

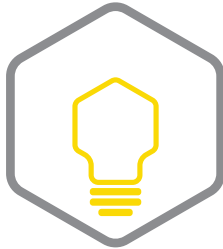
THE NETWORKED HOTBEDS OF BLOCKCHAIN

Creating Global Hubs for the Internet's Second Era

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Blockchain Research Institute

January 2018





Realizing the new promise of the digital economy

In 1994, Don Tapscott coined the phrase, “the digital economy,” with his book of that title. It discussed how the Web and the Internet of information would bring important changes in business and society. Today the Internet of value creates profound new possibilities.

In 2017, Don and Alex Tapscott launched the Blockchain Research Institute to help realize the new promise of the digital economy. We research the strategic implications of blockchain technology and produce practical insights to contribute global blockchain knowledge and help our members navigate this revolution.

Our findings, conclusions, and recommendations are initially proprietary to our members and ultimately released to the public in support of our mission. To find out more, please visit www.blockchainresearchinstitute.org.



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Idea in brief

- » The first generation of the Internet centered on Silicon Valley, which is home to many of the world's largest Internet companies and has become an engine of innovation, financing, incubation, and acceleration of entrepreneurial activity. The second generation of the Internet presents trailblazers around the world with an opportunity to chart a new path to an innovation economy built to last.
- » Whether the second generation of the Internet, based on blockchain, will be centered in any one location is anybody's guess; but many areas have a head start on forming what could become a global hub, one of a handful of leading blockchain centers.
- » The technology is far from widely accepted by everyday consumers, companies, and governments. But some areas are already taking the lead in adopting the technology and encouraging efforts to develop new applications that will broaden the technology's appeal.
- » These locations need to overcome a number of obstacles to the adoption of this new technology, such as
 - › Development of a clear strategy to ensure the blockchain era thrives
 - › Creation of a broad base of support for blockchain
 - › Resolution of funding bottlenecks in the start-up space across all industries
 - › Addressing a culture of risk aversion in large institutions
 - › Improving research and development spending
 - › Tackling policy and regulatory issues
- » Stakeholder collaboration is essential. We can learn from those jurisdictions developing applications and solutions with their own specific cultural spin—notably Australia, Dubai, Estonia, Hong Kong, Singapore, and the United Kingdom. These locations have recognized blockchain's potential and have moved decisively to turn it into reality.
- » The opportunity to lead the blockchain revolution is an open playing field. Critical to playing the game effectively is managing the issue of governance. Existing hotbeds such as Dubai, London, New York, Singapore, Sydney, and Zug (to say nothing of Silicon Valley) have thus far managed to navigate regulatory and governance uncertainties, giving us excellent insight into running this new technology race.

The opportunity to lead the blockchain revolution is an open playing field.



Introduction

Much has been written (particularly in the recent dizzying run-up in the value of a single bitcoin) about the development of cryptocurrencies and the nearly ubiquitous *initial coin offering* (ICO) fundraising model that has created a multitude of applications. As the value of these offerings gyrate, and the occasional hacker finds a way to spirit away the occasional multimillion dollar heist, accelerators around the world are looking past the volatile decentralized applications, developing remarkable capabilities that could run on blockchain, taking with them the technology's early painful lessons.

The first generation of the digital revolution brought us the Internet of information. The second generation—powered by blockchain technology—is bringing us the Internet of value: a new, distributed platform that will help us reshape the world of business and transform the old order of human affairs for the better. As with all revolutions, we will have winners and losers. But, done well, blockchain technology can usher in a halcyon age of prosperity.

As with all revolutions, we will have winners and losers. But, done well, blockchain technology can usher in a halcyon age of prosperity.

The Internet is entering a second generation, and the vast ecosystem for this new era of technology will need a location or locations that can provide energy, infrastructure, government support, and human resources. Just as blockchain has distributed the ledger of information and transactions, the hubs that will host the computing capability, the start-ups that are creating the killer apps, and the governance groups that are working on new regulatory controls, are also distributed around the globe.

The ability to leverage the dispersed ledger system that runs on the blockchain foundation is fast becoming the new normal underlying such daily tasks as banking, healthcare, voting, and taxation. Robots are mowing lawns, and transfers of property are paperless. Nations, regions, and cities around the world have artificial intelligence (AI) and quantum computing capabilities that will affect the future of work and the security of our digital infrastructures. This new development of the digital age will be at the heart of a vibrant and globally dispersed innovation economy.

In Internet parlance, this is “1993” for blockchain—the beginning of profound change in the digital space. In the coming decade, blockchain technology will transform how we do business, govern, communicate, manage our affairs, and build value. In the process, industries will change, companies will be upended, and untold value will be created.

The blockchain revolution has begun

This second era of the Internet opens new horizons to a prosperous future. The Internet, the web, social media, mobile computing, big data, and the cloud have paved the way for advancements in virtually every aspect of life. Yet these breakthroughs barely scratch the surface of the Internet's potential, especially when it comes to businesses and consumers.



The deep structures of corporations have changed little since the industrial age. Hierarchy, vertical integration, and bureaucracy remain its hallmarks. We have seen wealth creation without commensurate job creation, and social inequality in many Organisation for Economic Co-operation and Development (OECD) countries. Privacy, the foundation of a free society, is undermined by data frackers—conglomerates that mine vast pools of digital information, selling much of what they extract. Most people on the planet have yet to benefit from the digital economy; two billion of them don't have a bank account.

Technology has contributed to the problem. For the first time since the industrial revolution, technology may kill more jobs than it creates. At the annual meeting of the World Economic Forum in Davos, Switzerland, former US Secretary of State John Kerry cited research showing that fully 85 percent of US job losses were a result, not of outsourcing as is so often assumed, but of technology innovation eliminating the need for workers. Now a new round of automation, robotics, and disruptive business models is wiping out additional levels of the workforce.

The Internet of information opened a floodgate of content, but all that content came with a price. It also broke existing intellectual property models. People and organizations who published easily copied assets of value to their creators—like writing, photography, or music—undermined the rights of and denied compensation for the creators.

In this new era, in addition to the existing Internet of information, we have an Internet of value—a vast global ledger, available to everyone, that can store, exchange and manage securely and privately any asset or thing of value—from money, stocks and bonds to music, votes, titles and deeds, and intellectual property. We can build businesses and conduct transactions directly with less friction from intermediaries like banks, brokers, and governments.

At its most basic, blockchain is an incorruptible global database or digital ledger that could hold a record of transactions of currency and every item of value in our lives—anything that could be expressed in code.

This new version of the Internet has at its core the blockchain—the technology underlying the digital currency bitcoin. Blockchain is open and programmable. As such, it holds potential for unleashing countless new applications and capabilities that could transform everyday lives. If our institutions—banks or governments—embrace this technology in their operations, it will cut costs, increase the metabolism of commerce, and create new value for their stakeholders. In essence, it could offset the impact of labor displaced by AI and robotics.

At its most basic, blockchain is an incorruptible global database or digital ledger that could hold a record of transactions of currency and every item of value in our lives—birth and death certificates, marriage licenses, deeds and titles of ownership, educational degrees, financial accounts, medical procedures, insurance claims, votes, transactions between smart objects—in short, anything that could be expressed in code. Blockchain data represents the ultimate in accuracy and reliability because mass collaboration constantly



Blockchain represents a momentous leap forward. It is a transparent, incorruptible, and global real-time reconciliation of digital transactions in every kind of commerce.

reconciles it. Trust, in the traditional sense, is assured by the blockchain guarantee of integrity. This trust is achieved through clever code and mass collaboration.

