Introduction to Blockchain

FEI, February 2019

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Agenda

- Blockchain – how we got here?
- What are blockchains?
- Impact of blockchain on financial services
- Cryptocurrency updates
- Our work thus far
- Questions

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These Technologies Have Significant Impact on Our Daily Lives

- Internet
- Cloud
- Social media
- Business intelligence
- Analytics
- Mobile
- Streaming

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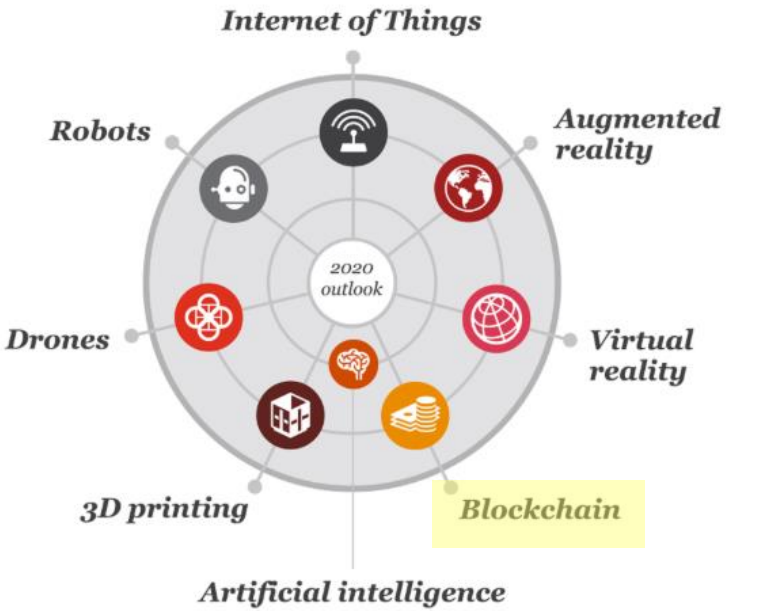
New Technologies Getting Ready to Rule the World



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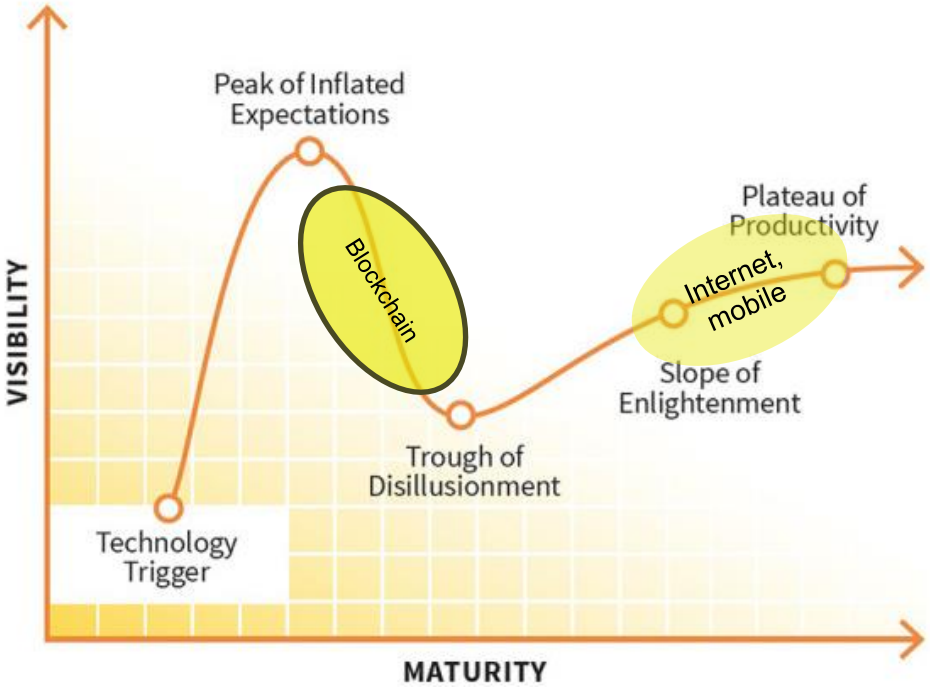
#TechMegatrend



