

STUDY OF BLOCKCHAIN TECHNOLOGY - BACKGROUND MEMORANDUM

House Concurrent Resolution No. 3004 (2019) ([appendix](#)) provides for a study during the 2019-20 interim regarding the potential benefit value of blockchain technology implementation and utilization in state government administration and affairs, including a comprehensive assessment of government areas in which blockchain technology can assist with agency affairs and administration, accounting and budgeting, transactions, creating necessary audit trails, authorizing a decision, authenticating authority, and establishing a system of record; and an analytical evaluation of implementing smart contracts to improve efficiencies in contract enforcement, the cost-effectiveness and increased security of utilizing a blockchain technology electronic voting system, and the exploration of other eGovernment services and applications, such as identity management, tax collection, land registry, distribution of benefits, and digital exchanges. The Legislative Management is required to report its findings and recommendations, together with any legislation necessary to implement the recommendations, to the 67th Legislative Assembly. The Legislative Management has assigned the responsibility for this study to the Information Technology Committee.

DISTRIBUTED LEDGER TECHNOLOGY AND BLOCKCHAIN BACKGROUND

In 2008 a new technology known as blockchain was created as an open, decentralized ledger that records transactions between two parties permanently without needing third-party authentication. Blockchain is a list of transactions called "blocks" that are shared between multiple parties in which new transactions are added at the end of the blockchain. The existing data is never changed or deleted when new data is added. If a portion of data is changed, the entire blockchain will change, resulting in the user being able to detect the change in data. When a transaction is initiated, it is bundled into a block, which is then verified for legitimacy by the majority of the participants in the system and added to the blockchain. The blockchain contains a verifiable record of every transaction made in the system. Blockchain is intended to be a decentralized technology so the data can be hosted at multiple locations. If data is destroyed at one location, the data remains available at other locations.

Blockchain is a form of distributed ledger technology (DLT), which is a database containing replicated, shared, and synchronized digital data available to users at multiple sites, countries, or institutions without the use of a central administrator or centralized data storage. After the invention of blockchain, the primary uses of the new technology centered on cryptocurrency, such as Bitcoin. More recently, DLT and blockchain have been used for purposes other than cryptocurrency, including for tracking fruits and dairy products from growers to consumers; tracking marijuana from seed to sale to consumers; private securities on the stock exchange; insurance needs; notary public services; gaming; tracking grants; and legal, audit, and tax services.

As blockchain technologies further developed, a second-generation blockchain system called Ethereum was created, leading to smart contracts, a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract while allowing the performance of credible transactions without third parties. Ethereum smart contracts expanded blockchain technology uses, including the ability to build programs directly into blockchain to allow financial institutions to use blockchain technology for financial instruments such as loans or bonds rather than only cryptocurrencies.

Blockchains were previously secured by a "proof of work" protocol, which helps to deter cyberattacks such as denial-of-service attacks. Proof of work allowed data miners that operate large data centers that provide security to make decisions related to the blockchains in exchange for cryptocurrency. Recently, the proof of work protocol has been replaced by a "proof of stake" protocol which uses a different process to validate transactions and provides for energy savings and a safer network when defending against cybersecurity attacks.

The most recent blockchain technology-related initiative is called blockchain scaling, which accelerates the network's transaction processing time by determining how many computers are necessary to validate each transaction and dividing the work efficiently among the required number of computers rather than having every computer in the network process every transaction.

The increased use in blockchain technology has led to a variety of industries changing traditional business processes. These industries include agriculture, forestry, and fishing; arts, entertainment, and recreation; aviation and space; education; energy; finance and insurance; health care; information and telecommunications; the media industry; professional services; public services; real estate; retail; tourism; transportation and storage; and venture capital.

