

BLOCKCHAIN IN GOVERNMENT WORKSHOP

Summary Report

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BACKGROUND

The Blockchain in Government Workshop was a one-day event, hosted on March 22, 2018, by the Institute on Governance at the ASPIRE Lab: An Innovation Collaboratorium. The event brought together public servants and stakeholders from private industry who are interested in the applicability and benefits of blockchain technology within the Canadian government.

This report summarizes content delivered by leading experts within the Canadian blockchain community and highlights the common themes and issue areas that arose during each session.

OPENING REMARKS

Opening remarks for the event were provided by Toby Fyfe, Interim President, Institute on Governance (IOG), who welcomed participants to the inaugural event at the ASPIRE Lab, a recently established space at the IOG with a mission to foster innovation and collaboration.

Mr. Fyfe described the IOG as an organization that exists to improve the way that government performs. In an era of low trust in government, the IOG has identified blockchain as one tool that Canadian governments can use to rebuild public trust and deliver the quality services that citizens and businesses expect.

BLOCKCHAIN 101

Hilary Carter: Director of Research, Blockchain Research Institute

To begin the first session, Hilary Carter gave an introduction to Bitcoin, the original, and still the most widely known and used blockchain network. Bitcoin is decentralized, community driven, socially constructed, and fungible, with a fixed supply of ‘coins’ that are not backed by any government. Ms. Carter explained how Bitcoin is nearly impossible to hack and can be thought of as a ‘truth-machine’ because it makes a single and permanent record of transactions involving the cryptocurrency.

During this introduction, Ms. Carter described the factors within the financial industry that drove the creation of Bitcoin, a space which the cryptocurrency was designed to disrupt:¹

- 2.5B adults are without access to a financial institution;
- the inefficiency of the financial system, as evidenced by the amount of time required for transactions to be settled and cleared; and
- the global financial crisis that began in 2007, and subsequent bailouts of banks that were “too big to fail.”

Ms. Carter then explained the general properties of blockchain technology that enables a so-called ‘decentralized ledger’ to process transactions of units beyond currency, such as votes, land titles, or health data. She provided the following fundamental properties of blockchain.

- **Decentralized:** Global distribution of network participants (known as nodes).
- **Trusted:** Multiple stakeholders with differing interest write to the same database.

¹ The Bitcoin genesis block incorporated criticism of the 2008 bailout.



- **Secure:** Tamper-resistant.
- **Easily audited:** Write-only.
- **Efficient:** Rapid settlements.

To conclude her presentation, Ms. Carter discussed some of the benefits blockchain can bring to government. These include the opportunity to provide better services to citizens and businesses at a reduced cost, increase trust in public institutions, and provide a new method to address global problems such as poverty, human rights violations, corporate greed, and climate change by preventing fraud, transforming foreign aid, and providing immutable records for all.

WORKSHOP ACTIVITY: KEY BLOCKCHAIN TAKEAWAYS

Matt Jackson: Research Director, Institute on Governance

Following Ms. Carter's session, workshop participants were asked to work with those at their table to identify the aspect of blockchain that resonated most with them. The majority of tables identified being able to trust that data are validated and the security of the blockchain as their key takeaways.

In addition to these key features, several tables noted that, while they understood how blockchain worked in principle, they could not envision what government services would look like on the blockchain.

BLOCKCHAIN IN GOVERNMENT

Namir Anani: President and CEO, Information Communication Technology Council (ICTC)

Namir Anani began his session by highlighting that distributed ledgers are not a new invention, recalling that Babylonians made multiple copies of important ledgers, in the event that one was destroyed.

In addition to this redundancy, which is a characteristic of blockchain, the following additional benefits were discussed:

- Order with no intermediary;
- automation of contracts;
- cost reduction and efficiency;
- permanent/immutable records; and
- faster settlements and transactions.

Blockchain is great because it creates order without an intermediary or manager. It eliminates duplication and supports smart contracts. It settles transactions quickly and makes a permanent record. Blockchain also circumvents and renders redundant a great many of the intermediaries which charge transaction fees in large and sophisticated financial transactions. Not only is it cheaper, but it is much faster.

