Chapter 6
Government and Public Sector

Improving Record Management

Blockchain can help government activities across multiple use case categories as a static store of secure information or a dynamic store of tradable information. One area in which blockchain can help government is record management. National, state, and local governments are in charge of keeping up people's records, such as birth, passing dates, and property exchanges. Some of these records still exist in paper form. Modifying and updating these records is tedious, superfluous, and frustrating. Blockchain technology can rearrange the record-keeping and make the records more secure. Marriage, death, and birth certificates could be stored in the blockchain network, where one's data will be recovered safely. Decentralized file storage, where data is distributed throughout the network, protects files from getting hacked or lost. Many local, city, and state governments have shown interest in storing and managing government records on blockchain. For example, the states of Vermont and Delaware, as well as the city of Dubai, are planning to use blockchain technology for government records including property ownership records, utility bills, and permits (Van der Meulen 2018).

Blockchain and Smart Contracts

American computer scientist Nick Szabo proposed the idea of smart contracts in 1994 (Giancaspro 2017). Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code and exist across a distributed decentralized blockchain network. A smart contract resides on a specific place on the blockchain with a unique address. Nodes invoke the contract by sending cryptocurrency to the address and then the consensus

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protocol takes care of the verification process. (Luu et al. 2016). Ethereum is the biggest and most popular blockchain system that supports the use of smart contracts. Ethereum is an open system that encourages developers all over the world to develop new smart contracts (Li et al. 2017).

Smart contracts come with advantages as described below (Li et al. 2017):

- **No need for the third party.** The contracts can be verified without a legal authority
- **Improved traceability.** The information of smart contracts is stored on the blockchain as all other transactions, and the behaviors are recorded
- **Improved security.** The consensus protocol and private key cryptography makes sure that the smart contracts operations run safely and securely.
- **Decentralized development**. Many enthusiasts all over the world are working on improving smart contracts

Despite the advantages and promising possibilities of smart contracts, there are some risks and disadvantages. Hackers have successfully hacked blockchain systems in the recent past. There are reports of cybercriminals using smart contracts for money laundering, which is difficult to prove because of the anonymity of public blockchain systems. Another significant problem is scalability. As smart contracts are being adopted in multiple business areas there is a risk that the current computer infrastructure will have difficulty keeping up with the development pace (Li et al. 2017; Giancaspro 2017).

The implications of using smart contracts are fascinating for the economy. Contracts are important part of any business—from incorporation to buyer-supplier relationships to employee relations. Automating them will change traditional firm structures, processes, and intermediaries, such as accountants and lawyers, whose role would radically change (Giancaspro 2017). Smart contracts can be used for paying security deposits in an escrow system, as financial instruments, or autonomous governance applications. A blockchain notary service provides a secure and inexpensive proof of existence for written documents related to someone's work or for protecting intellectual property. Furthermore, smart contracts can protect copyright, eliminating the risk of file copying, and would speed up the sale of creative works online (Bagley 2016). Business or governments can use the smart contracts to bypass regulations and reduce the costs. Blockchain can also be used for digitalized passports. The technology provides secure storage of ID credentials. Individuals will need to provide minimum information for proof of identity. Additionally, blockchain can be used for identity and access management. The U.S. Department of Homeland Security (DHS) has used blockchain technology to effectively deliver a "single sign-on" experience (Van der Meulen 2018). New York City's Department of Homeless Services use cryptocurrency to securely administer help via credits for social or humanitarian aid (Panetta 2018).

Blockchain can also be used to create and store legally binding digital wills, leaving no questions as to who should receive what assets. Elections are expensive and difficult to monitor. Secure voting is another area where blockchain can help. The technology provides a fraud-proof, anonymous digital voting solution to help

conduct fair elections. Sierra Leon was the first government to have used the technology for elections at a national level. The Ukrainian government has conducted blockchain pilots for regional elections and Brazil has shown interest in conducting national referenda using blockchain-enabled voting (Van der Meulen 2018).

Transparency in Government Services

There are examples of blockchain-enabled technology to improve transparency in government services. For example, Followmyvote.com is a peer-to-peer, election-voting platform that utilizes blockchain, offering full transparency to the whole election process. It is open source, cost-effective, and convenient, reducing opportunities for voter fraud and increasing turnout through improved accessibility to democracy (Singh 2018; Marr 2018). Finally, Democracy.earth is an open-source, peer-to-peer platform that aims to build democratically structured organizations—and potentially even states or nations—using blockchain tools. The advantages include liquid democracy, data ownership, and borderless governance (Singh 2018; Marr 2018). Table 6.1 summarizes blockchain applications in different sections of government.

