TIBA

Introduction to Blockchain Technology

Spring 2020

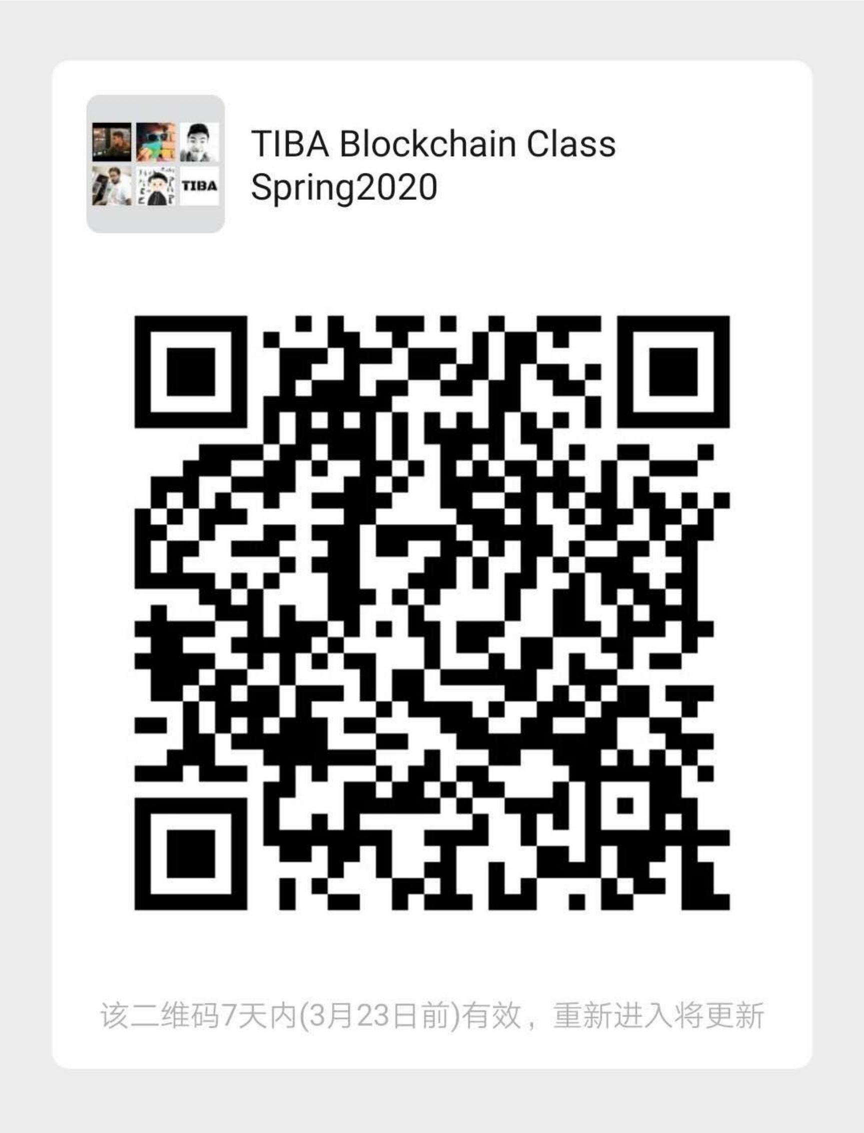
TIBA @ Tsinghua University

TIBA

Course Syllabus

- Introduction to Blockchain
- Cryptographic Primitives
- Distributed Systems
- Blockchain 1.0: Basic blockchain
- Blockchain 2.0: Smart contracts
- Blockchain for enterprise: Consortium blockchains
- Limitations & vulnerability of blockchain technology
- Applications: Beyond Cryptocurrency

Wechat Group

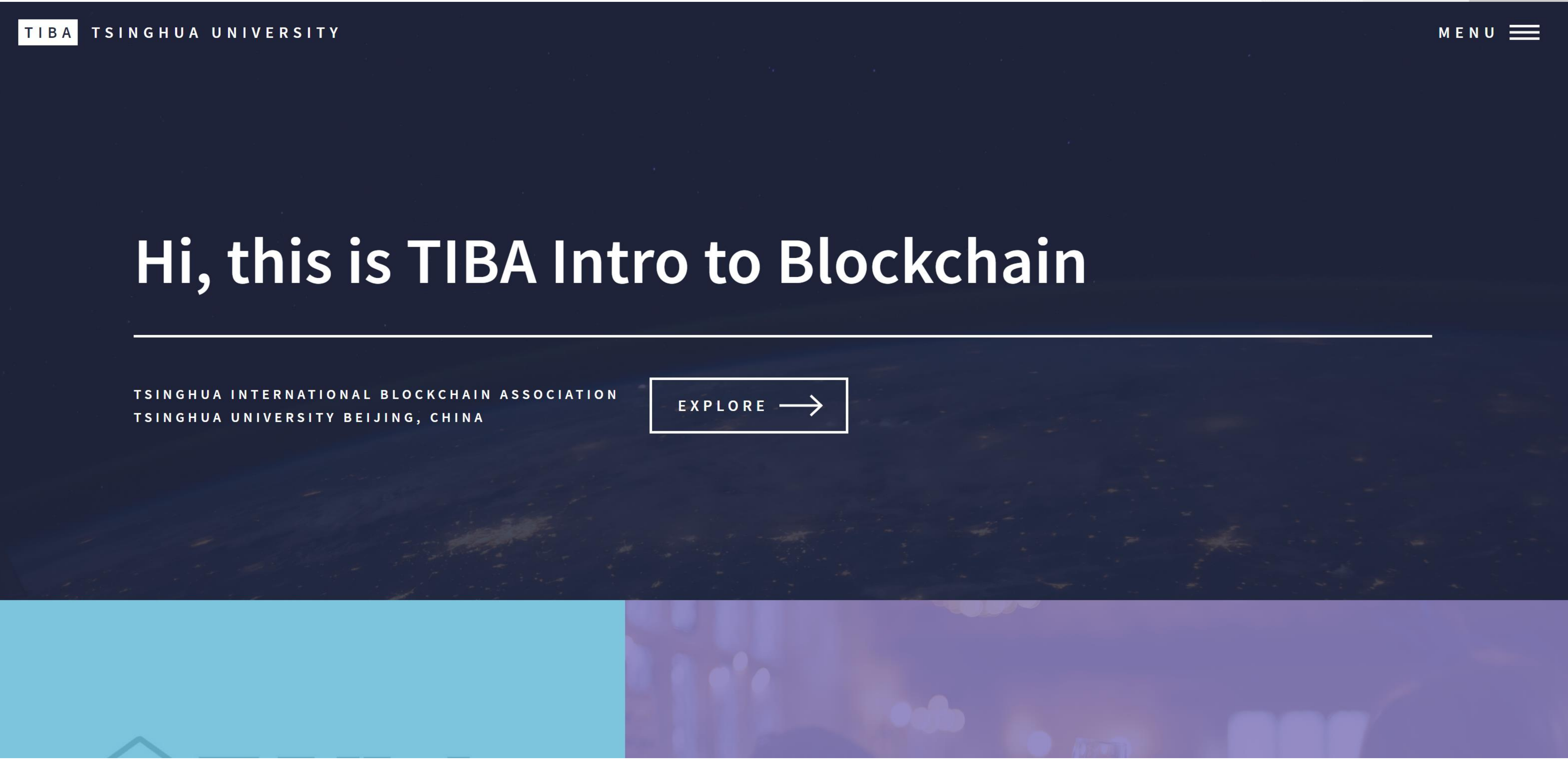


TIBA Blockchain Class Spring2020

该二维码7天内(3月23日前)有效，重新进入将更新

Course Website

https://samt6.github.io/TIBABlockchainCourseSpring2020/



Hi, this is TIBA Intro to Blockchain

TSINGHUA INTERNATIONAL BLOCKCHAIN ASSOCIATION
TSINGHUA UNIVERSITY BEIJING, CHINA

TIBA

Introduction to Blockchain

By Samuel Tang, TIBA@TsinghuaUniversity

Content

- Why Blockchain?
- Blockchain History
- What is Blockchain?
- Applications

Goal: Where does Blockchain come from and what is it?

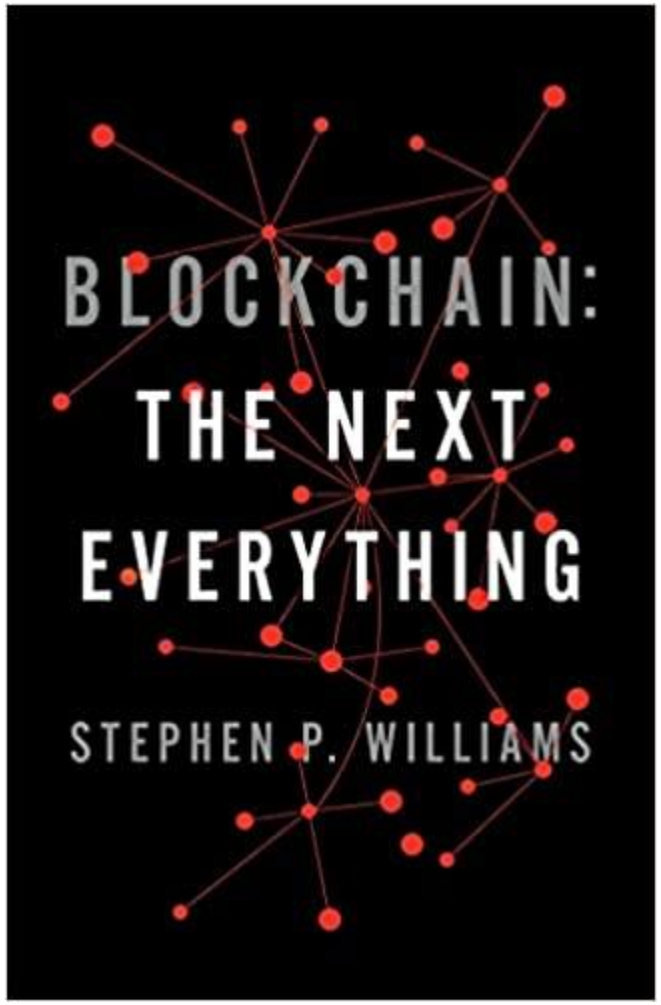
Why Blockchain?

Discussion

Why are you here?

Why learn Blockchain?

- High demand
- Revolutionary technology
- Cryptocurrencies and ICOs
- Trustless system
- Decentralization
- Immutability
- Transparency
- Anonymity
- …



Source: https://www.amazon.com/Blockchain-Everything-Stephen-P-Williams/dp/198211682X
Reading: https://www.forbes.com/sites/dantedisparte/2018/04/26/why-blockchain-why-now/#37d723874f42
https://www.coindesk.com/blockchain-faces-big-challenges-but-the-opportunity-is-enormous

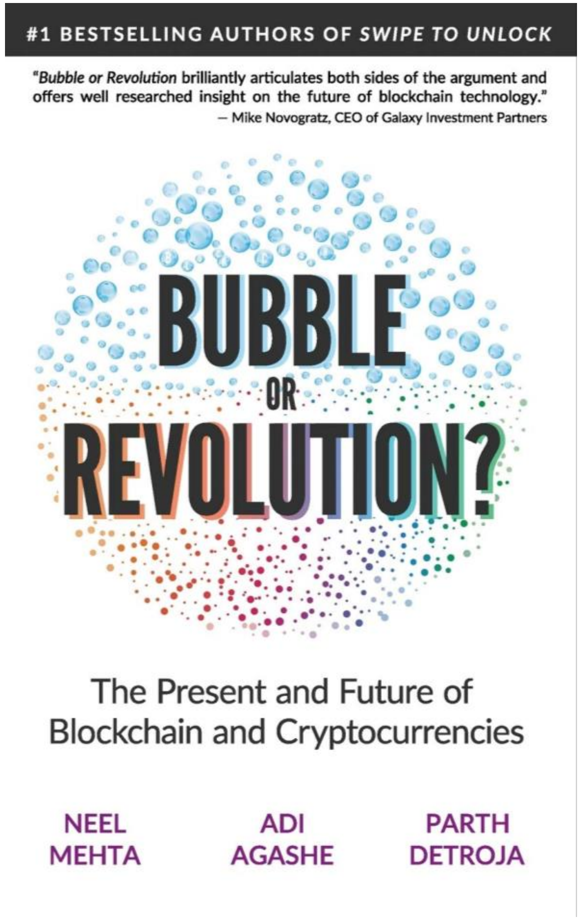
Why Blockchain is NOT the Answer

- Buzzword/over-hyped
- Limited applications
- Inefficient use of resources (energy consumption, duplicate data,…)
- Scalability problem
- Regulation
- Speed
- …

Source: https://steemit.com/blockchain/@beggars/the-blockchain-is-not-the-solution-to-every-problem
Reading: https://medium.com/@jimmysong/why-blockchain-is-not-the-answer-3b7d5f612d11
https://www.wired.com/story/whats-blockchain-good-for-not-much/
https://www.gartner.com/en/newsroom/press-releases/2019-05-07-gartner-predicts-90--of-blockchain-based-supply-chain

Is Blockchain the Future?

- Bubble or Revolution?
- Learn & know for yourself!



#1 BESTSELLING AUTHORS OF *SWIPE TO UNLOCK*

"*Bubble or Revolution* brilliantly articulates both sides of the argument and offers well researched insight on the future of blockchain technology."
– Mike Novogratz, CEO of Galaxy Investment Partners

BUBBLE OR REVOLUTION?

