



Canadian Blockchain Census 2019

Part I: Measuring Canada's Blockchain Ecosystem

OCTOBER 2019

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Foreword

Canada is uniquely positioned to play a leading role in the global digital economy. To achieve and maintain such a position, it is imperative that we understand the size, scale, and scope of Canada's national innovation ecosystem, and this understanding must include Canada's blockchain innovators.

The Chamber of Digital Commerce Canada provides dedicated support to Canada's emerging and rapidly growing blockchain ecosystem. As the national voice for Canada's blockchain innovators, the Chamber promotes the acceptance and use of digital assets and blockchain-based technologies.

The Chamber is pleased to publish this report, providing readers with the first quantitative study of Canada's national blockchain ecosystem. We hope this document serves as a resource to inform and support Canada's business leaders and policy makers in their efforts to grow and strengthen Canada's innovation ecosystem in a manner that will enable more seamless, user-friendly experiences while protecting the privacy and security of important data.

We are grateful to Canada's blockchain ecosystem respondents for enabling us to bring this story forward. Furthermore, we commend the Blockchain Research Institute and Accenture's research support; their collaboration has ensured that Canada's blockchain innovators could be counted and seen.

We hope this report will serve as a catalyst for proactive dialogue, engagement of multiple stakeholders, and increased support for the bright minds leveraging blockchain technology to build Canada's digital future.

Tanya Woods

Managing Director

Chamber of Digital Commerce Canada



For several years, global technology leaders have publicly stated that blockchain technology will be the foundation of a global innovation economy, one that is open, inclusive, and respectful of human rights, particularly the individual's right to privacy, digital security, and ownership of personal data and intellectual property (IP). Blockchain technology is expected to be a platform for securely running technologies such as artificial intelligence (AI), robotics and autonomous machines, Internet of Things (IoT), additive manufacturing, user-permissioned big data analytics, and peer-to-peer (P2P) networks for communications and financial transactions.

Canada is well positioned to be a global leader as the digital economy advances, with clusters of blockchain expertise running from the Yukon to Nova Scotia, and centers of blockchain excellence forming around Canada's industries. This research report provides a quantitative view of the blockchain landscape in Canada, based on a survey of 200 respondents and interviews with nearly two dozen people in the blockchain industry and government. While the research showed that the blockchain industry is diverse and growing in Canada, it also surfaced challenges regarding access to funding and business services, and uncertain regulatory environments.

There is a need for public education to support the blockchain innovation ecosystem. We agree with one respondent's comment that "Canada gets the importance of AI. We don't get blockchain." While many business and government leaders understand AI at a basic level, there is a need for more dialogue to highlight the opportunities blockchain could unlock.

We hope this report catalyzes positive dialogue in Canada. The Chamber of Digital Commerce Canada is an important forum for such dialogue. It's an integral organization for blockchain advocacy and policy development in Canada.

As a leading global research institute focused on blockchain technology, we are delighted to be collaborating with Chamber of Digital Commerce Canada and Accenture on this report. Our hope is that the report will help advance Canada's stake in this global field. We welcome all feedback on this report as we prepare its sequel.

Don Tapscott

Executive Chairman

Blockchain Research Institute



Executive Summary

Canada's blockchain ecosystem has not been measured in detail before. This report establishes the first quantitative ecosystem study of the Canadian blockchain ecosystem and identifies the needs of the various stakeholders.

This report provides Canada's leaders and ecosystem stakeholders with a baseline measurement of the ecosystem from which to begin observing annual changes and growth over the next five years and beyond. Here is a distillation of initial key findings.*

The Canadian blockchain industry is national

Over 400 ventures are leveraging distributed ledger technologies (DLT) and related innovations for building new value propositions with blockchain innovation. Ontario (52%) and British Columbia (29%) are the main micro-clusters of activity, with Quebec (9%) and Alberta (8%) growing in prominence in the Canadian landscape.¹

Canada's blockchain ecosystem attracts investment

International Data Corporation (IDC) expects worldwide spending on blockchain solutions by large companies and governments to hit almost US\$16 billion in 2023. Canada's spending on blockchain is projected to increase exponentially, from US\$72 million in 2019 to US\$644 million by 2023, with an impressive five-year compound annual growth rate (CAGR) of 73.3 percent—higher than any other country.²

This figure excludes investments by early-stage blockchain companies. One quarter of Canadian entrepreneurs reported that they have each spent in excess of \$1 million over the past five years on blockchain innovation within their respective enterprises.³

Financial research company Autonomous Research estimates that, since 2017, US\$20 billion was raised globally in blockchain crowdfunding events (i.e., initial coin offerings) with US\$12 billion in 2018 alone.⁴ Venture capital and private investments in blockchain have topped US\$10

billion over the past five years. Half of these investments went to the United States and Japan, with Canada start-ups receiving approximately US\$220 million (8th place globally).⁵ The total market capitalization of blockchain platforms is currently around \$200 billion.⁶

Canada's blockchain ecosystem creates high paying jobs

The average salary in Canada in 2018 was \$52,052.⁷ According to our survey, the average salary of a blockchain worker in Canada is \$98,423, nearly double the Canadian national wage average.⁸ Neuvoo pegs the Canadian average even higher, at \$133,750.⁹ The difference in average salary can be explained by the larger sample of start-up respondents in our analysis.

Canada's blockchain ecosystem is facing challenges to scale

Approximately 60 percent of survey respondents believe that Canada's blockchain ecosystem needs support to remain competitive.¹⁰ Survey respondents cite legal and regulatory issues (39%) and funding gaps (35%) as the top two challenges where they welcome support.¹¹

Research participants across Canada revealed a need for a deeper dive into policy and regulatory issues in a second research paper to be published later this year, "Canadian Blockchain Census 2019: Part II."

Overall, the report presents a compelling picture of opportunity for Canada to leverage its existing blockchain ecosystem to advance national priorities in the public and private sectors. The pace of growth in the global innovation ecosystem is accelerating, and the time to develop a road map and national plan to harness this potential in Canada is now.

*All amounts are stated in Canadian dollars unless indicated otherwise (US\$).

Blockchain Primer

Put simply, a blockchain is software that functions as a shared ledger distributed across nodes of a communications network.¹² What distinguishes this ledger from traditional shared databases, registries, or accounting software is its tamper-evidence nature. Parties can conduct and record transactions of digital assets peer to peer, and no one can alter or undo those transactions without a majority of the network's approval.¹³ Once a transaction is approved, a record of it is encrypted and time- and date-stamped. This capability is a significant advancement to the Internet as we know it today.

This technological advancement enables participants to trade, track, and trace nearly any asset, be it tangible or intangible, from its origin to its current holder—and they can do so quickly with reliable results.¹⁴ These assets can represent money, such as the digital currency bitcoin. They can also represent documentation of a person's national identity, the deed to real estate, or a patent of an invention; financial instruments such as stocks and bonds; or digital provenance of precious objects such as diamonds and Stradivarius violins.¹⁵

The applications that innovators are building on top of blockchain networks are already transforming how businesses and governments manage things of value, including stakeholder votes and health care data today. These applications are improving organizational processes by increasing efficiency, and promoting transparency and accountability in both private and public sectors. Blockchain technology is one of the most important inventions of our time.¹⁶ For more, see the Chamber of Digital Commerce Canada's "[Strategizing for the Future: Building a National Framework for Blockchain in Canada](#)".¹⁷



Methodology

Canada's blockchain ecosystem has not been well understood, in part, because it has not been well measured. While secondary research can offer some insights, primary research is imperative to ensure that the most accurate information is available to those who want to understand the potential and the challenges of emerging industry opportunities.

Over the last five months, the Blockchain Research Institute, with research support from Accenture, launched an online survey of the blockchain ecosystem and conducted interviews, company analysis, and secondary research to develop this report. Ignite Labs consulted on the survey instrument and research plan.

For the purpose of this research, the ecosystem has been defined as all activity necessary to the funding, development, adoption, and governance of blockchain technology in Canada's economy and society. Such activity included education, advocacy, policy and standards development, and regulatory compliance and enforcement; and it covered all aspects of technology infrastructure, from protocols and decentralized public platforms to private networks and distributed applications.

Online Survey

An online survey was conducted in English and French, targeting individuals at academic institutions, government offices and regulatory agencies, nonprofit organizations, and private sector enterprise—both blockchain-based or blockchain-focused start-ups and blockchain projects within established businesses—including professional service firms, incubators/accelerators, independent consultants, and investors in the blockchain ecosystem. Enterprise adopters of the technology were targeted. Individual end users of the technology, such as holders of digital currency and users of digital currency exchanges, were not targeted.

Of the 200 respondents, 158 surveys were complete and counted. The survey contained 94 questions, but respondents completed only those questions pertinent to their profile: academia, government, nonprofit, and private sector. Where necessary, secondary sources were cited to elaborate upon survey findings. While the survey sample was not large in this initial census, we believe that it was broad and balanced, and that the results are a fair and accurate representation of the ecosystem. In some cases (i.e., academia, government, and large enterprise), the survey sample was deemed too small to be statistically representative; however, we have reported the results in real terms as we believe the data provide insight into these markets.

Interviews and Statements

Follow-up interviews were conducted with, or written statements and messages were received from, two dozen individuals—entrepreneurs, leaders in large corporations, government policy makers, regulators, and thought leaders—all active in the ecosystem.

Company Analysis

To compile the list of companies active in the Canadian blockchain ecosystem, primary sources (e.g., local blockchain experts) and secondary sources (e.g., Capital IQ, Crunchbase, LinkedIn, ecosystem blogs, and company websites) were consulted. Of the 450-plus companies mentioning blockchain in their business description, nearly 400 organizations that contributed to the Canadian ecosystem were identified, company's function was verified, and any business that, upon scrutiny, didn't have a clear blockchain function was excluded.

Companies were categorized according to their function within the blockchain ecosystem. There were 12 distinct functions falling into five categories. The first category focuses on the financial system innovation: digital asset infrastructure, financial services and trading platforms, and cryptocurrency mining. The second focuses on building out blockchain technology for wider adoption by creating blockchain-based products through cloud services, big data, and security; transportation, supply chain, and manufacturing; communications, media, and entertainment; identity and authentication solutions; tokenized network and investment solutions; and energy, mining, and resources. The third area supports ecosystem growth by means of blockchain consultancy firms and infrastructure and services providers. The fourth area caters to start-up enablers: blockchain consultancies and facilitators; financial catalysts; and venture capital, private equity, angel investors, and incubators. The fifth group consists of regulatory bodies, advisors, and law firms. See Appendix C for details.

