Blockchain Working Group: Civic Records

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Using Blockchain to Authenticate and Maintain Vital Records

While the secure nature of blockchain can be implemented in a variety of contexts and uses, its application to personal identity has the potential to significantly improve the way governments record and maintain identifying events such as birth, marriage, and death. These milestones create markers of one's identity, and are used to authenticate and provide critical services and benefits to a person.

Vital record tracking systems in the United States are often heavily reliant on the exchange of paper, which can be time consuming to replace, and is vulnerable to tampering, theft, and loss. Additionally complicating the process are disparate recordkeeping systems and the reliance on physical copies (e.g. submission of birth certificates for drivers' licenses) which can result in unnecessary delays and additional opportunities for errors.[1]

Blockchain technology can provide a secure platform to simplify the management of trusted information.[2] While aspects of blockchain technology can be used to transform government recordkeeping and identity management, there are few case studies about blockchain in the context of government use[3].

As an innovation hub, California is particularly poised to tackle questions surrounding the streamlining of government. In the context of vital recordkeeping blockchain technology shows promise in improving access to individuals, bolstering protections and security while improving transparency and efficiency for governments. With these benefits come attendant drawbacks, namely cost, disruption to current systems, and privacy concerns. In any event, challenges related to vital record keeping will only become more pressing with time, and California policymakers will need to weigh current practice against rapidly evolving technology in order to construct the most effective and efficient system.

Vital Record Keeping

The United States did not begin systematically recording vital records until the early 1900s.[4] Despite their use in federal programs and the like, vital records are created and maintained by local authorities and are not considered Federal records.[5] The process for requesting a vital record varies by state. In California, The California Department of Public Health – Vital Records (CDPH-VR) maintains birth, death, fetal death/stillbirth, marriage, and divorce records once they have been recorded by the County Recorder's Office. Services provided by CDPH-VR include issuing certified copies of California vital records, registering, and amending vital records.[6]

Types of Vital Records

The three most common types of vital records are birth certificates, marriage certificates and death certificates. The vital record most often used to validate identity is one's birth certificate, which verifies age and place of birth. Birth certificates are needed to enroll in school, apply for a passport or government benefits, join the military and claim pension or insurance benefits.[7]

Similarly, marriage certificates and death certificates are necessary for providing essential benefits and authentications. While these three types of certificates are most commonly referred to as vital records, there are questions as to whether, fingerprints, and other genetic data or identifiers could be considered a vital record.

Issues with Current Vital Records System

The World Bank estimates that 1.1 billion people in the world do not have access to proper forms of identification.[8] Without reliable access to vital records, approximately one seventh of the world's population is left unable to conduct basic social activities such as, open a bank account, vote, utilize social programs, or gain employment. Access to identity is an integral part of our social and economic structure, both domestically and globally. Access to proper forms of identification allows individuals to participate in political, economic and social activities, and programs. This identity gap creates barriers for vulnerable populations from gaining much needed benefits and social programs.

Utilizing blockchain technologies for vital records such as birth, marriage and death certificates, has the potential to bridge the "identification gap"[9] by providing individuals with agency and power over their identity, as well as accessible and secure digital identification.

California Context and Considerations

The California Legislature has recognized the potential of blockchain technology by the passage of two bills: SB 838 (Hertzberg, 2018), which provides statutory authority for corporations formed in California to use blockchain to create and maintain corporate records and AB 2658 (Calderon, 2018), which defines blockchain for purposes of law and created the workgroup and framework that has led to this report.[10] The first and only legislation related to the management of vital records is SB 373 (Hertzberg, 2019) which was introduced in 2019 and is still being considered by the Legislature. SB 373 originally authorized the issuance of birth, marriage, and death certificates by means of blockchain, and has since been pared down to only marriage certificates. While local governments such as Berkeley and Sacramento have launched pilot programs that use blockchain technology to improve services, no programs have centered on the use of vital records.[11]

Currently, the California Health and Safety Code chiefly governs California Law surrounding vital records. Sections of this code outline everything from the creation of these records to the distribution of access to them.

- Health and Safety Code section 102400 states, "Each live birth shall be registered with the local registrar of births and deaths for the district in which the birth occurred within 10 days following the date of the event." (Health and Safety Code 102400).

- Health and Safety Code 102430 outlines the access laws for vital records, including who has access, and under what circumstances.

- Health and Safety Code Section 103525 describes the required content for certified copies of a birth, death, or marriage certificates.

    - SB 373 (Hertzberg, 2019) amends this section to allow for the use of blockchain technology to distribute digital vital records.

Any future legislation would need to address these code sections, which currently govern the creation, managing, and distributing of vital records.

A second and critically important consideration is whether government records are best kept on either a private or public blockchain. As discussed in chapter IV. Considerations for Appropriate Application, a private blockchain provides an added layer of protection. The sensitive and personally identifiable information that is kept on birth, marriage and death certificates requires the utmost attention to privacy. Given these circumstances, it is recommended that vital records be stored on a private blockchain.

