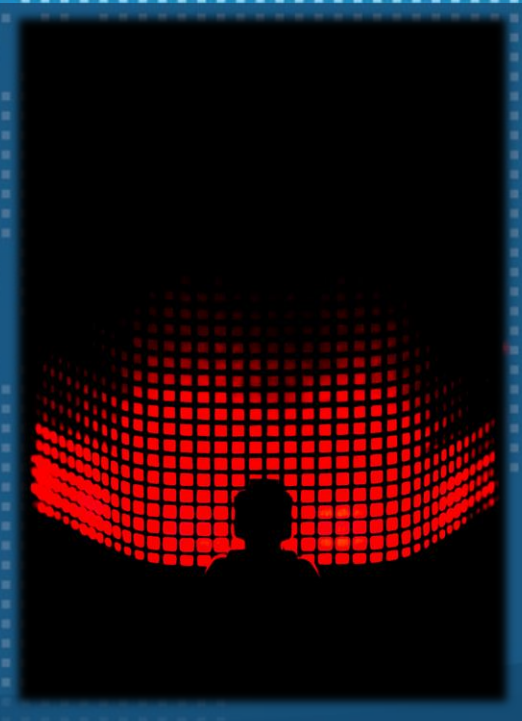
Even if the challenges posed by the pandemic have created a profound antipathy towards e-learning among Canadians, they also put some opportunities to the fore. Foreign companies looking to invest the online learning sector in Canada should be aware that the demand is for more quality and less strain on user's mental health. Those two areas, while representing important challenges, are the most significant opportunities in the foreseeable future.



2. Sub-Sector Analysis

AI & Big Data

- Overview
- Canada's AI Ecosystem
- Mila & the Montreal AI Supercluster
- Machine Learning
- The Cloud
- Data Management



AI & Big Data



Data Overview – As more and more large tech companies invest in Canadian data centres, businesses and governments alike turn to cloud computing and to the management of data as a priority. Accordingly, and with the help of the pandemic, institutions are showing a growing concern for security and the protection of data.

AI Overview – The Government of Canada has invested for many years to make the country a world leader in artificial intelligence and to “balance innovation with the ethical and responsible use of emerging technologies”. Besides major investments in the Montreal Supercluster, the federal government has funded a CAD \$125 million Pan-Canadian AI Strategy aiming at fostering cutting-edge innovation in AI.

The World Economic Forum estimates that in 2020, there was 44 zettabytes ($1,000^7$) of data in the digital universe and that number is expected to increase by 463 exabytes ($1,000^6$) a day in 2025.

AI & Big Data

Canada's AI Ecosystem

Ecosystem Overview

In 2019, Canadian AI companies received 57 venture capital deals and 658 million USD in venture capital. This represented an increase of almost 50% from 2018.

Canada's AI ecosystem consists of approximately 800 AI companies and 670 AI start-ups.



An Ideal Ecosystem for Foreign Investments

The province of Ontario has the largest number of pure-play AI firms with 361 companies, compared with 131 in Quebec, 103 in British Columbia, and 49 in Alberta.

Many international firms and tech giants have chosen Canada to establish new AI research labs. These include, but are not limited to, Ericsson, Facebook, Google DeepMind, Microsoft Research, Uber and Zesty.ai

AI & Big Data

Mila & the Montreal AI Supercluster



The Montreal Scale AI Supercluster

Scale AI is Canada's AI Supercluster. Its mission is to accelerate the growth of AI startups and enrich Canada's AI ecosystem. To date, Scale AI has invested more than CAD \$127 million and their budget is scheduled to increase each year. It invests in projects ranging from optimization of transportation assets to intelligent forecasting in the supply chain and cognitive supply chain in aerospace.

Source: <https://www.scaleai.ca/>

Mila (Montreal Institute for Learning Algorithms)

With more than 750 researchers from all over the world, the Mila Institute positions as a worldwide leader in AI. It collaborates with local, national and international organizations as well as more than 70 private partners. It has supported the growth of over 40 AI startups and its international reputation insures Montreal's place as an AI metropolis.