Review and Feedback

The report underwent several rounds of reviews, in which executives of the Chamber of Digital Commerce, the Blockchain Research Institute, Accenture, and external independent reviewers had an opportunity to provide commentary and critical feedback on the analysis of the data and the presentation of results. Several interviewees also reviewed the document prior to publication.

This report is the first of two. We welcome constructive feedback on this research as well as recommendations for addressing the implementation challenges that blockchain ventures are facing in Canada. Please e-mail us at Canada@DigitalChamber.org and use "Canadian Blockchain Census 2019" in your subject line.

Canada's Legacy of Blockchain Innovation

Canada has a history of blockchain-related innovation. Canadian entrepreneurs have grabbed global headlines with projects in the open decentralized ecosystem as well as in the permissioned enterprise space. The following diagram outlines some of the major events since the early days of blockchain industry in Canada.



Anthony Di Iorio starts The Toronto Bitcoin Meetup Group in November. Vitalik Buterin, the future inventor of Ethereum, attends the first meeting.



Bitcoin Embassy launches in Montreal as the first physical space in Canada exclusively for the bitcoin community.



In October, Bitcoiniacs launches the world's first bitcoin ATM at the Waves Coffee House in Vancouver.



Canada's first bitcoin association, Bitcoin Alliance of Canada, launches. Bitcoin Alliance later re-brands to become the Blockchain Association of Canada (BAC) in 2017.



In November, Vitalik Buterin authors the Ethereum white paper, proposing "a next-generation smart contract and decentralized application platform."



In January, Decentral launches in Toronto as Canada's first home for Ethereum software development and other crypto related ventures.



Canada's public and private sector leaders launch the world's first digital identity and authentication coalition, Digital ID and Authentication Council of Canada (DIACC).



In April, the Senate of Canada's Standing Committee on Banking, Trade, and Commerce initiates a study on the use of digital currency.



Rubix launches the world's first enterprise blockchain consulting team inside one of the "Big 4" in Toronto.



Ethereum releases software. Ongoing development is funded by an online crowd sale, officially registered in Switzerland.



Trust BIX launches the first sustainable beef supply chain traceability project.



Bank of Canada launches Project Jasper in collaboration with financial institutions, and other market participants to understand distributed ledger technologies.



The Muskoka Group Manifesto is published following the first meeting in Canada of international industry leaders to address digital currency and blockchain governance issues.



Blockchain Canada launches and hosts Canada's first Ethereum hackathon and pitch competition for the Government of Canada.



Alberta Treasury Branches (ATB Financial) is the first Canadian financial institution to test the use of a permissioned DLT for cross-border settlement and real time payments. Canadian-authored, global best-selling book, Blockchain Revolution, is published.



3iQ files confidential preliminary to apply for the first major exchange publicly-listed closed end bitcoin fund in the world.



Impak Finance, in Montreal, launches Canada's first compliant (non-security) initial coin offering (ICO). TokenFunder launches Canada's first fully compliant security token offering (STO) with OSC LaunchPad support.



Don and Alex Tapscott launch the Blockchain Research Institute, Canada's first global think tank dedicated to realizing the new promise of the digital economy.



George Brown College becomes the first Canadian post-secondary institution to offer a full-time blockchain certificate program.



BAC and Chamber of Digital Commerce launch the Chamber of Digital Commerce Canada, led by Tanya Woods. The Chamber Canada serves as the first national industry advocacy group for blockchain in Canada.



The governments of Canada and the Netherlands announce the launch of a pilot project for paperless travel between the two countries.



Canadian Securities Administration and Investment Industry Regulatory Organization of Canada jointly publish the first public consultation paper, "Proposed Framework for Cryptoasset Trading Platforms."



Quebec's energy authority rules that Hydro-Quebec must maintain its existing rates for digital currency mining and make available 300 megawatts for digital currency mining.



TokenGX becomes Canada's first crypto-asset (token) Exempt Market Dealer registered to permit fully compliant security token offerings for other issuers on an on-line platform.



The Chamber of Digital Commerce Canada launches Canada's first national election strategy on blockchain adoption to guide all political parties for Election 2019.



The first Alberta Blockchain Week showcases the incredible progress of blockchain technologies within the provincial ecosystem.



The Chamber of Digital Commerce Canada and the Blockchain Research Institute, with research support from Accenture, release the first-ever Canadian blockchain industry report measuring the size, scale and scope of Canada's blockchain innovation ecosystem.

The State of the Canadian Blockchain Ecosystem

Since its beginnings over a decade ago, blockchain technology and distributed ledger technology (DLT) are among the most talked-about technological advances of our time. Governments, nonprofits, academics, enterprise leaders, and entrepreneurs have experimented and applied it across a variety of use cases in multiple industries, gaining unprecedented efficiencies and disrupting the status quo business models and systems processes.

Worldwide spending on blockchain solutions by companies and governments is skyrocketing; IDC projects it to hit almost US\$16 billion in 2023. Canada's spending on blockchain is expected to increase exponentially, from US\$72 million in 2019 to US\$644 million by 2023, with an impressive five-year CAGR of 73.3 percent—higher than any other country.¹⁸

This figure excludes investments by early-stage blockchain companies. Financial research company Autonomous Research estimates that, since 2017, US\$20 billion was raised globally in blockchain crowdfunding events (i.e., initial coin offerings) with US\$12 billion in 2018 alone.¹⁹ Venture capital and private investments in blockchain have topped US\$10 billion over the past five years. Half of these investments went to the United States and Japan, with Canadian start-ups receiving approximately US\$220 million (8th place globally).²⁰ The total market capitalization of blockchain platforms is currently around a \$200 billion.²¹

Canada lays claim to some notable success stories. The launch of the Ethereum project, most often credited to Canadians including Vitalik Buterin in late 2013, has become the world's second largest blockchain network.²² Vancouver-based Dapper Labs created the popular online game, CryptoKitties, launched in October 2017 at an Ethereum hackathon in Waterloo, Ontario. CryptoKitties demonstrated the potential of non-fungible tokens that were not securities.²³ The blockchain-based digital identity service, Verified.Me, has also been developed by Toronto-based SecureKey Technologies in collaboration with the

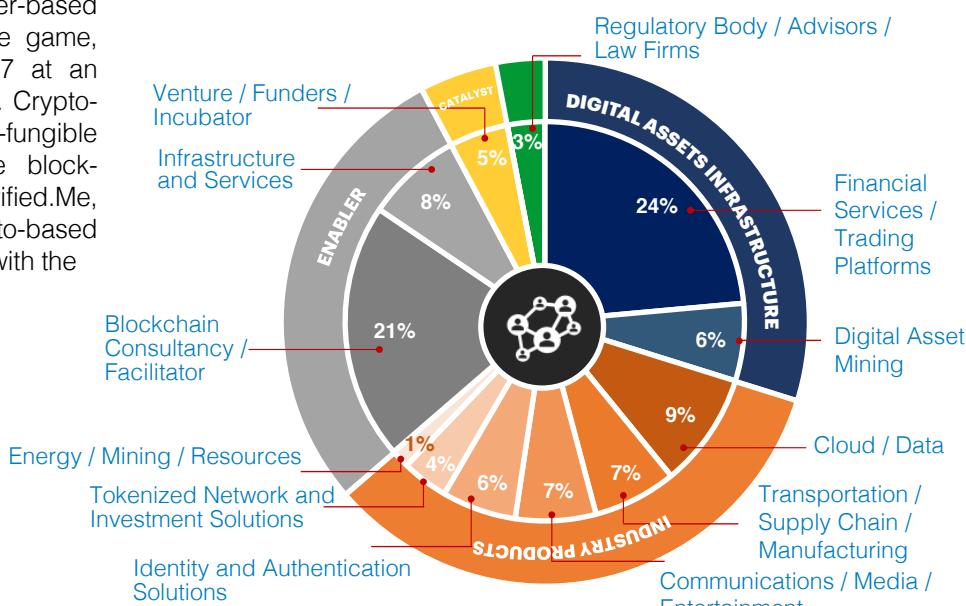
CANADIAN BLOCKCHAIN COMPANIES' FOCUS AREAS

Source: Accenture Research analysis of 400+ Canadian companies, Aug. 2019.

Digital Identity and Authentication Council of Canada (DIACC), the Command Control and Interoperability Center for Advanced Data Analytics, and Canada's leading financial institutions—Bank of Montreal, CIBC, Desjardins, National Bank of Canada, Royal Bank of Canada, Scotiabank, and TD Bank Group.²⁴

As we enter the last quarter of 2019, the Canadian blockchain community has a renewed sense of optimism. The narrative on blockchain is also shifting in corporate boardrooms and executive briefings, consistent with global trends. The World Economic Forum's (WEF) July 2019 global blockchain report states that, "when done right, blockchain is all about rethinking business models, rethinking relationships between companies and between companies and customers, and is, at its heart, a strategic change effort." The WEF "framework helps organizational leaders to confidently evaluate the relevant opportunities of blockchain technology."²⁵ In late 2018, WEF also acknowledged projections that 10 percent of the world's GDP could be stored on blockchains by 2025.

This report profiles some of the leading innovators that are adding value in the Canadian blockchain community. The list is not exhaustive, as several notable blockchain projects are not yet public knowledge; rather, we seek to reflect the Canadian blockchain community's energy and momentum. We found nearly 400 companies that are serving a function to advance and contribute to the growth of Canada's blockchain ecosystem. For more information, see Appendix C.



One of the major focus areas for Canadian companies is digital asset infrastructure (30%). Financial services and trading platforms represent 24 percent, and digital asset mining represents six percent of activity in Canada's blockchain ecosystem.²⁹

Blockchain-based products and services represent 34 percent of the Canadian ecosystem: cloud computing and data services (9%); transportation, supply chain, and manufacturing (7%); communications, media, and entertainment (7%); identity and authentication solutions (6%); tokenized network and investment solutions (4%); and energy, mining, and resources (1%).