-Namir Anani

During his presentation, Mr. Anani flagged an important consideration in developing blockchain applications: Not all blockchains are as open as the Bitcoin. He introduced three network models to illustrate this point.

- **Public:** Anyone can write to the blockchain, contribute to the consensus protocol, or read the full history of transactions (e.g., Bitcoin and Ethereum).
- **Private:** Permission to write to the blockchain are granted by a single organization. Ability to transact with and/or read from the blockchain may also be limited (e.g., within a single financial institution).
- **Hybrid:** Consensus is controlled by pre-selected stakeholders. Ability to read to the blockchain may be limited or restricted to the public (e.g., a consortium of financial institutions).²

Mr. Anani then explained some of the potential for blockchain applications in government, which include:

- Identity management;
- health records;³
- e-voting;⁴
- procurement;
- property and title transfers;⁵
- heritage content;
- financial transactions; and
- automated contracts.

Also noted was that blockchain technology remains in its infancy and still faces challenges, which include:

- Data storage costs and energy consumption;
- transparency and identification (e.g., ‘know your customer’ and ‘anti-money laundering’ regulations);
- standards and interoperability with legacy systems; and
- sustainability of the community.

Mr. Anani also spoke about the ICTC Blockchain Centre for Innovation, which will help position Canada a prime destination for blockchain innovation and investment by stimulating research and development, partnerships, commercialization, and capacity building, as well as support for policy and regulatory development.

PUBLIC SECTOR BLOCKCHAIN PIONEERS

Glenn O’Farrell: CEO, Groupe Média TFO

John Shannon: Acting Director General, Digital Technologies Research Centre, National Research Council Canada

Troy MacFarlane: Acting Director Digital Target State Architecture, Treasury Board of Canada Secretariat

² <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/>

³ http://pwc.blogs.com/health_matters/2017/03/estonia-prescribes-blockchain-for-healthcare-data-security.html

⁴ <https://www.forbes.com/sites/mikemontgomery/2018/02/21/one-place-where-blockchain-could-really-help-voting/#7b7223f6b892>

⁵ <https://www.forbes.com/sites/laurashin/2017/02/07/the-first-government-to-secure-land-titles-on-the-bitcoin-blockchain-expands-project/#10507c904dcd>



Glenn O'Farrell began the conversation by discussing why Groupe Média TFO, the French language audio-visual content provider for the Government of Ontario, is developing a blockchain prototype.⁶ The decentralized technology holds promise as the solution to the following three needs that are faced by all content broadcasters and producers, leveraging a private blockchain to improve trust and transparency, while increasing efficiency and potentially disintermediating some legal services, reducing costly fees by providing:

- Trustworthy consumption statistics;
- transparency and improved control over intellectual property (i.e., licensed works) including attribution and compensation; and
- the use of smart contracts to reduce legal fees.

Our media content is ultimately produced with tax dollars, and from that perspective, we need to be as efficient as possible with funding. The beauty, from our standpoint, is that blockchain supports contracts that work seamlessly. We tried to make a made in Canada audiovisual-sector solution, something which could work across the whole sector. The prototype will stimulate production contracts, artists engagement, distribution and funding contracts.
-Glenn O'Farrell

For John Shannon, the problem to be solved was data management. To begin, he gave the example of an Excel file that is sent out to a dozen team members who are each asked to provide updates and return the document to one individual who will process the changes. Rather than having that individual stitch twelve ledgers together, writing to a common decentralized ledger eliminates the need for this mundane task.

One place the National Research Council Canada (NRC) saw potential for blockchain to improve transparency and increase efficiency is in the disclosure of grant and contribution agreements, which are already public. What made their implementation so groundbreaking was that it used the public Ethereum blockchain, the first use of a public blockchain in any level of Canadian government.

This process, however, was not without its challenges. Initially, the project had intended to execute these agreements on the blockchain, saving time and money (rather than sending documents by express post for signatures). Eventually, due to constraints, the scope of the project was reduced to posting the executed agreements to the blockchain. Even still, it took nearly a year to get 100 lines of software implemented.