The Present and Future of Blockchain and Cryptocurrencies

NEEL MEHTA

ADI AGASHE

PARTH DETROJA

Source: https://www.amazon.com/Blockchain-Bubble-Revolution-Present-Cryptocurrencies/dp/0578528150

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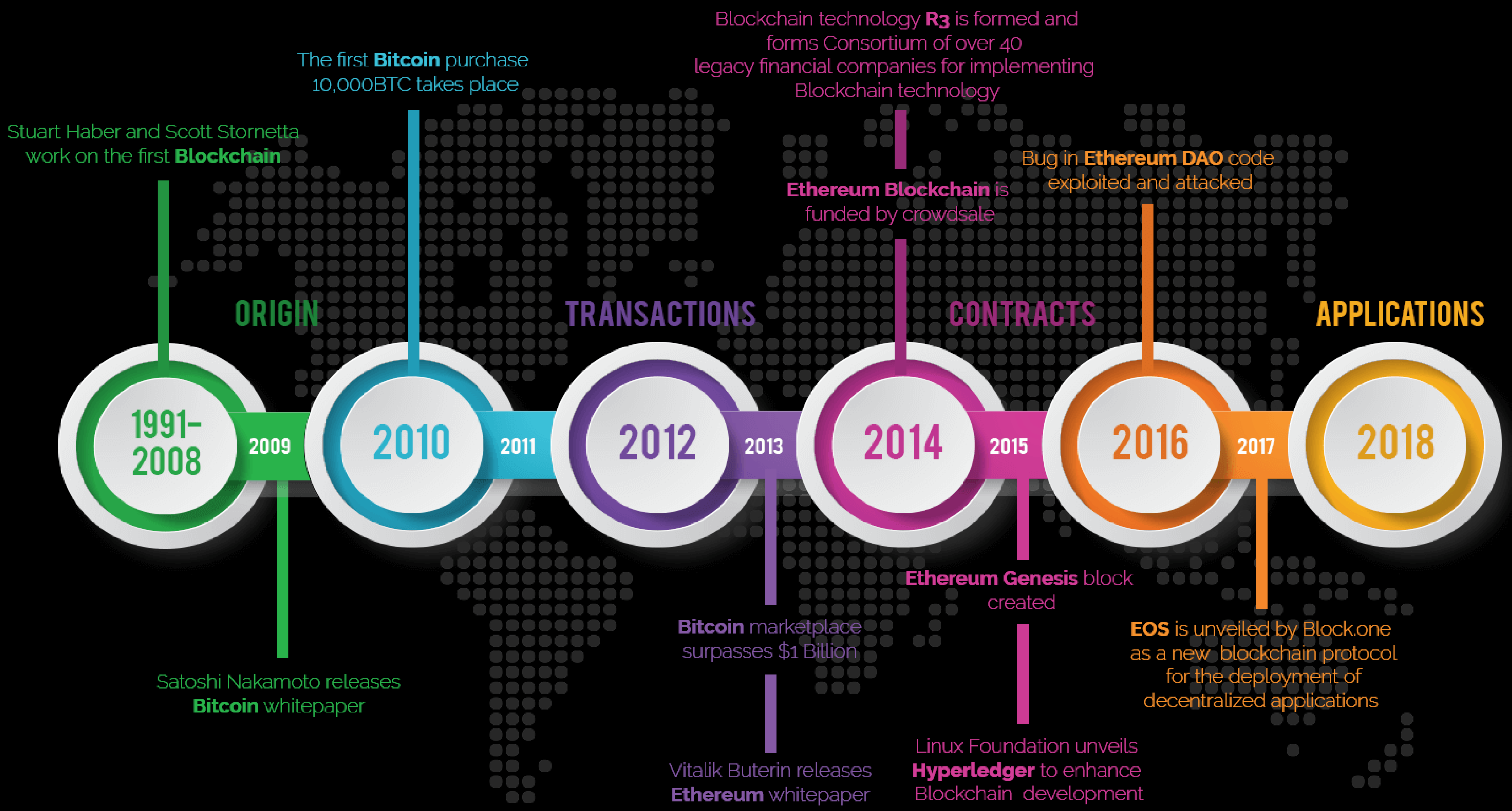
Blockchain History

101 Blockchains

THE HISTORY OF BLOCKCHAIN TECHNOLOGY



ORIGIN

1991-2008

Stuart Haber and Scott Stornetta work on the first **Blockchain**

2009

Satoshi Nakamoto releases **Bitcoin** whitepaper

2010

The first **Bitcoin** purchase 10,000BTC takes place

2011

TRANSACTIONS

2012

2013

Bitcoin marketplace surpasses $1 Billion

Vitalik Buterin releases **Ethereum** whitepaper

CONTRACTS

2014

Blockchain technology **R3** is formed and forms Consortium of over 40 legacy financial companies for implementing Blockchain technology

Ethereum Blockchain is funded by crowdsale

2015

Ethereum Genesis block created

Linux Foundation unveils **Hyperledger** to enhance Blockchain development

APPLICATIONS

2016

Bug in **Ethereum DAO** code exploited and attacked

2017

EOS is unveiled by Block.one as a new blockchain protocol for the deployment of decentralized applications

2018

Created by 101blockchains.com

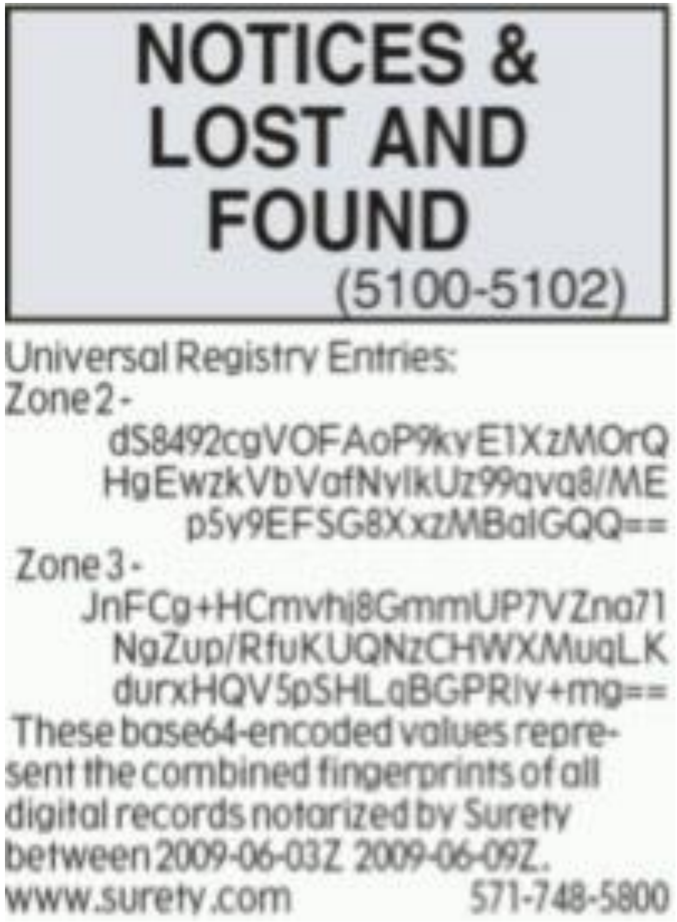
Blockchain History – Early Stage

- **1991**, cryptographer **Stuart Haber and W. Scott Stornetta** co-wrote a paper called "*How to Time-Stamp a Digital Document*", where they try to use a cryptographically secured chain of blocks to secure documents.
- **1992**, incorporate Merkle trees data structure
- **1995**, founded a company called Surety, the world's oldest running blockchain, uses the *New York Times* as timestamp!

Reading: https://www.vice.com/en_us/article/j5nzx4/what-was-the-first-blockchain

Blockchain History – Early Stage

The New York Times
Trump Tax Cut Pays Dividends For the G.O.P.
Parishioners Didn't Suspect Him. Then They Scrolled to Page 631.



NOTICES & LOST AND FOUND
(5100-5102)

Universal Registry Entries:
Zone 2 -
dS8492cgVOFAoP9kyE1XzMOrQ
HgEwzkVbVafNvlkUz99qva8/ME
p5y9EFSG8XxzMBalGQQ==
Zone 3 -
JnFCg+HCmvhj8GmmUP7VZna71
NgZup/RfuKUQNzCHWXMuqLK
durxHQV5pSHLqBGPRIy+mg==
These base64-encoded values represent the combined fingerprints of all digital records notarized by Surety between 2009-06-03Z 2009-06-09Z.
www.surety.com 571-748-5800

Source: https://www.vice.com/en_us/article/j5nzx4/what-was-the-first-blockchain

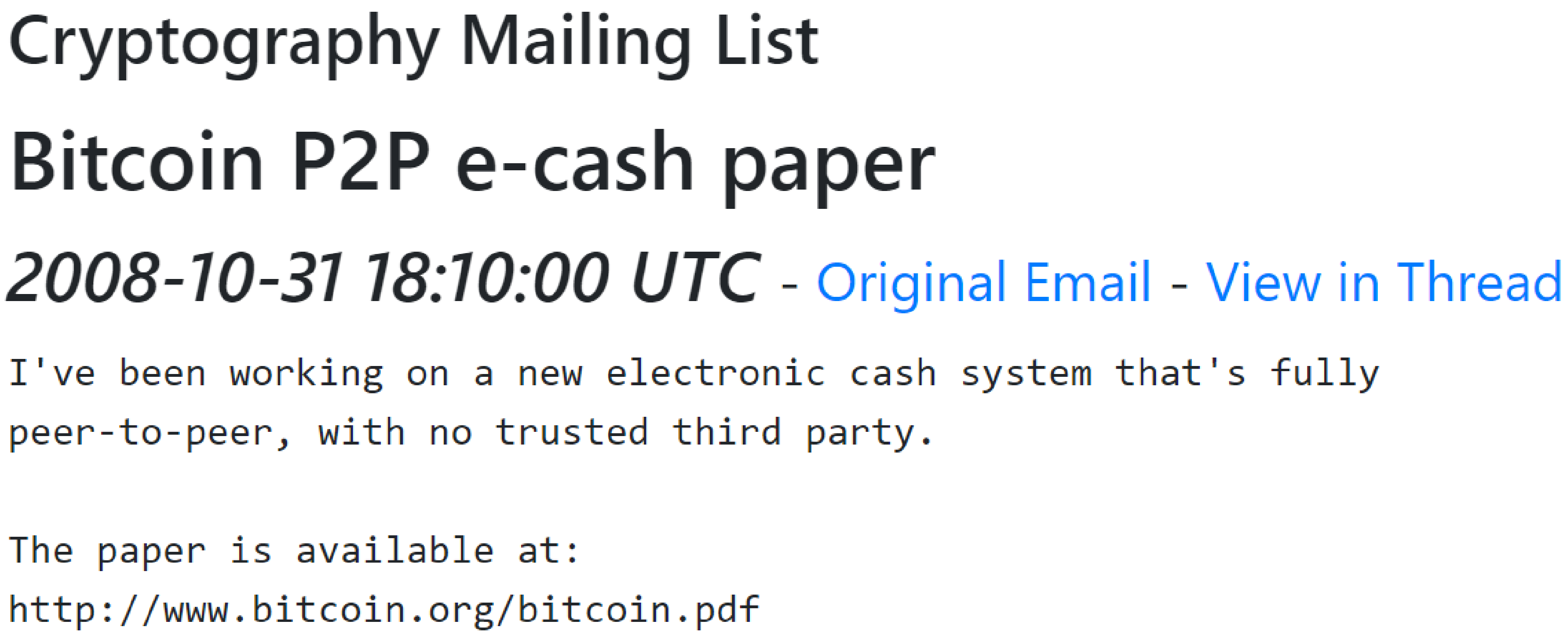
Source: https://freedomnode.com/blog/66/21-wise-and-funny-bitcoin-quotes-by-satoshi-nakamoto

What is Bitcoin?

- Bitcoin = bit + coin = data + monetary value
- “Bitcoin(₿) is a cryptocurrency. It is a decentralized digital currency without a central bank or single administrator that can be sent from user to user on the peer-to-peer bitcoin network without the need for intermediaries. “ - Wikipedia

Source: https://en.wikipedia.org/wiki/Bitcoin

Blockchain History – Bitcoin



Cryptography Mailing List

Bitcoin P2P e-cash paper

2008-10-31 18:10:00 UTC - Original Email - View in Thread

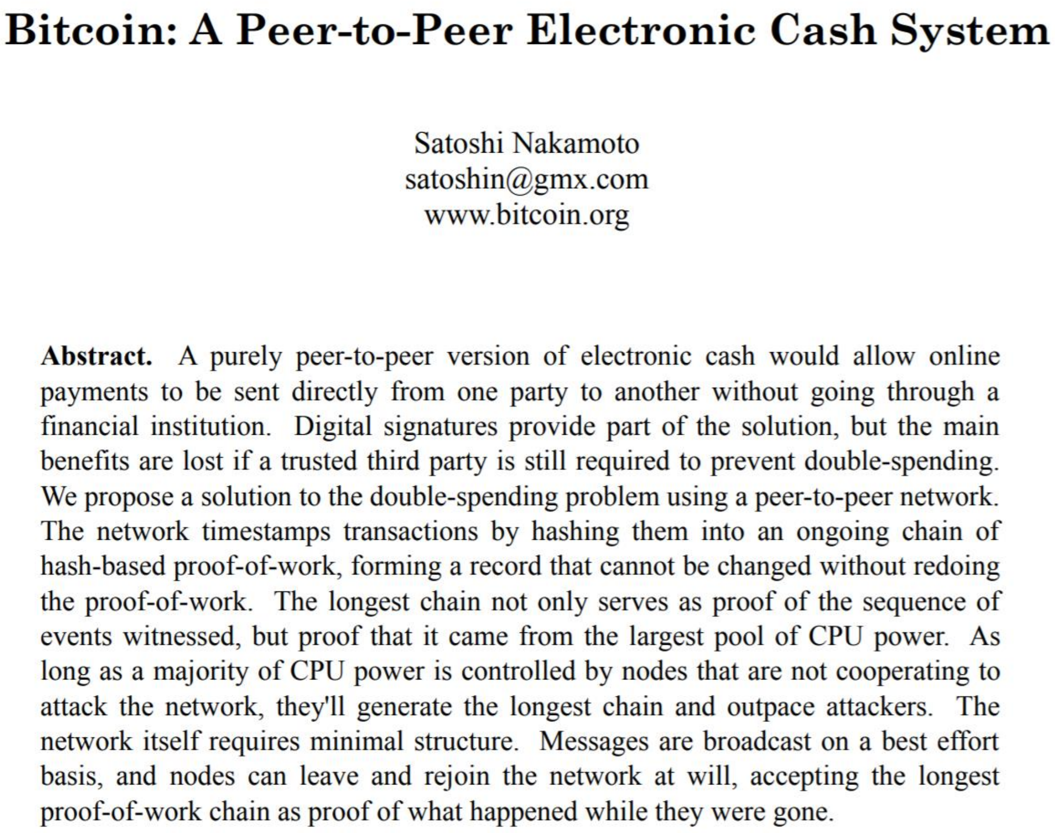
```
I've been working on a new electronic cash system that's fully
peer-to-peer, with no trusted third party.

The paper is available at:
http://www.bitcoin.org/bitcoin.pdf
```

Source: https://satoshi.nakamotoinstitute.org/emails/

Blockchain History – Bitcoin

- **August 2008**, domain name bitcoin.org was registered
- **October 2008**, a paper titled "*Bitcoin: A Peer-to-Peer Electronic Cash System*" was published by the name **Satoshi Nakamoto**
- **January 2009**, Satoshi mined the genesis block of the bitcoin blockchain (block number 0), with a reward of 50 bitcoins



Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

Source: Bitcoin white paper, https://bitcoin.org/bitcoin.pdf

Source: The Face Behind Bitcoin, Newsweek, https://www.newsweek.com/2014/03/14/face-behind-bitcoin-247957.html

Bitcoin Creator

- Satoshi Nakamoto, a pseudonym!
- Several potential suspects:
  - Hal Finny
  - NSA (National Security Agency)
  - Dorian Nakamoto
  - Craig Wright (self-claim)
  - Nick Szabo
  - …
- …but no one knows for sure and it'll likely remain this way
- Nakamoto Consensus

Reading: https://www.investopedia.com/tech/three-people-who-were-supposedly-bitcoin-founder-satoshi-nakamoto/

Blockchain History – Bitcoin

- **January 2009**, first bitcoin transaction (Satoshi to **Hal Finney**)
- **May 2010**, $25 worth of pizza for 10,000 BTC, purchased by **Laszlo Hanyecz** (Bitcoin has real value!)