Gartner's Technology Hype Curve

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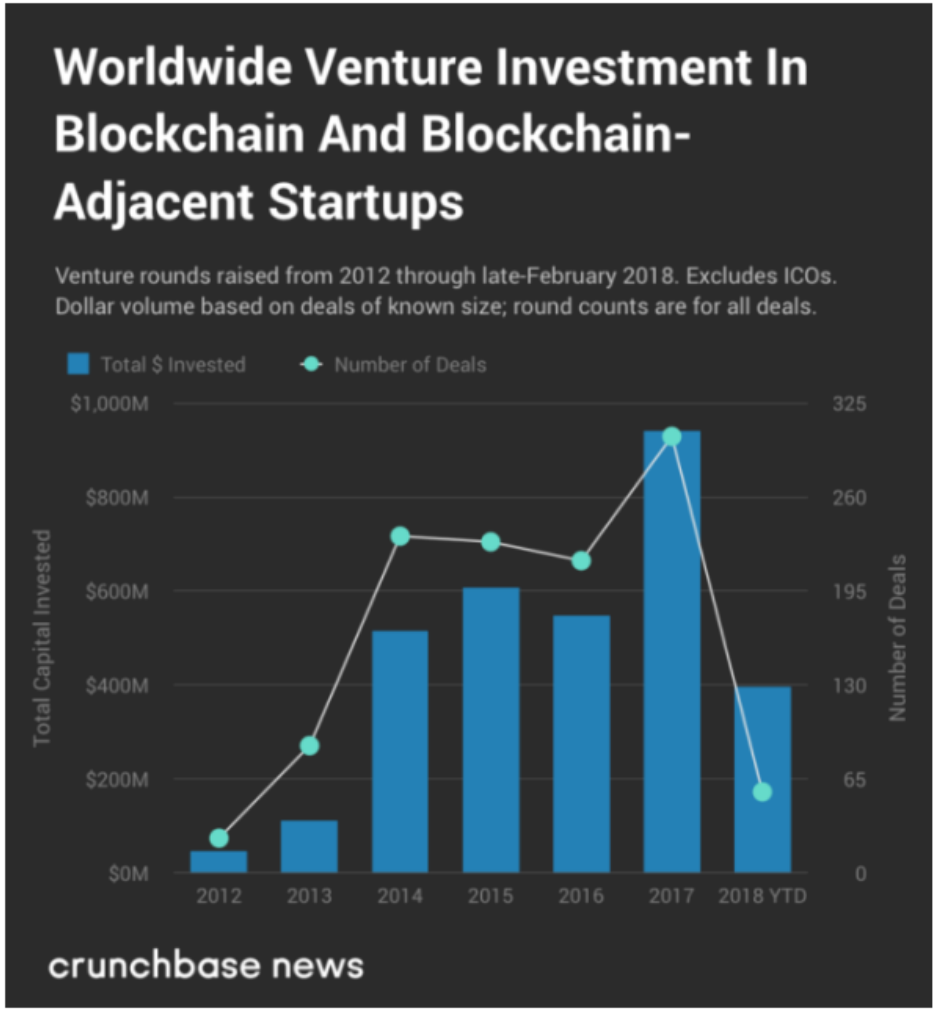
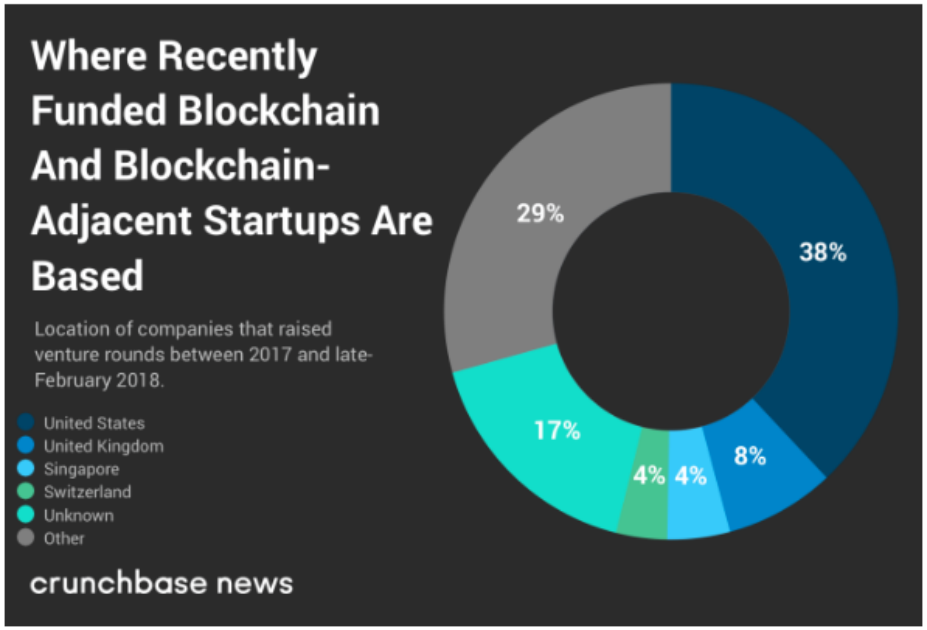
VC Investments in Blockchain Companies





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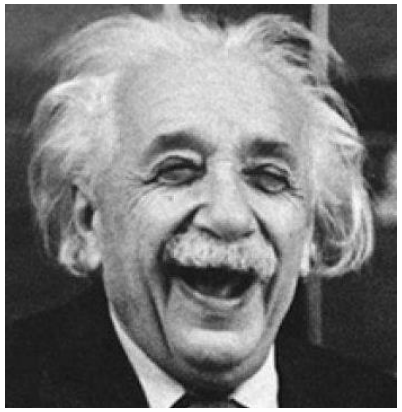
So, What Are Blockchains?



```
instantiateContract() {
  const contract = require('truf
  const service = contract(Comca
  service.setProvider(this.state

  this.state.web3.eth.getAccount
    if(error){
      console.error(error)
      return
    }
    this.setState({accounts: accounts})
    service.deployed().then((instance) => {
      let rentalServiceInstance = instance
```