Enablers represent 29 percent of the Canadian ecosystem: blockchain consultancies and facilitators (21%), and blockchain infrastructure and related services (8%). Lastly, the smallest section of the Canadian ecosystem consists of industry catalysts (8%): venture capitalists and incubators (5%) and regulatory bodies, advisors, and law firms (3%).

Innovation by Region

Our research shows that across Canada, provincial trends and activities are emerging. More than 400 blockchain-related companies are operating in Canada, with concentrations in Ontario (52%); British Columbia (29%); Quebec (9%); Alberta (8%); and Nova Scotia, Newfoundland and Labrador, and Prince Edward Island (2%) combined. Below we discuss the breakdown by region.

Western Canada

Approximately 37 percent of all Canadian blockchain activities take place in Western Canada. Perhaps its best-known crypto brand is CryptoKitties, developed by Dapper Labs of Vancouver.²⁶ Most of the ecosystem activity focuses on financial services, trading platforms, and crypto mining activity on the coast. A micro-cluster is emerging in Vancouver, with such start-ups as Neptune Dash, which owns and operates digital currency infrastructure assets.²⁷

Several companies focus on bitcoin or other digital asset and digital currency applications dedicated to supporting marketplace intelligence, risk assessment, and other such functions. For example, Blockchain Intelligence Group focuses on digital currency-agnostic search and analytic tools for law enforcement, government, financial, and retail sectors to analyze and monitor digital currency transactions.²⁸

The second area of activity is transportation and supply chain. These companies focus on asset tracking and streamlining the supply chain. Vancouver-based Tru-Trace is one of the better-known players in this space; it is developing an integrated blockchain platform that registers and tracks IP for the cannabis industry.²⁹ Rubikon Blockchain Corp.'s CertiCraft is another company in the cannabis supply-chain domain.³⁰ Vancouver-based BTL Group demonstrated how BTL's Interbit blockchain platform technology could drive down costs of energy trading in collaboration with Austria's Wien Energie GmbH.³¹

In Alberta, the ecosystem is actively innovating supply-chain solutions for petroleum, agriculture, and other natural resource sector applications. For example, GuildOne and R3 have partnered to develop a blockchain royalties distribution solution on GuildOne's Energy Block Exchange.³² GuildOne has been working with some of the world's largest petroleum companies to advance payment technologies on their systems using blockchain.³³ In addition, Blockchain Royalty Corp. provides an asset registry and revenue verification system for the royalty payments market through the implementation of blockchain technology for the energy industry.³⁴ In agriculture, TrustBIX has led globally with its "gate to plate" solution for beef traceability using blockchain technology.³⁵ Alberta Provisions, a Calgary-based business with brewing companies in Banff, Calgary, Edmonton, and Jasper, is also leveraging blockchain technology to provide consumers with information on the provenance of its beers.³⁶

In Saskatchewan, Dominion Bitcoin Mining Company, founded in 2013, sources and stores bitcoin in proprietary digital wallets, providing legal and transparent transaction records for its clients.³⁷

In Manitoba, most activity involves digital asset mining. For example, 83 North and Block Leasing have partnered to create Manitoba Bitcoin Mining, which not only runs its own crypto mining operations but also leases some of its mining capacity to customers.³⁸ Where possible, this Swan River-based start-up recycles the heat generated from mining to reduce its costs, boost its revenues, and protect the environment.

Central Canada

The highest concentration of blockchain activity is in Ontario (52%). Toronto is a financial hub, not only of the province, but also for Canada as a whole. Blockchain activity in this city aligns with most investments in blockchain innovation in the financial services segment.

As a result, many trading platform providers and blockchain consultancy firms have operations in the city. Some of the more well-known companies operating in the province include Coinsquare and Coinberry. Coinsquare operates a foreign exchange and trading platform for bitcoin, ether, and gold for desktop, tablet, and mobile devices.³⁹ Coinberry is a trading platform registered with Financial Transactions and Reports Analysis Centre of Canada for buying and selling digital currencies using Canadian dollars.⁴⁰

Other activity includes the project between Toronto-based Sprott and Oklahoma-based APMEX to launch OneGold, an online platform for investing in digital bullion that went live in November 2018.⁴¹ Companies in the digital identity and cloud/data field are also emerging in the city, with such providers as Graph Blockchain, which develops, markets, and implements private blockchain database management solutions.⁴²

In Ottawa, innovators are focusing on cloud/data, cybersecurity, and government technology solutions. Crypto4A is one such provider that aims to improve cybersecurity assurance for cloud, IoT, blockchain, connected-vehicle-to-everything (V2X) communications, and military application deployment in today's on-premise and software-as-a-service-based environments.⁴³ Brane Capital, a fintech company focused on the emergent digital asset market, has the tools, systems, and processes to enable large financial institutions to offer custody services securely and rapidly, anywhere on the planet.⁴⁴

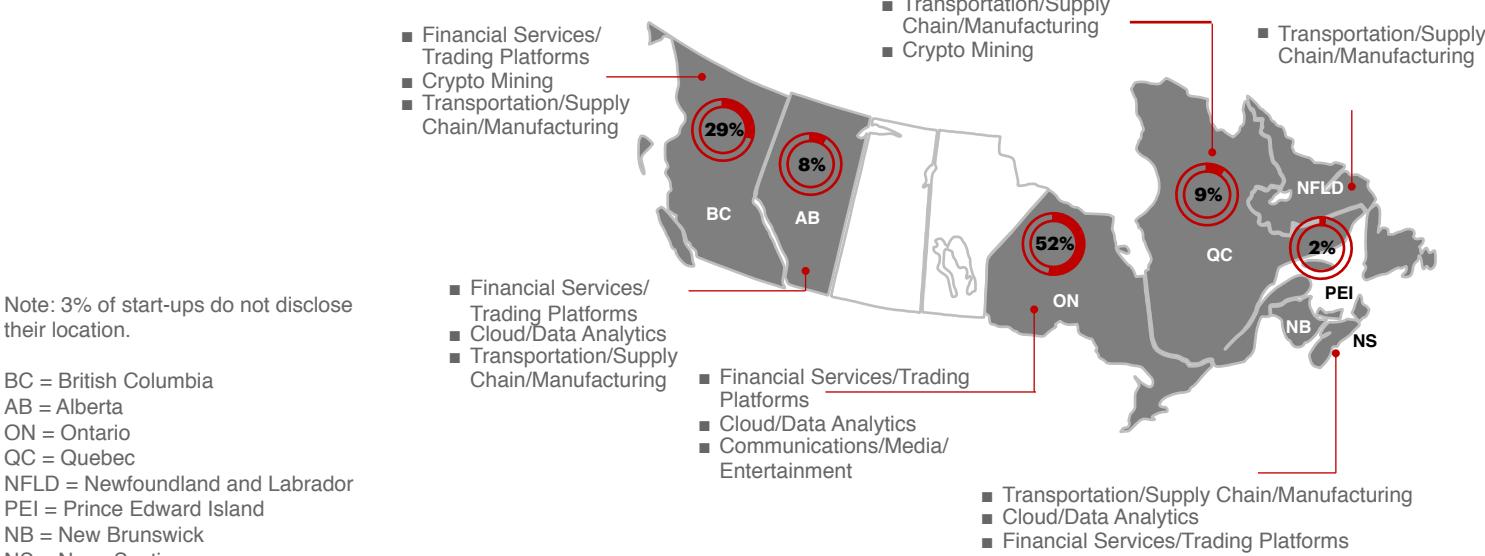
Montreal resembles Toronto with many blockchain providers focusing on trading platforms. We also see a strong focus on transportation and supply-chain solutions. Consider GreenStream Technologies, a platform provider that is enabling licensed cannabis producers, online cannabis merchants, customers, and government entities to transact, track, access, share, and authenticate legal exchange of cannabis throughout the supply chain.⁴⁵ Another Montreal-based organization is Catallaxy, dedicated to blockchain research and development (R&D), applied cryptography, digital assets, strategic support, education, and training.⁴⁶

Operating out of Brossard is Bitfarms, a prominent blockchain infrastructure company.⁴⁷ Bitfarms provides computing power to such cryptocurrency networks as Bitcoin and Litecoin through its five computing centers (a.k.a. "farms") across Quebec.⁴⁸

Eastern Canada

In Nova Scotia, companies are focusing primarily on supply-chain solutions. For example, the Halifax-based Peer Ledger is helping parties to collaborate on protecting human rights and safety, minimizing environmental impact, and reducing counterfeiting in their global supply chains.⁴⁹ Blockchain products are also found in the communications, media, and entertainment space, including Peerplays gaming platform.

Top 3 Applications by Province



Source: Accenture Research, Aug. 2019.

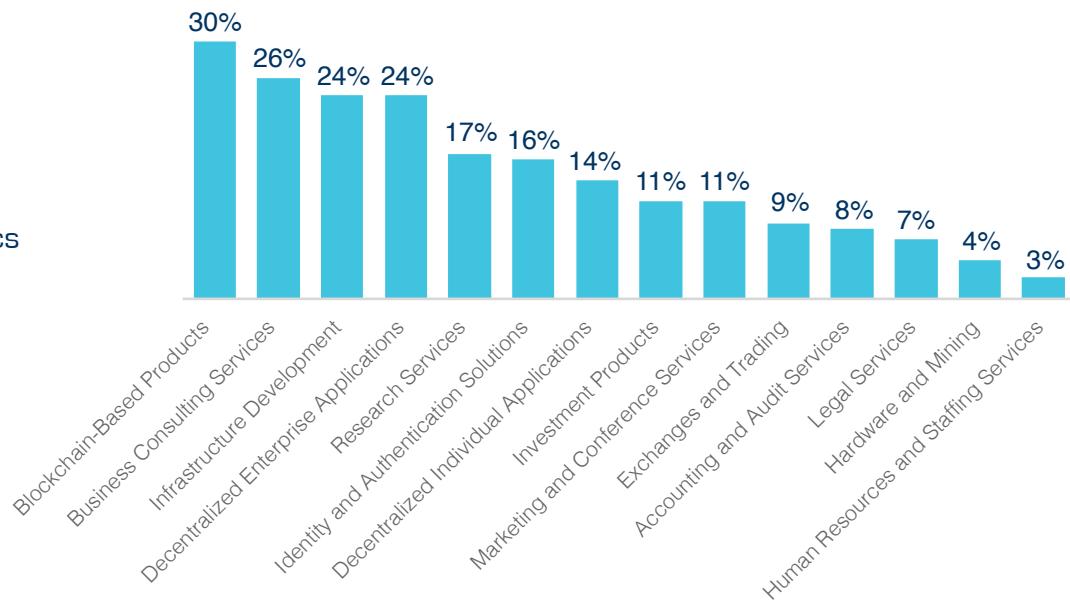
Scope and Size by Sector

We asked survey respondents about their products and services. The largest number described their offerings as blockchain-based products (30%), followed by business consulting services (26%), infrastructure services and applications (24%), decentralized applications for enterprise (24%), research services (17%), identity and authentication solutions (16%), decentralized applications for individuals (14%), investment products (11%), marketing and conference services (11%), exchanges and trading capabilities (9%), accounting and audit services (8%), legal services (7%), hardware and mining products and services (4%), and human resources and staffing services (3%).

