CAN BLOCKCHAIN HELP WITH GUN REGISTRIES?

A Survey of the Issues and Possible Solutions

Rob Klein
RSK Strategic

May 2020
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.

Blockchain Research Institute, 2021

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Foreword

Gun control is a sensitive and divisive issue—and it is a problem that we as a society must face. In Blockchain Revolution, Alex Tapscott and I pointed out that, as in other countries, US politicians are beholden to wealthy contributors and special interest groups such as the National Rifle Association (NRA). With respect to gun ownership, a majority of Americans want background checks of those seeking to buy guns, but the NRA has thus far thwarted any legislation to effect meaningful change.

Last year was the worst for mass shootings in America. We wanted to explore how blockchain technology might help to mitigate the crisis of gun violence, potentially by increasing the willingness of gun owners to use registries that maintained their individual privacy and other civil liberties while decentralizing and securing marketplace data.

This study comes at a tragic time in Canada. In April, a gunman took 22 lives in Nova Scotia. At the time of this writing, it was unclear whether he held licenses to use the firearms in his possession, and there were reports that he had been prohibited from buying guns decades earlier because of anger management issues. The Government of Canada acted swiftly—too swiftly for some, through an order-in-council from cabinet rather than through the legislative process—to ban nine semiautomatic firearms with ammunition magazines.

Project point person Rob Klein surveys the current (albeit very nascent) landscape and the interests of gun owners, manufacturers, retailers, regulators, law enforcement, and the families of victims of gun violence. He looks at the uniquely American dichotomy of passionate adherents of the Second Amendment and those appalled by the level of per-capita gun violence in the United States compared to other developed democracies.

Klein is a consultant for CurrencyWorks, an organization that develops and launches digital currencies with a goal to address important societal issues. Blockchain Research Institute members will remember his work on the case study, “KODAKOne: Changing the Still Image Marketplace on the Blockchain.” Klein bolsters his secondary research with interviews of CurrencyWorks colleagues as well as parties involved in VeriTransfer and BitRail.

He doesn’t suggest here that digital technologies can heal mental illness or bridge wide political divides. Rather, decision-makers should understand what distributed ledger technologies have to offer as they discuss and debate their public policy options. We hope that it gives our members ideas as they probe for middle ground in other polarizing issues.

DON TAPSCOTT
Co-Founder and Executive Chairman
Blockchain Research Institute
Case in brief

» The Second Amendment of the US Constitution reads, “A well-regulated Militia, being necessary to the security of a free state, the right of the people to keep and bear Arms, shall not be infringed.” This amendment gives citizens the right to defend themselves against an oppressive government, and so a centralized, government-controlled gun registry goes against the spirit of this amendment.

» Over the past decade, more than 1.2 million Americans suffered gun injuries. On average more than 36,000 Americans are killed every year by guns. In 2019, there were 41 mass shootings that killed 211 Americans. The United States does not require private sellers of firearms to conduct background checks of potential buyers and its gun registry system is fundamentally flawed.

» Countries with such checks and registries experience significantly fewer gun-related deaths; and, given the mass shootings by people with histories of mental illness or violence, 90 percent of Americans polled favor background checks. Yet, Americans have been reluctant to change how they purchase firearms, largely because of powerful lobbying against such change.

» As a highly encrypted, tamper-resistant, and decentralized database, distributed ledger technology (DLT) has the potential to serve as a registry of guns. DLT could allow gun buyers to prove a lack of a criminal record (the equivalent of a background check) without giving up personal information.

» Blockchain technology has already demonstrated its effectiveness in enabling governments, law enforcement, and industry to track and trace food and cannabis. Several organizations such as VeriTransfer and BitRail are experimenting with DLT to do the same for firearms sales without impeding the rights of legitimate gun owners.

» Citizens must actively petition and engage their governments to use the latest technologies for the registration and sales of firearms. The gun industry must demonstrate that it has built highly secure and scalable DLT platforms that can meet the needs of governments and the concerns of their citizens.

Citizens must actively petition and engage their governments to use the latest technologies for the registration and sales of firearms.
Lax firearm control leads to greater firearm violence

In the United States, one of the biggest impediments to the national deployment of any registry system are federal regulations that severely restrict how the government may register firearms. The Federal Bureau of Investigation (FBI) is required to use a paper-based solution.