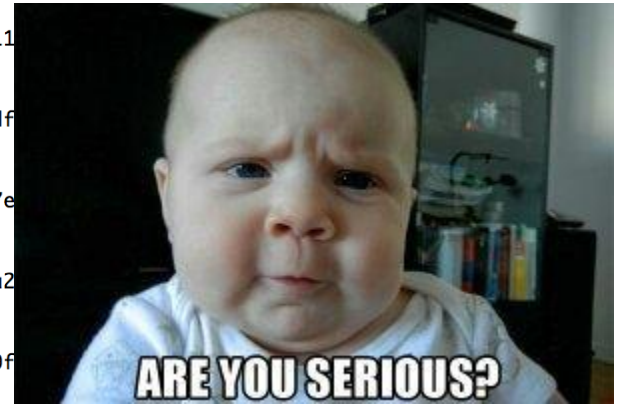
Console | Problems | Javadoc | Declaration

```
<terminated> Main (8) [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_74.jdk/Contents/Home/bin/java (2
Blockchain valid ? true
Block #0
 [previousHash : null,
timestamp : Sun Jan 21 12:42:04 CET 2018,
data : First Block,
hash : 0000a40b77debb3d74ca2c86868bb99d842b26948e22df29c54afd11

Block #1
 [previousHash : 0000a40b77debb3d74ca2c86868bb99d842b26948e22df
timestamp : Sun Jan 21 12:42:05 CET 2018,
data : Tout sur le Bitcoin,
hash : 0000471606d08875c7d74c55c4bef104f55d0be03306a20e1278ec7e

Block #2
 [previousHash : 0000471606d08875c7d74c55c4bef104f55d0be03306a2
timestamp : Sun Jan 21 12:42:05 CET 2018,
data : Sylvain Saurel,
hash : 000002963592fcf2ebdb7bb7e69b261928222f1e8dfede6a3cfd100f

Block #3
 [previousHash : 000002963592fcf2ebdb7bb7e69b261928222f1e8dfede6a3cfd100fe1f07d3b,
timestamp : Sun Jan 21 12:42:05 CET 2018,
data : https://www.toutsurlebitcoin.fr,
hash : 000014c11872ace425dd0fb285963b441d8a213c89607fb56a3f0b0a17ce7a26]
```



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Blockchain can significantly reduce the time needed for recording, reconciliation and reporting.

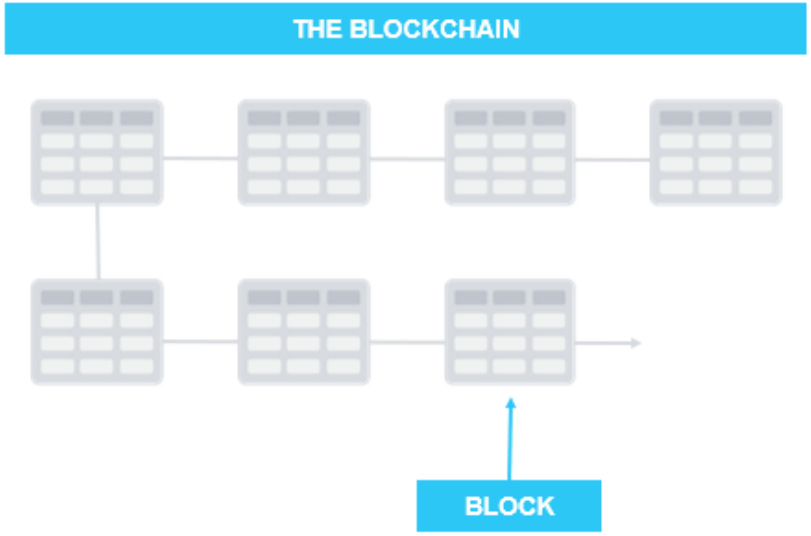
Blockchain is an accounting technology. It is concerned with the transfer of ownership of assets, and maintaining a ledger of accurate financial information. The accounting profession is broadly concerned with the measurement and communication of financial information, and the analysis of said information.

- The Institute of Chartered Accountants in England and Wales

Blockchain 101

What is a blockchain?

A specific type of **distributed ledger** technology that organizes data into **blocks** that are "chained" together chronologically by a **cryptographic hash function** and confirmed by a **consensus mechanism**



What is a Digital Asset?

A **digital asset** can represent currency, like the digital currency bitcoin. It can also represent assets like the title to a car or real estate, stocks, and bonds. Virtually **all assets, tangible or intangible,** can be recorded, traded, and tracked on a blockchain.

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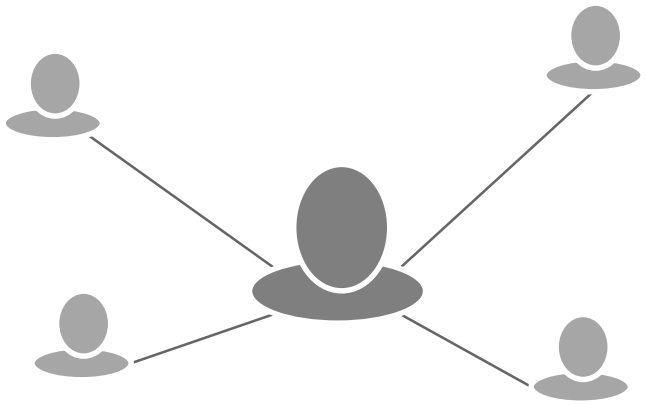
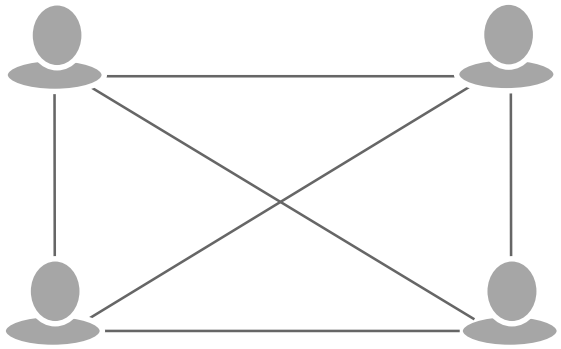
A New Type of Ledger