What products and services do you sell?

Respondent Demographics

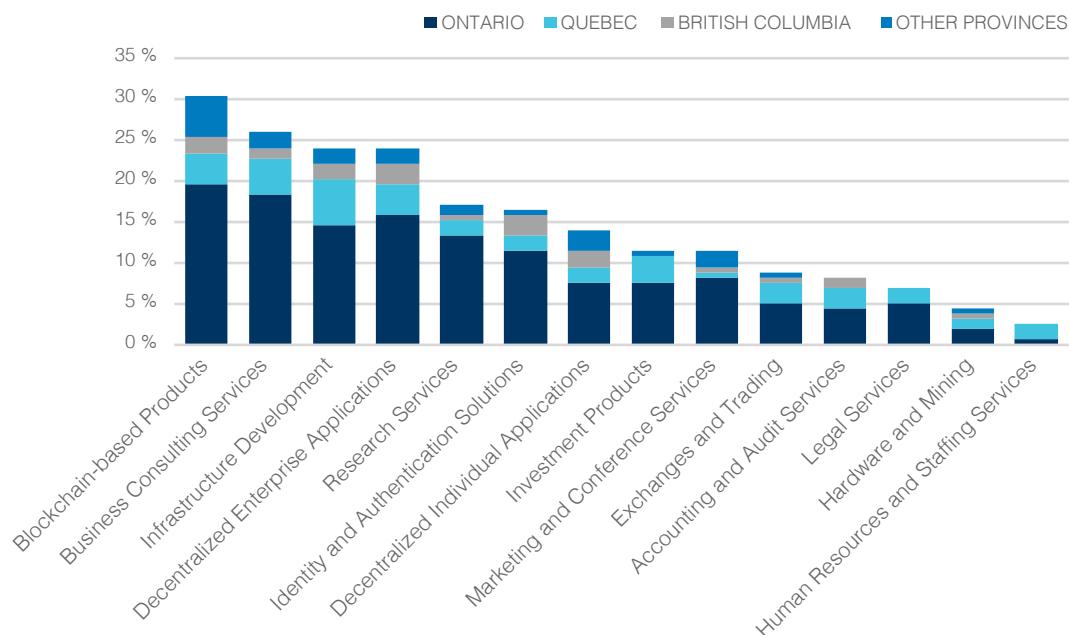
Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.



Data and research show several emerging provincial hubs: Ontario as a hub for blockchain-based products, Quebec as a hub of infrastructure services and applications, and British Columbia as a hub for decentralized applications for enterprise as well as identity and authentication solutions.

Provincial Breakdown

Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

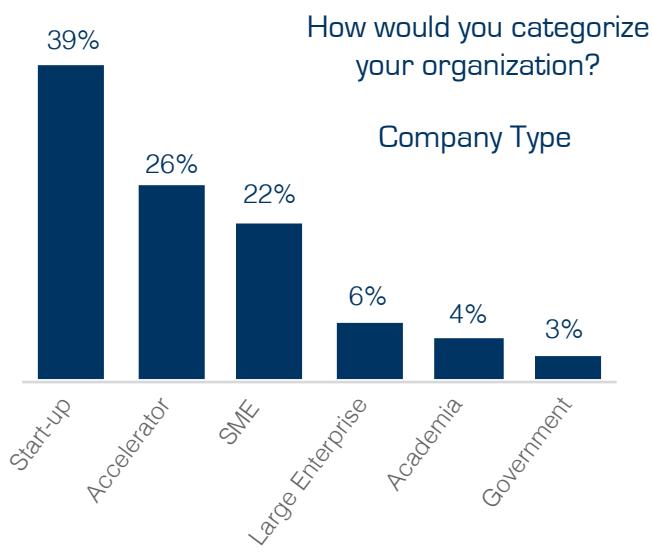


Private Sector

Canada's private sector includes small and medium-sized enterprises (SMEs), which encompasses the start-up community, as well as large enterprises. As of December 2017, there were 1.18 million employer businesses in Canada.⁵⁰ Of these, 1.15 million (97.9%) were small businesses, 21,926 (1.9%) were medium-sized businesses and 2,939 (0.2%) were large businesses.⁵¹ In this section, we look at the private sector blockchain companies that participated in our survey.

Of all respondents, 96 percent were from Canada and four percent from elsewhere in North and South America. Within Canada, respondents were based largely in Ontario (63%), Quebec (21%), British Columbia (9%), Alberta (4%), Saskatchewan (1%), and Nova Scotia (1%). Outside Canada, respondents were from the United States (2%) and Guatemala (1%).

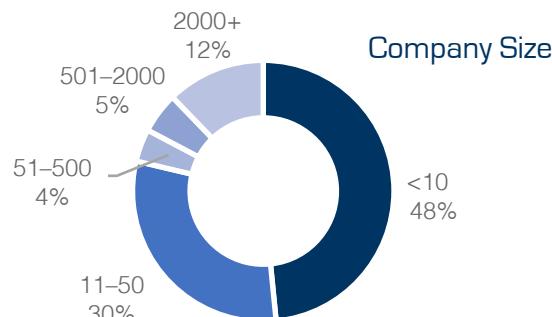
Of the respondents, 39 percent were start-ups. The rest fell into one of these categories: accelerators including consulting, venture capitalists, angel investors; law firms; small to medium-sized enterprises (employers with fewer than 500 employees); large enterprises; academia; and government.



Source: CDCC
Canadian Blockchain Census
Survey, Aug. 2019.

Almost half of the companies had fewer than 10 employees and just over 20 percent of them had more than 50 employees. Most respondents held senior positions within their organizations, 81 percent being company leaders, and 15 percent managers, and four percent junior staff contributing their views.

How many people are employed by your organization in Canada?



Source: CDCC
Canadian Blockchain Census
Survey, Aug. 2019.

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Canadian Blockchain Census
Survey, Aug. 2019.

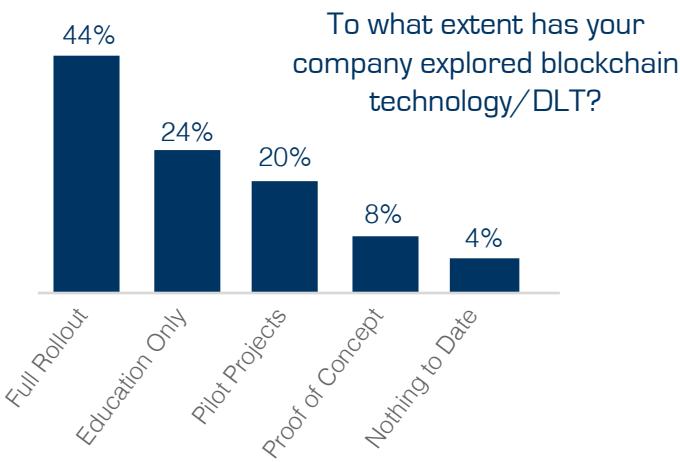


Small and Medium-Sized Enterprises

Businesses that employ fewer than 500 employees employ 89.6 percent of the population, contribute about 100,000 new jobs every year to the Canadian economy, and account for 52.5 percent of the country's gross domestic product.⁵² They are the engines of the economy, and their ingenuity is essential to Canada's innovation.

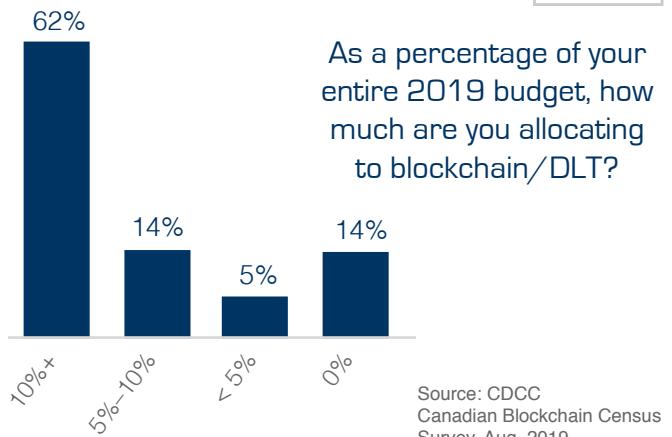
Our survey indicated a majority of SMEs have experimented with blockchain technology over the past five years. Twenty-five percent of our SME respondents each reported spending over \$1 million on blockchain projects and expected to increase this amount over the next few years as the space matures. Most of the investment funding on blockchain projects was reported to be coming from their technology budget.

When asked about the extent the respondents' companies had explored blockchain/DLT, we found that 44 percent of SMEs have completed a rollout, 24 percent concentrated on education, 20 percent ran pilot projects, eight percent did at least one proof of concept, and four percent have yet to move into the area.