Just as the invention of double-entry bookkeeping enabled the rise of capitalism, the nation-state, and the modern economic order, blockchain represents a similarly momentous leap forward. It is a transparent, incorruptible, and global real-time reconciliation of digital transactions in every kind of commerce. At the same time, blockchain has the ability to complement and strengthen current business models. It will enhance security and safety while allowing users to reduce costs. Blockchain is not a threat. Rather, it represents a massive opportunity for those who embrace it.

The financial services industry leaders—including big banks, insurers, and pension funds—are coming to recognize blockchain's transformative benefits. Consider the implications of a vast global and distributed ledger running on millions of devices and open to anyone, where we can securely and privately store and move not just information but anything of *value*—money, equities, bonds and other financial assets, titles, deeds, intellectual property, even votes. This new native digital medium for value would act as a ledger of accounts, a database, a notary, a sentry and clearing house, all operated through a consensus mechanism. The technology holds the potential to make markets radically more efficient, secure, inclusive, and transparent.

Individuals also have much to gain. Blockchain represents a conduit for peer-to-peer interaction, enabling us to cut red tape and cost in our everyday dealings with businesses and governments without sacrificing security or privacy. It will be simpler, faster, and cheaper to conduct our banking transactions, pay our taxes, and apply for licenses—to give just three examples. Even daily interactions among technologies can run on the blockchain. Smart devices can communicate with other smart devices. A smart street light can ask an autonomous car whether it's operating properly and get an actionable response. To hack the car, every smart device controlling traffic in the blockchain would have to be hacked first.²

Interest in blockchain across sectors and in government is spreading fast.

Interest in blockchain across sectors and in government is spreading fast. One recent development illustrates the speed of this revolution around the world: Deloitte, the international consultancy, recently opened a blockchain lab in the Silicon Docks neighborhood of Dublin, Ireland, and has more than 800 staffers worldwide working on blockchain-related initiatives.³ Even as technology displaces workers, new opportunities are opening. The number of blockchain related jobs in the United States has increased 207 percent this year, and 631 percent in two years.⁴

As the developments take shape, it's not only the technical experts that are being sought: a crypto jobs website has appeared as a niche for the nontechnical side of the growing industry. A global platform that drops the cost of participating and establishing trust could attract more participants, not only enabling entrepreneurs to raise



Hyperledger's goal is to build enterprise-grade blockchain technology that every industry could implement.

capital, rent assets, and create jobs in poor communities but also improving the delivery of aid and reducing corruption, a precondition for jobs. Still concerns abound that the new order may displace more jobs.

Blockchain began as the enabling technology of bitcoin, but has since expanded into a far larger ecosystem of technologies. Hyperledger, for example, is a project founded by the Linux Foundation, which counts hundreds of large organizations (Accenture, IBM, Thomson Reuters, and dozens of banks) as members. Its goal is to build enterprise-grade blockchain technology that every industry could implement.

Another blockchain, Ethereum, is pioneering smart contracts capable of simplifying and streamlining business logic inside and between organizations with entirely new business models. Today much of the innovation on this platform is through partnerships between start-ups and large corporations.

R3, a consortium of many of the world's largest banks, is pioneering innovations like real-time digital settlement and digital fiat currencies. Companies such as Digital Asset Holdings run by Blythe Masters (former CEO of J.P. Morgan's investment bank), Nuco run by Matthew Spoke (former head of the blockchain practice at Deloitte Canada), and Chain with investors NASDAQ and Visa are building private blockchains for banking, manufacturing, and energy providers.

This wildfire of innovation results from breakneck progress by innovators, entrepreneurs, and big business alike, who are poised to transform, for example, the core functions of financial intermediaries. The opportunities are immense, as are the risks. Blockchain may enable incumbents to do more with less, expand their services, reduce risk, and cut costs. It also radically lowers barriers for entrants to disrupt the status quo, challenging incumbents in virtually every market.

Some blockchain challenges

Like every revolutionary technology, blockchain comes with challenges and shortcomings. Are these fatal flaws, or implementation challenges to overcome? We are confident it's the latter. These are a few of the issues for consideration:

Many jurisdictions have yet to rule on the legal status of transactions and smart contracts.

- » **The technology is not ready for prime time.** If everyone rushed to buy bitcoin for example, the public blockchain underlying bitcoin would become unstable: its infrastructure lacks the transactional capacity to on-board millions of cryptocurrency owners. Many interfaces are user-unfriendly, requiring a high tolerance for alphanumeric code. Perhaps the biggest deterrent for mainstreaming the technology is a lack of legal recourse. Many jurisdictions have yet to rule on the legal status of transactions and smart contracts.



We need a stable approach to regulation, legislation, and negotiation of treaties to minimize uncertainty, ease transitions, and encourage investors to continue to support development.

- » **The energy consumed is unsustainable.** The proof-of-work method used to secure the bitcoin network involves hashing, the process of running pending transactions through a *secure hash algorithm* (SHA-256) to create a *hash* (a digital digest) that solves a puzzle. But hashing burns a lot of electricity, and the trend is toward more hashing.
- » **Governments may stifle it.** Where governments have undermined centrally-controlled networks like Napster, pure peer-to-peer networks like Tor have persisted. Will the Bitcoin blockchain network hold its own against mighty central authorities? While some jurisdictions have taken the lead in adopting blockchain, others are reluctant to allow it to displace legacy systems and procedures. We need a stable approach to regulation, legislation, and negotiation of treaties to minimize uncertainty, ease transitions, and encourage investors to continue to support development.
- » **Powerful incumbents will usurp it.** Digital conglomerates have dominated the Internet, extracting most of their value through monetizing user data. Will these same incumbents defend their territory against start-ups that threaten their dominance in the Internet's second era? Will they lobby so that onerous regulations apply to small start-ups and then sue any start-up that survives the regulatory inquisition?
- » **Incentives are inadequate for distributed mass collaboration.** Bitcoin miners have an incentive to secure the Bitcoin network because, if it failed, all the unconverted bitcoin earned by mining would be at risk. Any design change must set appropriate incentives to maintain miner decentralization. Is that possible? The number of new bitcoins that miners can earn halves every four years. Will transaction fees be enough to sustain the network when the mining reward drops to zero?
- » **Blockchain is a job killer.** Technology, AI, and robotics are displacing workers in traditional jobs around the world. Markets are slow to shift education models for workers to fill positions in a high-tech setting.
- » **Governing the protocols is like herding cats.** Unlike the Internet, the bitcoin community lacks formal oversight bodies to anticipate needs and guide their resolution. Community members prefer it that way but cannot agree on a way forward. If we don't address governance, then the movement could disintegrate into warring factions.
- » **Distributed autonomous agents will form "Skynet."** According to researchers in AI, we are years, not decades, away from autonomous offensive weapons and militarized drones. How should society govern them? App developers will need to identify any significant public impact—good, bad, or neutral—and alter source code and designs accordingly.



- » **Big Brother is (still) watching you.** While blockchains ensure a degree of anonymity, they also provide a degree of openness. Corporations and countries known for spying will likely redouble their efforts because value is involved. Imagine a big bull's-eye on top of the Internet. The good news is that shenanigans are transparent on the blockchain.
- » **Criminals will use it.** Criminals have always found ways to embrace new technologies as first users—from the automobile, to the Internet, to cell phones. Such is the case with blockchain. Criminals are as likely to explore the nefarious utility of blockchain as any other technology. That said, the most sophisticated authorities believe that digital currencies could help law enforcement to fight cybercrime by providing a record of suspicious activities.