Land Right Management

A number of governments around the world suffer from bad land registry records. There are hundreds or even thousands of years of land records, making keeping track of land ownership difficult. Factors contributing to the growing problems faced by land registry officials are:

- Discrepancies with the paperwork
- Forged documents and counterfeit titles
- Occasional loss of all documents

For developing countries notoriously bad land registry records, government corruption, the use of paper-only systems, and natural disasters all contribute to the growing problems faced by land registry officials in these nations. Blockchain-based technology is a cost-effective solution to these problems (Hamilton 2019).

The transparent nature of blockchain makes it an effective technology for use in public records systems, title registry, and land right management. Blockchain is more efficient, reliable and cost-effective than current models in use. It provides immutable records, secure access and storage, user friendliness, and operational simplicity. Blockchain technology allows users to easily secure the deeds of transactions by entering the details and uploading them on distributed document storage with immutable logs.

Table 6.1 Blockchain applications in government

Categories	Description	Real-world applications
Record management	• People's records, such as birth and passing dates, marital status, or property exchange can be recorded safely.	• Rearranges people's record-keeping and make it more secure for national, state, and local governments
Identity management	• Stores, confirms, and distributes identity-related information • Easily revises personal data or other data	• Individuals need to provide minimum information for proof of identity • Provides a secure and inexpensive proof of existence
Government services	• Improves transparency in government services	• Governments are using the technology to improve public safety, welfare, and transportation
Digital voting	• Provides anonymous digital voting solution to the whole election process to help conduct fair election	• Governments are using the technology to reduce opportunities for voter fraud and increase turnout
Smart property	• Creates digital assets such as stock, bonds, land titles, etc.	• Helps government to digitally record assets
Payments infrastructure	• Efficient payment transfers with improved record keeping	• Government agency can collect dues, taxes and other payments fast and safe
Copyright protection	• Low-cost notary services • Easy access to secure, dynamic information	• Protects copyright, eliminating the risk of file copying • Protection of intellectual property • Registry of independent artists' work

Source: Singh 2018; Marr 2018

Blockchain allows the user time stamp a particular document or service or ownership where, that time stamp cannot be changed. That is the major difference between a blockchain and a database. In a database, a record can be erased and the value can be changed without anyone knowledge because not all databases have an audit trail—there is no history of what was changed and when it was changed. Security against these types of abuses is a basic element of a blockchain, ensuring a truthful, historical record.

Propy is a real-life example of application of blockchain in land right management. Propy is a Silicon Valley blockchain-based startup company that deploys smart contracts on the blockchain. The company provides blockchain–based services, including deed registry and title registry. Blockchain deed registry secures the deeds of ongoing or closed transactions. Deeds are uploaded on distributed document storage with immutable logs. Blockchain title registry allows counties in the U.S. and across the globe to record a property ownership data on blockchain rather than conventional databases (Propy 2019). Blockchain land registry continues to be

an area of huge development. Several states, including Wyoming and Vermont, have shown a growing interest in blockchain technology. In January 2019, Propy partnered with the clerk's office in South Burlington, Vermont to develop a secure distributed ledger of the city's property ownership information. Currently, the city spends thousands on storing and protecting these records, and is interested in the cost savings a blockchain-based system brings to the equation. Countries around the world recognize the undeniable advantages that blockchain technology provides to the land registry. Officials in India, Netherlands, Sweden, United Kingdom, Columbia, and Dubai are seeking to change land registry systems with the integration of blockchain technology to register land and property sales (Hamilton 2019).

Real-World Use Cases

The following section describes the real-world blockchain use cases and blockchain applications in different global governments (Marr 2018; Singh 2018):

1. South Korea. Samsung is creating blockchain solutions to improve transparency in government services including public safety, welfare, and transportation.
2. Estonia. The Estonian government is working with Ericson Company on an initiative to create a new data center to move public records onto the blockchain.
3. United Arab Emirates (UAE). Their goal is to become a first blockchain-powered state. In 2016, Dubai formed a committee of 30 government agencies to investigate blockchain-enabled opportunities across healthcare, shipping, business registration, etc. As discussed in Chap. 7, UAE is the first country in the world to use blockchain technology for organ donation.
4. United Kingdom: The UK Department of Work and Pensions is investigating using blockchain to create more transparent government services to record and administer benefit payments.

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