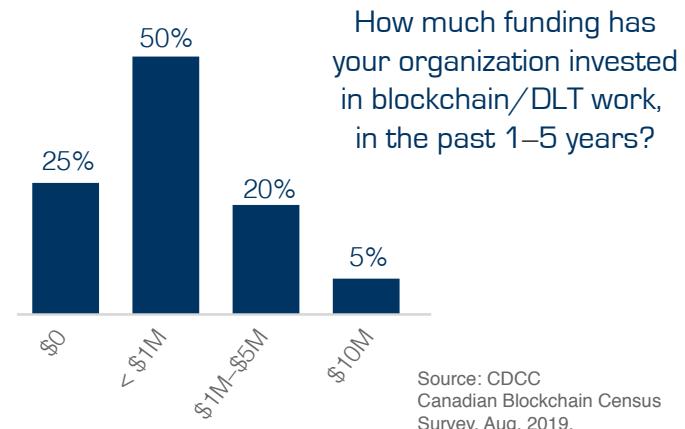
Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

Of our SME respondents, 62 percent reported that they were allocating more than 10 percent of their 2019 budget to blockchain technology. In contrast, 14 percent planned to invest no money.



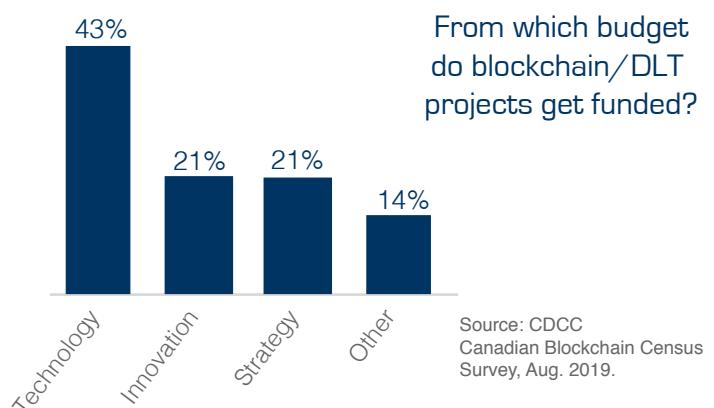
As a percentage of your entire 2019 budget, how much are you allocating to blockchain/DLT?

Half of the respondents reported spending less than \$1 million in the past one to five years, but 20 percent of companies said they invested \$1 million to \$5 million in the last one to five years. A quarter have invested no funds in the past five years.

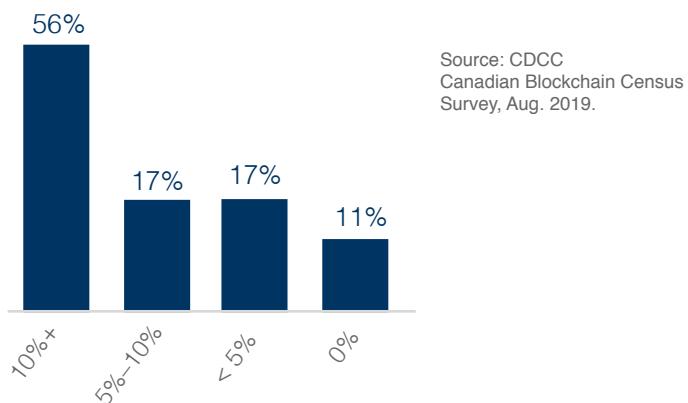


How much funding has your organization invested in blockchain/DLT work, in the past 1–5 years?

Almost half of SME companies funded DLT projects from their technology budgets, 21 percent from their innovation budgets, and 21 percent from strategy.



More than half of the companies (56%) planned to invest more than 10 percent of their budgets into DLT projects next year; 17 percent expect to invest between five percent and 10 percent of their budgets. A handful (11%) expected to have no budget for DLT projects next year.



On average, 71 percent of respondents were working on blockchain-related projects at least half of the time.

Large Enterprise and Multinationals

Publicly disclosed blockchain technology initiatives in the enterprise sector in Canada span from payments, supply chain, identity, and health care, to mortgage use cases and more. Multiple others are in development and not yet announced publicly.

While only a small number of large enterprises responded to this inaugural survey, we believe that the responses are worth tracking over time and reporting in subsequent reports.

One observation from our research is that nine of the 10 respondents indicated they had joined at least one consortium, and the remainder were not members of any blockchain consortium, whether business or technology focused (e.g., Hyperledger, R3, OCC Oil & Gas Blockchain Consortium, etc.).

Additionally, five of the 10 large enterprise and multinational company survey respondents agreed that favorable provincial policies, laws, and regulations aimed at blockchain and digital asset projects and innovation will accelerate adoption of blockchain in the country.

Promisingly, eight out of 10 respondents felt Canada's laws, policies, and regulations supported their blockchain and digital asset projects and innovation.

Accelerators

Consulting, law, and venture capital firms were classified as part of accelerators as these organizations are key drivers to help grow the blockchain industry. One hundred percent of participants from this sector agreed that the Canadian start-up community has more innovators than their counterparts abroad, and they all were interested in investing in blockchain companies.

However, respondents thought that access to talent, access to funding, regulatory uncertainty, and challenges to obtaining affordable audit or legal services were limiting Canada's growth in the space.

Of the responding investors, all have invested in blockchain/DLT companies in the past or are interested in future investments. Investors are interested in making investments in identity and authentication solutions, infrastructure providers, hardware and mining, and in exchanges and trading platforms.

All the participating investors in the survey were expecting to invest \$10 million to \$50 million in blockchain/DLT projects in the next year.

Public Sector

Public sector participation was low; however, we complemented low participation with in-depth secondary research. Canada has been adopting blockchain technology for various projects at all levels of government. At the municipal level, the town of Innisfil was the first municipality in Canada to accept digital currency (e.g., bitcoin) as payment for property taxes. In March 2019, Innisfil Council voted in favor of forming an agreement with the Toronto-based company, Coinberry.⁵³ On 10 July 2019, the city of Richmond Hill's council likewise voted in favor of entering into an agreement with Coinberry so that its residents and businesses could pay their property taxes in bitcoin.⁵⁴

Mentioned above as a collaborator in the Verified.Me digital identity service, DIACC has been working with government policy makers and industry to establish a Canadian digital identification and authentication framework so that Canada can participate fully and securely in the global digital economy.⁵⁵

The Government of Canada has been actively participating in Project Jasper, a collaborative research initiative between the public and private sectors, including financial institutions, the Bank of Canada (BoC), and other market participants to understand how DLT could transform the wholesale payments system.⁵⁶

BoC has also partnered with Payments Canada and TMX Group to investigate a DLT solution for a securities settlement system using central bank money.⁵⁷ BoC has also partnered with the Monetary Authority of Singapore and the Bank of England to work on a cross-border, cross-currency settlement system.⁵⁸ This collaboration combines Project Jasper and Singapore's Project Ubin, with a goal of using DLT to make crossborder payments faster and less costly.⁵⁹

GuildOne announced the Thunderbird Consensus, a project focused on removing contract disputes in First Nations' royalty payments.⁶⁰ The Thunderbird Consensus is a collection of data scientists, programmers, and academics who are researching the potential of innovative technologies such as blockchain, machine learning, and AI to encode and effect Indigenous Rights and Treaty Entitlements.

The National Research Council of Canada (NRC) experimented with the technology as well, to infuse transparency into its operations: its Industrial Research Assistance Program (IRAP) developed a prototype on the Ethereum blockchain for publishing IRAP grants and contribution data.⁶¹ During the pilot, IRAP reported the details of 7,669 disbursements valued at a total of \$811,747,925.⁶² The Government of British Columbia announced the launch of OrgBook BC, a searchable directory of public, verifiable data issued by government authorities about businesses in British Columbia.⁶³

Academia

Skills development in blockchain technology (e.g., coding, computational literacy and engineering, and business skills) will have a direct impact on the economy. Not just technical developers but business professionals—from the executive suite to the front line—must understand the fundamentals of blockchain and its applications. Companies are hiring based on experience with the technology, inventing with the technology and, where possible, relevant academic skills and certifications.

Three of the 28 top-ranked Canadian universities offer relevant blockchain certifications, compared to six of them offering certifications in AI.⁶⁴ All three Canadian post-secondary institutions offering blockchain certifications have extensive networks of partners to inform curriculum, facilitate programming, and offer students practical experience through projects and work opportunities.⁶⁵ For example, the University of Waterloo is the only Canadian member of Ripple's University Blockchain Research Initiative, which includes Berkeley Haas School of Business,

Cornell, Massachusetts Institute of Technology, Princeton, and Stanford.⁶⁶

A handful of universities have started offering courses or certifications in blockchain. For example, the University of British Columbia (UBC) in Vancouver and Kelowna has a range of blockchain programs, from one-day executive workshops to upper-graduate summer courses covering blockchain architecture, use cases, and socioeconomic impact of the technology. UBC announced that it would be launching Canada's first blockchain/DLT training path for graduate students in January 2020.⁶⁷ The initiative should build capacity for existing masters and PhD students in this area and contribute to scaling Canada's blockchain industry.

George Brown College in Toronto was the first to offer a blockchain developer comprehensive certificate.⁶⁸ York University in collaboration with the Blockchain Hub offers a range of degrees in the blockchain field. Students can choose from blockchain business tracks to technical and developer tracks. Students emerge with full certification once completing the course.⁶⁹ York's blockchain lab is focused on real-life managerial and entrepreneurial applications of blockchain technology.⁷⁰ Toronto's Ryerson University launched Blockchain Ryerson, an education program that brings the best blockchain events to campus through professional speakers and peer-facilitated workshops.⁷¹

University of Toronto (UofT) has the Creative Destruction Lab at the Rotman School of Management.⁷² The lab has a unique process for incubating and investing in new ideas. Its Blockchain Incubator Stream is a 10-month highly selective program in which blockchain founders are mentored by veteran entrepreneurs, investors, and visionaries in AI and blockchain. Participants are eligible for up to US\$100,000 in funding, local office space, and additional technical training.⁷³ The UofT also offers several blockchain-related courses and course content in the School of Continuing Studies, the Rotman School of Management, the Field Institute for Research in Mathematical Sciences, and the Faculty of Law.⁷⁴ Finally, the UofT has several student groups such as the Blockchain Laboratory of Toronto, which provides an educational environment for people interested in blockchain.⁷⁵

University of Waterloo has a blockchain research division where a diverse group of researchers are working on a range of blockchain academic and industry-driven research projects as a means to further the technical development and innovation of the endless applications of

blockchain.⁷⁶ Areas of research include a real-time embedded software group, a Communications Security Lab, a Side-Channel Security of Embedded Systems Lab, and Waterloo's Cybersecurity and Privacy Institute.⁷⁷ Waterloo's Institute for Quantum Computing has contributed to research on quantum's impact on blockchain encryption schemes.⁷⁸

The Government of Canada has launched several initiatives as well. For example, in August 2019, the Honourable Bill Morneau, Minister of Finance, launched the CyberSecure Canada certification program. CyberSecure Canada is a voluntary program that will help SMEs achieve a baseline level of cybersecurity, give their customers greater confidence, and provide competitive advantage.⁷⁹

Advocacy groups and think tanks are also working toward enabling the ecosystem flourish. The Chamber of Digital Commerce Canada provides exclusive national support for Canada's emerging and rapidly growing blockchain ecosystem by promoting the acceptance and use of digital assets and blockchain-based technologies.⁸⁰ The Chamber is the only national advocacy voice in Canada: it evolved from two pivotal grassroots advocacy organizations, the Bitcoin Alliance and Blockchain Association of Canada. The Chamber's mission includes working closely with government policy makers and regulators to ensure that they are educated on industry trends in Canada.