In 2016, the United States had an estimated 10,600 deaths from firearm violence per 100,000 people, compared to South Africa’s 6,900, Canada’s 2,100, and Japan’s 200. In 2000, South Africa passed its firearm Control Act, which banned automatic rifles and instituted background checks, permits, and licenses. Over the next five years, there was a decline on average per year in firearm-related deaths. Austria passed a similar law a few years before that and saw a similar result. Table 1 compares the data.

This research examines the challenges of governments—especially in the United States—to address firearm provenance and owner fitness from regulatory, marketplace, and ownership points of view. A blockchain solution could have a material impact in the lawful sale and usage of firearms without impeding the rights of legitimate firearm owners.

<table>
<thead>
<tr>
<th>Country</th>
<th>Relevant firearm laws</th>
<th>National registry?</th>
<th>Background checks or references?</th>
<th>Training required?</th>
<th>2016 firearm death rates‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Firearms Act (S.C. 1995, c. 39); Bill C-71</td>
<td>Yes*</td>
<td>Yes</td>
<td>Yes</td>
<td>2.1%</td>
</tr>
<tr>
<td>Japan</td>
<td>Firearm and Sword Law 1958</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>0.2%</td>
</tr>
<tr>
<td>South Africa</td>
<td>Firearms Control Act 60 of 2000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>6.9%</td>
</tr>
<tr>
<td>United States</td>
<td>National Firearms Act of 1954, amended 1968; 34 USC Ch. 409: National Instant Criminal Background Check System</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

‡ Mortality rate per 100,000 people includes suicides. * Registration required for restricted and prohibited firearms only.

In 2016, the United States had an estimated 10,600 deaths from firearm violence per 100,000 people, compared to South Africa’s 6,900, Canada’s 2,100, and Japan’s 200.

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Firearm regulations and challenges

The US firearm registry system is intentionally flawed

Society has a right to know and restrict a convicted felon or otherwise dangerous to themselves or others from acquiring a gun. To buy or sell a firearm in the United States, an individual or company must complete a Federal Firearms License (FFL), issued and monitored by the US Department of Justice’s Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). But the ATF does not maintain a federal firearms registry; nor are there records of private sales or individual purchasers. Because of US Congress regulations and the National Rifle Association’s (NRA) lobbying, all ATF records about firearm sales or owners are kept on paper, not electronically, making record searches difficult. If authorities or individuals have an FFL number, they can search the ATF’s database to determine whether an FFL is valid.

According to multiple surveys, most NRA members and nearly 90 percent of Americans support mandatory background checks for all firearm sales. Yet 22 percent of current US gun owners who acquired a firearm within the past two years did so without a background check. Most states do not require background checks for firearm sales between private parties. Every year in the United States, dealers and consumers can buy and sell firearms at some 5,000 firearm shows; in 32 states, no laws—federal or state—currently regulate firearm sales between private individuals at firearm shows.
US firearm background checks are imperfect

Since 1998, with the launch of the US National Instant Criminal Background Check System (NICS), the FBI has conducted 316 million NICS checks, of which two percent of buyers were rejected because of their history. Furthermore, approximately 3.6 percent or 310,000 FBI-administered background checks in 2017 were unresolved or deemed “delayed denial,” as their applications were not processed within the required three-business-day window. After which, the FFL holder can act at their own discretion to sell the gun, even if the background search proved inconclusive. A delayed denial can result in a person being able to buy a firearm without getting a background check. In addition, in 2017, the FBI reported that 4,864 of “delayed denial” cases involved individuals who were possibly prohibited and had probably acquired a firearm.

In February 2019, the US House of Representatives passed Bills HR8 and HR1112, which would have broadened federal firearm background checks and extended the time the government had to complete a background check before a gun sale could go through. The US Senate is not expected to take up this legislation this term.

Firearms move illegally around the world

Every year in the United States, approximately 380,000 firearms are stolen from their owners and only 60 percent of the thefts are reported to police. Some of these firearms are later used to commit other crimes.

Firearms from the United States are legally and illegally exported to other countries across North and Central America and the Caribbean, sometimes through “straw purchasers,” intermediaries who purchase and execute all the paperwork required for a legal firearm transaction on behalf of someone else. From 2014 to 2016, every 31 minutes, a US-sourced firearm was used to commit crimes in nearby countries.