National hubs for the Internet's second era

Since jurisdictions have a multitude of issues to consider, where, oh where, will blockchain likely call home? Many locations are oxymoronically emerging as centers of decentralized ledger systems. These jurisdictions compete by adopting more favorable laws and encouraging social and cultural flexibility as innovators create new technology and applications. While one location can quickly assimilate, another may have regulatory limits that slow progress.

A blockchain hub would turbocharge a region's economy in much the same way as Facebook, Apple, Netflix, and Google—commonly abbreviated to FANG—put a rocket under Silicon Valley. A hub will draw talent from around the world and would help propel the Blockchain Revolution across a wide range of businesses and governments, opening new markets and spurring innovation in small business financing, entrepreneurship, and research into new applications.

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The numbers are a moving target, but the United States has maintained the top position, with the United Kingdom in second. China, Canada, and Germany are next, with a lower tier of Australia, France, Singapore, and the Netherlands, followed by Brazil, Switzerland, and Israel, and then a growing group that are just joining the hunt, one of which, Estonia, is quickly coming into the circle (Figure 1, next page).

United States

Not surprisingly, the largest market for blockchain development is the United States with nearly 40 percent of the start-ups in the field. The head start provided by US Internet initiatives is slowly eroding as smaller jurisdictions with fewer regulatory or legacy system impediments start to gain ground.



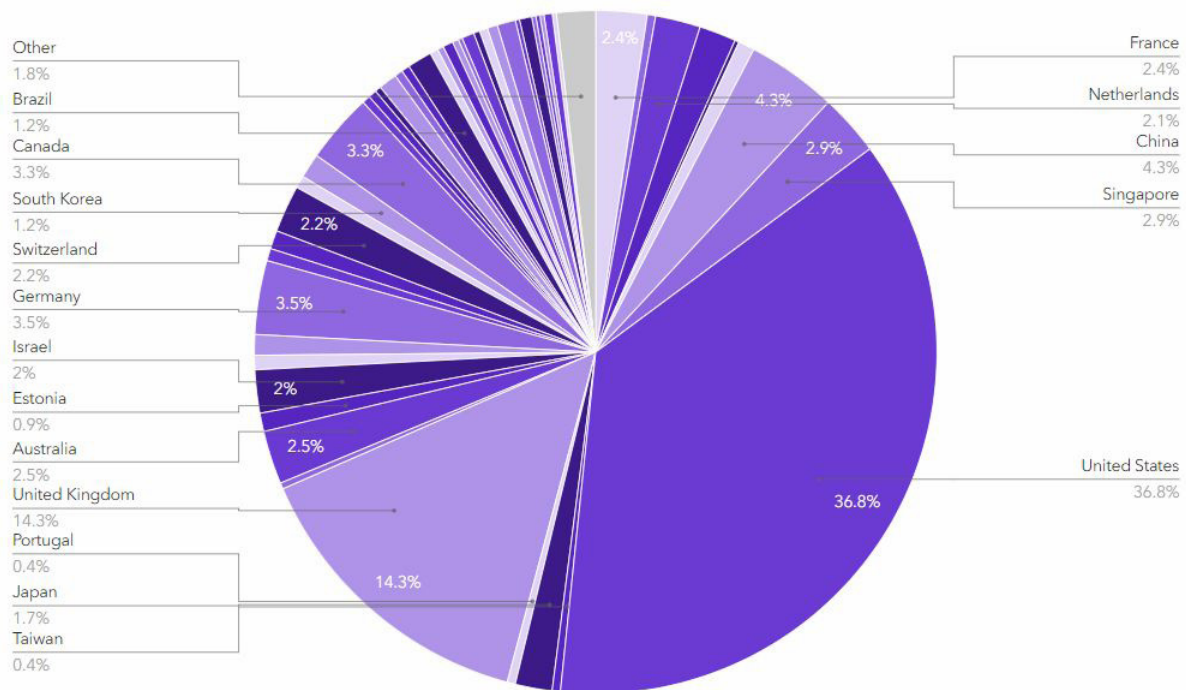
Notable among US-headquartered blockchain companies is Consensus Systems (ConsenSys), based in Brooklyn, New York. ConsenSys is actively building decentralized applications on the Ethereum blockchain that promise to shake the windows and rattle the walls of a dozen or more industries—from financial services, audit, and professional services to manufacturing, telecommunications, music, and film—with clients located all over the world. Other US-based leaders include Bitfury, a blockchain software and hardware company; Digital Asset Holdings, an investment company founded by Blythe Masters; Coinbase, a dominant cryptocurrency exchange; and Ripple, developers of a global payment protocol, backed by Google Ventures, Andreessen Horowitz, and others.

With the legacy power of the tech field that has grown up in Silicon Valley, US enterprises will likely remain the dominant force in the field.

United Kingdom

The United Kingdom is second behind the United States with 16.7 percent of blockchain start-up activity. The House of Lords witnessed a committee discussion of blockchain technology last

Figure 1: Where are the blockchain start-ups?



Source: Outlier Ventures, "Country breakdown chart," Start-up Tracker, as of 17 July 2018. outlierventures.io/startup-tracker/#locations.



year, demonstrating the pace at which London and United Kingdom have entered the conversation and jumped ahead on development and application.⁵ While the government level exchanges still demonstrated interest mixed with skepticism, the environment in the private sector has clearly reached a point that can no longer be ignored by government. A recent report on distributed ledger technology from the House of Lords is indicative of the rate of change in that nation. The focus on government leadership, research and standards, and the underlying need for a governance structure was clear:

With the right mix of leadership, collaboration, and sound governance, DLT offers a step change for service delivery in both the public and private sectors. By reducing data fragmentation and enhancing traceability and accountability, DLT promises cost-savings and efficiencies on a scale sufficient to impact national finances. DLT's facilitation of common business processes, based on common and authoritative reference and transaction data, provides the means to derive improved returns and efficiencies from past and future investments, including legacy systems, through enhanced interoperability.⁶

Identity management has been proposed as a next-step project for the United Kingdom to undertake using the blockchain foundation.

Key recommendations for the United Kingdom include active government support for promotion of mature UK digital capability, deployment of the academic community, industry integration, and an education outreach to improve understanding and acceptance.

Identity management has been proposed as a next-step project for the United Kingdom to undertake using the blockchain foundation.⁷ With identity theft at an alarmingly high rate of nearly 173,000 cases in 2016 in the United Kingdom, and legacy systems that are siloed between agencies, blockchain can permit both privacy and security for citizens.

The London Blockchain week, which grew out of an annual conference series, is coming up next month and includes a hackathon challenge to create government initiatives.

China

In recent years, China has also supported an environment for blockchain development by creating relevant policies to promote innovation. Just released, the "13th Five Year Plan for National Informatization," described several key directions including innovation-driven development and specified priorities that include forward-looking deployment of "new generation information network technologies."⁸

China is a dominant player in the mining of bitcoin, and is climbing on the list of countries that are home to blockchain start-ups.⁹ At the same time, China has been notably hostile to certain elements of blockchain ecosystem, while openly nurturing others. In 2017, China declared that ICOs were illegal. China required all China-based ICO



projects to issue refunds to investors. Almost equally damaging to the industry was an order that all bitcoin exchanges be shut down.

Where blockchain ultimately falls along the spectrum of China's technological journey remains to be seen, but it is safe to say that to count them out based on recent regulatory crackdowns would be premature. China's relationship with digital currencies could best be described as complex. It seems the country will move to implement the technologies it views as most beneficial, and curb those it deems a potential threat.

