

RESEARCH

Open Access



Blockchain government - a next form of infrastructure for the twenty-first century

MyungSan Jun 

Correspondence: ulcaman@gmail.com
BlockchainOS Inc., Seoul, Republic of Korea

Abstract

Today, more than 100 blockchain projects created to transform government systems are being conducted in more than 30 countries. What leads countries rapidly initiate blockchain projects? I argue that it is because blockchain is a technology directly related to social organization; Unlike other technologies, a consensus mechanism form the core of blockchain. Traditionally, consensus is not the domain of machines but rather humankind. However, blockchain operates through a consensus algorithm with human intervention; once that consensus is made, it cannot be modified or forged. Through utilization of Lawrence Lessig's proposition that "Code is law," I suggest that blockchain creates "absolute law" that cannot be violated. This characteristic of blockchain makes it possible to implement social technology that can replace existing social apparatuses including bureaucracy. In addition, there are three close similarities between blockchain and bureaucracy. First, both of them are defined by the rules and execute predetermined rules. Second, both of them work as information processing machines for society. Third, both of them work as trust machines for society. Therefore, I posit that it is possible and moreover unavoidable to replace bureaucracy with blockchain systems. In conclusion, I suggest five principles that should be adhered to when we replace bureaucracy with the blockchain system: 1) introducing Blockchain Statute law; 2) transparent disclosure of data and source code; 3) implementing autonomous executing administration; 4) building a governance system based on direct democracy and 5) making Distributed Autonomous Government(DAG).

At the time I initially planned to investigate the subject of blockchain technology and government, I could not imagine that so many blockchain projects were underway in so many countries. Moreover, the speed of expansion of government-led blockchain projects worldwide is astonishing. For example, Estonia has used blockchain technology to issue e-ID for identity verification for their citizens. Additionally, electronic voting systems based on blockchain are being built in many countries including Ukraine, Estonia, and Australia. Honduras and Georgia attempted to introduce blockchain technology to manage their land registers. The United States is working to incorporate blockchain technology to record and share medical information, and the UK is pursuing research and development to apply blockchain technology to public services.¹ China has announced plan to build a "Blockchain city," based on blockchain technology.² In addition, more than 100 blockchain projects are being conducted in more than 40 countries around the world. IBM reported that nine in 10 governments will invest in Blockchain projects by 2018.³

Various blockchain projects led by governments

Actually, there are so many projects that are conducted by governments. One can see the projects driven by governments around the world in the tables below.⁴ Table 1 contains various projects conducted by governments except voting system and digital currency projects. Table 2 contains the electronic voting system projects based on blockchain, and Table 3 contains the digital currency projects based on blockchain around the world. (Please note that not all projects are listed. There are much more projects than listed in tables below.)

What leads countries to rapidly initiate blockchain projects? In this article, I will argue that it is due to blockchain technology being directly related to social organization. Unlike other technologies, a consensus mechanism forms the core of blockchain. Traditionally, consensus is not the domain of machines but rather humankind. However blockchain operates through a consensus algorithm with human intervention. Consensus algorithms work every moment when the blockchain decides what data should be regarded as genuine and therefore stored in the blockchain. Blockchain has a structure in which all the participants validate the data and all the participants store the original version of the verified data.

Therefore, once the data is confirmed, which is synonymous with consensus being made and data stored in blockchain, it cannot be modified or forged.⁵ Blockchain is a cutting-edge social and physical technology that simultaneously makes possible an immutable and tamper-proof system. Thus, blockchain is an optimal technology for dealing with public data that should not be forged. However, the blockchain is not simply a data storage technique. With the smart contracts feature that comes with blockchain technology, it goes much further that it has the potential to replace existing social organizations.

Social technology

I think it would be helpful to adopt the concept of 'social technology' to understand the features of blockchain technology. To understand the concept of social technology, we first must distinguish between two kinds of technologies; "physical technology" and "social technology". In addition to physical technology, which involves the transformation and modification of things with engineering and scientific knowledge, there is another kind of technology that we can call "social technology." The concept of social technology comes from the analysis of Richard Nelson and Katherine Nelson⁶ who distinguished physical technology from social technology. In short, Social technology is defined as ways to communicate, cooperate, compromise, and make consensus with other people. Social technology contains the division of labor, social institutions, and decision making process in communities. Social technology refers to the technology that directly affects the structure of society, systems, social relations, and individual interactions. Social technology is a concept that allows us to identify and analyze these features of technology.

However, physical technology and social technology are also interwoven. Physical technology influences social technology and enables the construction of new social technology.⁷ For example, Internet technology allows people to communicate together immediately, regardless of their physical locations. Therefore, some smart people have endeavored to develop unprecedented physical technology to improve existing social technologies or to make a new social technology. (I think the effort of Satoshi Nakamoto who invented the blockchain technology⁸ is an exact case of these kinds of efforts.)