Traditional ledger



- One party has centralized control over the ledger
- A traditional ledger is only as trustworthy as the centralized party

Distributed ledger



- The ledger is distributed to all parties
- The ledger is decentralized, meaning there's no single gatekeeper, or middle-man, to the information
- A trust-minimized system relies on consensus rather than reconciliation

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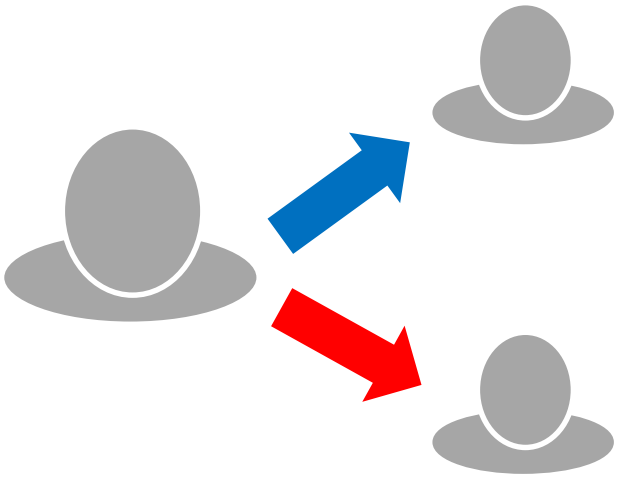
Blockchain Solved the Double-Spend Problem

You can't give the same dollar to two people.



Double-spending

- Double-spend is as the name implies: spending the same dollar more than once
- Double-spending is through the confirmation process involved in every transaction
- For non-cash payments, a banking institution acts as the centralized ledger ensuring you can't spend the same dollar twice
- Solving the double-spend problem is arguably the most important solution to a problem that blockchain solved

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4 Key Characteristics of a Blockchain

Distributed

The data is shared across every 'node', many equal nodes, no central authority, each node holds a copy of the blockchain, very resilient to failures/attacks.

Consensus Algorithm

A set of rules by which a distributed network reaches agreement that the information is correct and that all nodes have an identical copy of the blockchain ledger of transactions.

Cryptography

Blockchains use algorithms and math to secure and validate transactions on the network.

Immutable

Unable to be changed; once a transaction has been recorded into the blockchain, it cannot be changed.

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Why Do We Need Distributed Technology?

6 TRILLION
Cost of cyberattacks by 2022

600 BILLION
Lost to cybercrime In 2017

101 BILLION
Spent on cybersecurity In 2017

Major Centralized Hacks

- Yahoo: 1 Billion
- myspace: 427 Million
- EQUIFAX: 147 Million

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Benefits of Blockchain

Tamper resistant

Increased trust & security

Lower transaction costs

Decreased transaction & settlement times

Reduce or eliminate paper systems

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What are Smart Contracts?

- A ‘smart contract’ is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract.
- Features:
  - Partially or fully self-executing, self-enforcing, or both.
  - Allow performance of credible transactions without third parties.
- Platforms:
  - Solidity (Ethereum)
  - Hyperledger
  - Corda (R3)

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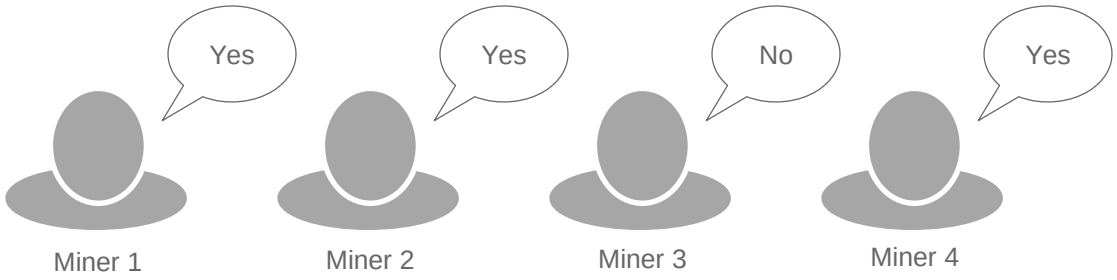
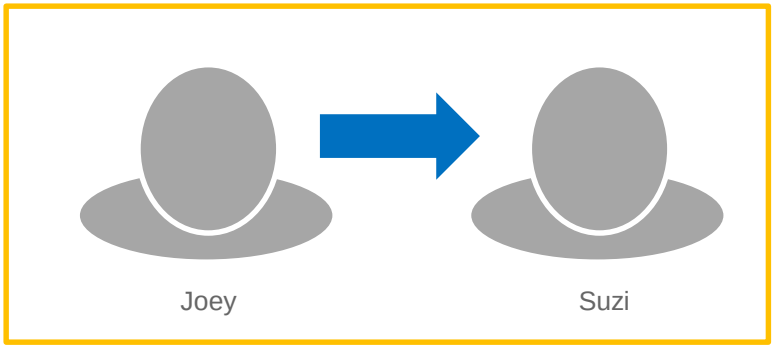
The Mechanics of a Blockchain Transaction