An example of this is China's use of surveillance technology, whether or not it raises eyebrows from outsiders. A BBC reporter recently tested the Chinese surveillance system that incorporates facial recognition, AI, and a gigantic database of relationships, registrations, and locations. His challenge was to evade detection by the system for as long as he could. In a city of 3.5 million, and a sea of CCTV cameras with AI and facial recognition capability, the time he was able to evade detection? Seven minutes.¹⁰

Just as China has leveraged other technologies for its security interests, it is likely it will continue to experiment with blockchain technology and related applications for the foreseeable future.

Many blockchain core developers are Canadian and continue to work in the ecosystem in both start-ups and advocacy groups.

Canada

Canadian entrepreneurs have been on the leading edge of blockchain innovation from the start. Ethereum, Canada's least known *unicorn*—a start-up that has attained a market value of more than \$1 billion—recently surpassed \$70 billion in value. Many blockchain core developers are Canadian and continue to work in the ecosystem in both start-ups and advocacy groups. A growing constellation of entrepreneurs and technologists are trying to build the future with companies in Toronto, Vancouver, and Montreal.

Bob Summerwill, community ambassador at Sweetbridge, a company transforming supply chains through blockchain technology, said,

Toronto is a very cosmopolitan city as well as a world financial center, and much of the blockchain innovation happens within that context. Vancouver is now up-and-coming for blockchain as well, with a good relationship being built with the BC Securities Commission, and is our link to China and the rest of Asia. There is a Women in Blockchain group in Toronto and one just starting in Vancouver.¹¹

The state of the Canadian blockchain landscape

- » Major Canadian investment banking firms are raising funds for blockchain start-ups to help them manage their assets digitally.¹²
- » Toronto's MaRS Discovery District launched a fintech hub in February 2015 to work with the financial services



With frequent meetups, hackathons, and education events, the Australian blockchain community has an advocacy team that is putting Australia at the forefront of innovation and collaboration on blockchain-based solutions.

sector and with start-ups to break new ground in financial services technology. IBM became the hub's first technology tenant, joining such financial services companies as CIBC, Manulife, and payments processor Moneris.

- » Some of the industry's most promising start-ups, such as Nuco/Aion, Paycase, Tendermint/Cosmos, and Decentral, each have strong roots in the Toronto area. Vanbex, Axiom Zen, and Frontier Foundry are based in Vancouver.
- » TokenFunder, a blockchain cousin to Kickstarter, was the first ICO to receive regulatory approval from the Ontario Securities Commission. Its founders postponed the company's launch to achieve regulatory recognition and keep blockchain innovation in Canada.

Australia

This year the third blockchain industry advocacy organization was established in Australia in as many years. Blockchain Association of Australia joined Blockchain Centre and the Australian Digital Currency Commerce Association with the goal of growing a community and ecosystem for the technology. As the technological developments have outpaced the skills market around the world, these associations are key to promoting a cultural shift and promoting adoption. With frequent meetups, hackathons, and education events, the Australian blockchain community has an advocacy team that is putting Australia at the forefront of innovation and collaboration on blockchain-based solutions.

As the Australian organizations have flourished, they have brought an array of start-ups to Melbourne and promoted the acceptance of cryptocurrency and other solutions in their market. Australia has removed taxes from transactions and trades that are made using bitcoin, and in a historic move, the Australian Securities Exchange has announced adoption of blockchain following a two-year test of the technology. The permissioned blockchain solution will replace the Clearing House Electronic Subregister System, considered a world-leading solution when introduced in the 1990s.¹³ This announcement marks the first major bourse to adopt the new technology.

Incubators are opening in Shanghai, Manila, and elsewhere in the region to expand the success of the Australian advocacies.

France

France is high on the list of countries hosting start-up initiatives, and some large French companies are experimenting. In March 2016, French Parliament dedicated an entire day of proceedings to blockchain that led to the prime minister's holding a hearing on legal and social issues of the technology.



The start-up initiatives are uniting in associations, the major financial institutions are making their opinions heard at the regulatory level, and the universities are initiating meetups and curriculum enhancements. All of this contributes to an active start-up culture despite slow-building interest from public authorities.¹⁴

Netherlands

By encouraging the development of a code of conduct and with frequent events and educational output, Crypto Valley is quickly developing a positive culture, and Zug is becoming a microcosm for how the technology is adopted and integrated.

With the claim of being the largest in the world, the Netherlands hackathon is helping to put Holland on the map in the world of blockchain start-ups. The government, universities, business, the port of Rotterdam, and even the royal family are engaged in the activities around StartupFest Europe held in The Hague. Initiatives run the gamut from real estate records to real-time banking reconciliation, digital identity solutions, logistics and supply chain challenges, and even a knowledge network designed to offer insights and support for entities that can't afford to launch their own blockchain initiatives.¹⁵

Switzerland

Switzerland represents one of the world's most decentralized political systems, which may be why its residents view decentralized ledgers as opportunities. Nicknamed "Crypto Valley," Zug has become a center for digital money by attracting bitcoin asset managers, brokers, and currency exchanges, perhaps because of the Swiss tradition of financial privacy and low corporate tax rates. As the presence of the industry players grew, Zug leaders responded by embracing the technology. City cashiers take utility payments in bitcoin (although only a handful of payments have been made), and the bitcoin exchange, Bitcoin Suisse—which has facilitated \$635 million in ICOs—has offices in the town center.¹⁶



Zug, Panoramio by Patrick Nouhailler, 2014, used under CC BY-SA 3.0.



The large market and social challenges of Brazil make an intriguing crucible for many start-up concepts, putting it on the list of start-up leaders.

Founded in the last year, the Crypto Valley Association is stepping in with working groups on policy, regulatory development, start-ups, and investments.¹⁷ By encouraging the development of a code of conduct and with frequent events and educational output, it is quickly developing a positive culture, and Zug is becoming a microcosm for how the technology is adopted and integrated. By latest count, 18 companies are listed as start-ups in Zug, with two meetups with over 2,000 members.

At the same time, there is concern about governance, largely via self-regulation to date. Systems that monitor fraudulent transactions have been effective in slowing hackers and discouraging operators who lack appropriate licensing for banking-style services, yet criminals who operate with cryptocurrency are difficult to identify or stop. The crackdown on bank secrecy in Switzerland is affecting the new technology, with concerns surrounding *know your customer* (KYC) and *anti-money laundering* (AML) violations. Leaders in Zug are actively pursuing regulation for their burgeoning industry.¹⁸

Brazil

The fifth largest Internet and mobile economy, Brazil, has been a crucial market for Internet goliaths like Facebook and Google. Brazilian *e-jeitinho* includes good humor and creativity, but also a certain tolerance of stretching the rules and operating outside of the system. When former cabinet members are linked to a \$16 million “lost treasure” of Brazilian and US currency in a Bahia apartment, the desirability of transparency and trust in transactions becomes obvious.¹⁹

Brazil has a busy network of disruptive Internet apps, including the familiar assortment of ride hailing and lodging. With the dawn of blockchain, it is moving quickly on a digital driver’s license due to launch early in 2018.²⁰ The large market and social challenges of this sprawling nation make an intriguing crucible for many start-up concepts, putting it on the list of start-up leaders.²¹

Estonia

For a glimpse of the future, Estonia is an unexpected place to start. With a nationwide fast-charge system for electronic vehicles (EVs) using a pay-as-you-go system, and delivery bots roaming freely on the city streets with lunch orders, Estonia has clearly claimed a front-line position in the race to be a high-tech leader.²² The birthplace of Skype, Estonia was also the first place to experience a national cyberattack in the early 2000s. It may be that the digital wake-up call was exactly what put Estonia on a fast track to leadership as a blockchain hub.