How can Blockchain Improve Local Government

Government has an important role to play in the creation, management and protection of the vital records of its people. Identity is not only foundational to nearly every government service, but it is a starting point of confidence in a resident's interaction with government and is a critical enabler of service delivery, security, privacy, and public safety activities. How identity attributes are collected, managed, and secured will continue to be of critical interest to leaders in the public sector charged with protecting the rights of residents.[12] Current vital record management models across the state vary from county to county. In many instances, this information is kept using outdated technology, and some counties rely solely on paper filing systems. Blockchain has the potential to create uniformity across the state, and promote access, protection of records, security, privacy, transparency and overall efficiency in the management of vital records. Given the challenges of protecting sensitive information, all of the following recommendations are predicated on the use of a private blockchain.

Access and Authentication: Blockchain has the power to allow individuals agency over their civic and vital information. By utilizing the distributed ledger function of blockchain and storing the hash of a digital file (which can correspond to any record), it is possible to convince third parties of the authenticity of the file – without revealing the actual content of the record itself. By ensuring that individuals have immediate access to their information and the ability to convince others of its authenticity, they can quickly be connected to needed services. This level of agency allows for more efficient and secure interactions with government which requires the proper forms of identification for verification.[13]

Security and Privacy: The decentralized aspect of blockchain provides an additional layer of security, making hacking very difficult because information cannot be gained or controlled from a single computer server.[14] In addition to security, blockchain provides potential privacy benefits. In contrast to a traditional system in which a central authority verifies transactions, network users validate the transactions in a blockchain, replacing the need for a single third-party institution to provide trust. This level of privacy gives individuals autonomy over their data.

Transparency: Records kept on the ledger can be immutable, meaning they are permanent and cannot be altered. This is a powerful tool that allows you to verify the state of a piece of data at a particular time. This level of transparency could improve the public's perception of government, and raise trust in government institutions.[15]

Potential Risks and Considerations:
Disruption: As with any new technologies, disruption of current norms and procedures is inevitable. While the introduction of blockchain will provide numerous advantages over

traditional procedures, blockchain technologies should be integrated into existing systems in a way that complements and upgrades current practices in order to mitigate disruptions. In the context of vital recordkeeping, it can be helpful to maintain paper files in conjunction with digital files while county registrars get accustomed to new processes.

Privacy and Governance: Under the U.S. Constitution, every citizen is protected from unlawful search and seizure. Arguably, this means that even if a government entity is an administrator of information held on a blockchain, that government entity cannot have unfettered access to personal information of citizens without reasonable controls.[16] This constitutional concern is at the heart of many of the fears surrounding blockchain. It is justified that there is a general fear of publishing private information on a distributed ledger. These concerns are largely accounted for if the state chooses to use a private blockchain.

Additionally, if illegal, incorrect or otherwise objectionable data is entered onto a blockchain ledger it cannot be removed. The potential impacts of the permanence and persistence of this information could potentially affect the privacy of individuals. Strong governance models and controls around data security and privacy will have to be examined carefully in order to regulate the information added to the blockchain.[17]

Finally, to the extent the State retains overarching responsibility for vital records, the State will need to establish some mechanism for the public oversight of the governance of blockchains that are used to store and access them. Note the oversight does not mean that the State needs to be involved in the operation of the blockchain(s) or even directly involved in their governance.

Accessibility: While Blockchain removes barriers connected to traditional record management models, it also creates new technological barriers, particularly for low-income or rural communities without computer access. Therefore, when rolling out a blockchain program it is imperative that there be efforts to examine accessibility across populations and to provide alternative ways of connecting individuals with their digital identities. Some examples include in the form of public library programs, or social service centers.

Implementation Costs: In order to roll out the technology, there needs to be an existing digitized database to draw from and a population willing to participate. Lastly and more importantly, the technical framework for such a system would have to be developed. All of these requirements could be time consuming and costly for the implementing agency.

Relevant Programs and Case Studies:

Marriage Certificates:

Washoe County: In April of 2018, Washoe County in northern Nevada created a pilot program to use blockchain technology to allow couples to receive digital marriage certificates directly to their emails. The program utilizes the Ethereum blockchain to create a hash of a couple's physical marriage certificate. The requestor receives a digital copy of their marriage certificate, which they can submit to agencies to verify for authenticity. The pilot was a great success, with participating couples receiving their marriage certificates within 24 hours via email, instead of having to wait 7 to 10 business days.[18] This usage of blockchain is both more secure than the current paper process, and is also more expedient. The program has since expanded and is being fully implemented by the county.