These sales are possible for several reasons:

» Lax US gun laws. The United States permits private gun sales. State law may not require background checks or even regulate private sales. According to Kristen Rand, the legislative director for the Violence Policy Center, “The traffickers are exploiting the background check system because they just find people who can have the background check. As long as they don’t raise suspicion with the dealer, then it’s difficult to identify that this is illegal.”

» Gun economics. Traffickers can sell military assault weapons and ammunition bought in the United States for three times their price in Mexico, and that business model makes trafficking such a lucrative enterprise.

» Ease of smuggling. Proximity to neighboring counties allows for the ease of smuggling guns across borders. The United States has long borders with Mexico and Canada and traffickers can disassemble guns into hard-to-detect components and then smuggle them through vehicles.
How blockchain could address provenance and fitness

Many of the same gaps (no national registry) and weaknesses (no tracking of private sales of thefts) in the United States and elsewhere also contribute to illegal firearm sales and distribution to nearby nations. Over the past several years, organizations have looked at how they could use blockchain to prove the provenance (register, track, and trace) of firearm ownership and firearm control—those legally permitted to own and use a firearm.

One of the key arguments against a national firearm registry is the fear that legitimate firearm owners’ rights may be violated. In a 2017 Pew Research Center poll, gun owners said that their right to own guns nearly rivaled other rights laid out in the US Constitution in terms of its personal salience and 74 percent said that right was essential to their own sense of freedom.31 A February 2019 poll asked if people thought it was more important to control gun violence or protect gun rights, and 58 percent said control gun violence, while 37 percent responded it was more important to protect gun rights.32

The use of a private and encrypted blockchain registry would ensure that only those individuals or government entities would have the necessary keys to view the data.

VeriTransfer

VeriTransfer is a decentralized and private blockchain platform that enables any registered and licensed firearm owner to manage their firearm inventory and data securely.33 VeriTransfer is a new venture from Northern Block, a Toronto-based software development consultancy for Ethereum-based applications.

VeriTransfer is a private, highly secure blockchain platform that assures users their firearm ownership remains confidential and can only be accessed by third parties if the user consent is provided. By using VeriTransfer, users can securely transfer their ownership of the firearms to retailers and via private sales by scanning a QR code of the purchaser’s license with their smartphone. In addition (where applicable), VeriTransfer allows:

» Firearm holders to digitally store their government-issued license.

» Firearm retailers to perform license eligibility checks prior to transferring firearm ownership to another person (e.g., selling a restricted firearm).

» A self-governing system for maintaining independent control of your firearm ownership.

» Firearm owners to control and administrate their own identities. No one can ever access their data but themselves.

» Firearm sellers to ensure they sell firearms only to people who are eligible.
Although VeriTransfer is not a gun registry, its decentralized application gives full ownership of firearm data to the license owner. VeriTransfer partnered with AION, now known as the Open Application Network, a public infrastructure for creating and launching production-grade distributed apps such as smart contracts. (Aion is the name of the digital asset associated with this network.)

**Technology overview**

VeriTransfer uses permissioned smart contracts (decentralized applications or Dapps) for users to access data from the blockchain. Dapps are software applications that run on a peer-to-peer network of computers instead of one individual computer. They are considered to be a form of software program designed to function on the Internet without being controlled by a single entity. Dapps can have front-end code and user interfaces written in any language, just like a traditional application, which can make calls to its back end.  

VeriTransfer Dapps tie the firearms’ manufacturer serial number into unique digital tokens, similar to the ERC-721 non-fungible token (NFT) standard developed for Ethereum. Firearm ownership can be transferred between license holders by sending these tokens electronically between the blockchain addresses of the license holders. There’s no need for users to acquire tokens, since they are automatically created through the system every time a firearm is added to the network.

**Key smart contracts**

Many functions of VeriTransfer rely on smart contracts within the Open Application Network. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller directly written into lines of code. The code and the agreements...
can blockchain help with gun registries?

The first smart contract records the fact that a person has a license and stores the hashed validation of this fact to the permissioned blockchain. The second maintains the record of gun ownership.

"We see the management of firearms as a perfect use case for blockchain technologies. ... It presents an optimal solution to the unresolved gun control problem.”