Almost all public services in the country have been digitized, and every resident has a secure digital identity through a program called e-Residency that is not limited to Estonian citizens and can be established without a visit to Estonia. The program may give Estonian businesses a significant head start on digitally integrated business



Almost all public services in Estonia have been digitized, and every resident has a secure digital identity through a program called e-Residency.

development.²³ Through the digital ID, customer on-boarding is streamlined across industries and locations. In addition, Nasdaq has plans to permit shareholder voting via e-Residency authentication, a notary system has been introduced for e-residents, and some asset wallet applications are in development.

The Estonian data isn't central, so major breaches are unlikely, but the underlying blockchain asserts its legitimacy making medical, school, financial, and government information readily verifiable across platforms—even allowing emergency personnel to access medical records before they reach a victim and pre-register him on the way to the hospital. With the ability to execute smart contracts for remote e-residents, Estonia is displacing the local governments of its subscribers. When compared with US systems for ID verification that often still require utility bills to prove residence, Estonia is positively futuristic.²⁴ Every time the data is viewed, the look is recorded, or sensitive data can be locked to prevent snooping.

Barack Obama famously quipped, "I should have called Estonia when we were setting up our healthcare Web site."²⁵ The Estonian system was established without charging its subscribers. As participation has grown and the data in the ledger blossom, the opportunity to develop killer apps is gigantic. And the security and privacy offered by the system is unprecedented. As Taavi Kotka, former Estonian CIO, said to *The New Yorker* of older systems that try to work with the vulnerability of our devices, "There is no government that knows more about you than Google or Facebook."²⁶ Without the need for a device subscriber identification module card, or a chip in a card, the channels for hackers are, at least for now, nonexistent.

Georgia and Ukraine

Much like Estonia, Georgia is part of a trend in former Soviet republics toward increased adoption of blockchain technology. Unencumbered by the legacy systems and models of the 20th century, these young countries have enjoyed fewer implementation challenges than most.

Georgia has recently moved its land registry on a blockchain, protecting property rights and testing the citizens' trust in the system.

In a data center that was built to "mine" bitcoin, the underlying technology is being used by the Georgian government to secure records.²⁷ The country has recently moved its land registry on a blockchain, protecting property rights and testing the citizens' trust in the system.

Bitfury, the operator of the Georgian data center, has also entered into a collaboration with Ukraine where the e-governance agency is working to overcome a historic distrust of government. While the entrenched bureaucracy in the country may be skeptical, the novelty of the technology provides some cover, as there is limited understanding of the implications. In 2017, a bill was initiated to introduce and promote blockchain by defining key terms such as *token* and *smart contract*.²⁸ Konstantin Yarmolenko, a board member of the Bitcoin Foundation Ukraine, announced the proposed bill on Facebook.²⁹



the formation of a Smart Nation and Digital Government Office, healthcare video consultation systems, on-demand public transport and testing of autonomous vehicles. Projects directed at utilities, universities, security systems, media, and fintech are all underway. Singapore was recently identified as the third largest ICO market (after the United States and Switzerland) and the leading ICO hub in Asia.³³

Stockholm and Boden

In 2015, a report from the Stockholm School of Economics claimed Stockholm, with a burgeoning unicorn factory, held the second place position (behind London) as “one of the EU’s biggest hubs for fintech.”³⁴ The bitcoin mining community was quick to take advantage of Sweden’s northern climate as a means to cool its data farms naturally. Boden, a municipality in northern Sweden, calls itself “The Node Pole,” a now well-established business park for running data centers with “close to carbon-free footprints.”³⁵ Already ahead of other European cities, Swedish cities (along with leading businesses) take pride in going increasingly cashless in their daily transactions, while many major banks no longer keep cash on hand.³⁶

Dubai

The Dubai blockchain strategy, led by blockchain innovator Vinay Gupta, was launched in 2016 as an exploration and evaluation of technology innovations that can provide simple and secure transactions to “make Dubai the happiest city on earth.”³⁷ The program pillars include government efficiency, industry creation, and international leadership.

Smart Dubai is a collaborative platform that pulls together public and private partners on a platform called simply “du.” Solutions for city planning, health data, transportation, and other categories are served on personalized dashboards with analytics for individuals, businesses, and government needs. The Future Foundation is attracting participation from companies around the world for a \$300 million accelerator program that is turning Dubai into a center of blockchain development. The Crown Prince has targeted 2020 for all government documentation to be entered on a blockchain, which is attracting involvement from business leaders around the world.³⁸

Dubai is poised to be one of the key locations for innovation. With the world’s busiest airport, and a gateway to Asia and Africa, it is pursuing the potential of financial applications as well as supply chain, real estate, transportation, and healthcare.

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Virtual smart cities

For a tantalizing peek into the future, look no further than DenCity, a virtual, blockchain- and AI-powered smart city or “metaverse,” where users define the lifestyle and the rules.³⁹ Users don’t buy this gaming universe to play on their game system; they participate in



the ICO and become a part of the virtual galaxy economy. Could this be the testing platform for the civilizations of the future, and one of an increasing number of user-friendly applications which take blockchain's potential into the mainstream? Only time can tell.

A tolerance for novel ideas and a willingness to collaborate on unfamiliar terrain are vital components of innovation.

Drivers of blockchain development

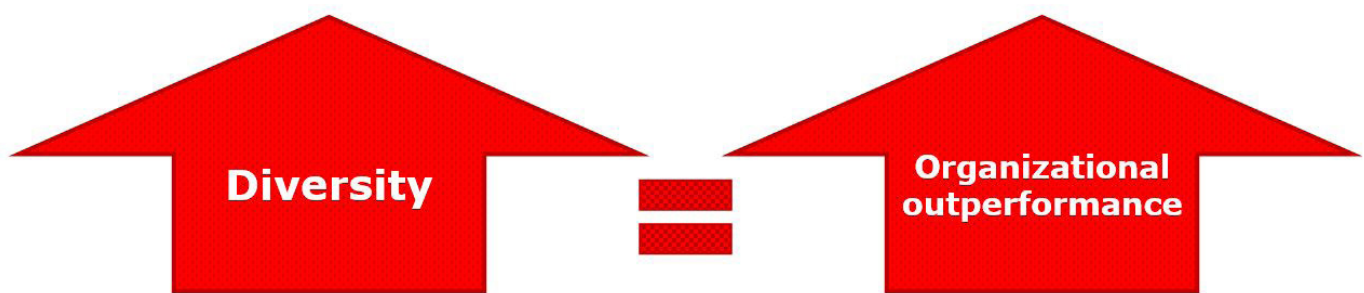
Talent and diversity

A tolerance for novel ideas and a willingness to collaborate on unfamiliar terrain are vital components of innovation. Diversity is a known correlate of organizational performance and competitive advantage. In a 2015 McKinsey study, companies that were both gender and ethnically diverse outperform their less diverse peers (Figure 3).⁴⁰

Regions in which the local population is one that embraces diversity and engages in inclusion practices will be well served in this regard. While blockchain technology is decentralized by nature, talent is migratory. People move to favorable environments where they can thrive socially, in areas that offer the promise of new economic opportunities, even at the cost of near-term economic hardship. Tech communities that can overcome cultural barriers among their populations, and work together to achieve common goals, will thrive.