Source: https://amp.businessinsider.com/bitcoin-pizza-10000-100-million-2017-11

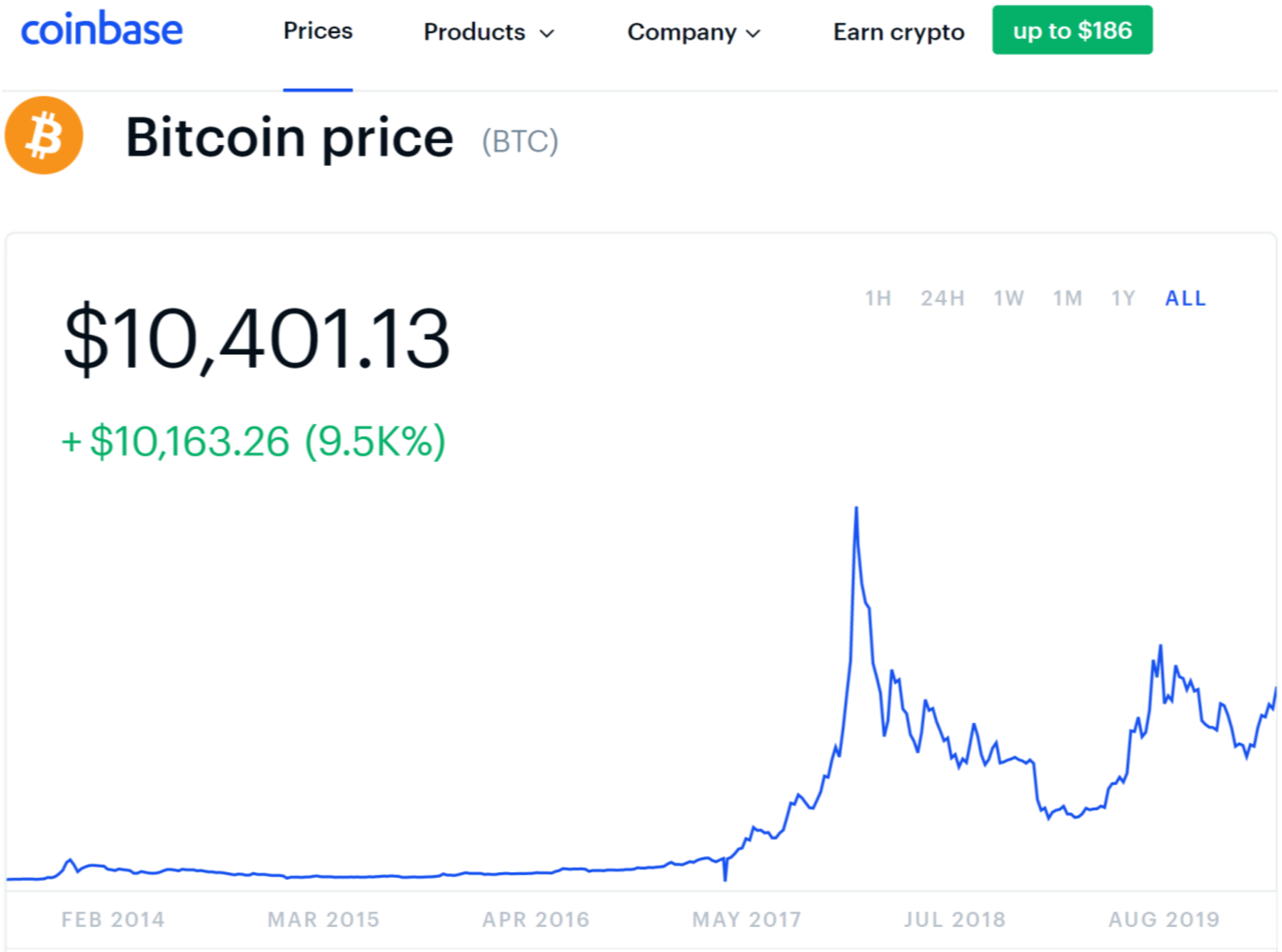
Blockchain History – Bitcoin

- **Feb 19, 2020**, 10,000 BTC = 101,479,000 USD

☺

Source: https://coinivore.com/2018/05/22/happy-bitcoin-pizza-day-8-years-ago-today-someone-spent-82-million-on-two-pizzas/

Blockchain History – Bitcoin



Bitcoin price (BTC)

$10,401.13

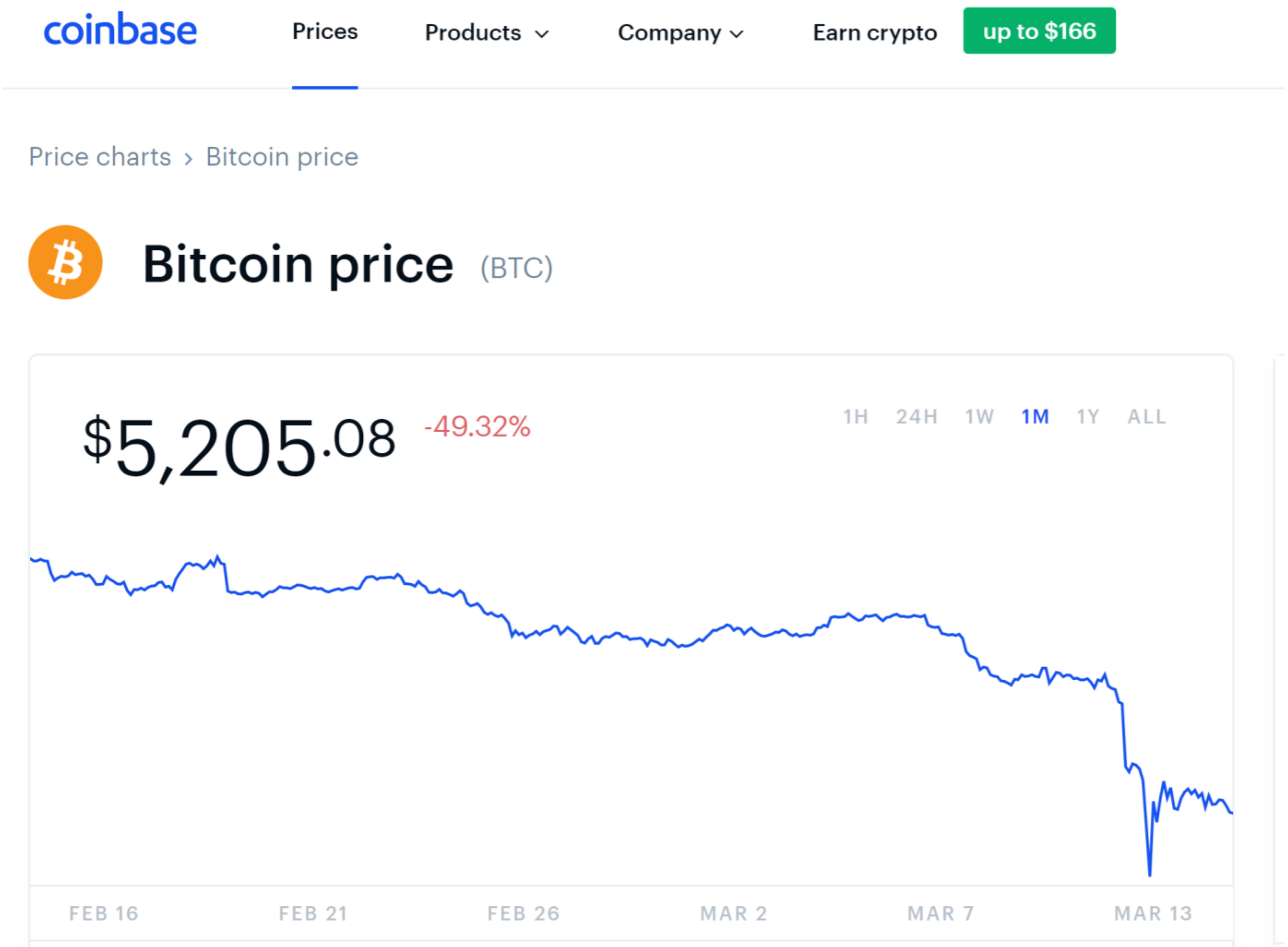
+$10,163.26 (9.5K%)

- Feb 12, 2020

1 BTC = 10,401.13 USD

Source: Coinbase, https://www.coinbase.com/price/bitcoin

Blockchain History – Bitcoin



Price charts › Bitcoin price

Bitcoin price (BTC)

$5,205.08 -49.32%

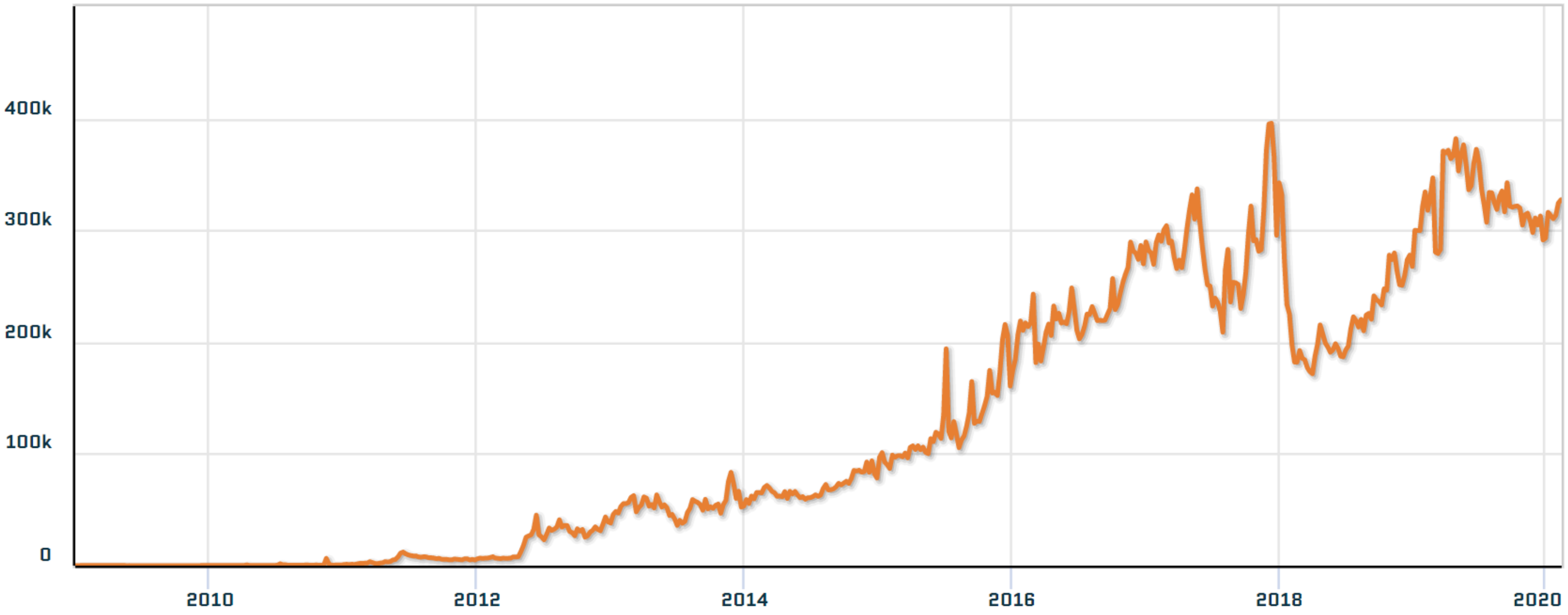
- March 14, 2020

1 BTC = 5205.08 USD

- down 49.32% over a month

Source: Coinbase, https://www.coinbase.com/price/bitcoin

Blockchain History – Bitcoin



- Number of Bitcoin transactions over the years

Source: https://www.quandl.com/data/BCHAIN/NTRAN-Bitcoin-Number-of-Transactions

Blockchain History – Bitcoin

Mt.Gox

- **July 2010**, **Mt. Gox** was launched by **Jed McCaleb**, the biggest online Bitcoin exchange platform
- **June 2011**, suffered a significant security breach which allow the hacker to change the Bitcoin pricing to a single cent
- **End of 2013**, handled over **70%** of all Bitcoin (BTC) transactions worldwide

Source: https://en.wikipedia.org/wiki/Mt._Gox
Reading: https://www.coindesk.com/2-billion-lost-in-mt-gox-bitcoin-hack-can-be-recovered-lawyer-claims

Blockchain History – Bitcoin

Mt.Gox

- **February 2014**, **Mt. Gox** was hacked and filed for bankruptcy
- **Mt. Gox** lost about 850,000 bitcoins, (750,000 belonged to its customers) valued more than $450 million, at the time and $8.5 billion today

Source: https://en.wikipedia.org/wiki/Mt._Gox; https://www.theverge.com/2014/2/19/5425220/protest-at-mt-gox-bitcoin-exchange-in-tokyo
Reading: https://www.coindesk.com/2-billion-lost-in-mt-gox-bitcoin-hack-can-be-recovered-lawyer-claims
https://www.ledger.com/hack-flasback-the-mt-gox-hack-the-most-iconic-exchange-hack/

Blockchain History – Bitcoin

Mt.Gox

- Although 200,000 bitcoins were eventually recovered, the remaining 650,000 (3.7% of Bitcoin's circulating supply) have never been recovered
- The victims of the **Mt.Gox** hack have not seen a Satoshi of their Bitcoins returned to this day
- The Bitcoin price **drop to nearly 50%** of its value prior to the hack. It took till the end of 2016 to return to the same value

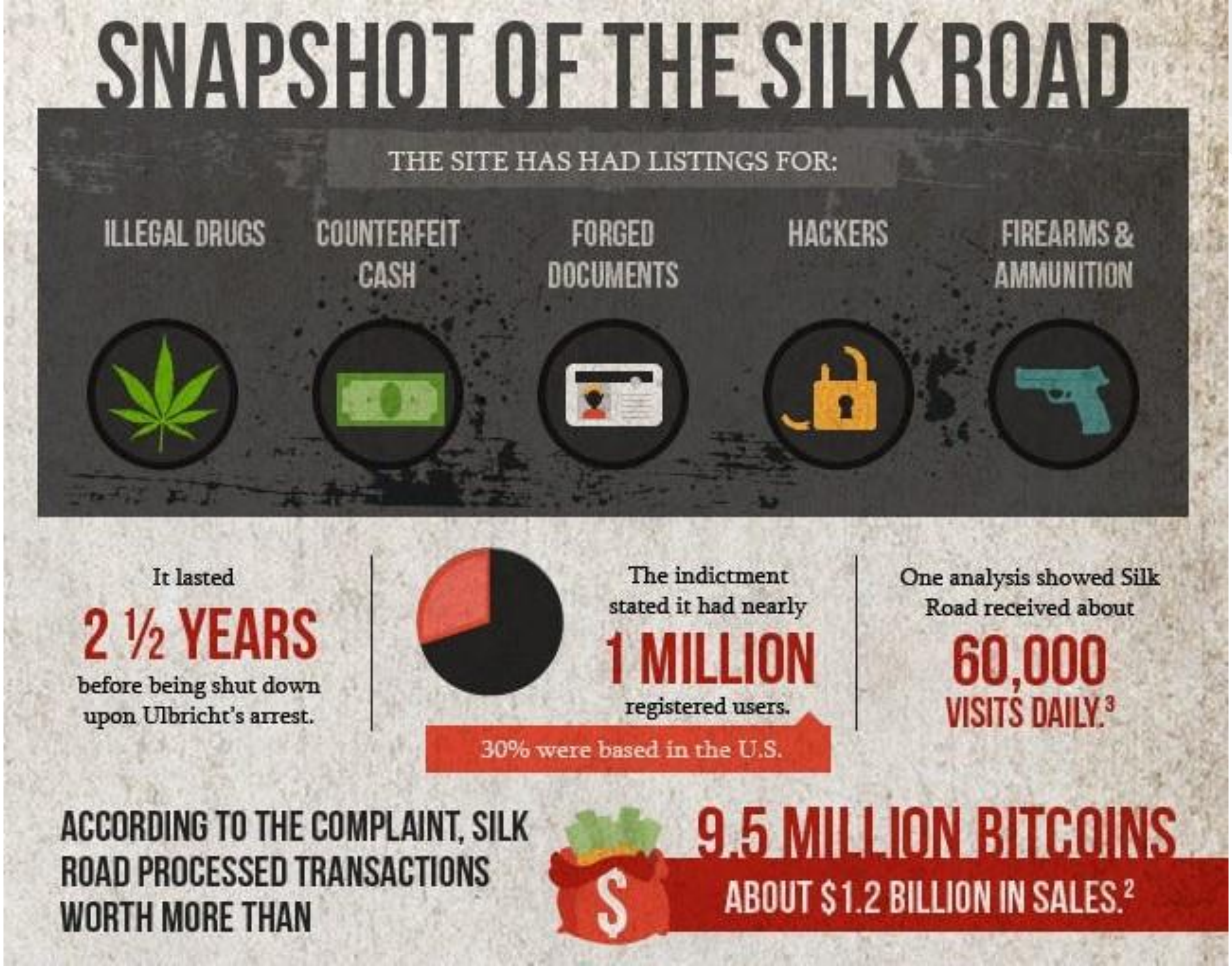
Source: https://www.ledger.com/hack-flasback-the-mt-gox-hack-the-most-iconic-exchange-hack/
Reading: https://www.coindesk.com/2-billion-lost-in-mt-gox-bitcoin-hack-can-be-recovered-lawyer-claims

Blockchain History – Bitcoin

Silk Road

- **February 2011**, **Ross Ulbricht** used **Tor**(anonymous communication) and **Bitcoin**(anonymous transaction) to create an online black market for drugs
- http://tydgccykixpbu6uz.onion
- February 2012, **Ross Ulbricht** called himself Dread Pirate Roberts

Source: https://www.zdnet.com/article/after-silk-road-seizure-fbi-bitcoin-wallet-identified-and-pranked/
Reading: https://news.law.fordham.edu/jcfl/2018/02/21/silk-road-the-dark-side-of-cryptocurrency/



SNAPSHOT OF THE SILK ROAD

THE SITE HAS HAD LISTINGS FOR:

ILLEGAL DRUGS

COUNTERFEIT CASH

FORGED DOCUMENTS

HACKERS

FIREARMS & AMMUNITION

It lasted

2 ½ YEARS

before being shut down upon Ulbricht's arrest.