Mathieu Glaude
President and CEO
Northern Block

The first smart contract records the fact that a person has a license and stores the hashed validation of this fact to the permissioned blockchain. Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism.\(^\text{35}\)

The smart contracts render transactions traceable, transparent, and irreversible. Smart contracts can facilitate, verify, and enforce access to blockchain data between different users. Smart contracts can be described as a specific data slot on a blockchain that can be queried and changed by calling its functions. In VeriTransfer, a firearm license holder’s data is managed through the following smart contracts:

» **Licensing smart contract:** Anytime a firearm license is issued to an individual, a transaction is sent to VeriTransfer’s permissioned blockchain. This smart contract records the fact that a person has a license and stores the hashed validation of this fact to the permissioned blockchain. Many functions of VeriTransfer rely on smart contracts within the Open Application Network. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller directly written into lines of code.

» **Firearms smart contract:** This maintains the record of gun ownership represented by a digital token within the contract and associates it with a specific individual. Retailers and firearms holders can pass the ownership from one to another, and the smart contract will facilitate the transfer of the digital token between users that are registered on a blockchain and have a blockchain address.

These two smart contracts interact with one another. Every new firearm registered in the system creates a new unique token that can be associated with a dealer’s or individual’s blockchain address. VeriTransfer anticipated launching its controlled beta in the second quarter of 2020.\(^\text{36}\) As of this writing, it is "actively looking for strategic partners, user feedback, and investors.”\(^\text{37}\)

Looking ahead

According to Blockchain News Network, Mathieu Glaude, VeriTransfer advisor and the president and CEO of blockchain development company Northern Block, said, "We envision a future in which many instances of VeriTransfer are connected by utilizing bridging technology to facilitate the movement of data in the trusted framework.”\(^\text{38}\) The biggest challenges that VeriTransfer faces are:

» Overcoming consumers’ fear that its platform will enable governments to breach their privacy.

» Scaling the adoption of its platform and driving usage without the endorsement of and adoption by major retailers and/or governments.
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Addressing the public’s concerns regarding background checks and private gun sales because it is a firearms provenance solution.

Even so, Glaude was excited about VeriTransfer’s potential societal impact: “We see the management of firearms as a perfect use case for blockchain technologies. Empowering individuals and retailers to privately manage their firearms in a decentralized manner is powerful, and it presents an optimal solution to the unresolved gun control problem.”

Said Kesem Frank, co-founder of Aion, “We are incredibly excited to be involved in a real-world use case of now the Open Application Network, blockchain technologies that has the potential to save lives. This is all achieved while maintaining data privacy and has the potential to eliminate data silos within government agencies.”

BlockSafe

Based in Cheyenne, Wyoming, BlockSafe created a private blockchain solution for Internet of Things (IoT) devices—smart guns—that use various biometric and mobile app-based technologies to prevent unauthorized or nonregistered gun usage. To date, smart guns have not caught on because of their high price tag (up to three times more expensive than equivalent firearms) and fear of centralized reporting and gun control.

Kevin Barnes, founder and CEO, developed BlockSafe as a blockchain-based system for gun owners to manage and monitor their firearms themselves. BlockSafe also provides blockchain as a service for firearm manufacturers and three-dimensional gun hobbyists who want to enhance the safety and defense capabilities of their firearms.

According to Barnes, “BlockSafe represents a revolution in managing access to firearms through the creation of a blockchain for smart gun technology.”

KEVIN BARNES
Founder and CEO
BlockSafe

Night at the range by Bob n Renee, n.d., used under CC BY-SA 2.0.
technology that will allow gun owners to secure, manage, and control access to who can use their firearms, disabling stolen weapons, while maintaining a decentralized database that has no central point of failure or control.\textsuperscript{41}

BlockSafe has developed a mobile app, whereby the user embeds a blockchain token ID (TrigX, its native token of its proprietary blockchain Libertas), a software development kit, and an application protocol interface that enables gun manufacturers to blockchain enable their smart guns. To use their BlockSafe firearm, users activate their firearms’ personal identification security protocol (fingerprint scan, password, etc.), which activates the TrigX token, which then validates the user’s ID against the BlockSafe private ledger. The TrigX token will look to be used to reward or compensate users for validating their data written to their ledger. In addition, BlockSafe uses Lisk sidechain technology to build out its blockchain. Lisk (\texttt{lisk.io}) is a public blockchain platform that provides decentralized blockchain apps.