Canada is perhaps one of the best global examples of diversity as a strength. Sweetbridge's Bob Summerwill makes the case that cultures of inclusion begin with committed political leaders. Summerwill, who hails from England, has made Canada his home. He told us, "Having a prime minister who has set the tone with his 'cabinet which looks like Canada' and his recent apology to the LBGTQ2 community is world-leading, as far as I can see. Canada is renowned as a country of nice people, and that is well deserved."⁴¹

Figure 3: Diverse teams improve organizational performance



Source: Hilary Carter, 2017.



Beyond having an exceptional talent pool, Thomson Reuters chose to invest in Toronto because of its diverse population.

In Toronto, 50 percent of the city's population was born outside of Canada, and as such, diversity is the rule, not the exception. The diverse social and cultural fabric, combined with a highly educated population, has provided fertile ground for talented people from all over the world to innovate. This was one of the reasons behind the Thomson Reuters decision to invest \$100 million in its newly established, Toronto-based technology hub. According to Dave Moran, head of communications at Thomson Reuters, Canada, "Our investment in Toronto is all about talent. Toronto provides a rich mix of emerging and mature technology employers, a growing fintech community, and a robust pipeline of talent."⁴²

Beyond having an exceptional talent pool, Thomson Reuters chose to invest in Toronto because of its diverse population. Moran told us, "We needed a location that offered us the same incredible diversity as our customers and employees. With clients in over 140 countries, it's fitting that we are investing in the world's most diverse and multicultural city."⁴³

Improved investment climate

Venture capital investment, the kind needed to spur development of blockchain applications, is accelerating. Thomson Reuters Venture Capital Review reports that venture capital activity in Canada grew by 36 percent in 2016 to \$3.7 billion, the highest in 15 years. Ontario led the advance with a 49 percent surge in activity, making it the fourth biggest place of venture capital investment in North America, behind only California, New York, and Massachusetts. Its capital Toronto posted the highest increase in activity of all North American cities. Indeed, Toronto, with a 52.7 percent jump was one of only two large cities to post a growth in venture capital last year. The other was the Orange County metropolitan area in California.⁴⁴

Fintech innovation

Big banks are already embracing blockchain. Linda Mantia, Royal Bank of Canada's (RBC) executive vice president for digital, payments, and cards, told *CoinDesk*, "If you look at every major advancement enabled by technology, there's always hype. Eighty percent of the money won't make it, but the last 20 percent can be massive. At the end of every hype there's something transformative." She added that RBC would not shy away from the opportunities and risks involved: "No one wants to miss it. If you don't hop on the hype bandwagon, you'll be left behind."⁴⁵

"No one wants to miss it. If you don't hop on the hype bandwagon, you'll be left behind."

 LINDA MANTIA
Executive Vice President
Royal Bank of Canada

Blockchain entrepreneurship

Under the right conditions, entrepreneurs are the engines of economic vitality in society. They bring fresh thinking to the marketplace and fuel the creative destruction that allows economies to prosper.



Ethereum pioneered smart contract technology, which, as its name suggests, is software that mimics the logic of contracts but with guaranteed execution, enforcement, and payments.

Ethereum was founded in 2014 by a nineteen-year-old University of Waterloo dropout named Vitalik Buterin, a polymath and autodidact who saw the potential of blockchain long before most had awoken to the idea. Kick-started by a record-shattering crowd sale in 2014 where he raised \$18 million in a global *initial coin offering*, Ethereum is now a certified “unicorn” valued at more than \$75 billion. It is used by dozens of *Fortune 500* companies, among them Microsoft, J.P. Morgan, and BHP Billiton.

Ethereum is based on the premise that blockchain technology can do more than simply move and store value. Specifically, Ethereum pioneered smart contract technology, which, as its name suggests, is software that mimics the logic of contracts but with guaranteed execution, enforcement, and payments. As a programmable platform capable of complex business logic like contracts, Ethereum has the potential to transform every industry and even transform how our institutions—from corporations to governments—function in the economy and society.

As a technology, blockchain has captured the imagination of entrepreneurs around the globe, and meetups have become their collaborative forum. Held in cities all over the world, blockchain meetups are increasing in popularity and attracting people of all professional backgrounds at various stages of their career.

Government priorities

While cryptocurrency may be antiestablishment, ironically, governments are providing the impetus for blockchain’s implementation.



BC Blockchain Meetup by Bob Summerwill, 2017, used with permission.



Discussions are taking place in the House of Lords in the United Kingdom, in the ministries of Canada, in the Estonian cabinet, and in government seats around the world as inventors are introducing applications that could run stock exchanges, public records, transportation, energy, and health systems. Brad Duguid, the minister of economic development and growth, told the Canadian Club:

Mayor John Tory of the City of Toronto spoke of his work to make Toronto a global technology leader that attracts talent pools from other countries, and to convince Canadians who have left for Silicon Valley to return home.

Our challenge is to ensure that our entrepreneurs move those start-ups to scale ups and scale ups to global companies here in Ontario. That means helping our fast runners run faster and focusing on companies in Ontario with the greatest growth potential.

It says goodbye to the feel-good, spread-the-peanut-butter approach of government trying to be everything to every sector to every company. That approach might make us feel good but in this fiercely competitive global economy we must focus on where we're strongest.

Our world-class tech, entrepreneurial and research talent, our globally competitive tax rates and R&D tax credits, and our thriving business climate are simply undeniable.

We've become a globally competitive hotbed of talent and disruptive technology.

So much so, that when I go abroad to attract investment to Ontario, it's no longer a sales pitch I'm giving. It's a compelling and factual business case.⁴⁶

In December 2016, the Ontario government asked businesses and the public to help identify and improve financial services regulations that are unclear, outdated, redundant, or unnecessarily costly. The government will use the input "to help make it simpler for businesses to interact with government, innovate and grow, without jeopardizing essential standards that protect the public interest."⁴⁷ Wider adoption of blockchain can turn that vision into reality.

Even at the municipal level, government action can positively affect global centers' innovation. In November 2017, Mayor John Tory of the City of Toronto spoke of his work to make Toronto a global technology leader that attracts talent pools from other countries, and to convince Canadians who have left for Silicon Valley to return home. He told the Blockchain Research Institute's private member audience:

If you become an embracing and nurturing and welcoming place for smart people with the ideas of the future, regardless of their nationality, their skin color, their sexual orientation or their religious faith-they themselves are going to create a lot of jobs. And these developments are here to stay. They're going to make life better and make jobs more secure. And they're going to new create a lot of wealth. I'm in favor of



*Toronto being one of places in the world where people are going to look to for that.*⁴⁸

Governments can and do play a transformative role in the establishment of tomorrow's innovation hubs, whether by way of creating and sustaining cultures of tolerance, encouraging private funding of innovation, or through direct government investment. Those regions that have the right combination of inputs will most likely have the greatest opportunities for economic impact.

Growth inhibitors

Governments, banks, and other players around the world are racing to assert leadership in blockchain technology. A key handicap—and one that this project addresses—is the absence of a clearly defined strategy for governments and other stakeholders to promote blockchain technology.

No national strategy

The same concern has been raised about other areas of financial technology. A 2015 report by the Innovation Policy Lab at the University of Toronto's Munk School of Global Affairs concluded, "Most successful ecosystems are the result of critical interventions by key actors and local leaders, often within the context of a supportive policy environment, but rarely led exclusively by public sector actors."⁴⁹ According to the study's authors, a key challenge is to develop a vision of the interventions needed to cultivate and support the fintech ecosystem and to develop a strategy for what each stakeholder group can do to address them.