Transaction #3 in a blockchain





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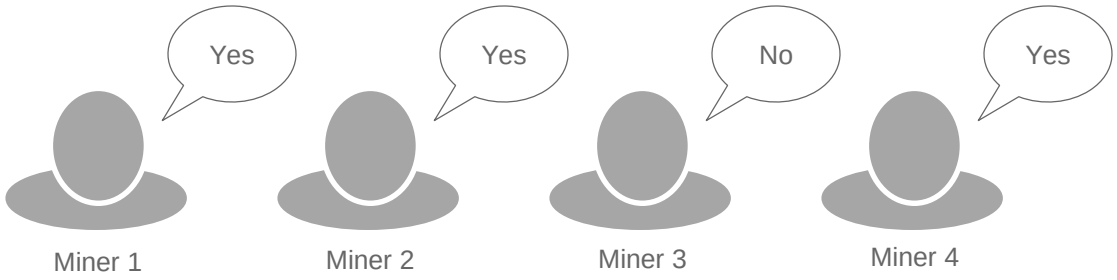
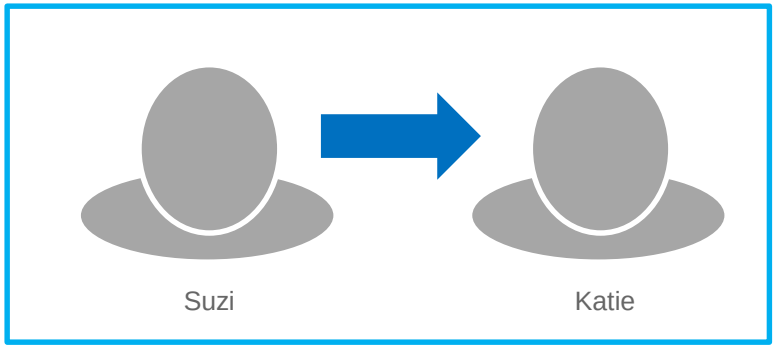
The Mechanics of a Blockchain Transaction

Transaction #4 in a blockchain





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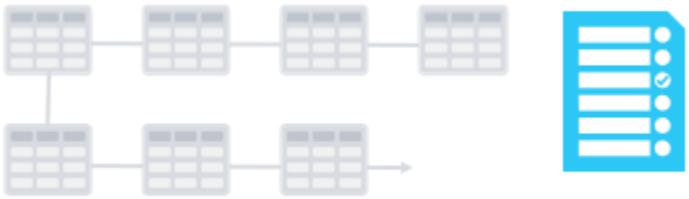
Public and Private Blockchains

PUBLIC BLOCKCHAINS

public (inter-)
The internet

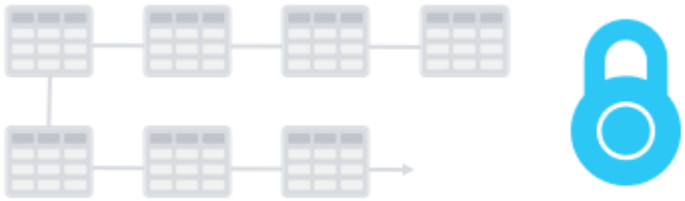
ENTERPRISE BLOCKCHAINS

private (intra-)
Intranets & IT



A permissionless blockchain

Allows anyone to participate on the network's consensus mechanism, via nodes, if they have the ability to do so.



A permissioned blockchain

Restricts participation in consensus and may also restrict the types of transactions that each participant may make.