Source: <https://mila.quebec/en/>



AI & Big Data

Machine Learning

A World Leader – One of the key components of Canada's leadership role in AI is its constant innovation in machine learning and its conjunction with the IoT. In terms of spending, Canada comes second only to the United States in machine learning and the Mila institute is a large part of that success.

Impact of the Pandemic – The pandemic has increased spending in machine learning and AI in general as innovations in this area presented real-life advantages for tracking the disease and preventing its spread. It is likely that such uses will become more widespread in the future.

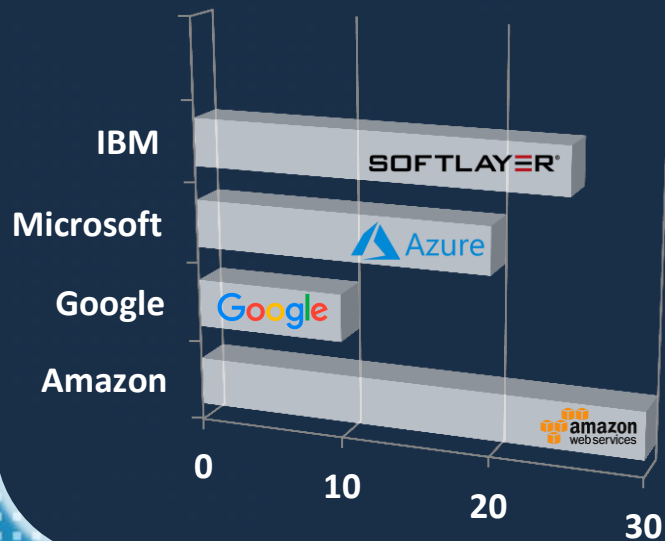
Canada's Armed Forces – The Canadian Government is working hand in hand with the private sector to enhance efficiency with machine learning. For instance, the armed forces are relying on machine learning and IoT for the maintenance of aircrafts. Lockheed Martin's C-130 are now equipped with hundreds of sensors producing fault codes on failing parts and the system can develop good practices for the maintenance of the aircraft. This is just one example of the Canadian government working with the private sector to develop new and more efficient technologies.



AI & Big Data

The Cloud

Cloud Share (%)



By 2023, it is estimated that public cloud computing spending in Canada will amount to USD \$10.3 billion (double from 2019).

In 2019, two-fifths of Canadian companies used cloud computing. The Covid-19 pandemic doubled that figure.

Canada has been a destination of choice to install data and cloud centres due to its geographical location. The colder climate and the rarity of earthquakes present optimal conditions for their installation.

Small to medium-sized Canadian businesses are the slowest to adopt the cloud, but the gap is slowly closing. Opportunities for foreign investment are mostly centred on those companies.

AI & Big Data

Data Management: The Example of the Data Science Network for the Federal Public Service

The Data Science Network – The Data Science Network is an initiative of Statistics Canada which stems from the need to form a community of “data science enthusiasts.” This initiative was put forth with the objective of creating a common space where academic, government, and private sector actors can share information about data science. With the Data Science Network, Statistics Canada hopes to better the use of data in Canada in general, with the final objective being to enhance security both at an institutional and individual level.

DATA SCIENCE NETWORK



POWERED BY
STATCAN STEWARDSHIP

Key Opportunities - Initiatives like this one aim at directing government policies and enlightening decision making of all sorts. This objective highlights that data management is a key component of public and private administration and reveals that opportunities in this area are bound to emerge in the next years. Once again, concern for Cyber Security will drive innovation and provide openings for investment.

AI & Big Data

Data Management: Opportunities

Opportunities in Data Management - Whereas small companies are slower to adopt data management infrastructures, it may be their best shot at competing with large tech companies. According to the Harvard Business Review, data management and the adoption of data software is giving midsize companies a way to compete with digital giants. By optimizing their activity, those innovations open opportunities for businesses willing to adapt and change in order to survive in a world dominated by large companies. Opportunities for foreign investments are certain to arise in that area for years to come.