The blockchain ecosystem also has various educational groups. The Blockchain Research Institute partnered with INSEAD, one of the world's top business schools, to launch a set of courses under the specialization of "Blockchain Revolution for the Enterprise."⁸¹ CryptoChicks is a nonprofit organization that is empowering women who want to learn about blockchain technology.⁸² CryptoCamp aims to grow, connect, and diversify the ecosystem.⁸³ Finally, Blockgeeks is an online hub where entrepreneurs, investors, and leaders can learn about the rapidly evolving world of blockchain technologies.⁸⁴

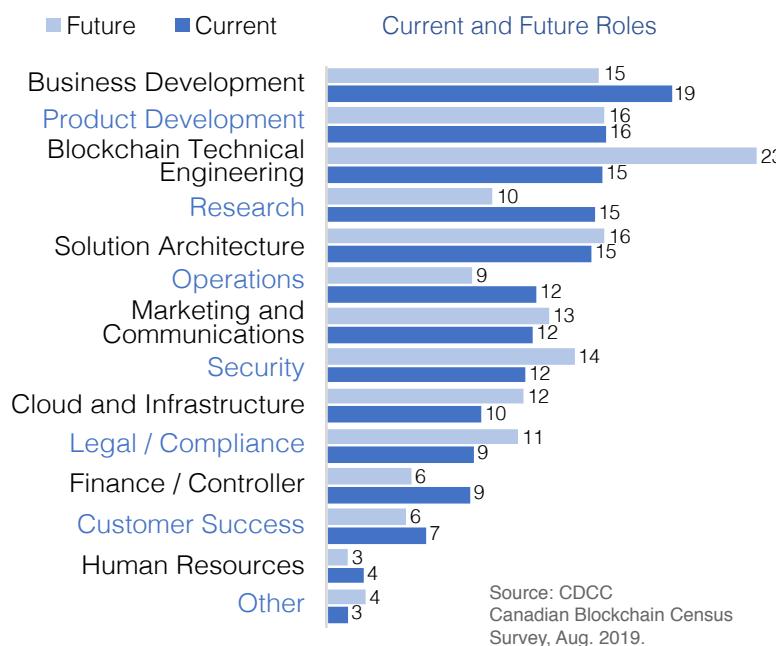
Seven of the 12 survey respondents from academia report that interest is high in blockchain courses, certifications, talks, research, and events and has gone up since last year. While a small sample size, more than half of our survey respondents from academia report that interest is high in blockchain courses, certifications, talks, research, and events and has gone up since last year.⁸⁵

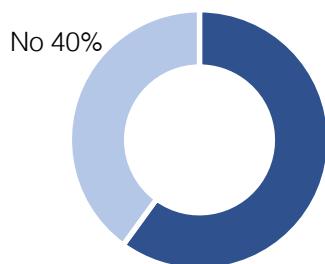
Employment and Average Wages

Based on the respondents, we see a need for skills around blockchain technical engineering, followed by product development, solution architecture, business development, security, and legal compliance.

Our survey respondents expressed a talent shortage: 60 percent of companies were hiring skilled employees for their blockchain teams outside Canada. Global average salaries for blockchain professionals range from \$83,958 to \$178,577 per year.⁸⁶ Neuvoo pegs Canada's average blockchain salary at \$133,750.⁸⁷ Our research shows that almost 40 percent of the respondents were earning between \$75,000 to \$100,000 per year, with an average salary of \$98,423; while start-ups had an average salary of \$95,341. The difference in average salary can be explained by the larger sample of start-up respondents in our analysis. In June 2019, the overall average weekly earnings in Canada were \$1,023.97, which would work out to \$53,355.64, if sustained over 12 months.⁸⁸

What roles do your blockchain/DLT employees fill?



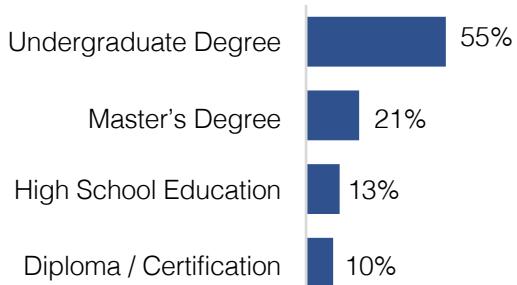


Are you finding and hiring skilled employees for your blockchain team outside of Canada?

Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

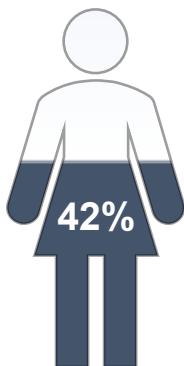
Over half of companies were hiring talent with undergraduate degrees for their blockchain roles, 21 percent found employees with master's degrees, 13 percent needed only high school certification, and 10 percent accepted candidates with diplomas or certification. From industry interviews, a recurring theme was uncovered that skills in developing blockchain solutions were considered an asset in the hiring process.

What level of education do applicants require for blockchain roles?



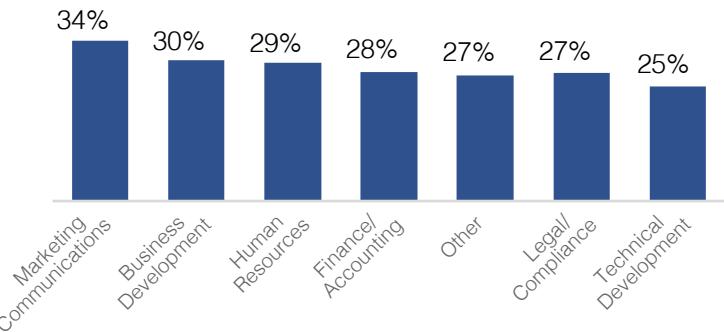
Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

On average, of the survey participants' companies, 42 percent of employees were female. The top three roles for women in the blockchain ecosystem included marketing and communications (34%), business development (30%), and human resources (29%).



Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

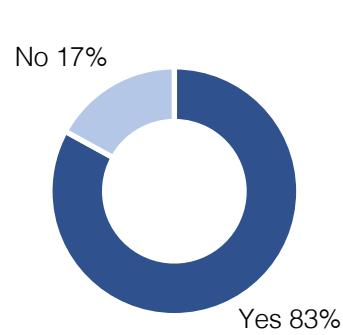
What is the general percentage of women in your organization working on blockchain by the following roles?



Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

Challenges to Growth

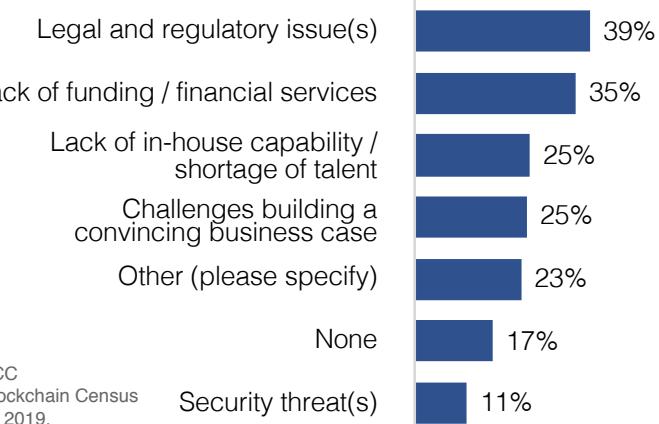
We asked respondents whether their organizations "faced any barriers regarding blockchain/DLT." Over four-fifths of them said yes. Of the seven possible barriers, almost half put "legal and regulatory challenges" at the top of the list, followed by "lack of funding."



Is your organization facing any barriers with regards to blockchain/DLT?

Source: CDCC
Canadian Blockchain Census Survey, Aug. 2019.

Top Challenges



Ecosystem Challenges

There are multiple facets to the barriers faced by blockchain innovators, from basic access to business services to securities law to taxation, and they involve multiple regulatory and government agencies. For example, the uncertainty and inconsistency in the treatment and view of digital assets by different government agencies and departments across Canada strains start-up resources and creates confusion for the ecosystem.

The blockchain community has been more active over the last number of years to educate policy makers on the pace of change in the local blockchain ecosystem. This can be seen by the growing number of blockchain events and conferences that target policy makers, and the number of regulatory organisations such as CSA, Ontario Securities Commission (OSC), and Bank of Canada and the Canadian Senate that have made public positions about this topic.⁸⁹

Innovators Require Regulatory Clarity

According to survey results, the collective federal and provincial policy and regulatory positions relative to digital assets, and the businesses dealing with them, are unclear to many in Canada's blockchain ecosystem, especially the entrepreneurs. For example, several entrepreneurs pointed to the lack of harmonized legislative definitions and a consistent national taxonomy for categorizing and understanding digital assets, designed to distinguish securities from commodities tokens, non-fungible tokens, and stablecoins as some of the challenges.⁹⁰ For larger corporations, the uncertainty has at times been perceived as a limitation for larger follow-on investments in innovation in this industry.