In August 2019, the company announced that its BlockSafe IoT network went live and it had four partnerships, two of which are still in operation:\textsuperscript{42}

> Guniary (\texttt{www.guniary.com}) is the world’s first blockchain-enabled gun owner diary. Creating a safe personal diary to store encrypted gun information that only the end user can un-encrypt. Featuring secure information sharing using a temporary, expiring Guniary Key.

> Distributed Reality (\texttt{www.distributedreality.io}) is a virtual reality-based training system for law enforcement and tactical organizations that utilizes a distributed ledger.

\textbf{Guniary}

Guniary is a blockchain firearms diary and safety platform for firearm owners. Guniary has partnered with BlockSafe to create an anonymous and secure platform for smart guns equipped with radio frequency identification monitoring technology. Its leaders expect its online portal to allow law enforcement and firearm holders to self-monitor their firearms in real time.

One of the interesting Guniary product attributes is its ability to combine mobile phone destination management and geofencing. In most states, firearm owners are restricted how and where they transport their firearms. According to Duane Jacobsen, the CEO of Guniary:

\begin{quote}
While Guniary is a gun diary that enables owners to record their target shooting and hunting activities, we also designed it to help gun owners cope with the byzantine rules and regulations that vary state by state and in some cases, city by city. If a gun owner follows the smart contract rules embedded in Guniary, they can safely transport their firearms.\textsuperscript{43}
\end{quote}
For example, if firearm owners driving to their shooting ranges pass through a school zone, they would be violating the federal Gun-Free School Zones Act (GFSZA), which prohibits any person from knowingly possessing a firearm at a place the individual knows, or has reasonable cause to believe, is a school zone.\textsuperscript{44} A school zone is defined as in, or on the grounds of, or within a distance of 1,000 feet from the grounds of, a public, parochial, or private school that provides elementary or secondary education. However, individuals with state-issued concealed carry permits are not prohibited by the GFSZA from possessing a gun in a school zone. By using Guniary, firearm owners can safely plan out their route and avoid restricted areas. In addition, according to Jacobsen:

> Longer term, Guniary’s smart contracts can help its owners legally transfer the ownership of their firearms as part of any inheritance by linking their death records and gun ownership or providing a smart contract that links a police stolen-gun report to the stolen gun. Police stolen-gun reports are paper based, and if the report is ever lost or misplaced and the gun is used in a crime, the gun owner could be held liable. With Guniary, this would never happen.\textsuperscript{45}

**GunClear**

GunClear was co-founded by University of Connecticut business professor David Noble and ex-computer science student Mat Fox, who wondered why blockchain track-and-trace technology could not be used for gun registry.\textsuperscript{46} GunClear is designed to make it easy for gun owners to securely, compliantly, and confidentially store their firearm ownership provenance using blockchain-distributed technology. While most gun owners are law-abiding, the paperwork to buy or sell or transport a firearm across state lines is extremely cumbersome—this is where GunClear comes in.

GunClear is based off Ethereum and uses a NFT to hold the data of every gun transaction while obscuring the data of previous transactions, which is coupled with zero-knowledge proofs, so everyone could trust the system without knowing individual details.

One of the big disadvantages of using Ethereum is its potential transaction costs and processing time. GunClear overcomes this challenge by employing a multiple-chain network that can reap the benefits of both a public and separate child blockchain. Initially, a token for a firearm is created on the Ethereum main chain but can then be transferred to a distributed child chain. This approach provides the benefits of being backed by the Ethereum main chain while also allowing for the execution of transactions on a smaller child chain. Users get the best in security and speed. As of July 2019, GunClear had raised $244,700 in financing and was working on its proof of concept (POC).\textsuperscript{47}
BitRail

BitRail LLC is a blockchain infrastructure that enables organizations to operate regulatory compliant (know your customer, anti-money laundering, and anti-terrorist funding) cryptocurrencies for payment on their own platforms. Headquartered in Atlanta, BitRail was founded by serial entrepreneurs Steve Urvan and Cameron Chell.