Data Centres – Recently, Google and Digital Realty have both announced the implantation of large Data Centres in Canada and the rapid growth of data creation is bound to lead to the opening of more every year. Cloud regions are also necessitating more and more data centres.

2. Sub-Sector Analysis

Video Games & Digital Media

- Overview
- Historic Overview
- Major Players
- Key Trends



Video Games & Digital Media

Overview – The Canadian video game industry is the 8th largest in the world and is making some of the biggest games of the planet. With a strong esports scene and a thriving gaming industry, Canada positions as a world leader in the video game market, both in quality and in quantity.

Revenues of USD **\$3 billion** in 2020.

Esports is growing exponentially and promises to become the most important sector in the industry.

More than **50,000** full-time employees.

There are more than **700 game development studios** in Canada.



The number of gamers has increased as the result of physical distancing measures enforced to manage the **Covid-19 pandemic**

23 million Canadians are playing video games.

Video Games & Digital Media

Historical Overview

Provincial Government Incentives

In 1997, leading video game companies such as Ubisoft received incentives from the Quebec government to open in Montreal. Since 1997, Ubisoft Montreal has grown to be one of the largest studios by employee-count and expanded its operations with the opening of a new studio in Quebec city and Saguenay.



A Turn Towards Digital Media

After becoming a major innovation hub for video games, the Greater Montreal Area transformed and became focused more and more on attracting digital media companies and the Montreal scene developed into a major pole for 3D modeling and the film industry. Today, Toronto and Vancouver are also attracting major digital media businesses and are known world-wide for the quality of the ecosystem and governmental incentives. As in other ICT sub-sectors, investors are enticed by a highly qualified and low-cost workforce.

Video Games & Digital Media

Key Trends

Made in Canada – There is a strong video game culture in Canada which is reinforced by the fact that more than 80% of the country's gaming companies are controlled and owned by Canadians. It is a sector relying like no other on national expertise and it makes it particularly hard for foreign companies to make their mark.



Esports

– Esports is a relatively recent but major trend in the video game industry. Worldwide, there are more than 300 million persons watching or playing esports. During the pre-Covid year, the Entertainment Software Association of Canada (ESAC) estimates that over 30% of Canadians were engaged in esports in one way or another. In its study, the ESAC found that 15% of Canadian adults play esports and more than 20% of kids and teens have watched esports tournaments online.

- The fact that Toronto headquartered company GameSquare Esports has reported a 97% year-over-year revenue growth for Q1 2021 is testimony to the importance of this trend.

Video Games & Digital Media

Key Trends

Entertainment and Media:

- Third most filmed country in the world
- In 2018, film and television contributed \$12.8 billion and supported 181 thousand jobs in the industry
- Canada's digital media studios provide visual effects and animation for Hollywood blockbusters and Academy award-nominated films. Multimedia technologies that major studios rely on for films like Maya, Houdini and Harmony were developed here.



Key Institutions :

- Vancouver Film School
- Sheridan College (Toronto)
- School of Arts Animation and Design (NAD) (Montreal)
- Nova Scotia College of Art and Design University (Halifax)