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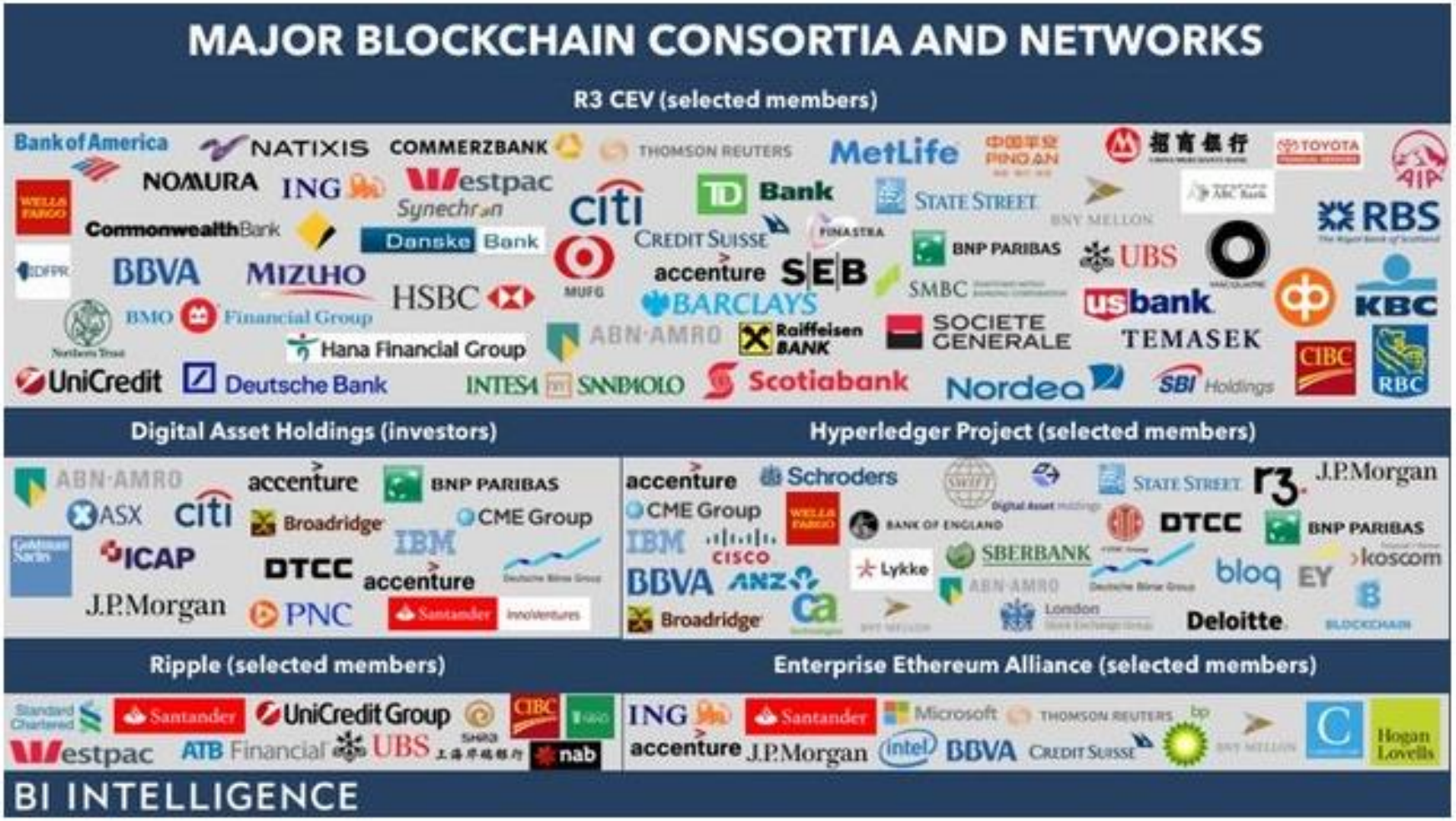
Early Movers and Leaders



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Practical Applications for Blockchain

BLOCKCHAIN 1.0

Already in Existence

- Cryptocurrency
- Payments
- Remittance
- Private Stock Trading
- Smart Contracts
- T+O Clearance and Settlement

BLOCKCHAIN 2.0

- Identity Management
- Complex Smart Contracts
- Asset Ownership
- IoT Management
- Complex Exchange Management
- Electronic Health Records Management

BLOCKCHAIN 3.0

- Complex, Advanced Financial Instruments
- Decentralized Management and Governance (DAOs)
- Liquidation of Physical Assets

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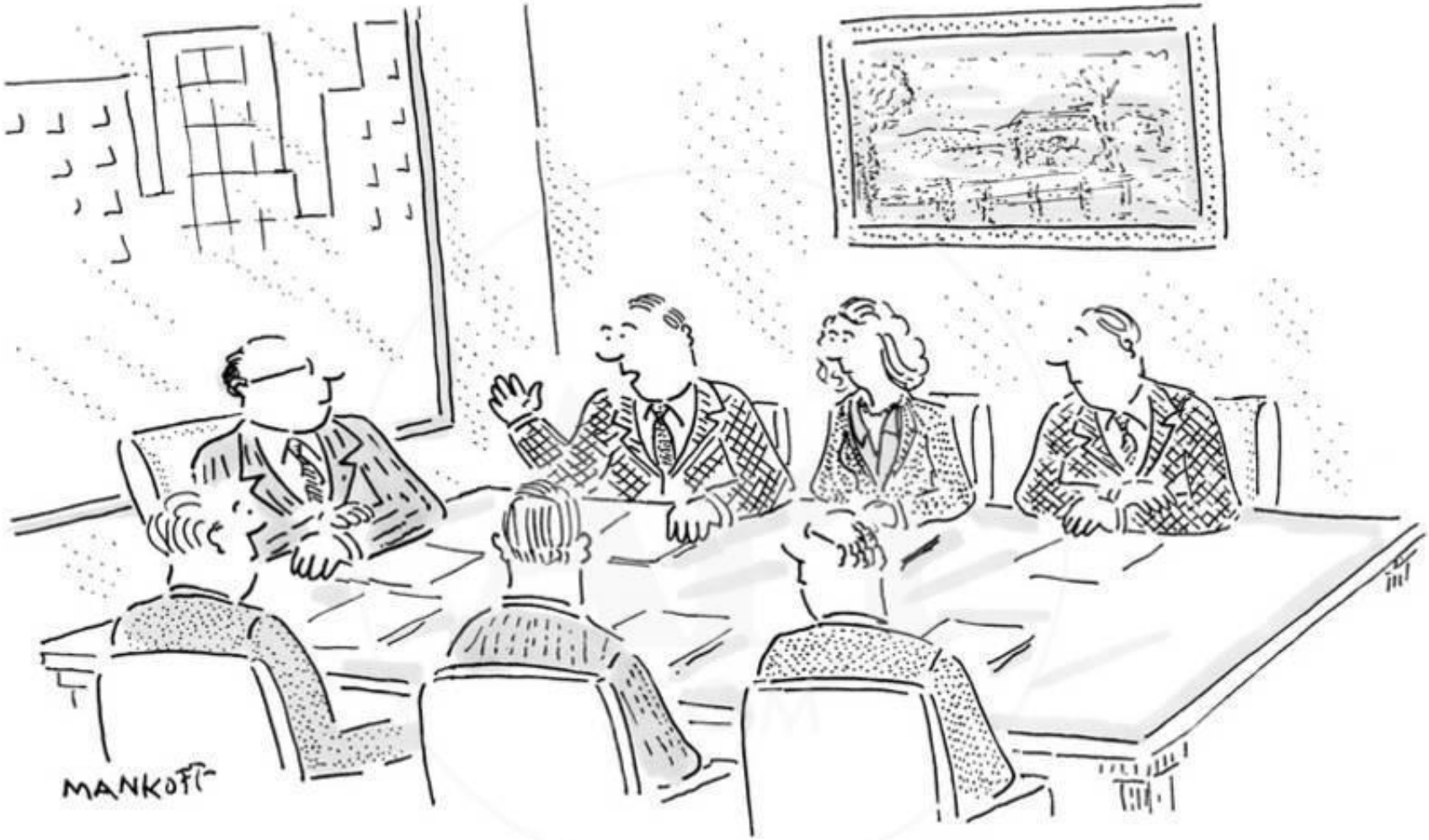