Positive Momentum Exists, but the Risk of Stalling Grows

The Government of Canada has been active at home and abroad in establishing processes such as regulatory sandboxes for innovators to test their inventions. However, according to survey results, respondents think that most of the policy and regulatory activity in Canada has focused on tokens and digital assets, not on general blockchain innovation. For example, the OSC has been active in issuing guidance to the extent that its mandate allows, which is limited to securities. As a result, non-security token applications, and non-token blockchain innovation need attention from a policy and legislative perspective, nationally and provincially.

The Honourable Colin Deacon, independent senator for Nova Scotia and a member of Senate Standing Committee on

Banking, Trade, and Commerce, said, "We have got to build a true regulatory sandbox that can address the reasonable concerns, but not through a purely retrospective lens."⁹¹ Progress is being made in some jurisdictions. Recently, some Canadian regulators have initiated modernization or burden reduction processes to make the environment more conducive to business, including blockchain innovations.

"Our regulators are working to manage important risk factors like consumer protection, privacy and confidentiality, financial crime, and financial stability. This is really important," continued Senator Deacon.⁹²

"There is an opportunity, and arguably a national mandate, to manage important risk factors beyond the mandates of securities regulators. In provinces, we need to see various departments of finance and innovation take pro-growth positions to support the non-securities aspects of digital assets and blockchain technology," said Tanya Woods, Managing Director of the Chamber of Digital Commerce Canada. "We would further like to see harmonization or agreement between the federal government, Bank of Canada, and the provinces regarding the treatment of digital assets in Canada or the direction we want to take the country in this space. We have a lot to gain if we can achieve this, and a lot to lose if we remain complacent," said Woods.

Overall, the blockchain community in Canada has acknowledged the need for more widespread education, across the public and all levels of government, to support future progress. Some important initiatives are underway, including those of the Chamber of Digital Commerce Canada, which has been actively participating in provincial and federal consultations as they arise. The Chamber has also established the first national plan for blockchain in Canada; and it has initiated the creation of the first ecosystem measurement report to ensure that policy makers across Canada are well equipped to respond to the industry.

The blockchain community has collaborated to run number of events to raise awareness, educate stakeholders, and build Canada's brand as a blockchain hub.⁹³ For example, in April 2019, various Canadian cities hosted "Blockchain Week," which included dozens of activities involving thousands of people from over 50 countries.⁹⁴

These activities, while helpful, are just a start, and more concerted effort is required to educate Canadians about the benefit blockchain innovation can bring to the country.

Funding Services

According to survey results, the second largest challenge facing blockchain innovators is “lack of funding.” The top response to the question, “What do you think is needed to accelerate blockchain/DLT adoption in Canada?” was “Access to private funding or government grants.”

The challenge of finding business financing is not unique to the blockchain or Canada market. Entrepreneurs in the US recently stated that access to financing is their single biggest problem.⁹⁵ A small proportion of respondents indicated that they’d like to receive government support or tax credits. Of survey respondents, 71 percent received no government funding or program support, and the remaining 29 percent did. Among them was Ottawa-based Bitaccess, which provides blockchain software services to fintech businesses in over 15 countries; it received funding from NRC IRAP.⁹⁶ NRC IRAP also granted \$45,000 to Vancouver-based start-up, Rubikon Blockchain Corp., “a firm in the ‘floriculture production’ industry (NAICS: 111422)” with an R&D project; the start-up is focused on creating a compliant cannabis supply chain.⁹⁷

Banking Services

Some entrepreneurs surveyed highlighted that limited access to basic corporate banking services in Canada is a challenge. Banking executives suggested that the hesitation comes in part from a position of risk management. There is a desire to encourage innovators and provide banking services to blockchain businesses, though some of the lingering misperceptions of the blockchain reputation linger, such as the concern of being linked to the volatile crypto markets. There continues to be a need for greater awareness and education of bank executives so that risk models are updated.

Auditing Services

In Canada, the big four audit companies have not yet offered financial statement audit services to blockchain or digital asset start-ups in the Canadian market, even though these same organizations have provided consulting and advisory services in the space for more than five years. While the larger firms are somewhat tentative, some smaller firms have been developing expertise and innovating in this service space. As a result, most blockchain start-ups procure audit services from smaller auditing firms.

Additionally, the Chartered Professional Accountants of Canada has started studying the impact of blockchain on accounting and the audit function.⁹⁸ The Canadian Public Accountability Board has issued guidance, and a number of successful audits have been completed this year.⁹⁹

Concluding Remarks and Observations

Throughout this report, the phrase *digital assets* is used broadly to encompass the types of assets—money, securities, personal data, intellectual property, and the rights to all sorts of tangible assets and physical property—that blockchain technology enables individuals and organizations to trade, track, and trace peer to peer over communications networks. This technological capability is unprecedented. There is still much to learn about it, about how business and society will use it to produce and manage such assets.

Understanding and balancing all stakeholder interests is key—nurturing innovation by being business-forward, providing a clear path for innovators to proceed, and protecting the needs of all ecosystem participants.

This is a critical time for the blockchain community in Canada. The blockchain industry in Canada is growing at an impressive five-year CAGR of 73.3 percent, the highest of any country in the world, and the average wage of blockchain professionals is nearly double the Canadian national wage average.¹⁰⁰ The overall energy, momentum, and activity in the innovator ecosystem remain high, as this report has highlighted. Enterprises that have experimented with the technology for several years are embarking on transformations that promise to reshape the future of industries in Canada. Venture capitalists are engaging with interest and capital to back Canadian blockchain innovation.

To support the blockchain innovation community in Canada, there's still work to be done. From the research concluded, there's a perception of limited coordination in Canada's policy and regulatory environment as well as limited funding and access to general business services.

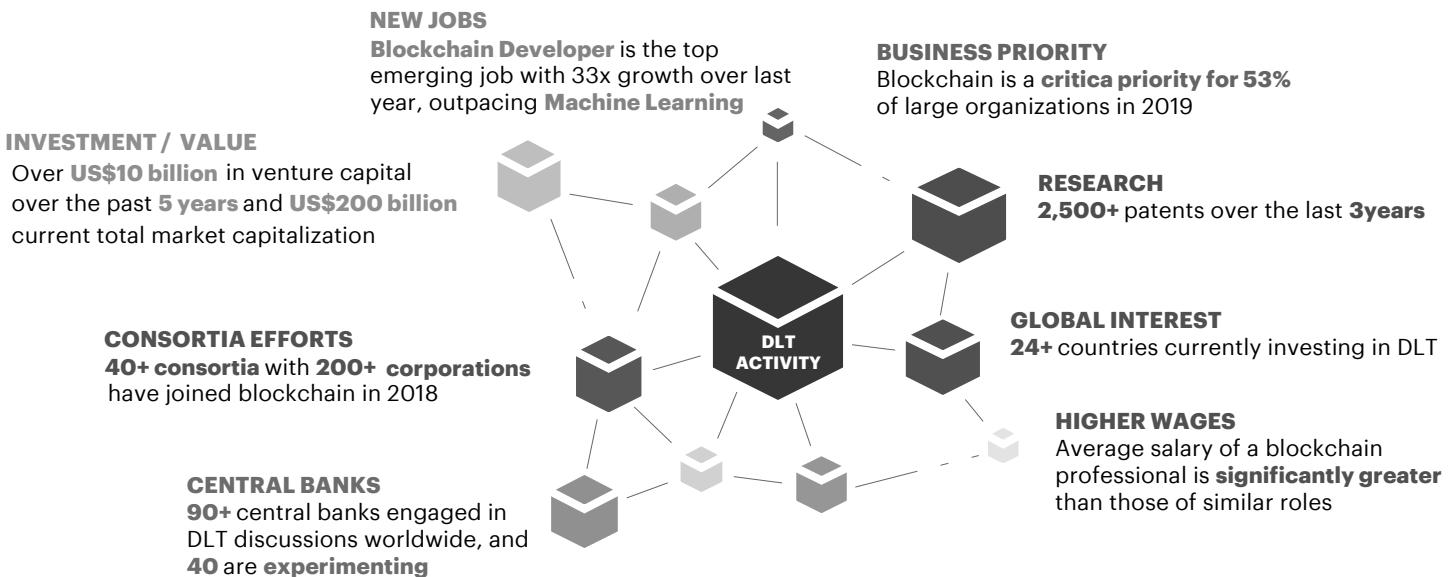
Consider that Canadians living in Toronto came up with the idea for Ethereum. Ethereum (ETH) has a market cap today of over US\$20.895 billion (\$27.644 billion).¹⁰¹ The Ethereum team created a “legal organizational structure in Switzerland” and raised US\$15.571 million (\$20,656 million) there in Ethereum’s initial crowdsale.¹⁰² Creating an environment for entrepreneurs and large corporations to innovate generates returns for the countries that embrace new technologies.

Canada has an opportunity to lead the world in this emerging area of the digital economy. The time is now to go all-in and to catalyze organic activity in the Canadian blockchain ecosystem, with swift, decisive, and aligned leadership and active collaboration between public and private sectors. The Chamber of Digital Commerce Canada believes this must be a national priority, and now is the time to make it so.