The indictment stated it had nearly

1 MILLION

registered users.

30% were based in the U.S.

One analysis showed Silk Road received about

60,000

VISITS DAILY.[3]

ACCORDING TO THE COMPLAINT, SILK ROAD PROCESSED TRANSACTIONS WORTH MORE THAN

9.5 MILLION BITCOINS

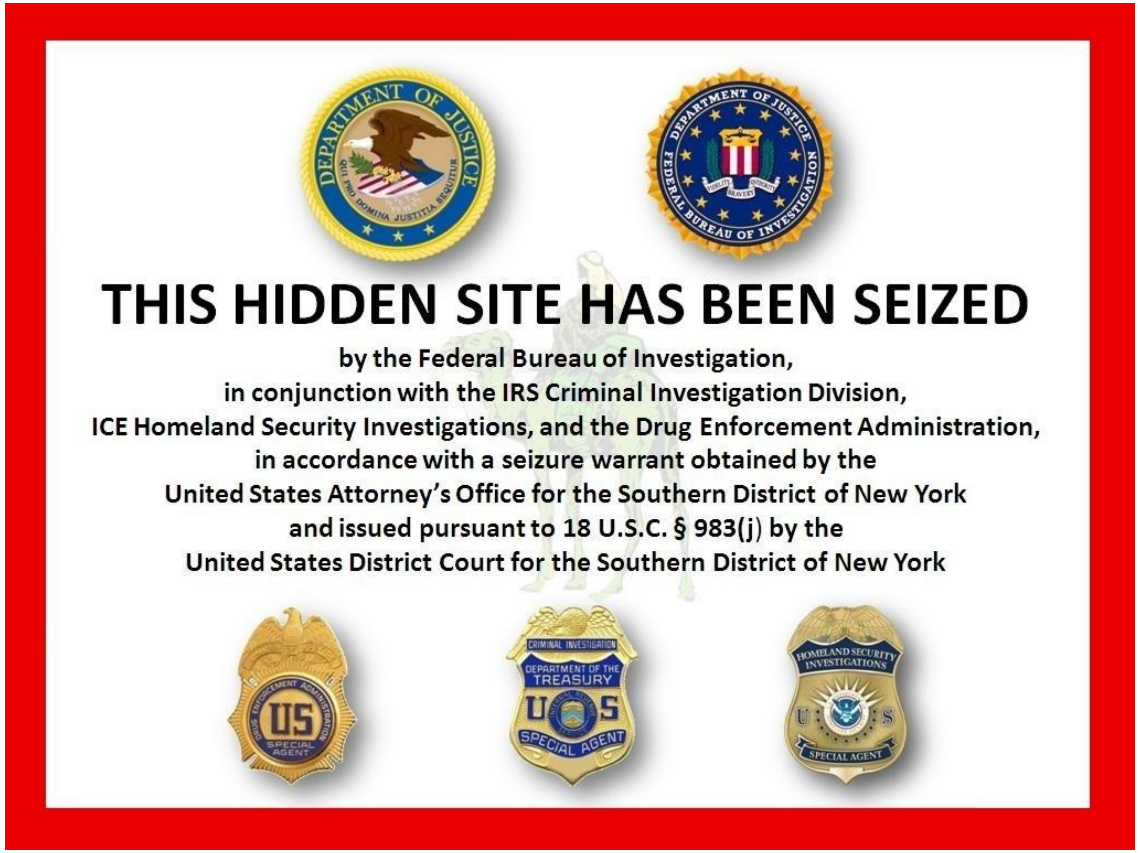
ABOUT $1.2 BILLION IN SALES.[2]

Source: for full picture go to https://www.businessinsider.com/silk-road-history-2013-10/, http://www.drugabuse.com/featured/silk-road

Blockchain History – Bitcoin

Silk Road

- **October 2013**, FBI arrested Ross Ulbricht and shut down the website
- **May 2015**, Ross sentenced To double life imprisonment without the possibility of parole
- **October 2015**, two agents involved with the case charged with corruption
- **Silk Road 2.0** shut down by FBI and Europol on 6 November 2014
- **Silk Road 3.0** went offline in 2017 due to loss of funds

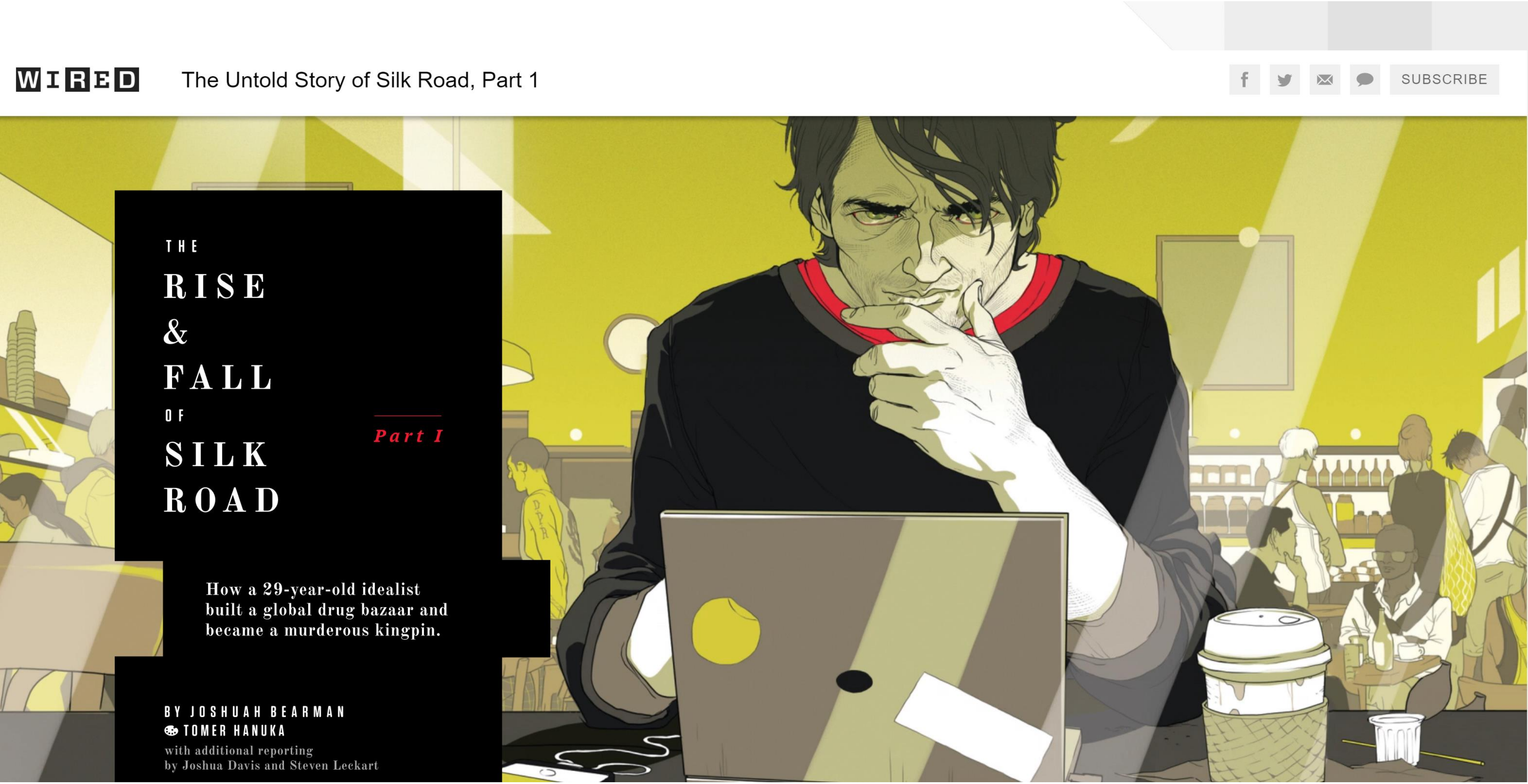


THIS HIDDEN SITE HAS BEEN SEIZED

by the Federal Bureau of Investigation,
in conjunction with the IRS Criminal Investigation Division,
ICE Homeland Security Investigations, and the Drug Enforcement Administration,
in accordance with a seizure warrant obtained by the
United States Attorney's Office for the Southern District of New York
and issued pursuant to 18 U.S.C. § 983(j) by the
United States District Court for the Southern District of New York

DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION
US SPECIAL AGENT
CRIMINAL INVESTIGATION
DEPARTMENT OF THE TREASURY
US SPECIAL AGENT
HOMELAND SECURITY INVESTIGATIONS
SPECIAL AGENT

Source: https://en.wikipedia.org/wiki/Silk_Road_(marketplace)#Book_club
https://www.ranker.com/list/silk-road-dark-web-timeline/quinn-armstrong



The Untold Story of Silk Road, Part 1

THE RISE & FALL OF SILK ROAD

Part I

How a 29-year-old idealist built a global drug bazaar and became a murderous kingpin.

BY JOSHUAH BEARMAN
🎨 TOMER HANUKA
with additional reporting
by Joshua Davis and Steven Leckart

Reading: https://www.wired.com/2015/04/silk-road-1/

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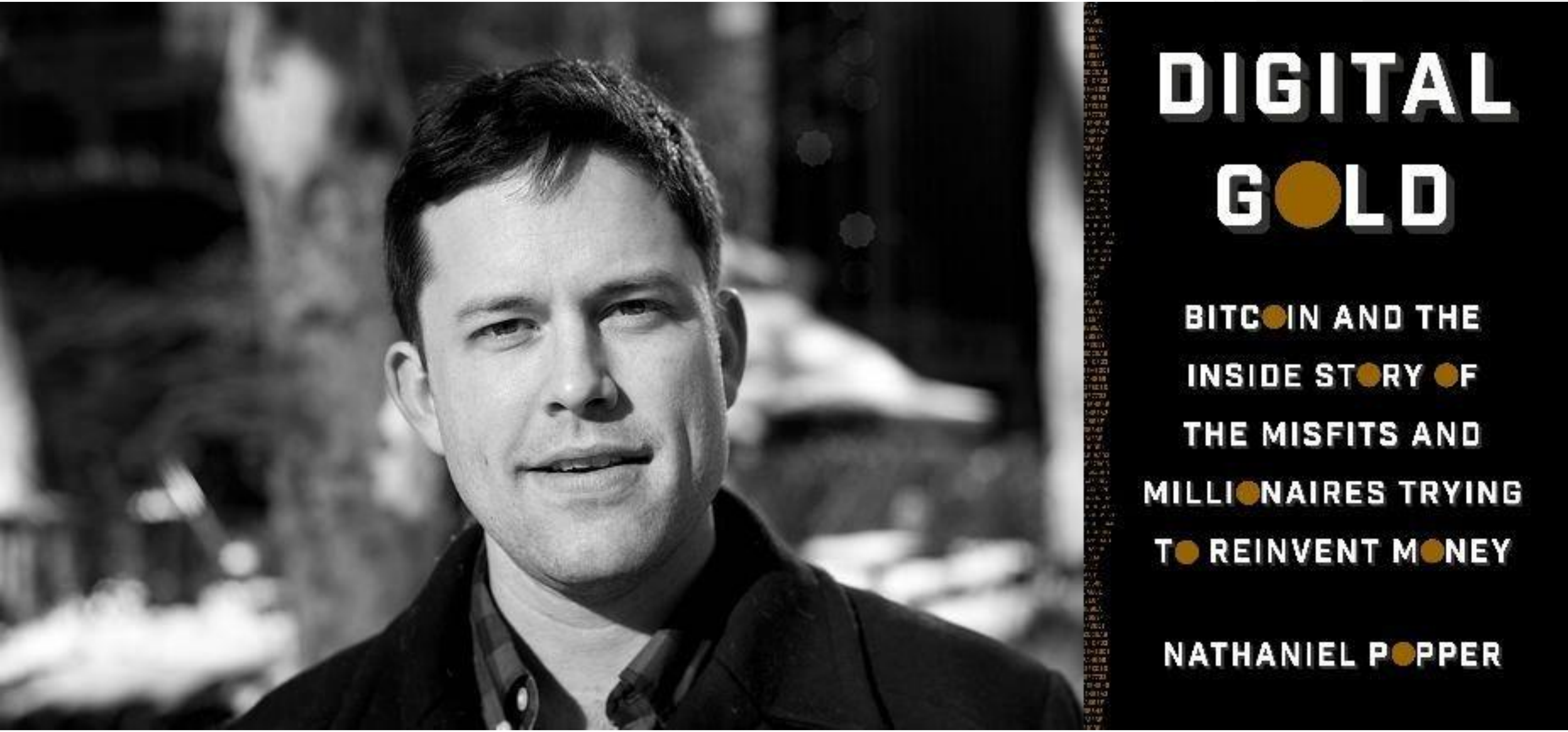
More on Silk Road

- Forbes, 2019, “*Best Stories Of The Decade: ‘Meet The Dread Pirate Roberts, The Man Behind Booming Black Market Drug Website Silk Road’*”,*https://www.forbes.com/sites/forbesdigitalcovers/2019/12/23/meet-the-dread-pirate-roberts-the-man-behind-booming-black-market-drug-website-silk-road/#4b18800b482a*
- Newsweek, 2015, “*The Rise and Fall of Silk Road, the Dark Web's Amazon*”, *https://www.newsweek.com/2015/02/27/silk-road-hell-307732.html*



Source: https://www.forbes.com/sites/laurashin/2015/05/19/what-bitcoins-history-means-for-its-future-qa-with-nathaniel-popper-author-of-digital-gold/#4d050c1f3916

Blockchain History – Ethereum

What is Ethereum?

- **Ethereum** is a public blockchain-based distributed computing platform featuring **smart contract**
  - Ethereum VM, decentralized *Turing-complete* virtual machine for executing scripts
  - “ether”, cryptocurrency token
  - “gas“, a priced resource for computation
  - Ethereum == Bitcoin 2.0 ?