"On the one hand, eliminating the middleman would result in lower costs, increased sales, and greater consumer satisfaction; on the other hand, we're the middleman."

Examples: Clearing and Settlement

- The Australian Securities Exchange (ASX) has become the first major security exchange to announce the adoption of blockchain technology; the system has gone live.
- DTCC is working with IBM, R3 and Axoni to shift post-trade clearing of single-name credit default swaps on to a blockchain system by the end of next year. Success of this initiative will pave way to do the same with other derivatives processed by the giant US clearing house.

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Examples: Payments

- Challenge from standalone cryptocurrencies? Central banks across the world are exploring the potential for shifting parts of their payments systems on to blockchain technology or even using it to launch digital currencies.
- Ripple is growing to become a significant contender for Swift, which is also experimenting with its own blockchain technology.
- “Utility settlement coin“ by Switzerland's UBS: tokens convertible into cash on deposit at central banks.
  - Other financial institutions part of the consortium: Barclays, CIBC, Credit Suisse, HSBC, MUFG, State Street, BNY Mellon, Deutsche Bank, Santander, NEX and blockchain startup Clearmatics.

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Examples: Syndicated Loans, PE Capital Allocations

- Credit Suisse is leading a consortium of 19 financial institutions to work with Synaps to start putting syndicated loans on blockchain systems.
- In partnership with PwC, Northern Trust is building a blockchain-based platform for private equity funds. Auditors will have fast access to data stored on its private blockchain.

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Examples: Identity

Identity is core to running a distributed ledger (you need to know who is on the ledger!).

- Identity on blockchain is core to R3's Corda
- Accenture is working with UN and Microsoft on a blockchain identity system for people with no identity papers
- Dozens of start-ups are working on building blockchain systems for customer identification, including Cambridge Blockchain, Tradle, Credits and Blockstack.

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Top 10 Cryptocurrencies by Market Cap

Top 100 Cryptocurrencies by Market Capitalization

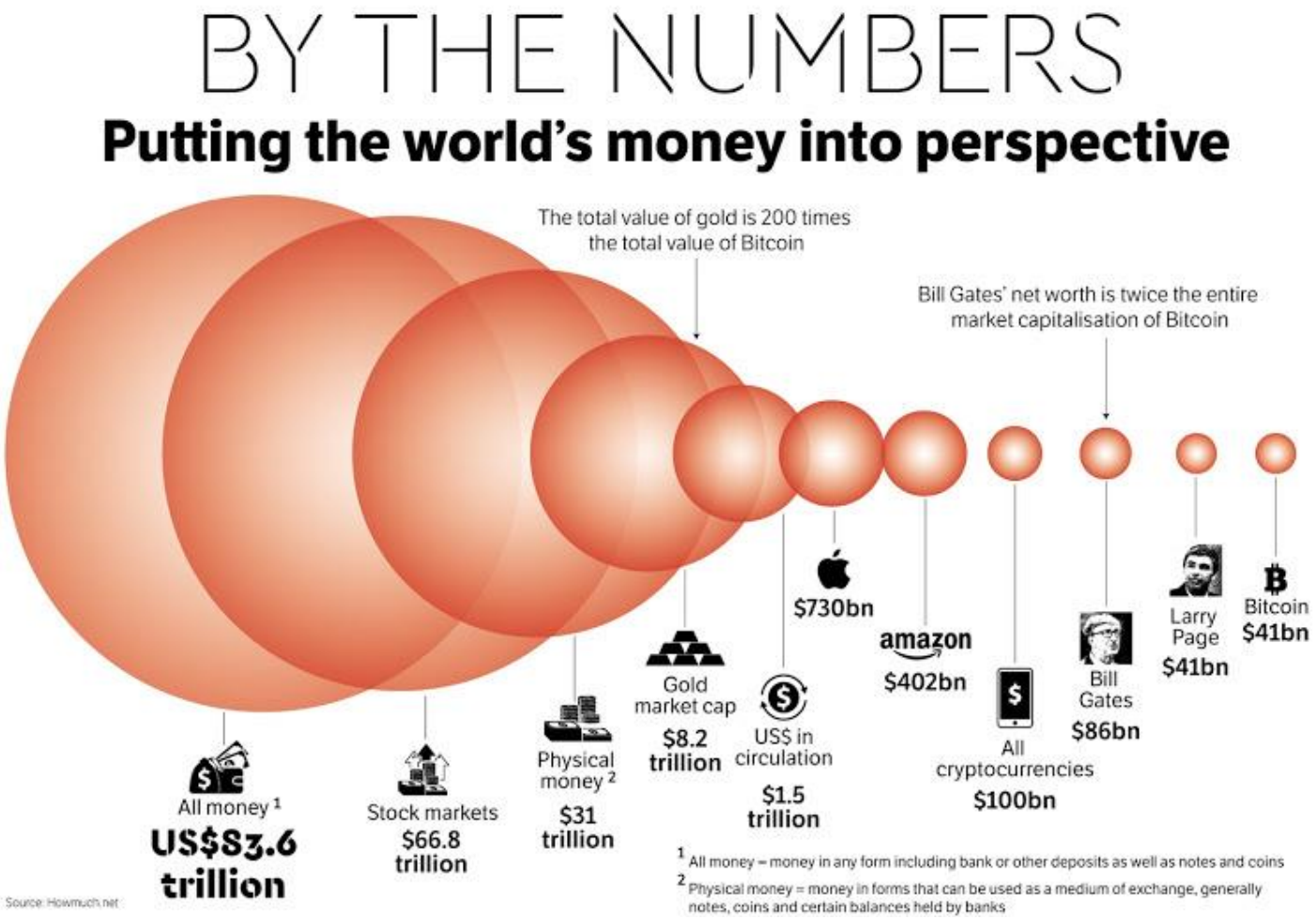
Cryptocurrencies ▾ | Exchanges ▾ | Watchlist | USD ▾ | Next 100 → | View All