In 2015 Vermont became the first state to pass blockchain-related legislation by requiring the Vermont Attorney General, Department of Financial Regulation, and Secretary of State to report to the Vermont General Assembly on opportunities and risks of creating a presumption of validity for electronic facts and records that employ

blockchain technology. As of June 2019, the National Conference of State Legislatures reported 33 additional states, including North Dakota, have passed blockchain-related legislation. The 66th Legislative Assembly passed the following bills during the 2019 legislative session related to blockchain:

House Bill No. 1045 - Signatures, records, and smart contracts - This bill created North Dakota Century Code Section 9-16-19 and provides:

- A signature secured through blockchain technology is considered to be an electronic form and to be an electronic signature;
- A record or contract secured through blockchain technology is considered to be in an electronic form and to be an electronic record;
- Smart contracts relating to a transaction may not be denied legal effect, validity, or enforceability solely because the contract contains a smart contract term; and
- A person in or affecting interstate or foreign commerce using blockchain technology to secure information the person owns or has the right to use retains the same rights of ownership or use with respect to that information as before the person secured the information using the blockchain technology.

For purposes of this section, **blockchain** is defined as a distributed ledger technology that uses a distributed, decentralized, shared, and replicated ledger, which may be public or private, permissioned or permissionless, or driven by tokenized cryptoeconomics or tokenless, and which is protected with cryptography, is immutable, and auditable and provides an uncensored truth.

For purposes of this section, a **smart contract** is defined as an event-driven program, with state, that runs on a distributed, decentralized, shared, and replicated ledger and which can take custody over and instruct transfer of assets on that ledger.

House Bill No. 1048 - Distributed ledger technologies pilot project - This bill created Section 54-59-02.2 to require the Information Technology Department (ITD) to research and develop the use of distributed ledger-enabled platform technologies, such as blockchains for computer-controlled programs, data transfer and storage, and program regulation to protect against falsification, improve internal data security, and identify external hacking threats. Research must include efforts to protect the privacy of personal identifying information maintained within distributed ledger programs. The department is required to select a state agency, upon the request of the state agency, to serve as a pilot program for the implementation and use of distributed ledger-enabled platform technologies. The chief information officer is required to report to the Legislative Management before June 1 of each even-numbered year regarding the implementation of distributed ledger technologies.

2017-18 INFORMATION TECHNOLOGY COMMITTEE

During the 2017-18 interim, the Information Technology Committee received information from representatives of ITD and IBM Corporation related to DLT and blockchain technology. The committee learned about DLT and blockchain history and uses. The committee was informed blockchain for government involves four components--identity, business assets, privacy, and governance. Identity includes all known participants, business assets vary for each blockchain use, privacy addresses the confidentiality of transactions between parties, and governance relates to a group overseeing the rules and operations of blockchain technology and distributed ledgers. The committee recommended House Concurrent Resolution No. 3002 (2019), which provided for a Legislative Management study of DLT and blockchain for state government. The resolution was not approved by the 2019 Legislative Assembly, but certain components of House Concurrent Resolution No. 3002 were included in House Concurrent Resolution No. 3004 (2019).

STUDY PLAN

The following is a proposed study plan for the committee's consideration in its study of blockchain technology:

1. Receive and review information from representatives of ITD and other selected organizations regarding:
 - a. History of DLT and blockchain technology;
 - b. Uses of DLT and blockchain technology in the private sector;
 - c. Potential uses of DLT and blockchain technology for state government, including:
 - (1) Agency affairs, administration, accounting, budgeting, and transactions;
 - (2) Creating necessary audit trails;
 - (3) Authorizing a decision, authenticating authority, and establishing a record;
 - (4) Evaluation of implementing smart contracts to improve efficiencies in contract enforcement;

- (5) The cost-effectiveness and increased security of utilizing a blockchain technology electronic voting system;
 - (6) Identity management, tax collection, land registry, distribution of benefits, digital exchanges, and other eGovernment services and applications; and
- d. How other state governments have used DLT and blockchain technology.
2. Receive and review information from representatives of state agencies regarding advantages or disadvantages on agency operations of DLT and blockchain technology.
 3. Receive and review information from representatives of the North Dakota University System regarding advantages or disadvantages on agency operations of DLT and blockchain technology.
 4. Receive and review information from interested persons regarding the committee's study of blockchain technology.
 5. Develop recommendations and any bill drafts necessary to implement the recommendations.
 6. Prepare a final report for submission to the Legislative Management.

ATTACH:1