Video Games & Digital Media

Major Players in Canada's Gaming Industry



Vancouver

BioWare™



ludia



hb studios

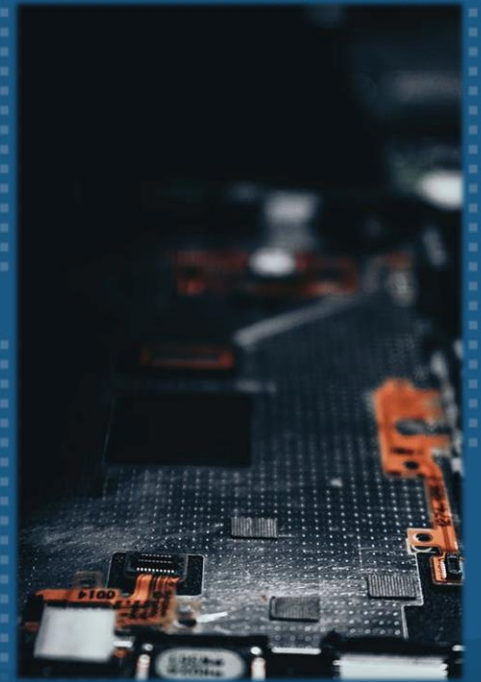
bE
HAVIOUR

Besides Canadian companies, international players like **Microsoft**, **Blizzard**, **Electronic Arts (EA)**, **Square Enix** and **WB Games** are also active in Canada .

2. Sub-Sector Analysis

Hardware

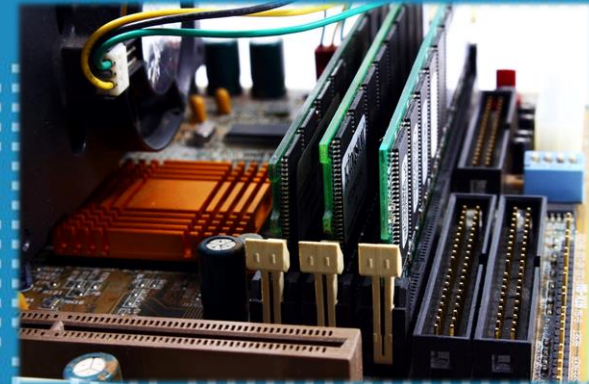
- Overview
- Leading Players
- Supply Chain
- Regulations



Hardware

Overview:

This subsector comprises establishments primarily engaged in: manufacturing computers, computer peripheral equipment, communications equipment, and similar electronic products, as well as components for such products.



Key Stats

- There are **2860** establishments in Canada involved in the manufacturing of electronic hardware
- In 2019, the top two provinces for manufacturing are **Ontario** (CAD \$3621 million) and **Quebec** (CAD \$1544 million).
- According to 2019 trade data, **Canada exported USD \$14.9 billion and imported USD \$51 billion in hardware.**

Hardware

Leading Hardware and Infrastructure Companies

3 Leaders

Celestica, CAE and Sierra Wireless are the top 3 Hardware companies in Canada. Celestica is the Canadian leader in Fintech and Medtech, while Sierra Wireless is also a leader in medtech.

The logo for SMART, featuring the word "SMART" in a bold, black, sans-serif font with a registered trademark symbol.The logo for CAE, featuring a blue stylized arrow pointing upwards and to the right, with the letters "CAE" in a bold, black, sans-serif font below it.The logo for SIERRA WIRELESS, featuring a red grid of dots forming a stylized shape above the words "SIERRA WIRELESS" in a bold, black, sans-serif font.The logo for Celestica, featuring a red grid of dots forming a stylized shape above the word "Celestica" in a bold, black, sans-serif font with a trademark symbol.

Hardware and Edtech

Smart technologies is lower in the list of Canada's top hardware companies, but remains a leader in hardware for Edtech. The company is currently owned by Foxconn but is headquartered in Alberta.

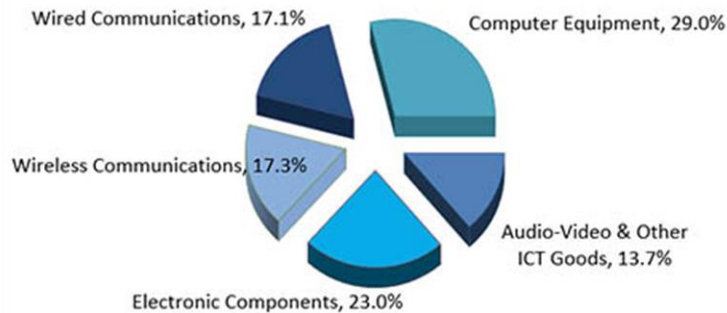
Hardware

Canada's Supply Chain

Exports

- The Canadian ICT manufacturing sub-sector relies heavily on the export market. About 99% of ICT products manufactured in Canada were exported in 2019.
- Canadian exports of ICT goods increased by 1.6% in 2018 to \$11.9 billion. Exports of electronic components and computer equipment increased the most (+\$676 million and +\$138 million, respectively), while communications equipment had the steepest decline (-\$171 million).