Birth Certificates:

Illinois: The Illinois Blockchain Initiative (IBI) was launched on November 16, 2016 as a collaborative effort by a number of state and county agencies in Illinois to explore and assess the possibilities of applying blockchain technology in governance and public service delivery.[19] One of the pilot projects established by the IBI involved the development of digital birth certificates using blockchain technologies. The IBI partnered with the blockchain technology company Evernym to develop a birth registration process that would allow residents access to digitized birth records without the pains and costs of the traditional heavy record management models, which rely heavily on paperwork filing.

The program was set up to work as such: after a child's birth, government agencies verify birth registration information, using existing standards of live birth certification, and then secure the information via blockchain. After the information has been stored, the parents of the child gain legal authority to manage a digital ID until they are 18 years old. This identity information can be requested by businesses and government institutions via encrypted access for verification and authentication. As added security, access to the information is cryptographically sealed, and requires the identity holder's consent or the consent of their legal guardian to access it.[20] However, after initial concerns were brought to program directors, the project eventually shifted to using existing birth records rather than generating new ones.

General ID Information:

Austin MyPass: In February of 2019, the city of Austin created a pilot project that aims to utilize blockchain to help their growing unsheltered population. A collection of city agencies and other groups in Austin are testing a service they would call MyPass, which aims to give unsheltered individuals who might not have valid identification access to all of their vital records on a digital blockchain that they can access from any device. The goal of the program is to empower the homeless with that information and allow them to have ownership and autonomy of their data and use it to garner services. [21] While promising, the pilot is in its infancy.

E-Estonia: In 2007, Estonia launched the e-Estonia initiative to digitize all governmental data concerning individuals using blockchain. Most of Estonia's government services and functions, including taxation, citizen identification, voting, health, and public safety are fully digitized and many utilize blockchain technology. The initiative utilizes a Keyless Signature Infrastructure (KSI) blockchain technology designed to make sure networks, systems, and data are free from compromise all while retaining data privacy. Estonia claims that digitization ensures its history cannot be rewritten by anybody and the authenticity of the electronic data can be mathematically proven. [22]

While few use-cases exist, the usage for blockchain technology is particularly promising as it relates to vital records, and even more specifically marriage certificates. The pilot in Washoe County has been wildly successful, and shows there's a willingness on behalf of governments and residents to innovate and bring a historically paper reliant process into the 21st century. It may be advisable to begin with marriage certificates, as the process has been shown to work with minor hiccups before piloting birth or death certificates, which contain more sensitive information.

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[2] State of Illinois. "Illinois Blockchain and Distributed Ledger Task Force Final Report to the General Assembly" *House Joint Resolution 25.* January 31, 2018. https://www2.illinois.gov/sites/doit/Strategy/Documents/BlockchainTaskForceFinalReport020518.pdf

[3] Julie Hamill, Harris Bricken. "Blockchain Technology: Local Government Applications and Challenges" *International City/County Management Association (ICMA) and Government Finance Officers Association (GFOA).* October 2018. https://icma.org/sites/default/files/2018-Nov%20Blockchain%20White%20Paper.pdf

[4] "Vital Records" *National Archives.* November 15 https://www.archives.gov/research/vital-records

[5] Ibid.

[6] SB 373 (2019-2020). http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200SB373

[7] USA Gov. "Replace Your Vital Records." January 2, 2020. https://www.usa.gov/replace-vital-documents

[8] World Bank Group, and the Center for Global Development. "Principles on Identification for Sustainable Development: Toward the Digital Age." February 2017, 4. http://documents.worldbank.org/curated/en/213581486378184357/pdf/Principles-on-identification-for-sustainable-development-toward-the-digital-age.pdf

[9] Ibid, 3.

[10] Senate Office of Research. "Issue Primer—Blockchain Technology. "*Policy Matters"* June 2019. https://sor.senate.ca.gov/sites/sor.senate.ca.gov/files/Issue%20Primer%20-%20Blockchain.pdf

[11] Ibid, 4.

[12] State of Illinois. "Illinois Blockchain" p.20.

[13] Young, Andrew and Michelle, Winowatan, and Verhulst, Stefaan. "Case Study: Registering Births on the Blockchain in Illinois." GovLab, October 2018. p.4. https://blockchan.ge/blockchange-birth-registration.pdf

[14] Senate Office of Research. "Issue Primer," p.3.

[15] Julie Hamill, Harris Bricken. "Blockchain Technology: Local Government," p.6.

[16] Julie Hamill, Harris Bricken. "Blockchain Technology: Local Government" 13.

[17] State of Illinois. "Illinois Blockchain," p.14.

[18] Washoe County, "Digitally Certified Document Copies" https://www.washoecounty.us/recorder/blockchain.php

[19] Young, Winowatan, and Verhulst. "Case Study: Registering Births" p.3. https://blockchan.ge/blockchange-birth-registration.pdf

[20] Ibid, p,3.

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[22] Julie Hamill, Harris Bricken. "Blockchain Technology: Local Government," p.7-8.