BitRail was created through a partnership with CurrencyWorks, a global platform for companies building corporate currencies. The BitRail platform aims to enable compliant cryptocurrencies for payments in accordance with state money transmitter laws and the Financial Crimes Enforcement Network (FinCEN). FinCEN’s mission is to safeguard the financial system from illicit use and combat money laundering.

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**Table 2: Comparison of blockchain-based firearm solutions**

<table>
<thead>
<tr>
<th>Provider/start-up</th>
<th>Stated mission</th>
<th>Type of blockchain</th>
<th>Use of token</th>
<th>Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armchain</td>
<td>Self-regulating gun control platform</td>
<td>On- and off-chain</td>
<td>No</td>
<td>N/A</td>
<td>Defunct as of April 2020</td>
</tr>
<tr>
<td>BitRail</td>
<td>Crypto payments</td>
<td>Ethereum</td>
<td>No</td>
<td>Live</td>
<td>Launched with GunBroker.com</td>
</tr>
<tr>
<td>BlockSafe</td>
<td>Blockchain solution provider for smart guns</td>
<td>TrigX, native token of proprietary blockchain Libertas</td>
<td>Yes</td>
<td>POCs</td>
<td>Announced that its IoTStream platform was live, and that it had four partnerships, two of which are now defunct</td>
</tr>
<tr>
<td>FAABS Project</td>
<td>Mobile blockchain app that verifies the buyers can legally acquire the firearm from another party</td>
<td>N/A</td>
<td>N/A</td>
<td>Blockchain code live</td>
<td>Defunct as of April 2020</td>
</tr>
<tr>
<td>Guniary</td>
<td>Blockchain platform for firearm owners that will allow them to store and track information about their firearms</td>
<td>Uses BlockSafe’s blockchain-as-a-service (BaaS) network</td>
<td>No</td>
<td>N/A</td>
<td>Mobile tracking application is unique</td>
</tr>
<tr>
<td>GunClear</td>
<td>Gun ownership provenance using blockchain-distributed technology</td>
<td>Ethereum and uses a non-fungible token (NFT)</td>
<td>No</td>
<td>POC</td>
<td>Raised $244,700</td>
</tr>
<tr>
<td>VeriTransfer</td>
<td>Gun ownership blockchain registry</td>
<td>Similar to the ERC-721 NFT standard developed for Ethereum</td>
<td>No</td>
<td>POCs</td>
<td>Looking for strategic partners, user feedback, and investors</td>
</tr>
</tbody>
</table>
laundering and promote national security through the collection, analysis, and dissemination of financial intelligence and strategic use of financial authorities.\textsuperscript{48}

In January 2019, BitRail announced its first client, GunBroker.com, the world’s largest online marketplace for hunting, outdoor sports, and firearm products.\textsuperscript{49} (See Table 2 on previous page for a survey of other entrepreneurial initiatives.)

**Implementation challenges**

**Not just passing but enforcing new policies**

What have other countries done to implement blockchain firearm control solutions? On 27 March 2017, Arizona Governor Doug Ducey signed into law a bill (HB 2417) that recognized blockchain signatures and smart contracts after it passed the house with a vote of 28-1.\textsuperscript{50}

But then on 20 April 2017, Governor Ducey signed into law a bill that prohibited the use of blockchain technology to track firearm information.\textsuperscript{51} First filed by state senator Paul Boyer in January, Arizona’s senate passed the bill earlier in the month with a vote of 17-12 (with one member abstaining); the house passed the bill with a vote of 34-24 (with one member abstaining). The bill (HB 2216) prevents anyone except law enforcement agents from using distributed ledgers to track the firing of a firearm:

"Electronic firearm tracking technology” means a platform, system, or device or a group of systems or devices that uses a shared ledger, distributed ledger, or blockchain technology
or any similar form of technology or electronic database for the purpose of storing information in a decentralized or centralized way, that is not owned or controlled by any single person or entity and that is used to locate or control the use of a firearm.\textsuperscript{52}

On 21 June 2019, the Canadian government passed Bill C-71, which amended firearm regulations.\textsuperscript{53} Of key interest was section 58.1 of the Firearms Act related to the role of the chief firearms officer, an individual designated in writing for a province by the provincial minister or for a territory by the federal minister. Section 58.1 states:

\begin{quote}
A chief firearms officer who issues a license, an authorization to carry, or an authorization to transport may attach any reasonable condition to it that the chief firearms officer considers desirable in the particular circumstances and in the interests of the safety of the holder or any other person.\textsuperscript{54}
\end{quote}