Source: https://en.bitcoinwiki.org/wiki/Ethereum

Blockchain History – Ethereum

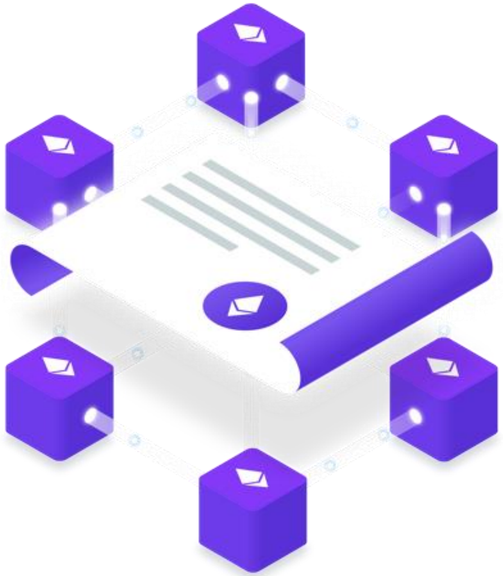
Ethereum: the World Computer

Source: https://www.youtube.com/watch?v=j23HnORQXvs

Blockchain History – Ethereum

Smart Contract

- A **smart contract** is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code
- The code is stored on and exist across a distributed, decentralized blockchain network
- first proposed in 1994 by **Nick Szabo** (invented "Bit Gold" in 1998)



Source: https://www.investopedia.com/terms/s/smart-contracts.asp
https://www.pulsehyip.com/smart-contracts-development; https://www.originprotocol.com/en/product

TIBA

Blockchain History – Ethereum

Ethereum History

- **November 2013**, **Vitalik Buterin** published the Ethereum whitepaper
- **June 2014**, Ethereum foundation founded
- **July & August 2014**, Ethereum crowdsale, future users and investors allowed to purchase Ether in exchange for Bitcoin, 11.9 million Ethereum tokens were sold (about 13% of the circulating supply), raising about 18.4 million USD

Source:
https://www.coinmama.com/guide/history-of-ethereum
https://www.cnbc.com/2018/02/19/ethereum-creator-vitalik-buterin-warns-about-cryptocurrency-investment.html

Blockchain History – Ethereum

Ethereum History

- **July 2015**, Ethereum blockchain launched
- **May 2016**, Value of Ethereum tokens worth more than $1 billion
- **July 2016**, the Dao hack

Source: Blockchain@Berkeley Fundamental Decal Fall 2018 Lecture 2: https://blockchain.berkeley.edu/courses/fall-2018-fundamentals-decal/; https://www.coinmama.com/guide/history-of-Ethereum; https://www.preethikasireddy.com/post/how-does-ethereum-work-anyway

Blockchain History – Ethereum

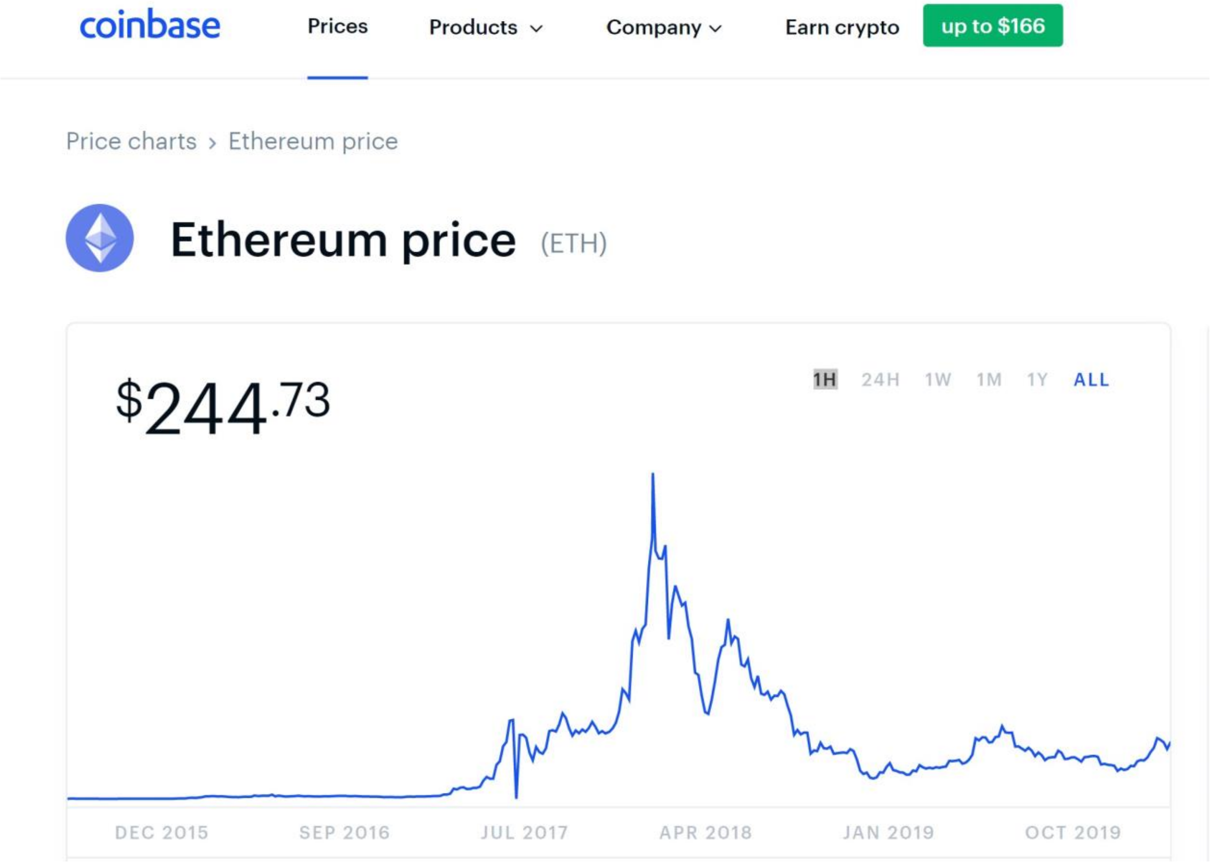
The Dao Hack

- **Dao**(Decentralized autonomous organization)
  - a complicated smart contract that allows any app idea to be voted on by token holders
  - "The DAO" was a specific DAO created on the Ethereum blockchain, raised over 150 million USD with crowdsale
  - **June 2016,** an unknown attacker exploited the vulnerability and withdrew 50 million USD in Ether from the smart contract (roughly 15% of all Ether at the time)

Source: https://www.coinmama.com/guide/history-of-ethereum

Blockchain History – Ethereum

Ether Price



Price charts › Ethereum price

Ethereum price (ETH)

$244.73

- March 6 2020,
1 ETH = 244.73 USD

Source: https://www.coinbase.com/price/ethereum

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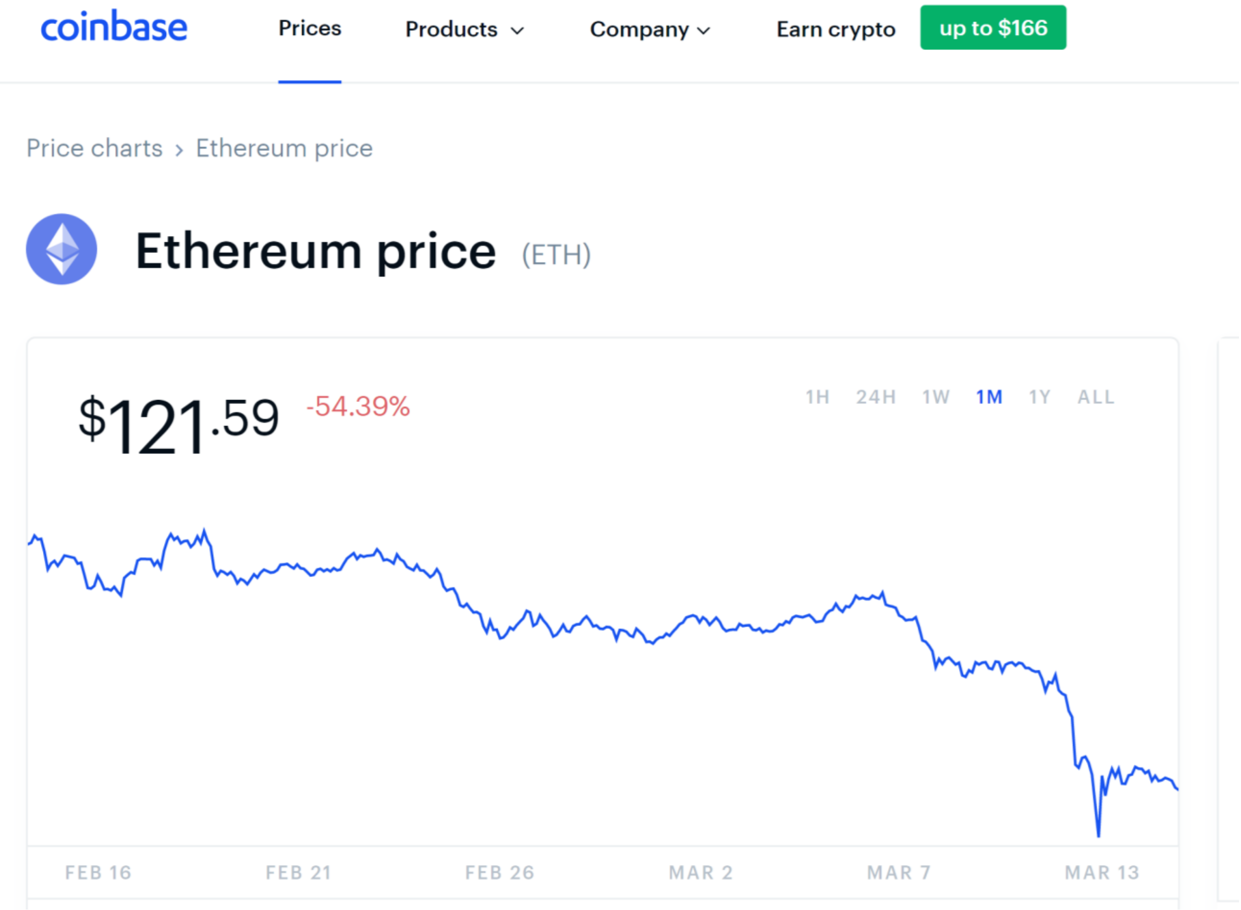
Blockchain History – Ethereum

Ether Price



- March 14 2020,

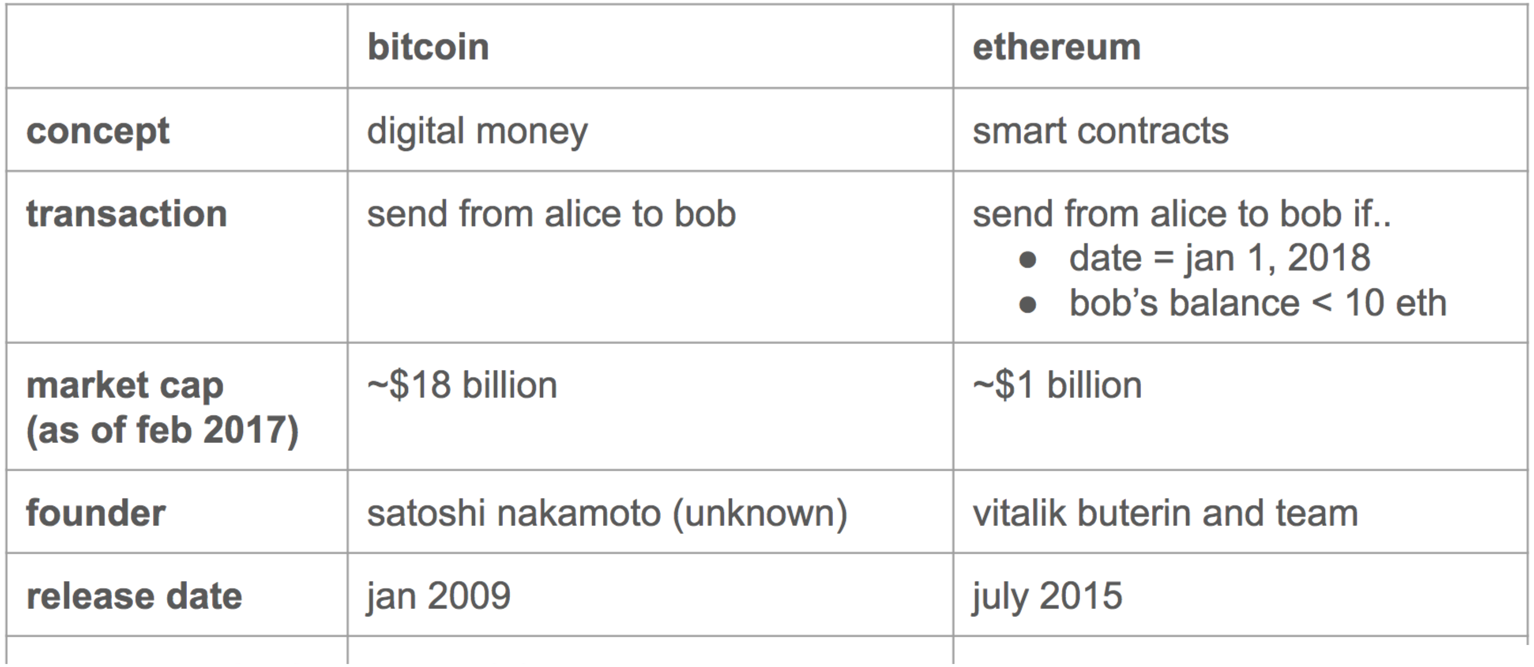
1 ETH = 121.59 USD

- down 54.39% over a month

Source: https://www.coinbase.com/price/ethereum

Blockchain History

Bitcoin vs. Ethereum

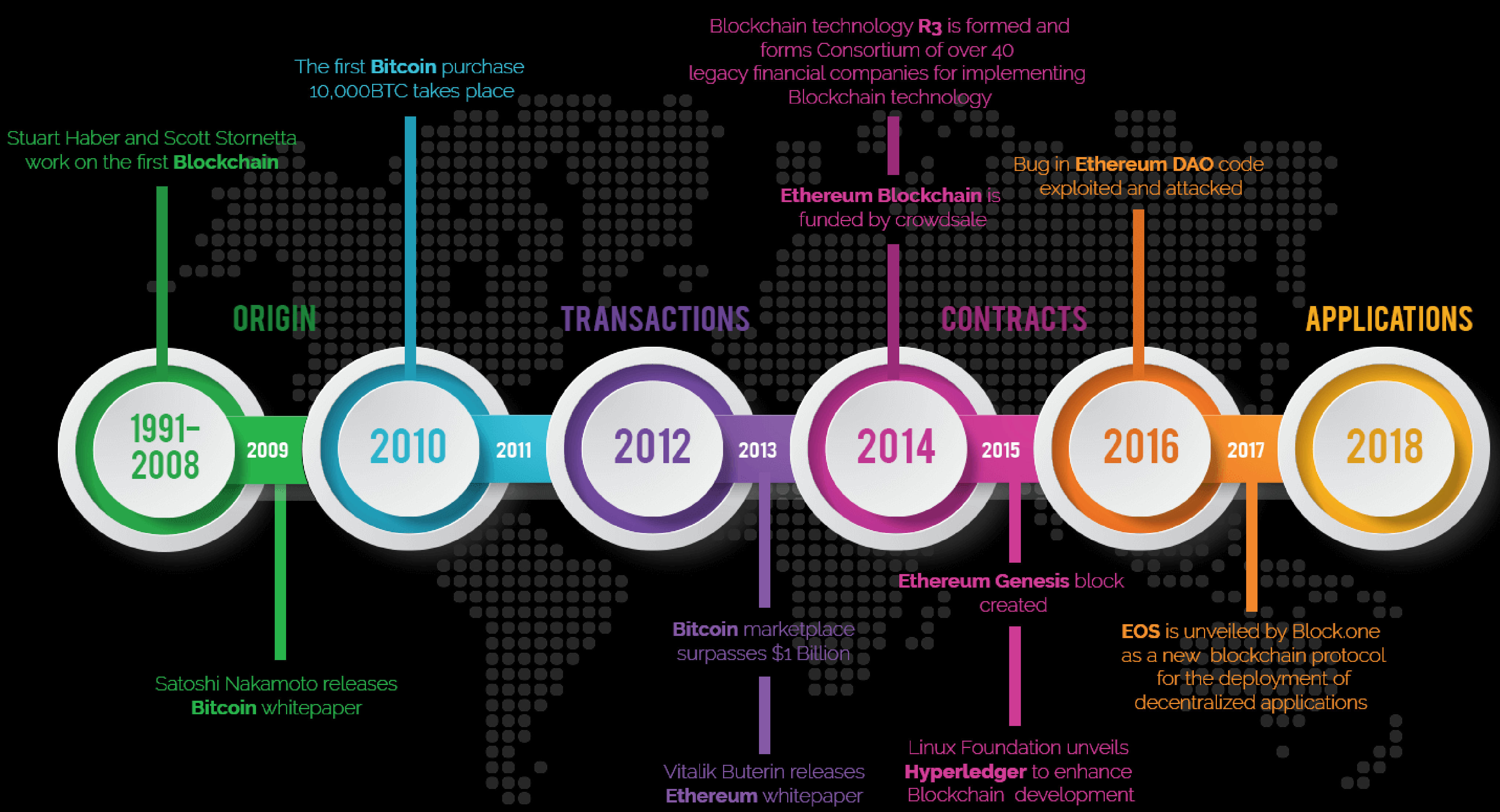


	bitcoin	ethereum
concept	digital money	smart contracts
transaction	send from alice to bob	send from alice to bob if.. ● date = jan 1, 2018 ● bob’s balance < 10 eth
market cap (as of feb 2017)	~$18 billion	~$1 billion
founder	satoshi nakamoto (unknown)	vitalik buterin and team
release date	jan 2009	july 2015