Companies by employee size, 2019



Export Trends

- Exports of ICT goods to the United States increased (+6.5%) to about \$8.5 billion in 2019 accounting for 71.4% of all ICT goods exported from Canada.
- Overall, Canadian exports of ICT hardware and services grew by 3.4% annually from 2013 to 2018 to reach \$22.9 billion.

Hardware

Regulations

Canada's Energy Efficiency Regulations

These apply to imported electronic products such as TVs, audio and video equipment and other electronic devices. The regulations outline the energy performance standard in terms of the maximum number of watts used while the device is powered off and powered on.

Energy Efficiency Verification Mark & Report

These are required to confirm that the energy performance of the electronic device has been verified. The mark must be granted by a certification body that is accredited by the Standards Council of Canada. A prominent certification body for electronic devices in Canada would be CSA, founded in Ontario in 1919.

Provincial Regulations

The provinces of Quebec, Ontario and British Columbia have their own energy efficiency regulations for electronic devices. Likewise, import taxes are different depending on the province of entry. All provinces have a unique tax rate and it can affect costs significantly.



3. Concluding Remarks

Concluding Remarks

- Key Takeaways
- Trade Shows and Major Events



Concluding Remarks

The Canadian ICT Sector

After a slower 2020, the Canadian ICT Sector is set to bounce back and grow from the 2019 figures. In fact, Canadian ICT spending is forecasted to reach more than USD 100 billion a year by 2024 and foreign investment will contribute significantly to this trend.

Every single ICT sub-sector was affected in one way or another by the Covid-19 pandemic and its long-term effects are still to be assessed. Still, we have been able to provide an overview of the ways in which the pandemic has modified the ICT landscape. For most sub-sectors, transitions have accelerated and the adoption of new technologies was forced by necessity. This has presented new challenges and opportunities. Here are the most important takeaways from our findings.



Source:

<https://www.idc.com/getdoc.jsp?containerId=CA45058320#:~:text=As%20a%20result%2C%20Canadian%20ICT,will%20reach%20C%24122%20billion.>



CIDEP
IDENTIFY QUALIFY CONNECT

VEDP

Concluding Remarks

Key Takeways

Cyber Security

- The pandemic and an increasing dependence on ICTs have resulted in more frequent cyber threats and vulnerabilities seem more exposed than ever before.
- Cyber security creates opportunities across ICT sub-sectors.
- Small and medium-sized businesses are particularly vulnerable and need outside expertise to face threats. The Canadian Government is investing massively to close this gap; this creates a friendly ecosystem for foreign investors.
- The perspective of a general Canadian *Rip & Replace* policy could provide multi-billion opportunities and this is a trend worth following closely.

Internet of Things

- Opportunities reside mostly in the transformation towards the 4.0 industry and in this area, Canada is well behind many of its counterparts.
- Home automation is also a significant trend to look out to, despite strong competition.
- IoT is finally to be regarded as one of the main sources of new data and is hence opening doors for companies involved in data management.

Concluding Remarks

Key Takeways

Fintech

- Canadian finance is extremely concentrated. The strength of the major banks makes collaboration with traditional institutions a necessity for anyone interested in implementing new tech in the financial world.
- While online and digital payments are already well implemented, new sub-sectors like regtech and proptech are booming and presenting ongoing opportunities.
- Wealth management has also boomed with the pandemic, but competition is fierce and companies like WealthSimple and Nesto are rapidly gaining market share.

E-Health

- While health is a provincial competence, the federal government is chaperoning initiatives in telemedicine and private companies are taking the lead when it comes to digitalizing health records and assuring high-quality e-health.
- As such, the growing fragmentation of the Canadian health system is opening never seen before opportunities, especially with provinces still looking to implement integrated digitalized health records and to close the care gap between Indigenous communities and the rest of the population.