There are tremendous efficiencies in government because it is so process-heavy. These processes all line up to one another, so the second we say we want to do something different, everything crashes to a halt.
-John Shannon

Another issue identified by Mr. Shannon that made it difficult to use a public blockchain was paying transaction fees. The Government of Canada is not able to acquire Ether (the

⁶ <https://www.groupemediatfo.org/groupe-media-tfo-launches-the-development-of-a-blockchain-prototype-a-solution-to-credit-the-rights-of-audiovisual-works-creators-2/?lang=en>

cryptocurrency of Ethereum) through a request for proposal, or otherwise, to pay the fees required to post the information to the blockchain. This required NRC to contract a third-party to post these agreements to the Ethereum blockchain.

In addition to making these agreements available on a public blockchain, NRC commissioned a blockchain browser that allows anyone to easily search the blockchain to give real-time, granular visibility to government funding.

We get a million requests for information all the time about IRAP programs and the like from people looking for updates, and now we point them to our blockchain browser. Now they can see what is going on in real time. It's faster for them and more efficient for us. The future applications of this can be even better. Imagine politicians being able to use this to know when funding is coming to their riding, so they can always be sure to make an announcement.
-John Shannon

At the Chief Information Officer Branch of the Treasury Board of Canada Secretariat, Troy MacFarlane leads blockchain work with a whole-of-government approach. In that role, he not only partners with organizations to lead back office transformation, but is also leading the development of a Government of Canada Blockchain Whitepaper.

In addition to that work, Mr. MacFarlane is also leading the upcoming Government of Canada Blockchain Codefest, a 'hackathon-style' event which will solicit proposals and help advance promising applications of blockchain within the Canadian federal government.

When asked what they would tell a public servant who is starting out on their blockchain journey, each of the panelists agreed that the best advice is to just start. Charge forward, but don't try to solve everything at once.

Do something small. Don't try to move the battleship, just paddle a canoe.
-John Shannon

DEPUTY MINISTER KEYNOTE ADDRESS

John Knuble: Deputy Minister, Innovation, Science and Economic Development Canada

John Knuble began by describing the leading role that Innovation, Science and Economic Development Canada (ISED) has played in promoting the commercialization of blockchain technology in Canada, particularly through the supercluster initiative.

The motivation for funding blockchain by the federal government is done with a desire to minimize bureaucratic processes and reduce fraud, while enhancing cybersecurity. Ultimately, the government hopes that blockchain will increase public trust in government.

Funding for research is just one part of the department's blockchain agenda. ISED has also convened a Deputy Minister committee on policy innovation with the mission of looking at disruptive technologies through the lens of government services, which includes both blockchain and artificial intelligence (AI).

Mr. Knubley also noted that, within the federal government context, financial technology (fintech) is a strategic space which is drawing considerable attention. The Bank of Canada is looking at this deeply in terms of inter-bank payments⁷ as well as cryptocurrencies.⁸

Also discussed was how ISED is working to support the leadership required bring projects from conception to commercialization, while keeping growing companies in Canada.

On the topic of regulation, Mr. Knubley added that, like for AI, there is little regulation currently in place. He noted that, moving forward, it will be important to ensure that development of these disruptive technologies occur in compliance with existing privacy regulations.

BLOCKCHAIN DEMONSTRATION - VERIFIABLE ORGANIZATIONS NETWORK

John Jordan: Executive Director, Service Strategy, British Columbia Ministry of Citizen's Services

John Jordan concluded the workshop with a demonstration of Verifiable Organizations Network⁹ (VON), a trusted ecosystem for British Columbia businesses that is currently under development and will be launched in the coming weeks. This solution uses a permissioned public blockchain network to solve an important problem in this space: the friction business owners encounter when registering a business and obtaining the permits, licences, and qualification required, which are often in paper form and require in-person visits to government service centres.