United Kingdom and Australia are leading the way in strategic formulation. The UK Treasury commissioned a report that compared the UK environment for fintech with other leading countries in the field.⁵⁰ The Treasury responded by unveiling various commitments and actions to ensure that the United Kingdom develops and retains a vibrant and competitive fintech sector. A cornerstone of these measures was the creation of an industry-led panel to advise on fintech strategy and policy, and to identify specific niches where British fintechs can develop a competitive edge over their rivals in other parts of the world.

In March 2016, the Australian government published a document, *Backing Australian Fintech*. The Hon. Scott Morrison, the country's treasurer (finance minister), made his ambitions clear in the preamble:

I want to help create an environment for Australia's fintech sector where it can be both internationally competitive and play a central role in aiding the positive transformation of

A key handicap is the absence of a clearly defined strategy for governments and other stakeholders to promote blockchain technology.



Australia's economy. The Turnbull government wants to offer home-grown and offshore fintech innovators an opportunity to develop and refine new products and services in the Australian market through a regulatory system that allows them to be frictionless through their scale journey while still becoming a regulatory match fit for deployment into domestic and global markets.⁵¹

One problem in determining the magnitude of funding bottlenecks is that accurate and comprehensive data are hard to come by, especially for specific technology sectors and for firms at various stages of growth.

Funding bottlenecks

Lack of funding is no longer the prime obstacle to blockchain entrepreneurs, as it was for Internet technology start-ups. Through ICOs, entrepreneurs have harnessed this distributed financing mechanism to launch their firms. Now they must overcome regulatory hurdles. One problem in determining the magnitude of funding bottlenecks is that accurate and comprehensive data are hard to come by, especially for specific technology sectors and for firms at various stages of growth.

Traditional funding models

- » **Angel capital.** While most angel investors do deals quietly and independently of formal groups, organized angel groups can help connect investors with deals or put together syndicated investments. These groups can also provide data that give insight into an otherwise “invisible” investment market.⁵²
- » **Venture capital.** Funding has grown steadily since 2011. The average venture capital investment in Canada has grown to \$5.6 million in the first nine months of 2016, still far behind most other countries, including the United States with an average deal size of \$17.7 million, the United Kingdom at \$16.9 million, and Israel at \$15.3 million.
- » **Debt financing.** Banks, credit unions, and other lenders are growing more sympathetic to fintech start-ups.

Risk aversion

Our research points to an unfortunate tendency among government and private sector players to focus on mitigating the risks of the blockchain and fintech revolution, rather than reaping its rewards. Writing about fintech strategies for Canada—with a viewpoint that applies globally as much to blockchain entrepreneurs as to the rest of fintech—Michael King and Amy Young noted:

Most collaborations happen at the periphery of the banks' primary management structures and are led by people who lack the executive power to make the needed procurement decisions. Similarly, there is an opportunity to improve the level of fintech expertise among incumbent firms. As interviewees contacted by the Munk team put it: “The only



way to get a contract with a Canadian bank is to have one first with a US bank.” Banks and fintechs need to understand each other’s strengths and constraints so they can work together.⁵³

The challenge is not to enlarge the risk appetite among investors, but to reorient it to fast-growing technology industries, like blockchain.

Inadequate R&D spending

According to the OECD, Korea’s R&D spending has jumped from roughly average in 2000 to first place in 2015, and both its industrial powerhouses—Samsung, Hyundai, LG, among others—and technology start-ups can derive much benefit from it. Israel has produced more unicorns than Canada, even though it has just one-quarter of Canada’s population. The lesson is clear: governments that fund innovation fuel the economic growth of tomorrow.

Policy and regulatory impediments

Regulatory barriers and government policies can be major impediments to gaining a leadership role in the blockchain economy. There has been no systematic study of the dos and don’ts of regulation of blockchain technology, but too much is at stake to address this issue on an *ad hoc* basis. Without a more comprehensive approach, there remains a high risk that a socially and economically valuable industry could be strangled at birth. Regulators should encourage the blockchain industry for many reasons, and encourage collaboration that will eliminate artificial barriers to sharing knowledge, governance, and best practices.

Conclusions and recommendations

Regulators should encourage the blockchain industry for many reasons, and encourage collaboration that will eliminate artificial barriers to sharing knowledge, governance, and best practices.

What is the way forward to create networked hubs of blockchain? Building innovative blockchain ecosystems takes leadership, vision, and perhaps even a little courage. After all, for a technology in its cradle stages, blockchain has had its fair share of bad press. Advocating for a future isn’t easy when neither the path nor the destination is clear. Because technology alone doesn’t create prosperity—people do—each of us must advocate for the future we want to see. We need leadership to pursue the business models of the future and overcome the implementation challenges.

The blockchain transformation is well underway. Governments, businesses, and individuals are demonstrating that the way forward is on the blockchain, and that the time to build the future is now. In the United Kingdom, Australia, Singapore, Hong Kong, and elsewhere, governments have brought stakeholders together to develop a coordinated and coherent blockchain strategy.



Now, in this new era, it makes sense to establish collaborative commissions with members representing the main stakeholders in the digital economy—namely government, financial institutions, the research community, technology entrepreneurs, civil society and, not least, consumers.

Like the institutions that have stewarded the Internet, these groups should have a mandate, development of concrete recommendations that would direct and govern the unfolding Blockchain Revolution and other critical technologies such as AI, quantum computing, the Internet of Things, autonomous vehicles, drones, and robotics.



Establish local research and development

In Canada, the Blockchain Research Institute serves as a leading center for global blockchain research. The Institute has received the support of three levels of government in Canada: federal, provincial, and municipal, along with a number of government agencies and global corporations.

Given the prospect that blockchain technology is set to transform financial services, the innermost architecture of the corporation, animate the Internet of Things, recast the role of government, revamp our content industries, and solve important problems like the security of organizations and the privacy of individuals, the time for further discovery is now. New blockchain-based business models will transform most industries, and disruptors like Uber may themselves become disrupted. Understanding them will be critical to thriving in this economy.

Every government would do well to fund deep research into killer applications, whether by joining a research syndicate or establishing their own. In doing so, they should seek to identify the most important opportunities for blockchain in business and government, with the objective of gaining insights into the transformation occurring within their borders and beyond.

Deep research unlocks the potential of blockchain across industries and within the functions of organizations, and identifies projects that potentially benefit a wide range of players, and where competitive issues are not a concern. Research should identify and explain key application opportunities, issues, strategies, and approaches that enable companies and governments to capitalize on this emerging technology. Analysis ought to go both deep and wide and identify the most important applications vertically by industry and horizontally by function within different types of organizations.

Ultimately, research should help to ground decision-making around blockchain integration and prototyping—offering guiding principles and tradeoffs to different approaches while remaining agnostic toward technology partners. These are the objectives of the Blockchain Research Institute, which can serve as a model for global blockchain research yet to come.

Every government would do well to fund deep research into killer applications, whether by joining a research syndicate or establishing their own.



At a minimum, governments at all levels should have a basic understanding of blockchain-based initiatives in their own backyards, along with their transformative potential to create economic growth opportunities.



Create blockchain centers of excellence

Regions would do well to establish a cluster of blockchain-related businesses, encouraging them to feed off each other. In time, they could become global centers for research and commercialization of blockchain technology in their own right.