This section was amended to include the following for businesses, but this amendment is not yet in force:

58.1 (1) A chief firearms officer who issues a license to a business must attach the following conditions to the license:

\begin{enumerate}
\item[(a)] the business must record and, for the prescribed period, keep the prescribed information that relates to the business’ possession and disposal of nonrestricted firearms;
\item[(b)] the business must record and—for a period of 20 years from the day on which the business transfers a nonrestricted firearm, or for a longer period that may be prescribed—keep the following information in respect of the transfer:
\begin{enumerate}
\item the reference number issued by the registrar,
\item the day on which the reference number was issued,
\item the transferee’s license number, and
\item the firearm’s make, model, and type and, if any, its serial number; and
\end{enumerate}
\item[(c)] the business must, unless otherwise directed by a chief firearms officer, transmit any records containing the information referred to in paragraph (a) or (b) to a prescribed official if it is determined that the business will cease to be a business.
\end{enumerate}

58.1 (2) The prescribed official may destroy the records transmitted to them under paragraph (1)(c) at the times and in the circumstances that may be prescribed.\textsuperscript{55}

The use of DLT would be the ideal low-cost solution to enable Canadian retailers to store and manage firearm registration information securely.

\section*{Overcoming legal disputes and voter resistance}

While many blame the NRA for Congress’ reluctance to pass these bills, Americans overall view changes to firearm legislation as a slippery slope.

The use of distributed ledger technology would be the ideal low-cost solution to enable Canadian retailers to store and manage firearm registration information securely.
Americans said that governments should not change any firearm laws that could over time infringe on their rights and freedoms. Of note, between 84 and 94 percent of US registered voters and 69 percent of NRA members favor background checks.

In the wake of two mass shootings involving assault-style weapons in El Paso, Texas, and Dayton, Ohio, an overwhelming bipartisan majority of voters favored background checks on firearm buyers and taking firearms from people who were a danger to themselves or others, according to a Fox News Poll conducted from 11 to 13 August 2019, about a week after those mass shootings. But, when asked to choose one or the other, voters would rather live in a country where firearm ownership is legal than in one where firearms are banned.

So how to overcome this resistance? First, we need to educate lawmakers and bureaucrats at all levels of government on the power of the blockchain technology to serve multiple purposes, including to:

» Securely, immutably protect confidential information on gun owners and their respective firearms.

» Anonymize these same data to protect user identity and registration information, which can then be shared in the sale of firearms transactions.

» Ensure this anonymized data exchange among buyers, sellers, governments, and even law enforcement officials would not infringe on the rights and obligations of the gun owners.

Secondly, companies and organizations as mentioned in this case study need to work at the local grassroots and national level with both pro-gun (e.g., NRA, Canadian Coalition for Firearm Rights) and gun control organizations (e.g., Coalition to Stop Gun Violence, Moms Demand Action for Gun Sense in America, Coalition for Gun Control) to explain how blockchain solutions can address both parties’ needs and requirements.

Thirdly, companies should target pro-gun control governments (e.g., Canada, New Zealand) on how blockchain-based solutions can effectively address their gun registry and background checks—and protect user identification requirements—and do so at a potentially lower cost basis.

Using DLT could be the ideal low-cost solution to enable Canadian retailers to store and manage firearm registration information securely compared to traditional IT solutions.
Rallying firearm owners and onboarding their assets

“We did a lot of research, interviews, and proof of concepts,” said VeriTransfer’s Mathieu Glaude. “In speaking with Americans there is a background fear, that no matter how secure someone claims their gun registry is, that the government will be able to gain access to their data via a backdoor and sometime in the future, they [the government] could be able to seize their guns!” Glaude went on to say:

The general public is unaware how secure DLT is, that is why we put the emphasis in our marketing and communication, that by using our platform, users are in complete control of their privacy and data, with very little mention of the underlying technology. We are very excited about VeriTransfer’s potential societal impact. We see the management of firearms as a perfect use case for blockchain technologies. We empower individuals to privately and securely manage their firearms in a decentralized manner!