Table 1 Examples of government-led blockchain projects

Nation	Project	Status
Australia	Australian senators launch parliamentary friends of blockchain group.	Announced in August 9, 2017
	The Australian Securities Exchange (ASX) announced that they will use blockchain technology to clear and settle trades by replacing the outdated Clearing House Electronic Subregister System, also known as CHES.	Announced in December, 2017. The proposed transition is expected to take place in March 2018.
China	Social security funds management system	Announced in 2016
	Mortgage valuations on blockchain	Announced in 2016
	Blockchain-based asset custody system (PSBC)	Successfully executed more than 100 real business transactions on the blockchain since the system went live in October 2016
	Blockchain city project (By Wanxiang Group)	The project was announced by Wanxiang Group in 2016 and backed by Chinese government
Dubai	Government documents management system to be enacted by 2020	Ongoing
	Global blockchain council (GBC) was established in 2016 with 32 members, including government entities, international companies, leading UAE banks, free zones, and international blockchain technology firms	Ongoing
	Digital passport based on blockchain	Announced in June 2017
	Real-time information system about shipments to Dubai	Announced in 2017
Estonia	eID (electronic ID management system)	The government is currently upgrading the existing system with blockchain technology.
	E-health (medical information management system)	The government is currently upgrading the existing system with blockchain technology.
	e-Residency (a first-of-a-kind a transnational digital identity)	Since 2015, more than 27,000 people from 143 countries have applied and 4272 companies have been established as of December 2017
France	French government has adopted new rules that will enable banks and fintech firms to establish blockchain platforms for unlisted securities trading.	Announced in December, 2017
Ghana	Land title registry project by NGO "Bitland"	Ongoing
Georgia	Land title registry project	Ongoing
Honduras	Land title registry project	Announced in 2015 and known as failure now
Kazakhstan	Announced that they will make the most favorable business climate for cryptocurrency and Financial technology(Fintech)	Announced in July 17, 2017
Russia	Blockchain based documents management system announced by Moscow government	Announced in 2016
	Russia's ministry of health is launching a blockchain pilot	Announced in Aug 10, 2017
Singapore	Cross-border interbank payments	A proof-of-concept project has been initiated in 2016.
Sweden	Trials of a blockchain smart contracts technology for land registry	Tested in early 2017

Table 1 Examples of government-led blockchain projects *(Continued)*

Nation	Project	Status
Switzerland	The city of Zug (the capital of the canton of Zug) started accepting bitcoin as payment for city fees. The large number of companies engaged in cryptocurrency are located in Crypto Valley in Zug	Since July 2016 (Crypto Valley was named by Ethereum co-founder Mihai Alisie)
	Zug offers blockchain-based digital identity to their residents	Announced in 2017
The United Arab Emirates and Saudi Arabia	The central banks of the United Arab Emirates and Saudi Arabia announced that they would launch a pilot initiative that two institutions test a new cryptocurrency for cross-border payments.	Announced in December, 2017
Ukraine	E-vox (Ethereum blockchain-based election platform)	Announced in 2016
	Blockchain-based auction system	Announced in 2016
United Kingdom (UK)	The UK government's Department of Work and Pensions tested an experiment in which a blockchain system is used to distribute welfare payments.	Announced in July 2016 and successfully finished trial system
	Blockchain as a service for each government department	Available since August 2016
	Blockchain-based digital currency	UK's Financial Conduct Authority (FCA) permitted blockchain startup, Tramonex, to issue digital money
	Blockchain-based payment system between banks	Announced in 2017
United States (US)	Pilot project for secure exchange of personal health data online	A two-year agreement for the tests was announced in 2016
	Approving plan to issue stock via Bitcoin's blockchain (Securities and Exchange Commission)	Announced in 2015
	Arizona bill to make blockchain smart contracts "legal"	Officially became state law in March 29, 2017
	Governor of Delaware has officially signed a bill making it explicitly legal for those entities to use blockchain for stock trading and record-keeping.	Announced in July 2017
	Illinois launches blockchain pilot to digitize birth certificates	Announced in Aug 31, 2017

Indeed, the history of humankind has been interwoven with the development of technology. In twenty-first century society, individuals do not interact directly through the face-to-face communication. It is now common that technology mediates the interactions of individuals. We now use technologies everyday such as email, BBS, mobile messages, messengers, SNS etc. In this sense, the nature and characteristics of technology that weaves between individuals and individuals, individuals and groups, or groups and groups become an important subject. We are now facing Blockchain technology.

The reason why blockchain is expected to change social organization is because it can replace the role played by existing social technologies including the bureaucracy, the most elaborate and dominant organization form in modern society.