This story began in 2016, when BC Registry Services, the Digital ID & Authentication Council of Canada (DIACC), and IBM partnered to build their own “little canoe;” a proof-of-concept shadow ledger that showed that blockchain provided a “potential framework to enable more secure, effective, and efficient corporate registrations – both within a single province and across multiple jurisdictions.”¹⁰ When other provinces joined the network, the distributed ledger allowed each to see business registrations in other jurisdictions in a standardized format, reducing reporting delays and data processing errors.

The success of the proof-of-concept provided the opportunity to push the solution further, to provide a mechanism by which businesses could secure *digital* permits, licences, and qualifications from government, without having to visit a slew of government offices. This iteration included a pivot from a general purpose distributed ledger (Hyperledger Fabric) to one that is purpose built to support identity (Hyperledger Indy) as they anticipate eventually iterating further, to provide digital identity for business people as well.

To illustrate the value of this future-state, Mr. Jordan showed the steps a fictionalized entrepreneur, Mary, would currently have to take to open her own bakery. Mary would have to

⁷ Bank of Canada - Project Jasper: <https://www.bankofcanada.ca/wp-content/uploads/2017/05/fsr-june-2017-chapman.pdf>

⁸ Bank of Canada Staff Discussion Paper - Central Bank Digital Currency: Motivations and Implications <https://www.bankofcanada.ca/wp-content/uploads/2017/11/sdp2017-16.pdf>

⁹ <https://von.pathfinder.gov.bc.ca>

¹⁰ DIACC: Is Blockchain the Answer to Corporate Registries in Canada? <https://diacc.ca/2017/06/06/is-blockchain-the-answer-to-corporate-registries-in-canada/>



first register her business, a step which can currently be completed online through BC Registry Services.¹¹ She would then bring this certificate to the office of the regional health authority to obtain her health operating permit. Finally, she would need to bring both these certificate to the municipality to register for a business licence.

To better facilitate Mary's experience, BC Dev Exchange created what they call 'TheOrgBook.' The idea is that Mary can just type into TheOrgBook to register her business with BC Registry Services. This is the foundational claim around which the VON network is built.

Once the business is registered, anyone, including different levels of government that issue permits and licences, can use TheOrgBook to query the verified organization and view their claims (e.g., restaurant licence, food handling certificate, fire sprinkler permit). For the user, TheOrgBook shows a workflow (i.e., the order in which credentials must be acquired) and verifies proofs, allowing businesses to access and acquire services online.

Government services can use TheOrgBook to get verified data about a verified organization (i.e., the type of information that would have previously required an in-person visit to a government office). These services request a proof from TheOrgBook that the business has the required permit to access the service, and once they are enrolled, the service creates and pushes a verifiable claim (e.g., the *new* permit) back to TheOrgBook. TheOrgBook acts like a digital wallet, and Government services will talk to that 'wallet' to verify claims, not to each other (i.e., these relationships will not be traced on the ledger). Eventually businesses will have their own wallets which will hold their own credentials so they can prove things themselves.

Before the system is made operational, it will be preloaded with businesses that are registered in British Columbia, which will bootstrap a network effect by providing the supply (foundational claims). As a major supplier of downstream services, these processes can be enhanced by reducing friction present in the current-state, which will create a demand for the network. The Province of British Columbia is already on-board, and Ontario is getting involved, which shows that these service providers see value in the process, and that the VON network is growing.

During the course of the demonstration, Mr. Jordan also raised the following important considerations when providing services on a blockchain network:

- Avoid putting identifying data on the ledger because one day it could be hacked;
- avoid a single number for all digital relations. This is, again, too risky. We need multiple numbers, one for each relationship; and
- you need to be careful about privacy. Mr Jordan's example: "You buy some beer, and the government gets a notification. 'Oh, they're buying beer again. They buy a lot. We should charge them more for health care.'"

SUMMARY

The Blockchain in Government Workshop provided attendees the opportunity not only to learn more about this foundational technology, but also to learn from those within the public service who have worked in this space. The overarching message from the blockchain in government

¹¹ <http://www.bcbusinessregistry.ca/>



pioneers who presented was clear: Go out and try something small, and once that is working, start building the future-state.

ACKNOWLEDGEMENTS

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