Source: https://blog.coinbase.com/a-beginners-guide-to-ethereum-46dd486ceecf

101 Blockchains

THE HISTORY OF BLOCKCHAIN TECHNOLOGY



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Bug in **Ethereum DAO** code exploited and attacked

2017

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APPLICATIONS

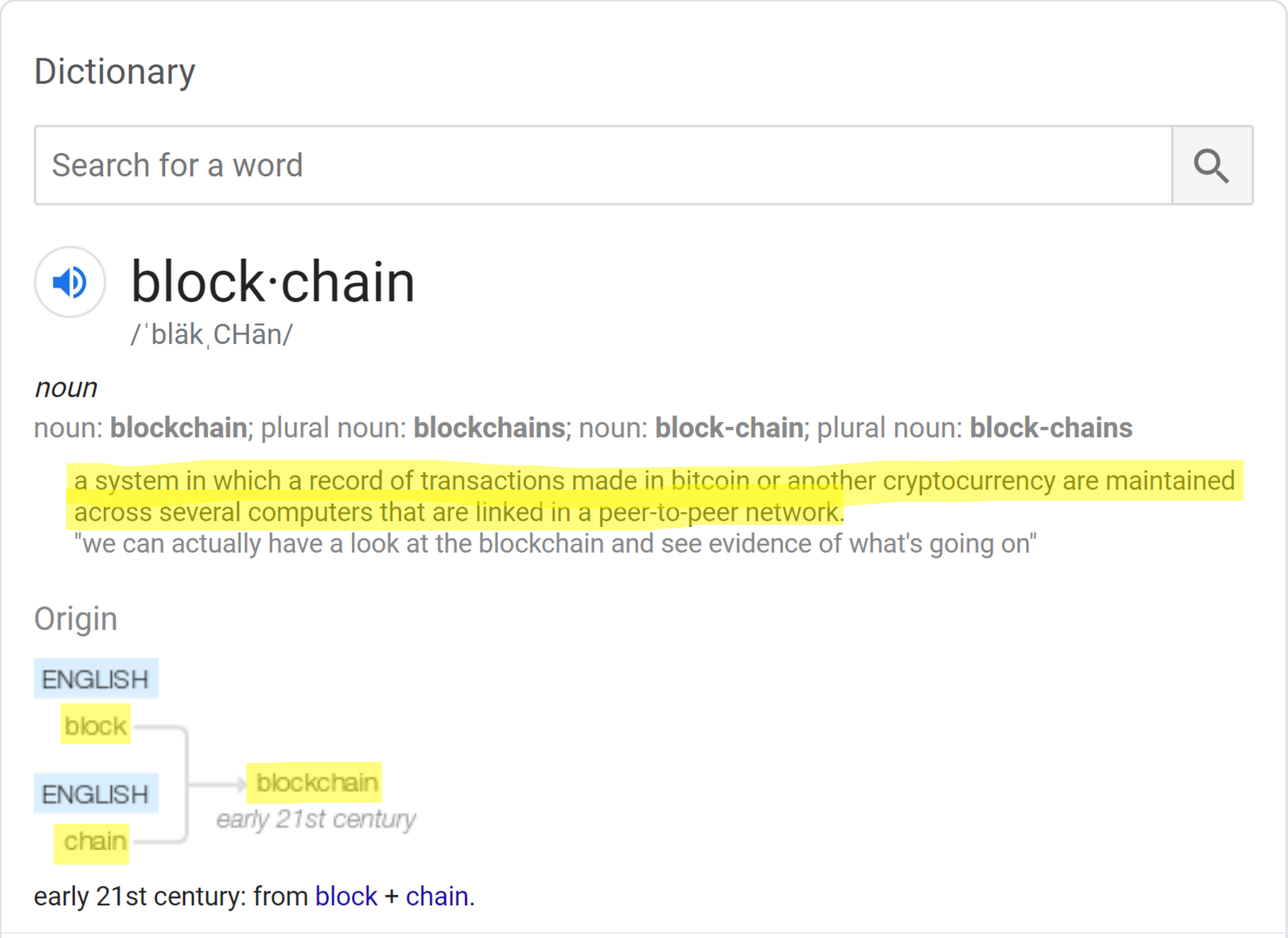
2018

Created by 101blockchains.com

Questions?

What is Blockchain?

Blockchain Definition



Dictionary

Search for a word

block·chain

/ˈbläkˌCHān/

noun

noun: **blockchain**; plural noun: **blockchains**; noun: **block-chain**; plural noun: **block-chains**

a system in which a record of transactions made in bitcoin or another cryptocurrency are maintained across several computers that are linked in a peer-to-peer network.

"we can actually have a look at the blockchain and see evidence of what's going on"

Origin

early 21st century: from block + chain.

Google Dictionary

Source: https://www.google.com

TIBA

Blockchain Definition

Vice.com
“At its core, a blockchain is just a database that is maintained by a network of users and secured through cryptography.

When new information is added to the database it is parceled in “blocks,” which can be thought of as containers for this data. Every so often a new block is created and linked to a “chain” of previously created blocks. Each block has a unique ID called a hash that is created by running the ID of the block that preceded it and the data stored in the current block through a cryptographic algorithm. This ensures the integrity of all the data stored on the blockchain because altering the data in any block would produce a different hash. “

Source: https://www.vice.com/en_us/article/j5nzx4/what-was-the-first-blockchain

Blockchain Definition

Wikipedia.org
“A blockchain, originally block chain, is a growing list of records, called blocks, that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data (generally represented as a Merkle tree).”

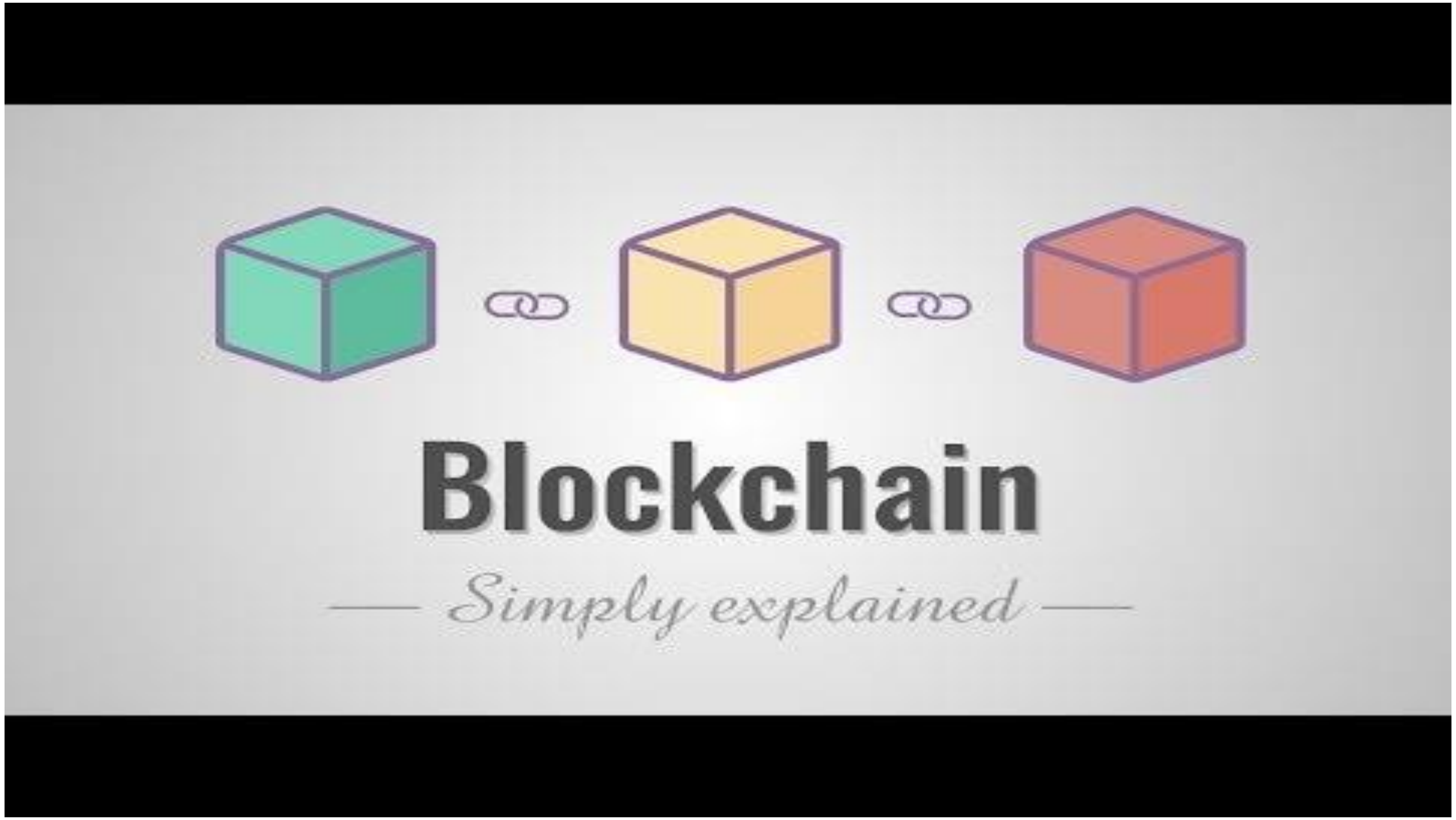
Source: https://en.wikipedia.org/wiki/Blockchain

Blockchain Definition

"Blockchain is a data structure that's secure (tamper-resistant) by the nature of cryptography and a decentralized database by giving a network of users each a copy of the data and the possible ability to modify those data and a trustless system/distributed network by allowing users to constantly check on one another to reach a single consensus."

- Samuel Tang

Blockchain Definition



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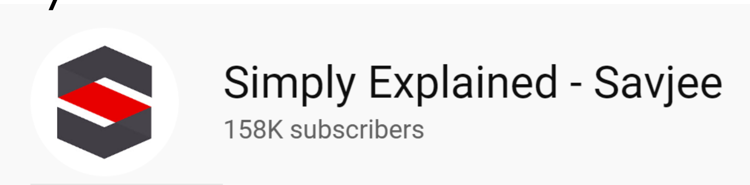
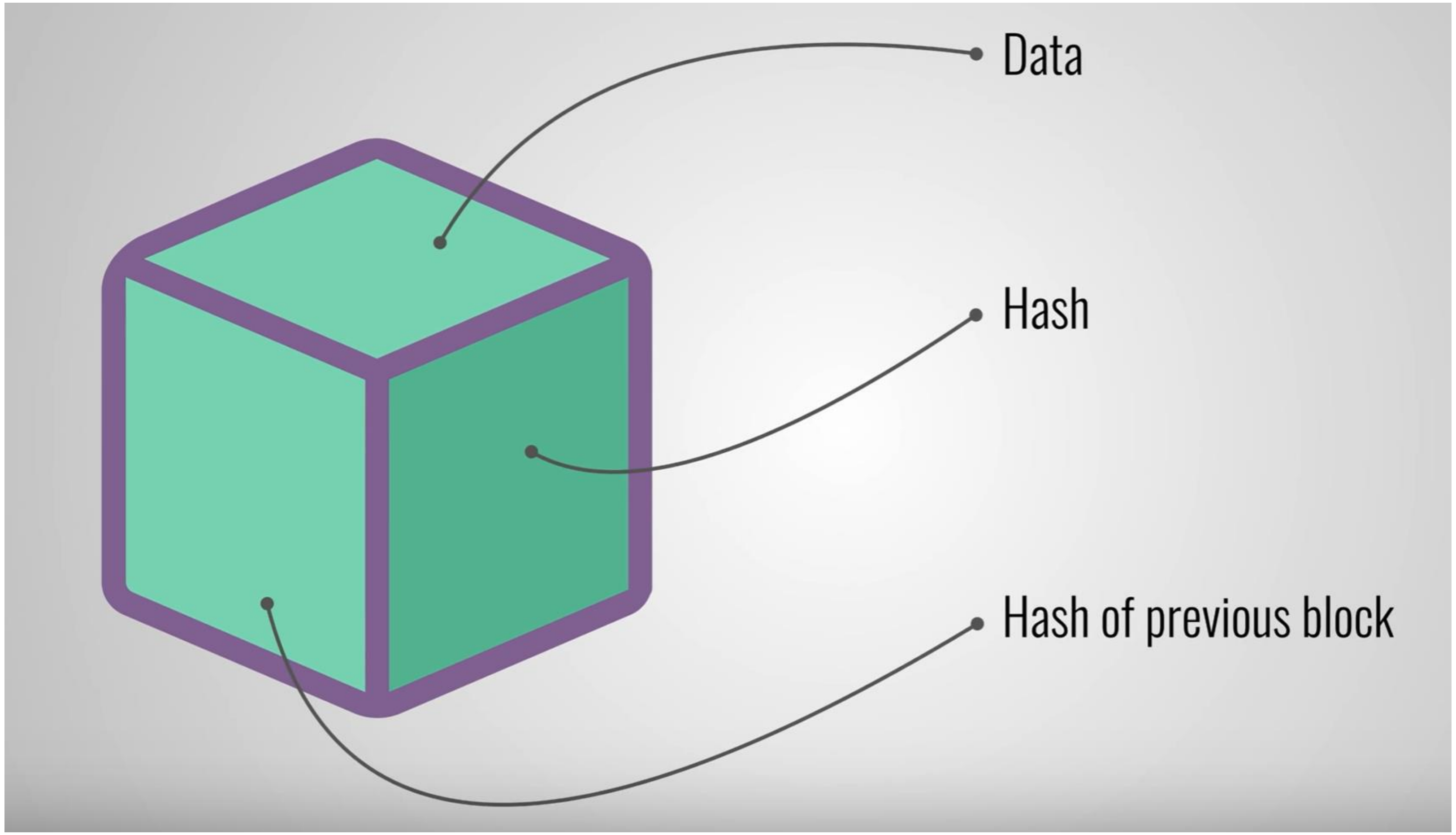