Appendices

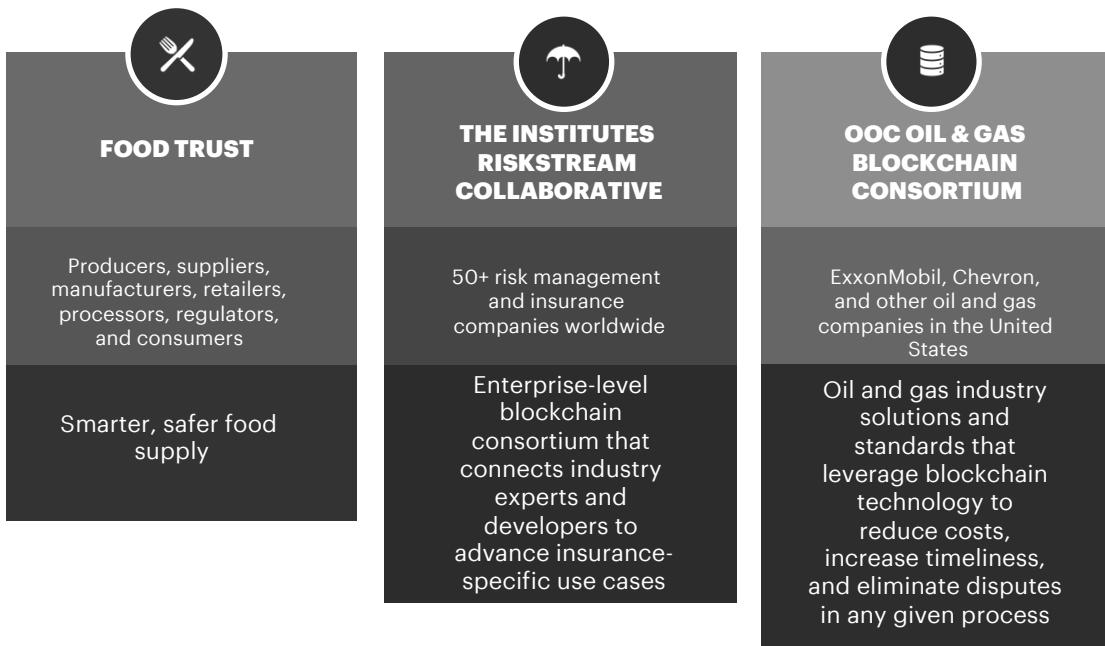
A. Global Trends

The global blockchain ecosystem has been the subject of research and study for a number of years. Some prominent statistics stand out as defining characteristics.



Source: Accenture Research, Aug. 2019.

Consortia continue to be the dominant model in enabling industry-level change for blockchain. Several have matured in operating structure and governance and are starting to focus on adoption. Consider these consortia.



Source: Accenture Research, Aug. 2019.

B. Canadian Innovation Programs

The global blockchain ecosystem has been the subject of research and study for a number of years. Some prominent statistics stand out as defining characteristics.

The Honourable Navdeep Singh Bains, minister of Innovation, Science, and Economic Development (ISED), has said, "We are in a global innovation race."¹⁰³ Here are a few government programs and platforms set up to drive Canadian innovation.

Innovation and Skills Plan

In its 2017 budget, the Government of Canada announced its Innovation and Skills Plan, an aspirational project to make Canada a leader in innovation.¹⁰⁴ The plan was to create new well-paying jobs, foster economic growth, and establish Canada as one of the most innovative countries in the world by 2025. That included growing Canada's goods and services exports by 30 percent, doubling the number of high-growth companies from 14,000 to 28,000, and increasing support for job training.¹⁰⁷

The 2017 budget also included \$50 million investment to the CanCode program, which was so successful in developing coding, data analytics, and digital content development in Canadian students from kindergarten through grade 12 that it received an additional \$60 million through 2020.¹⁰⁶ It also supported initiatives that provided K-12 teachers with the training and professional development needed to introduce digital skills and coding-related concepts into the classroom.

Innovation Superclusters Initiative

Superclusters like Silicon Valley are dense and diverse areas of capital, knowledge, and entrepreneurship with attractive business policies and public infrastructure. They have proven effective in attracting talent and investment across highly innovative industries. The goal of the Innovation Superclusters Initiative, administered by ISED as part of the Innovation and Skills Plan, is to foster five such ecosystems through partnerships among academic institutions, businesses of all sizes, and nonprofit organizations. The government has committed "up to \$950 million, matched dollar for dollar by the private sector," to the initiative and expects these superclusters to generate 50,000 more jobs and \$50 billion in gross domestic product growth in 10 years.¹⁰⁵

Applicants had to demonstrate how their entity would create comparative advantage for Canada's highly innovative industries, power the growth of innovative firms, and develop strong regional brands. The winners, announced in February 2018, were the Ocean Supercluster (Atlantic Canada), SCALE.AI supercluster involving robotics and AI (Quebec), the Advanced Manufacturing Supercluster (Ontario), the plant-based Protein Industries Supercluster (the Prairies), and the Digital Technology Supercluster (British Columbia), all with potential blockchain use cases.¹⁰⁸

Innovative Solutions Canada

The Innovation and Skills Plan called for Innovative Solutions Canada, administered by ISED and set up to fuel the growth of SMEs not just by providing them access to capital, information, and services but also by challenging them to provide novel solutions for the government itself, the single largest purchaser of Canadian goods and services.¹⁰⁹ The 20 participating government agencies and departments set aside \$100 million for this challenge. SMEs propose solutions where none exist yet in the marketplace. An inventor of a novel solution selected under the program could receive up to \$150,000 to develop a proof of concept (POC). If the POC receives approval, the inventor could receive up to \$1 million to develop, test, and validate a prototype. If the resulting innovation addresses the particular challenge, then the government might procure it.¹¹⁰

Industrial Research Assistance Program

NRC IRAP provides grants to small businesses to perform the technical R&D to develop and improve new capabilities, which would otherwise cost too much to do. NRC IRAP funding covers up to 50 percent of contractor fees and up to 80 percent of internal labor costs, to a maximum \$50,000.¹¹¹ These projects are often focused on early-stage research or development activities, and the exploration of new technology-based market opportunities. This grant is for small businesses who have been incorporated in Canada for at least two years.

Another IRAP funding initiative targets mid-sized projects that focus on overcoming technical risks and uncertainties through the development and commercialization of innovative products that fill a market void. NRC funds such projects up to \$10 million in technology development grants (including up to 80% of labor costs for employees directly engaged in the project).

Digital Charter

On 21 May 2019, Minister Bains introduced Canada's new Digital Charter, another element of the Innovation and Skills Plan for stimulating economic growth.¹¹² The charter outlines rules for Canada's digital domain: to rebuild Canadians' trust in their government's handling of the people's information. The goal is twofold: (1) to protect Canadians' privacy and personal data and (2) to leverage Canada's unique talents and strengths for leading the world's digital transformation, modeling best practices in data privacy.

Under the charter, Canadians will have equal opportunity and equal access to tools for participating in an increasingly digital world and controlling their data in aggregate: they will decide who can use which data, for what purpose, and at what price. Canadians will manage their information as easily as they do their money or other assets, licensing it, loaning it, and transferring ownership of it to their heirs. The Digital Charter identifies financial technology and crypto as trends, but it does not clearly prioritize blockchain technology, which is a notable shortcoming of the plan.

C. Companies in the Canadian Blockchain Ecosystem

Financial System Innovation

Financial Services and Trading Platforms

These companies provide digital exchange capability that allows exchanges from fiat currency to digital assets (or vice versa) and conversions between digital assets.

Cryptocurrency Mining

Mining is the process by which members of a blockchain network agree on which block of transactions to record to the relevant blockchain. This category includes mining pools and companies that conduct mining for profit.

Blockchain-based Products

These products are built on blockchain architecture to create specific industry applications.

Cloud Services, Big Data, and Security

These are providers of cloud-based infrastructure and data security products for distributed application development.

Transportation, Supply Chain, and Manufacturing

These companies work on applications of blockchain technology to transform manufacturing and the movement of physical goods through the global supply chain.

Communications, Media, and Entertainment

These companies work on applications of blockchain technology to transform customer propositions in the communications, media, and entertainment space.

Identity and Authenticity Solutions

These companies work on distributed applications for secure digital identity or provenance of assets.

Tokenized Network and Investment Solutions

These companies are building investment products with a focus on digital assets as alternative asset classes.

Energy, Mining, and Resources

These companies work on applications of blockchain technology to drive efficiency and transform operations in the energy, mining, and natural resources industry.

Support for Ecosystem Growth

Blockchain Consultancy and Facilitators

These professional services firms bring specialized business advisory, risk, tax, assurance, audit, legal, and technical expertise to benefit innovators and organizations operating in the blockchain ecosystem.

Blockchain Infrastructure and Services

These companies provide core technology infrastructure, network, and computing services to the blockchain ecosystem.

Industry Catalysts

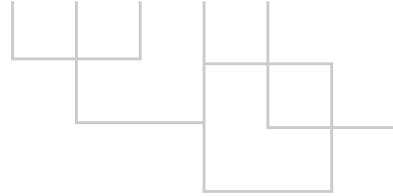
Venture Capital, Funders, and Incubators

These institutions provide venture capital, private equity, or growth capital for blockchain innovators. The category includes angel investors.

Regulatory Bodies, Advisors, and Law Firms

These companies or individuals help to define or advise on legal, regulatory, or policy matters.

About the Authors



About the Chamber of Digital Commerce Canada

Digital asset innovators by providing dedicated support to advance Canada's emerging and rapidly growing blockchain innovation ecosystem. Our mission is to promote the acceptance and use of digital assets and blockchain-based technologies. As broad and multi-sectoral applications of blockchain technology continue to emerge, so too do the complex policy, legislative, and regulatory issues. These unique issues are driving critical conversations across our country. They are also demanding attention and action from governments around the globe and will do so for the foreseeable future. Through education, advocacy, and working closely with policy makers, regulatory agencies, and industry, our goal is to develop an environment that fosters blockchain innovation, infrastructure, job creation, and investment in Canada. For more information, please visit www.DigitalChamber.org/Canada.



About the Blockchain Research Institute

Co-founded in 2017 by Don Tapscott and Alex Tapscott, the Blockchain Research Institute is a knowledge network organized to help realize the new promise of the digital economy. Its syndicated research program, which is funded by major corporations and government agencies, aims to fill a large gap in the global understanding of blockchain technology and its strategic implications for business, government, and society. Its global blockchain experts are dedicated to informing leaders of the market opportunities and challenges of this nascent technology. Research areas include financial services, manufacturing, retail, energy and resources, media, telecommunications, health care, and government; the management of organizations, the transformation of the corporation, and the regulation of innovation; and blockchain's potential role in the Internet of Things, robotics and autonomous machines, artificial intelligence, and other emerging technologies. For more information, please visit www.blockchainresearchinstitute.org.



About Accenture

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions — underpinned by the world's largest delivery network — Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With 482,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at www.accenture.com.

Notes

1. Accenture Research, Sept. 2019.
2. Jessica Goepfert et al., *Worldwide Semi-annual Blockchain Spending Guide*, International Data Corporation, 2017H2, 19 July 2018. www.idc.com/getdoc.jsp?containerId=prUS44150518.
3. CDCC/BRI, "Canadian Blockchain Census Survey," Aug. 2019.
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