In addition, universities and colleges have played a much more active role in blockchain research and development. These institutions should be closely involved in a center of excellence, and as test beds for blockchain applications. For example, universities could test a blockchain electronic voting platform in campus elections.



Engage governments as model users

Governments can play a critical role in a global blockchain hub, foremost by using the new technology itself to transform operations. This is not just a case of government's supporting the private sector. It is a demonstration of benefits that blockchain technology can bring to the public sector.

While blockchain's impact on business will be profound, it will have an equal if not greater impact on public institutions charged with delivering services to all citizens. The reasons are manifold: blockchain technology has the potential to rebuild public trust in political institutions by creating more transparency and lessening the opportunities for corruption. What's more, it can help the machinery of government run more efficiently, at lower cost, and with an unprecedented level of privacy and security.

The practical applications of blockchain are almost limitless. All our official documents—birth and death certificates, marriage license, driver's license, passport, health card, land titles, status of tax payments, school transcripts, and so on—can be stored in a single blockchain identity owned by citizens. Some have suggested that the blockchain could even become a public document registry beyond any government sanction or involvement. Smart devices can be linked in a blockchain ledger to lower security, maintenance, and energy costs through automated access, lighting, and temperature controls. Similarly, a blockchain can track the location and condition of government vehicles and the safety of bridges, railways, and tunnels. This technology has the potential to improve almost every aspect of a government's interaction with its citizens.

Governments everywhere have become active participants in the blockchain revolution. A strong domestic public sector market is critical to technology entrepreneurs and the second era of the Internet.

While blockchain's impact on business will be profound, it will have an equal if not greater impact on public institutions charged with delivering services to all citizens.



The smart city concept—that is, the pervasive use of information and communications technologies, including Internet applications, to enhance city dwellers’ quality of life and municipal governance—has evolved over the past decade. The goal is to integrate as many assets and services as possible, from libraries, schools, hospitals, and municipal administration to public transit, traffic management, water treatment plants, and elections. Amsterdam, Barcelona, Southampton, Stockholm, and Tel Aviv are among the cities that have sought to implement the smart cities concept, especially popular in Europe.



Collaborate across national lines

Building an innovation economy does not mean isolating from the rest of the world. Indeed, now more than ever, bridges and strengthened ties to key markets, expanded trading partners, and constructive work with foreign governments are critical. It is vital for the blockchain community to have continued—and even expanded—access to the United States, by far the largest source of financing for blockchain start-ups, the biggest market for their products, and the biggest supplier of talent for blockchain and other fintech ventures.

Amsterdam, Barcelona, Southampton, Stockholm, and Tel Aviv are among the cities that have sought to implement the smart cities concept, especially popular in Europe.

Maintaining strong links with the United States will be especially critical over the next few years if President Donald Trump carries through on his protectionist campaign rhetoric. Mr. Trump has vowed to renegotiate the North American Free Trade Agreement, impose a border-adjustment tax as part of a wide-ranging tax reform, and tighten immigration rules. These are bound to raise challenges for cross-border trade, investment, and other areas of cooperation.

Collaboration among like-minded countries—Canada, the United Kingdom, Australia, and Singapore—can promote blockchain expertise internationally.



Education and cultural change

Revolutionary new products and services often run into early skepticism, even mockery and hostility. Entrenched interests resist change, and established leaders are often the last to embrace the new, if they ever do. Blockchain is no exception. It has already brought dislocation, conflict, confusion, and uncertainty, and is sure to bring more. Regulators and policymakers have tended to favor stability over innovation.

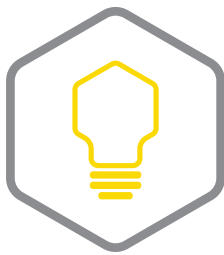
While skepticism and resistance could cost hub prospects dearly if they hamper the drive to an exciting new technology that shows signs of being as transformative as the computer, the smartphone, or the Internet, the good news is that attitudes are starting to change. Especially encouraging is that regulatory bodies are actively exploring the emergence of blockchain to enhance the financial welfare of businesses and consumers, prevent abuse, and bring transparency into the financial system and economy as a whole.⁵⁴



The second generation of the Internet is an irresistible force that, one way or another, will make itself felt in almost every facet of our daily lives.

We all can and should do more to spread the message that blockchain is here to stay. Governments could play a valuable facilitating role by organizing conferences and encouraging universities and colleges to integrate blockchain and other cutting-edge technologies into their curricula. They could use various media platforms to promote the benefits of blockchain and their commitment to it. They could form a digital economy commission to dial up the volume on blockchain.

The second generation of the Internet is an irresistible force that, one way or another, will make itself felt in almost every facet of our daily lives. We dare not turn our backs on it.



About the authors

Don Tapscott

Don Tapscott, CEO of the Tapscott Group and executive director of the Blockchain Research Institute, is one of the world's leading authorities on the impact of technology on business and society. He has authored over 15 books, including *Wikinomics: How Mass Collaboration Changes Everything*, which has been translated into over 25 languages.

Don has been advancing groundbreaking concepts for over three decades. His 1992 bestseller, *Paradigm Shift*, helped coin this seminal management concept, and *The Digital Economy*, written in 1995, changed business thinking about the transformational nature of the Internet. Two years later he helped popularize the terms "Net Generation" and "the Digital Divide" in *Growing Up Digital*.

Don's most recent and ambitious book was co-authored with his son, start-up CEO and bitcoin governance expert Alex Tapscott. *Blockchain Revolution: How the Technology Underlying Bitcoin is Changing Business, Money and the World* was published in May 2016 and is, according to Harvard Business School's Clay Christensen, "the book, literally, on how to survive and thrive in this next wave of technology-driven disruption."

Don is a member of the Order of Canada and is ranked the second most influential management thinker in the world by *Thinkers50*. He is an adjunct professor at the Rotman School of Management and chancellor of Trent University in Ontario.

Hilary Carter

Hilary is the director of faculty at the Blockchain Research Institute where she works closely with more than 50 blockchain thought leaders to conduct the definitive investigation into blockchain

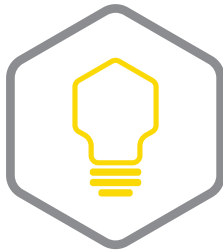


applications, strategy, and use-cases. She serves as an advisor to IVEP.io, a Swiss-registered, blockchain-based Interactive Video and Experience Protocol in development, and TokenFunder.io, Ontario's first regulator-approved initial coin offering. Hilary is a speaker, a management graduate of the London School of Economics, and holds the Certified Bitcoin Professional designation.

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About the Blockchain Research Institute

Co-founded in 2017 by Don and Alex Tapscott, the Blockchain Research Institute is a knowledge network organized to help realize the new promise of the digital economy. It builds on their yearlong investigation of distributed ledger technology, which culminated in the publication of their critically acclaimed book, *Blockchain Revolution* (Portfolio|Penguin).

Our 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.

Our global team of blockchain experts is dedicated to exploring, understanding, documenting, and informing leaders of the market opportunities and implementation challenges of this nascent technology.

Research areas include financial services, manufacturing, retail, energy and resources, technology, media, telecommunications, healthcare, and government as well as the management of organizations, the transformation of the corporation, and the regulation of innovation. We also explore blockchain's potential role in the Internet of Things, robotics and autonomous machines, artificial intelligence, and other emerging technologies.

Our findings are initially proprietary to our members and are ultimately released under a Creative Commons license to help achieve our mission. To find out more, please visit www.blockchainresearchinstitute.org.

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