Simply Explained - Savjee
158K subscribers

Source: Simply Explained – Savjee, Youtube
https://www.youtube.com/watch?v=SSo_EIwHSd4

Blockchain Definition Data Storage



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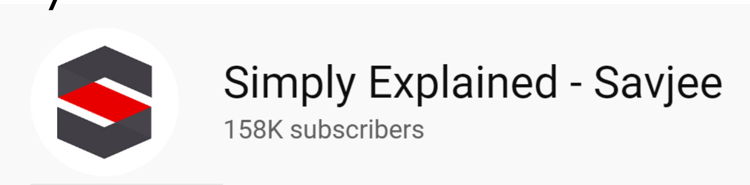
Simply Explained - Savjee

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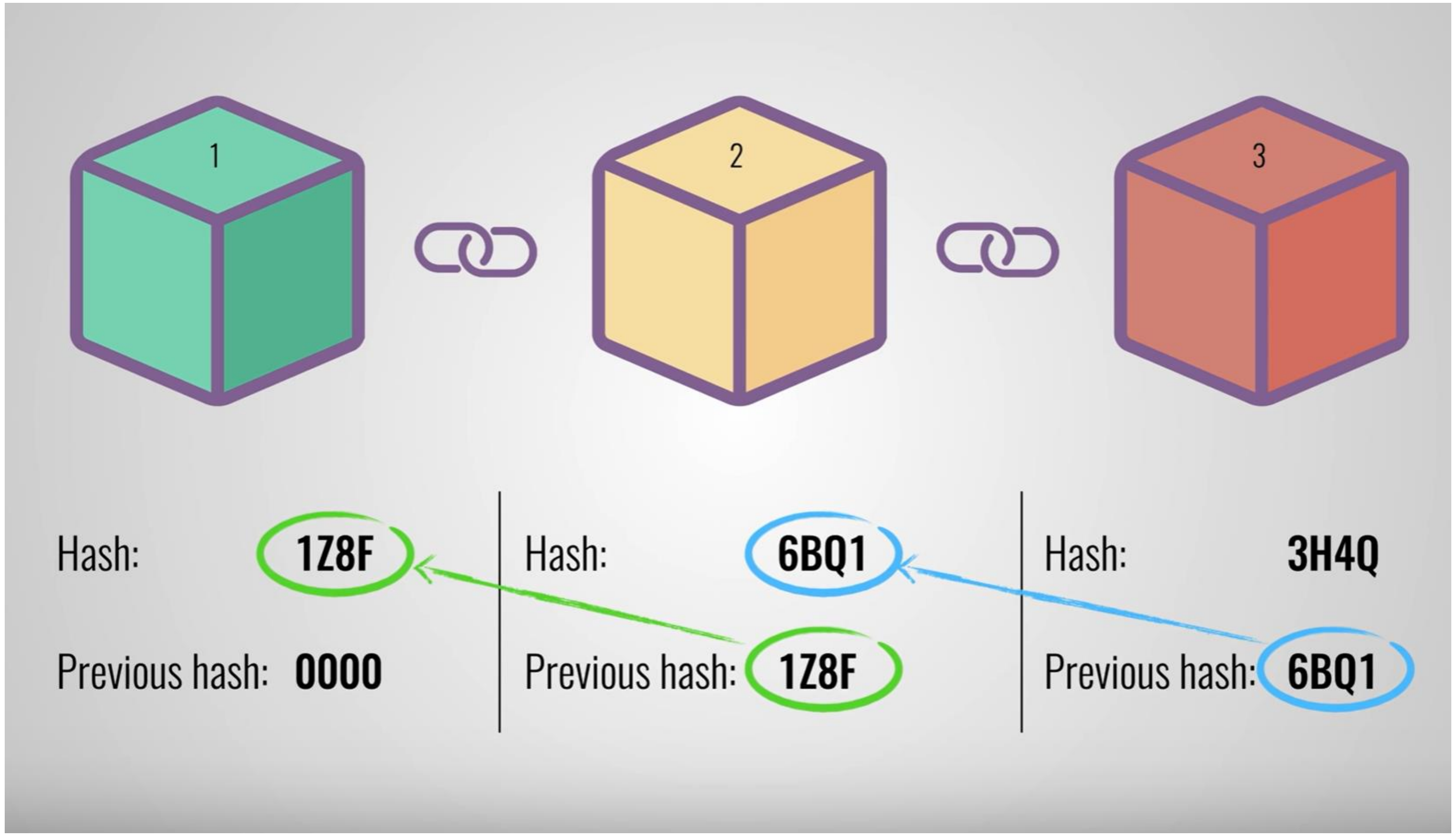
Source: Simply Explained – Savjee, Youtube, https://www.youtube.com/watch?v=SSo_EIwHSd4

Blockchain Definition Chain of Blocks

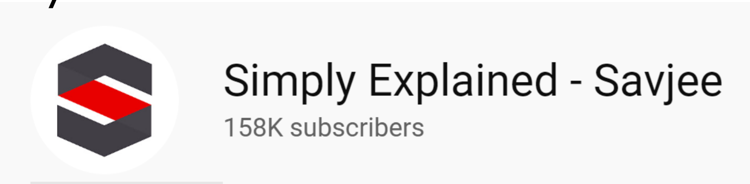


Hash: 1Z8F
Previous hash: 0000

Hash: 6BQ1
Previous hash: 1Z8F

Hash: 3H4Q
Previous hash: 6BQ1

By:



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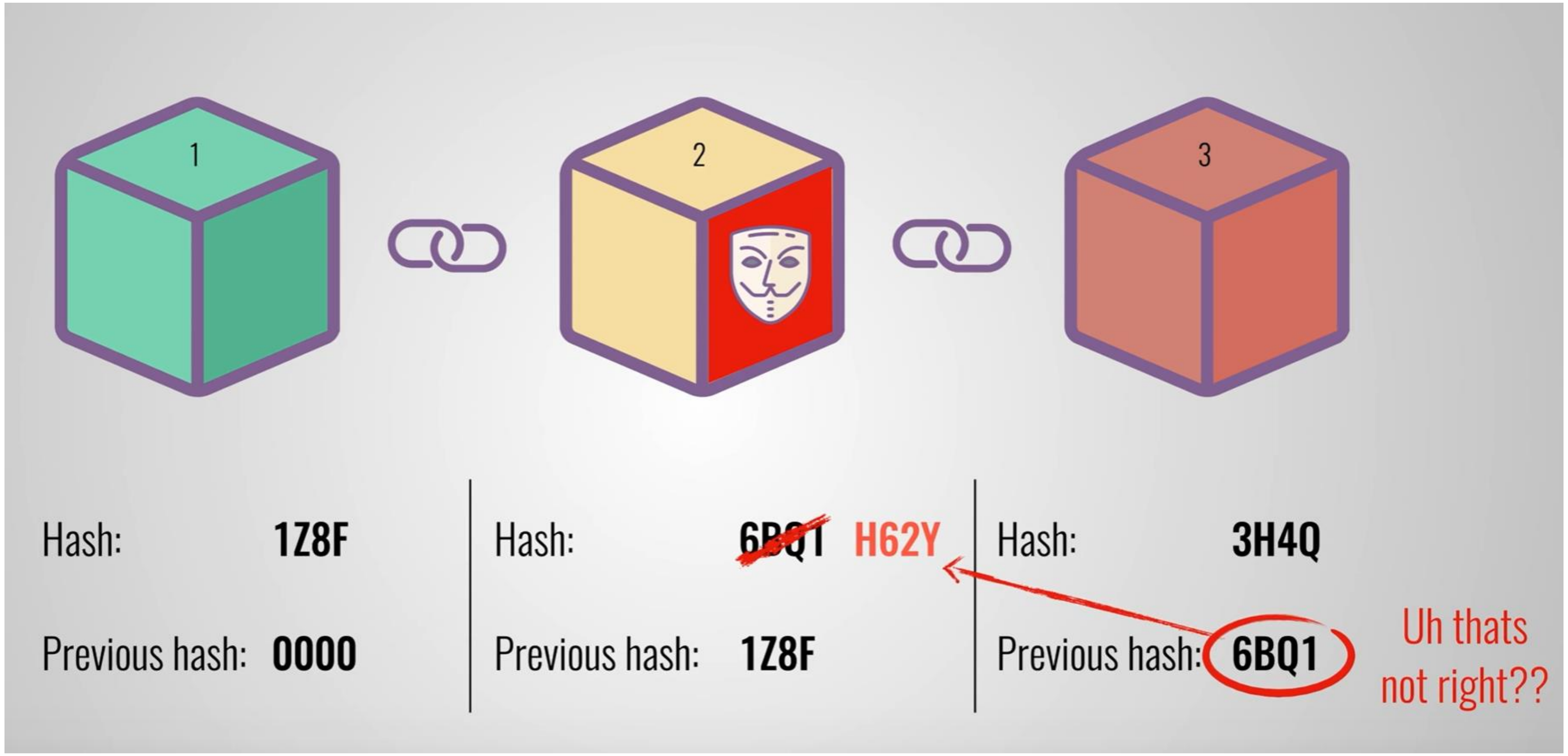
Source: Simply Explained – Savjee, Youtube, https://www.youtube.com/watch?v=SSo_EIwHSd4

Blockchain Definition Tamper-Resistant



Hash: 1Z8F

Previous hash: 0000

Hash: ~~6BQ1~~ H62Y

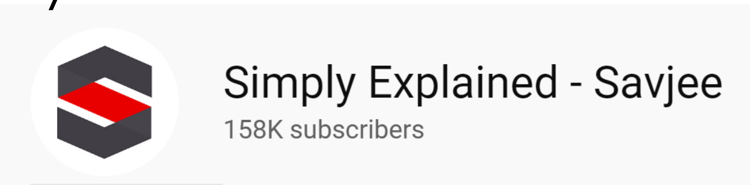
Previous hash: 1Z8F

Hash: 3H4Q

Previous hash: 6BQ1

Uh thats not right??

By: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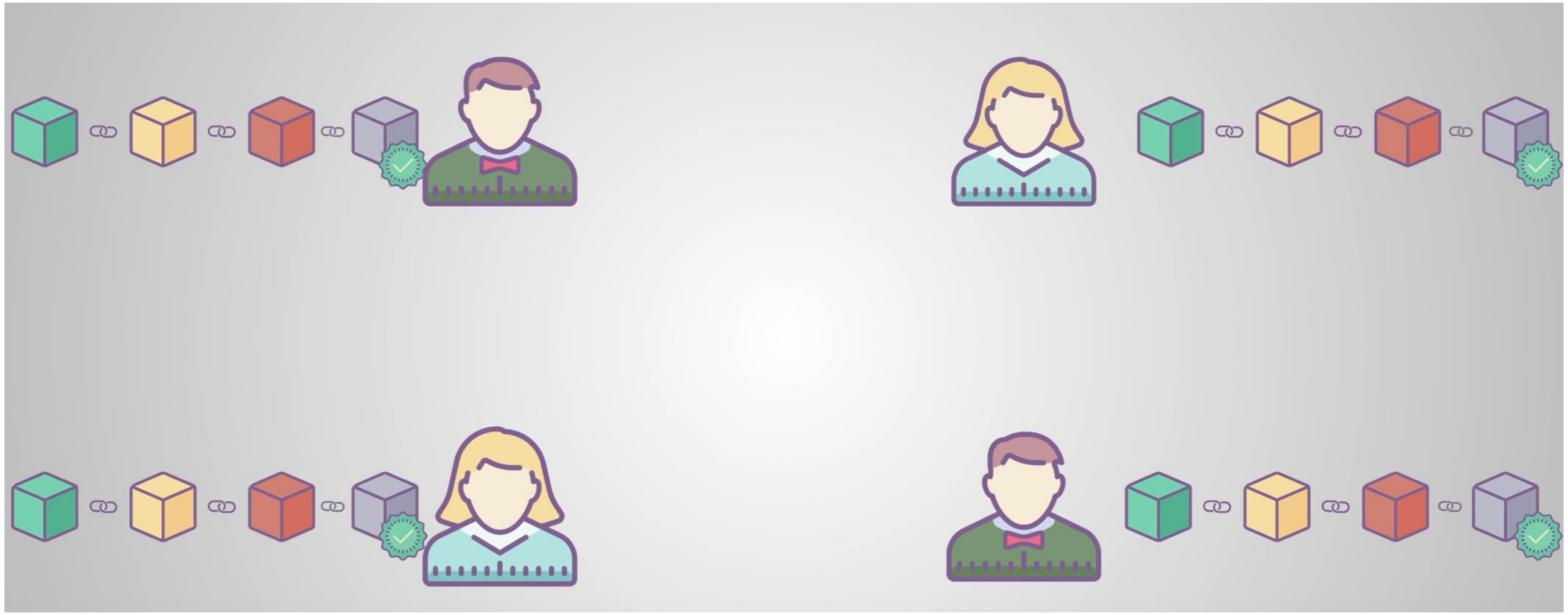
Source: Simply Explained – Savjee, Youtube, https://www.youtube.com/watch?v=SSo_EIwHSd4

Blockchain Definition Distributed/Decentralized



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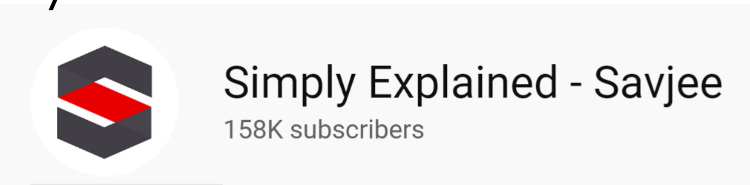