Concluding Remarks

Key Takeways

EdTech

- Until recently, EdTech was about learning hardware and student platforms.
- The pandemic changed everything and put the focus on platforms like Zoom, Microsoft Teams, and Google Classroom as well as on the quality of online learning in general.
- The most important opportunities now lie in rendering online learning more efficient, more healthy and human and in developing better learning hardware.

AI & Big Data

- The Montreal Region and Canada are world leaders in AI and provide an ideal ecosystem.
- Canada is more and more seen as a perfect location for building cloud and data centres.
- Most of the world's major AI and data companies are already present on the Canadian soil, making it a very competitive sector.
- Canada is a must destination for AI and data companies, but one has to keep in mind the competition and challenges awaiting.

Concluding Remarks

Key Takeways

Video Games & Digital Media

- Clusters like Montreal, Vancouver and Quebec are still home to an important video game industry, but incentives are turning more and more to the digital medias.
- Esports and 3D modeling are not set to go away soon and were even helped by the pandemic. Those sub-sectors should increase activities by double-digit figures every year.
- While it presents interesting opportunities, one has to keep in mind that it's a market where almost all the large companies are already present.

Hardware

- Canada is a major manufacturer of hardware and Ontario is full of small to large companies involved in that sector.
- There is still a significant gap between needs and production as Canada still relies on more than USD \$50 billion of hardware imports every year.
- The federal government is working to palliate this gap by investing massively in made in Canada hardware. This could present relatively low-cost opportunities for foreign companies looking to manufacture in Canada.

Concluding Remarks

Trade Shows and Major Events

Big Data x AI Toronto Conference:

Providing a unique platform for IT decision-makers and data innovators to explore and discuss insights, showcase the latest innovative projects, and connect with the best and brightest minds in the industry.

Toronto, Ontario

October 13-14, 2021



Collision Conference:

Collision is the meeting place for tech and media leading companies. Collision unites more than 100 partners, 1,260 startups, and 38,000 attendees from more than 140 countries.

Toronto, Ontario

June 20-23, 2022

World Summit Americas:

Top AI brains giving their predictions for 2021

Heated discussions on AI and ethics and AI4good, applied solutions for enterprise and hands-on workshops

Montreal, Quebec

October 13-14, 2021

Concluding Remarks

Trade Shows and Major Events

Canada's Medtech Conference

Attendees will hear from and engage with high-profile health system leaders and network with colleagues in the medtech industry. Previous conferences have ghosted Ministers of health, Hospitals CEOs and other influential thought leaders.

October 5-6, 2021

Virtual conference

lot People First Summit

Municipal leaders in human capital and solution providers from across Canada and the world will be discussing the future of work in the public sector.

May 2022 (Date TBA)

Location TBA

IoT Intelligent Cities Summit

- Leading global municipal professionals and tech experts will share ideas and case studies on how to utilize new technology to make cities more intelligent – making them more efficient, offering better city services and improving quality of life.

May 2022 (Date TBA)

Location TBA

IoT Health Care Summit

Healthcare professionals and solution providers will be sharing new developments, case studies, and ideas that help the healthcare sector move forward.

May 2022 (Date TBA)

Location TBA

Concluding Remarks

Trade Shows and Major Events

Canadian Fintech Summit

Attendees will compete for investment opportunities and partnerships in a pitch battle, listen to powerful founders, CEOs and industry leaders share insights on the currently challenges and opportunities for the Canadian fintech industry. Attendees will also be able to engage in hands-on learning workshops led by industry leaders to deepen their knowledge on fintech and learn how to adapt turn current issues into the solutions of tomorrow.

Toronto Ontario

April 5-7, 2022

Canadian Higher Education Information Technology

It's the only national conference for higher education IT professionals. Given the changes in learning due to the COVID-19 pandemic, the conference will be discussing the exciting changes in e-learning that should persist and be further developed, as well as ways to improve remote learning.

May 2022 (Date TBA)

Location TBA