#	Name	Market Cap	Price	Volume (24h)	Circulating Supply	Change (24h)	Price Graph (7d)
1	Bitcoin	$59,631,190,326	$3,402.57	$5,036,423,878	17,525,362 BTC	-0.12%	
2	XRP	$12,058,772,787	$0.292908	$383,098,014	41,169,202,069 XRP *	0.54%	
3	Ethereum	$10,964,226,073	$104.66	$2,344,403,372	104,762,538 ETH	0.31%	
4	EOS	$2,128,664,461	$2.35	$467,958,833	906,245,118 EOS *	0.33%	
5	Bitcoin Cash	$2,026,954,529	$115.11	$192,614,670	17,609,300 BCH	-1.04%	
6	Tether	$2,023,483,223	$1.00	$3,569,022,750	2,021,103,317 USDT *	0.04%	
7	Litecoin	$2,001,666,787	$33.16	$655,060,620	60,366,177 LTC	1.14%	
8	TRON	$1,718,862,035	$0.025781	$156,944,216	66,671,422,606 TRX	0.39%	
9	Stellar	$1,434,974,800	$0.074861	$122,284,367	19,168,570,823 XLM *	1.42%	
10	Binance Coin	$1,122,523,217	$7.95	$86,431,527	141,175,490 BNB *	-0.80%	
11	Bitcoin SV	$1,104,804,337	$62.74	$98,713,143	17,608,223 BSV	-1.77%	

Feb 7, 2019

Source: https://coinmarketcap.com/

Bitcoin in Perspective



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What is an ICO?

- An Initial Coin Offering (ICO), is a fundraising mechanism in which new projects sell their underlying crypto tokens in exchange for bitcoin and ether. It's somewhat similar to an Initial Public Offering (IPO) in which investors purchase shares of a company.
- Many view ICO projects as unregulated securities that allow founders to raise an unjustified amount of capital, while others argue it is an innovation in the traditional venture-funding model.
- Are ICOs legal? Maybe!!!

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Regulation Highlights

- The *Howey* test and the *Munchee* order
- Tokenization of assets - Token Taxonomy
- OCC charter for FinTech companies (July 31st, 2018)
- Efforts to evolve global standards for blockchain based systems
- Some states are more active in blockchain regulations:
  - New York - BitLicense
  - Arizona – recognition of smart contracts
  - Vermont – blockchain as evidence
  - Illinois – real estate records
  - Delaware – registration of shares on blockchain
  - Rhode Island – Open for blockchain business!

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Regulation Highlights *(contd…)*

- U.S. Office of Government Ethics (OGE)
- Bank of International Settlements
- Congressional blockchain caucus and progress thus far
- International updates
  - South Korea
  - Brazil
  - Europe

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What are the current rules for accounting for Cryptocurrency and ICO's?

THERE ARE NONE!

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Accounting for Cryptocurrency and ICO's

- There is currently NO authoritative guidance in accounting for cryptocurrency and ICO's.
- FASB, SEC, IASB have all failed to address accounting.
- Accounting approach is left to issuers and auditors.

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Accounting for Cryptocurrency and ICO's

- Chamber of Digital Commerce, Digital Accounting Consortium and Wipfli working with IFRS in hope of some guidance to be issued.
- Could likely result in other rule makers issuing guidance.

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Some of Our Work Thus Far

- Audit engagement with one of the largest cryptocurrency exchanges
- Cryptocurrency compliance and tax work
- Conceptualize and develop pilots
- Board education with one of the medium size banks in Wisconsin
- Speaking engagements at various banking forums and professional groups
- Co Chairing Digital Chamber of Commerce Digital Accounting Consortium

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