FACTS MA

FOSTERING ADVOCACY AND
COLLABORATION THROUGH SCIENCE

Applications of Blockchain Technology

COMMITTEES

House Energy and Commerce Committee; Science, Space, and Technology Committee

Senate Commerce, Science, and Transportation Committee; Committee on Finance

For further information contact FACTS•MA
contact@factsma.org

Follow us @FACTS-MA

www.factsma.org

Blockchain technology allows a secure, unforgeable public record of transactions, financial or otherwise[1,2]. It is useful in situations in which parties want records kept that all parties can access, authorized parties can add to, but no party can change, once written. Currently, such records are maintained by trusted third parties, such as banks or brokers, which is expensive, costing as much as 5% per transaction[3].

Cryptocurrency

The only current application of blockchains is in cryptocurrencies[4,5]. There are over 1000 cryptocurrencies, such as Bitcoin and Ethereum, with a total value recently varying between 300 and 800 billion dollars[6].

- Cryptocurrencies, such as Bitcoin, allow participants to securely transfer tokens, i.e. bitcoins, in return for goods or services.
- The key to cryptocurrencies is that recording transactions uses a lot of computer power. Thus, the entire network must collaborate to maintain the system. Computers that contribute are rewarded with new bitcoins and are known as "bitcoin miners"[7].
- Thus, the value of bitcoins (in the absence of speculation) is set by the expense of the computer power required to make new ones.
- Stealing from the network requires 51% of the network computing power, costing more than the bitcoins that could be stolen[8].
- Cryptocurrencies are designed to allow for maintenance and secure exchange of currency without the need for a central bank[9].
- Cryptocurrencies promise to greatly reduce the cost of financial transactions, especially between parties in different countries[10].

Digital Identity, Digital Rights and Provenance Management

Blockchains could securely record the ownership, and thus provenance, of any item, physical or electronic[11,12]. Proposed, although as-of-yet-unrealized, applications include:

- Supply Chain Management: The history of items in a supply chain could be securely recorded and shared amongst many companies[13].
- Digital Identity: Ownership of any item–a house, song, college transcript, health record or passport–could be publicly recorded[14].
- Digital IP: Such a record could be used to pay royalties for online use[15].
- Voting: Votes could be securely recorded on a blockchain[16].

Self-Executing Contracts[17]

- A major innovation in the Ethereum blockchain is to embed algorithms in each block[18], which are executed on the network, allowing transaction in ether (the Ethereum token), such as:
  - Automatically making bond, loan, or mortgage payments.
  - Automatically executing stock trades or insurance payouts.

Although there are many avenues for application of blockchain technology, there are also risks and downsides. Chief among them are the lack of regulation and consumer protections typical of the SEC-regulated stock market and the different incentives for cooperation in non-financial blockchains. See the Risks and Downsides of Blockchain Technology FACTSheet for details[19].

Sources

[1] "Blockchain Technology". FACTS•MA, 11 February 2018
https://www.factsma.org/factsheets/blockchain-technology
[2] "Blockchains: The great chain of being sure about things". The Economist, 31 October 2015
https://www.economist.com/news/briefing/21677228-technology-behind-bitcoin-lets-people-who-do-not-know-or-trust-each-other-build-dependable
[3] "The Essential Role of Trusted Third Parties in Electronic Commerce". A. Michael Froomkin, Oregon Law Review 49, 1996
https://repository.law.miami.edu/cgi/viewcontent.cgi?article=1309&context=fac_articles
[4] "Bitcoin: A Peer-to Peer Electronic Cash System". Satoshi Nakamoto, The Cryptography Mailing List, 31 October 2008
http://nakamotoinstitute.org/bitcoin
[5] "A Short History Of Bitcoin And Crypto Currency Everyone Should Read". Bernard Marr, Forbes, 6 Decebmer 2017
https://www.forbes.com/sites/bernardmarr/2017/12/06/a-short-history-of-bitcoin-and-crypto-currency-everyone-should-read
[6] Cryptocurrency Market Capitalizations
https://coinmarketcap.com
[7] "What is Blockchain Technology? A Step-by-Step Guide For Beginners". Blockgeeks
https://blockgeeks.com/guides/what-is-blockchain-technology
[8] "How banks or governments could wipe Bitcoin off the face of the planet". Lexie, ExpressVPN, 18 August 2017
https://www.expressvpn.com/blog/how-to-destroy-bitcoin
[9] "BITCOIN: A Primer for Policymakers". Jerry Brito and Andrea Castillo, Mercatus Center, George Mason University, 2013
https://www.mercatus.org/system/files/Brito_BitcoinPrimer.pdf
[10] "Money Transfers in Bitcoins? Western Union, MoneyGram Weigh the Option". Andrew R. Johnson, Wall Street Journal, 18 April 2013
http://online.wsj.com/article/SB10001424127887324493704578431000719258048.html
[11] "BlockChain Technology: Beyond Bitcoin". Michael Crosby, Applied Innovation Review (2), June 2016
http://scet.berkeley.edu/wp-content/uploads/AIR-2016-Blockchain.pdf
[12] "21 Areas of Blockchain Application Beyond Financial Services". Elena Mesropyan, Let's Talk Payments, 1 December 2016
https://letstalkpayments.com/21-areas-of-blockchain-application-beyond-financial-services
[13] "Using blockchain to drive supply chain transparency". Stephen Laaper and Joseph Fitzgerald, Deloitte
https://www2.deloitte.com/us/en/pages/operations/articles/blockchain-supply-chain-innovation.html
[14] "The Blockchain for Identity Management" and "The Blockchain for Asset Management". in The Blockchain and Government, Duke University
https://sites.duke.edu/lucasfaganblockchain
[15] "Blockchain Could Help Artists Profit More from Their Creative Works". Don Tapscott and Alex Tapscott, Harvard Business Review, 22 March 2017
https://hbr.org/2017/03/blockchain-could-help-artists-profit-more-from-their-creative-works
[16] "Want to make your vote really count? Stick a blockchain on it". Niall Firth, New Scientist, 6 September 2017
https://www.newscientist.com/article/mg23531424-500-bitcoin-tech-to-put-political-power-in-the-hands-of-voters
[17] "How Smart Contracts Work". Morgen Peck, IEEE Spectrum, 28 September 2017
https://spectrum.ieee.org/computing/networks/how-smart-contracts-work
[18] "Everything you've ever wanted to know about Ethereum". Mohit Mamoria, The Next Web, 28 November 2017.
https://thenextweb.com/contributors/2017/11/28/ultimate-2000-word-plain-english-guide-ethereum
[19] "Risks and Downsides of Blockchain Technology". FACTS•MA, TBD
https://www.factsma.org/factsheets