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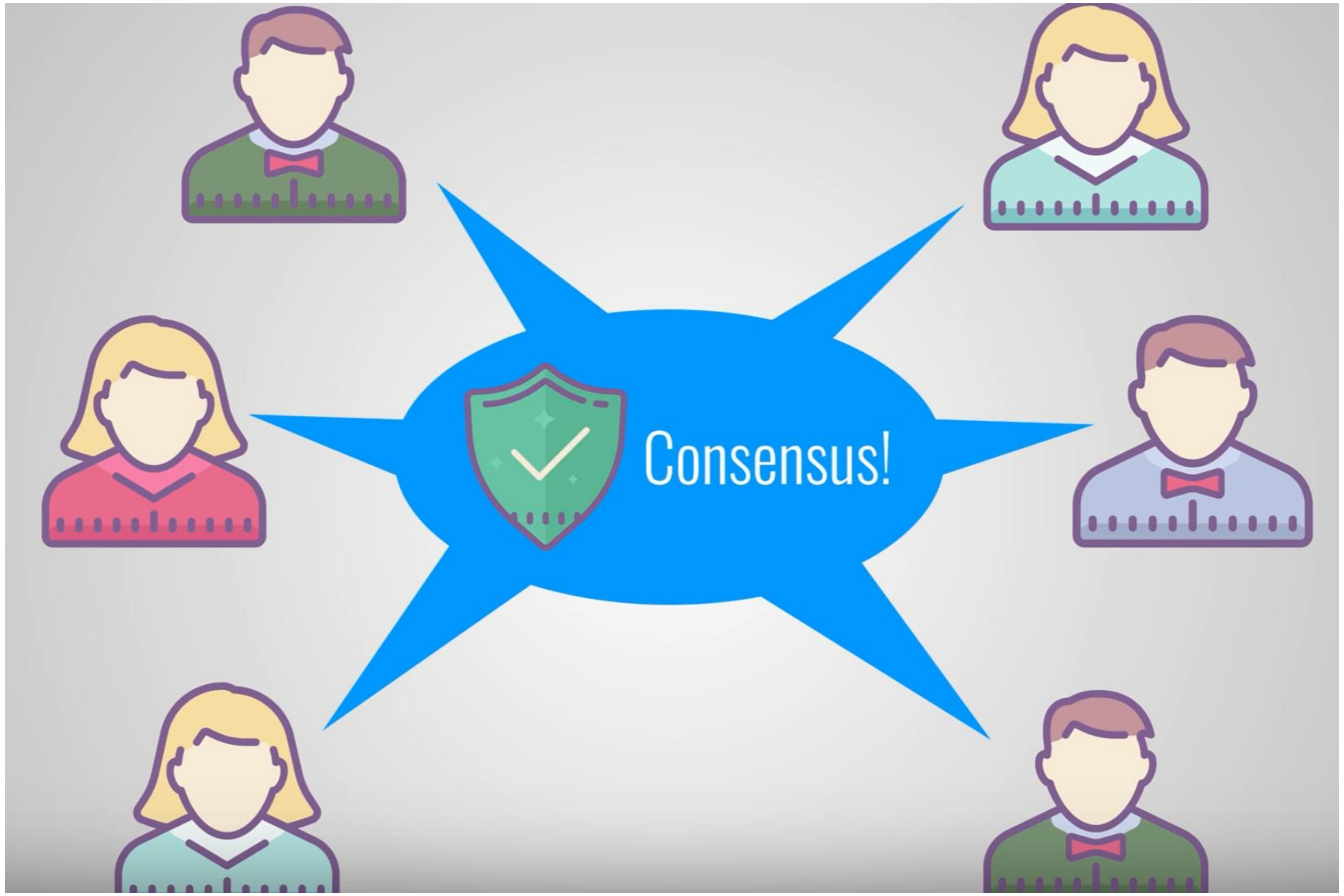
Blockchain Definition Consensus



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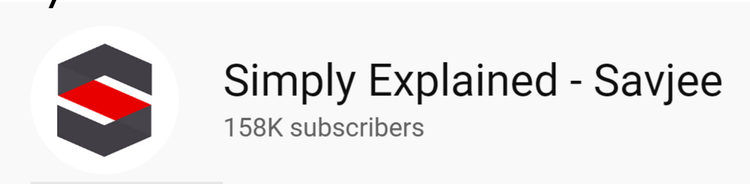

Simply Explained - Savjee

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Source: Simply Explained – Savjee, Youtube, https://www.youtube.com/watch?v=SSo_EIwHSd4

Blockchain Definition

Core Idea:
Blockchains == an immutable ledger of data without relying on a central authority

Blockchain Definition

Additional Material:

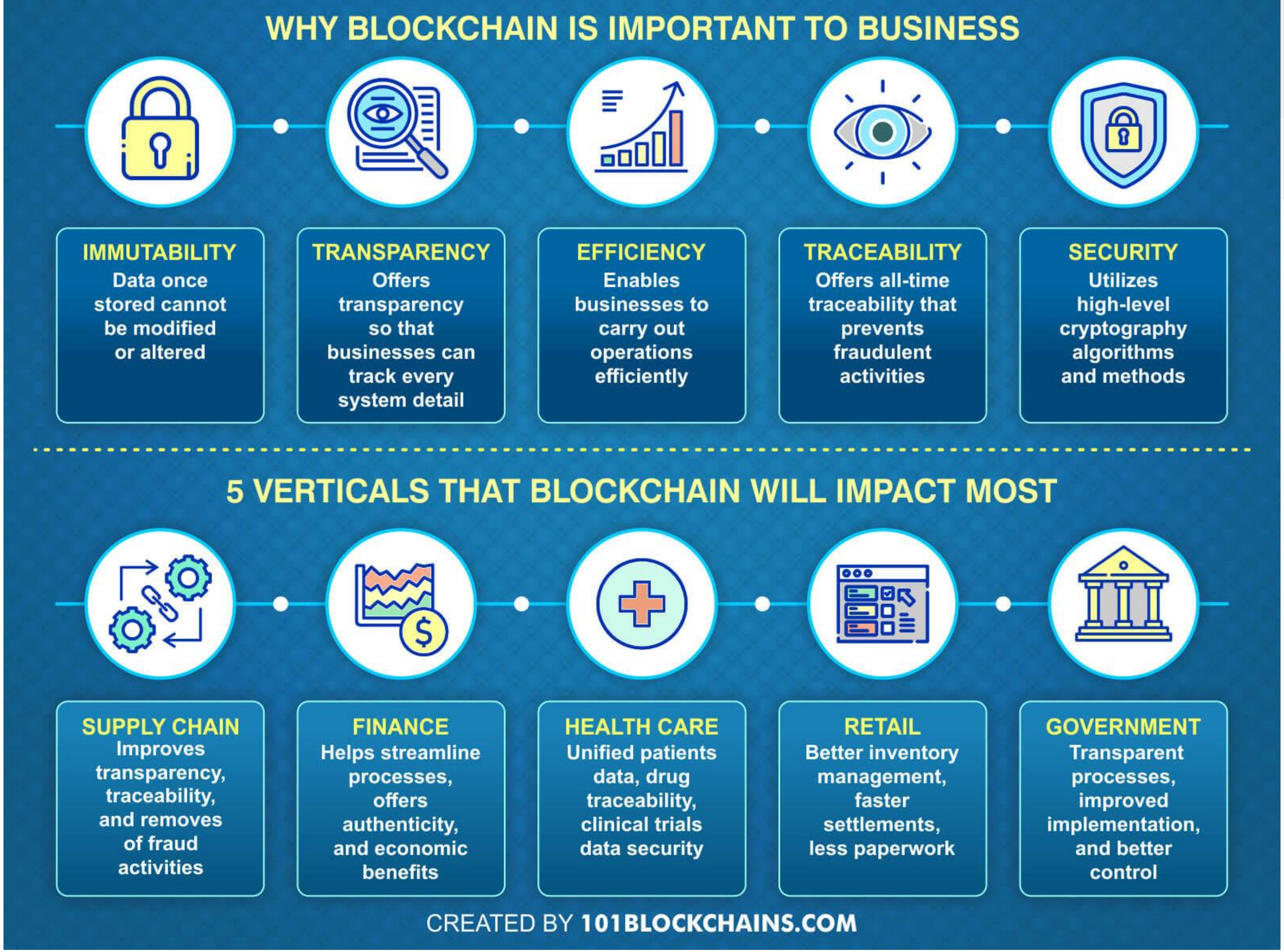
- Blockchain Explained, Investopedia, https://www.investopedia.com/terms/b/blockchain.asp
- Understand the Blockchain in Two Minutes, YouTube, https://www.youtube.com/watch?v=r43LhSUUGTQ
- ‘Blockchain’ is Meaningless, The Verge, https://www.theverge.com/2018/3/7/17091766/blockchain-bitcoin-ethereum-cryptocurrency-meaning
- A simple explanation of how blockchain works, Medium, https://medium.com/the-mission/a-simple-explanation-on-how-blockchain-works-e52f75da6e9a
- What is blockchain technology?, IBM, https://www.ibm.com/blockchain/what-is-blockchain

Questions?

Blockchain Applications

Discussion

What are some applications of blockchain that you can think of?



WHY BLOCKCHAIN IS IMPORTANT TO BUSINESS

IMMUTABILITY
Data once stored cannot be modified or altered

TRANSPARENCY
Offers transparency so that businesses can track every system detail

EFFICIENCY
Enables businesses to carry out operations efficiently

TRACEABILITY
Offers all-time traceability that prevents fraudulent activities

SECURITY
Utilizes high-level cryptography algorithms and methods

5 VERTICALS THAT BLOCKCHAIN WILL IMPACT MOST

SUPPLY CHAIN
Improves transparency, traceability, and removes of fraud activities

FINANCE
Helps streamline processes, offers authenticity, and economic benefits

HEALTH CARE
Unified patients data, drug traceability, clinical trials data security

RETAIL
Better inventory management, faster settlements, less paperwork

GOVERNMENT
Transparent processes, improved implementation, and better control

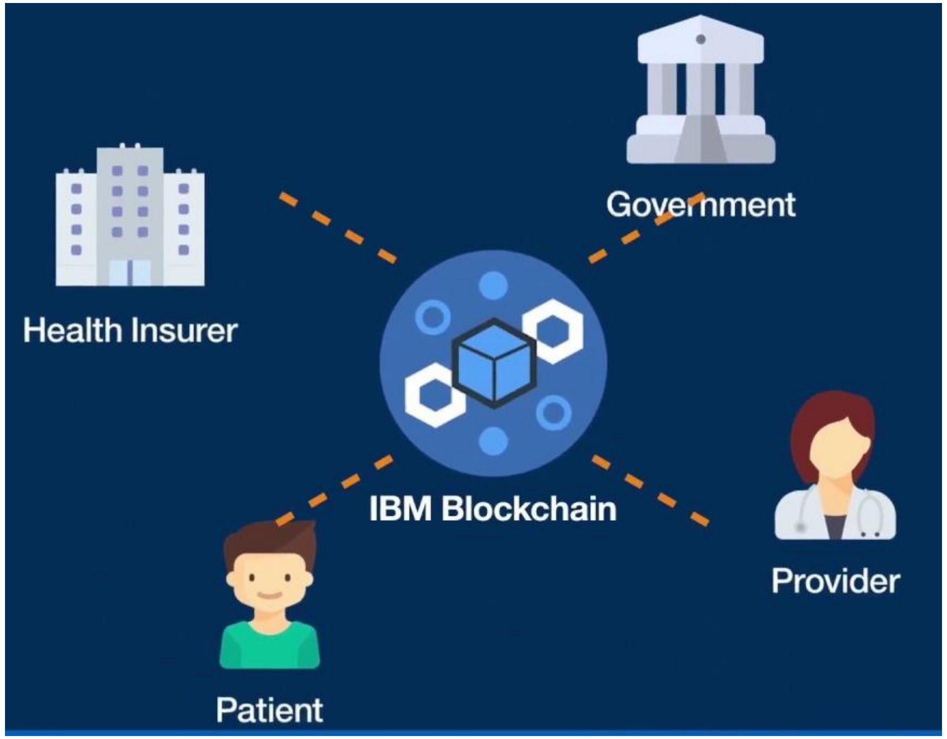
CREATED BY **101BLOCKCHAINS.COM**

Source: https://101blockchains.com/why-blockchain-is-important/

Blockchain Applications

Potential Applications

- **Cryptocurrency**
  - Bitcoin
  - Ethereum
  - …
- **Healthcare**
  - patients assign access rules for their medical data
  - same record for all parties
- **Government**
  - secure online voting system



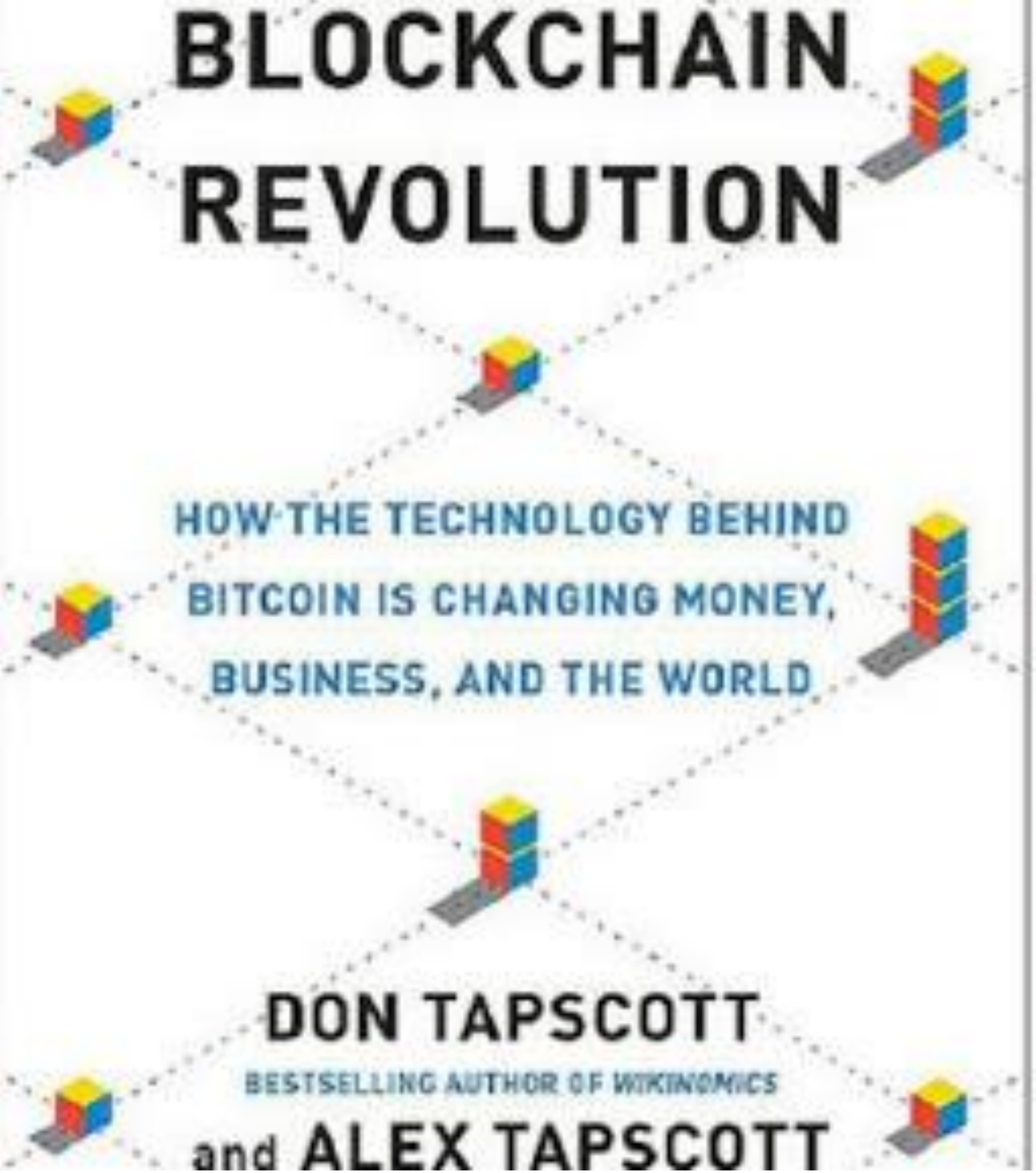
Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6517629/

Blockchain Applications

Potential Applications

- **Music**
  - musicians to receive equitable royalty payments
- **Insurance**
  - improved transparency
- **Digital identification**
  - more secure management & storage of digital identities with tamper-proof infrastructure
- **Supply chain**
  - IBM Food Trust – used by Walmart to trace lettuce
- and more…

Source: https://builtin.com/blockchain/blockchain-music-innovation-examples
https://consensys.net/blockchain-use-cases/digital-identity/



BLOCKCHAIN REVOLUTION

HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD

DON TAPSCOTT

BESTSELLING AUTHOR OF WIKINOMICS

and ALEX TAPSCOTT

Source: http://www.alextapscott.com/in-the-press/blockchain-revolution-excerpt-don-alex-tapscotts-upcoming-book/

Questions?

More Resources

- Digital Gold by Nathaniel Popper
- Blockchain Revolution by Alex & Don Tapscott
- Blockchain at Berkeley Fundamentals Decal by University of California, Berkeley
- Bitcoin and Cryptocurrency Technologies by Princeton University
- Next: Blockchain documentary by ox3production
- Introduction to Blockchain by codecademy

Thank you for listening!
See you in two weeks!