Duane Jacobsen, CEO of Guniary, said:

Our strategy to transform the industry is multifold. We are looking to engage (1) gun manufacturers’ and their supply chain to embed our blockchain technology into their products, (2) shooters who want a digital diary of their target sessions, and (3) gun owners who want to safely transport their firearms and want to be in compliance of all of the federal, state, county and city regulations. Longer-term we want to work with (4) insurance companies to help them craft usage-
based insurance policies, similar to what they are doing for consumer car insurance. In other words, our plan to transform the industry, ecosystem, and consumer behavior is multifaceted and it all begins with creating products that address their particular needs.62

Lastly, all blockchain gun registry companies have reiterated that, at least in the United States, a federally mandated, government fiat-imposed solution will not gain the sufficient support to become law. Therefore, as with DLT, a solution must initially be a distributed grassroots initiative.

Key takeaways

**Lesson 1.** The consensus of companies and interviewees in preparing this case study is that while consumers and NRA supporters strongly want some type of gun control, the fear of the unknown both from a technology point of view and legislative overreach makes it challenging.

While the underlining blockchain technology and business use cases can address the challenges facing governments and their citizens regarding privacy concerns for firearms registry and background checks, the political will (at least at the federal level) hinders the deployment of this technology in the near term.

**Lesson 2.** Traumatic mass gun shootings can sometimes be the catalyst for dramatic shift in the public and governments’ call to action. The horrific mass shooting in New Zealand in early 2019 is a case in point.

Governments outside the United States may be more amenable to doing pilot programs to test the viability of blockchain firearms registries and background checks solutions. Canada’s Bill C-71 would make a good test case for blockchain solutions, as government mandates and requirements place a heavy burden on retailers without specifying underlying solutions or technologies to meet the requirements.

**Lesson 3.** As private gun sales in the United States are regulated at the state level, companies should look to target those states with the most restrictive regulations—they may be the most receptive to testing and adopting blockchain solutions. Companies such as VeriTransfer should look to the states to work with grassroots organizations, state legislators, and law enforcement in crafting “set-aside funding” to pilot their type of solution for private gun sales.
About the author

For more than five years, Rob Klein has been deeply involved in the blockchain space, consulting for companies involved in mining; exchanges, payments, and remittance; nonprofits; and supply chain management markets. Rob authored the Blockchain Research Institute case study on KODAKOne, which dealt with providence and management of copyright of photographic images.

Rob helps organizations understand and leverage blockchain and token economics to build communities and drive their businesses forward. In addition to his work in blockchain, Rob is the managing partner at RSK Strategic where he provides technology, cannabis, consumer hard goods, and mining exploration companies with corporate development, mergers and acquisitions, and strategy consulting services. In his spare time, Rob volunteers at the University of Toronto, where he mentors and coaches students on entrepreneurship.

Disclosures

Rob Klein consulted for CurrencyWorks and co-authored the Freedom Coin/BitRail white papers. In addition, Rob led the research on the KODAKOne case study. CurrencyWorks Inc. (TSXV: CWRK and OTCQB: CWRK) is a publicly traded company redefining the transaction value chain for customer attraction, engagement, and retention by increasing transactions through the creation and implementation of their own digital currency. CurrencyWorks partners with established brands who have large customer bases, fan followings, or online communities. CurrencyWorks acts as a vendor or joint ventures to develop and launch digital currencies to solve real-world problems and create more transactions. CurrencyWorks was previously known as ICOx Innovations Inc.

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About the Blockchain Research Institute

Co-founded in 2017 by Don and Alex Tapscott, the Blockchain Research Institute is an independent, global think tank established to help realize the new promise of the digital economy. For several years now, we have been investigating the transformative and disruptive potential of blockchain technology on business, government, and society.

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 protocols, applications, and ecosystems and their strategic implications for enterprise leaders, supply chains, and industries.

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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Notes


42. BlockSafe, "Powered by BlockSafe: Companies in Our Network," n.d. blocksafe.co/partners.html, accessed 27 March 2020. The two other partners were TriggerSmart and GunShotSpot.
43. Duane Jacobsen, interviewed via telephone and e-mail message by Rob Klein, 10 Feb. 2020.
45. Duane Jacobsen, interviewed via telephone and e-mail message by Rob Klein, 10 Feb. 2020.