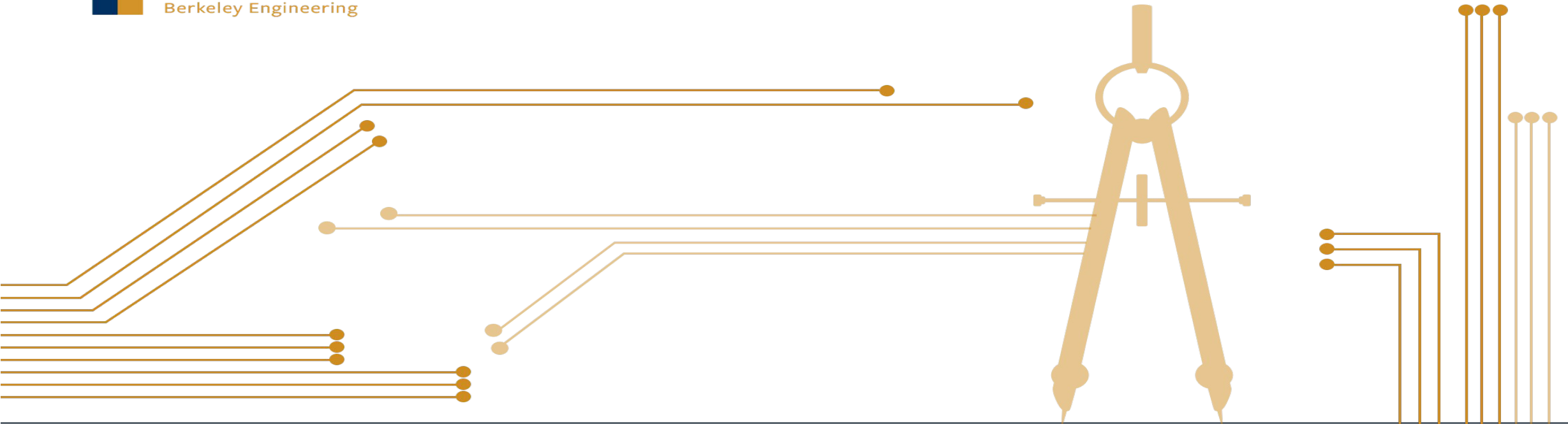




Pantas and Ting
Sutardja Center
for Entrepreneurship & Technology
Berkeley Engineering



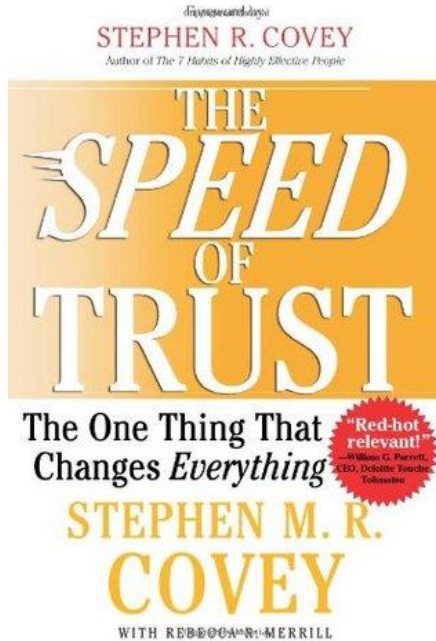
Blockchain Disruption

Anton Shmakau, Arnaud Mauvais, Dion HOUNG-LEE, Fabio Gava, Joanne Wong, Senthil Subramanian, Shail Rajput

This work was created in an open classroom environment as part of a program within the Sutardja Center for Entrepreneurship & Technology and led by Prof. Ikhtlaq Sidhu at UC Berkeley. There should be no proprietary information contained in this paper. No information contained in this paper is intended to affect or influence public relations with any firm affiliated with any of the authors. The views represented are those of the authors alone and do not reflect those of the University of California Berkeley.

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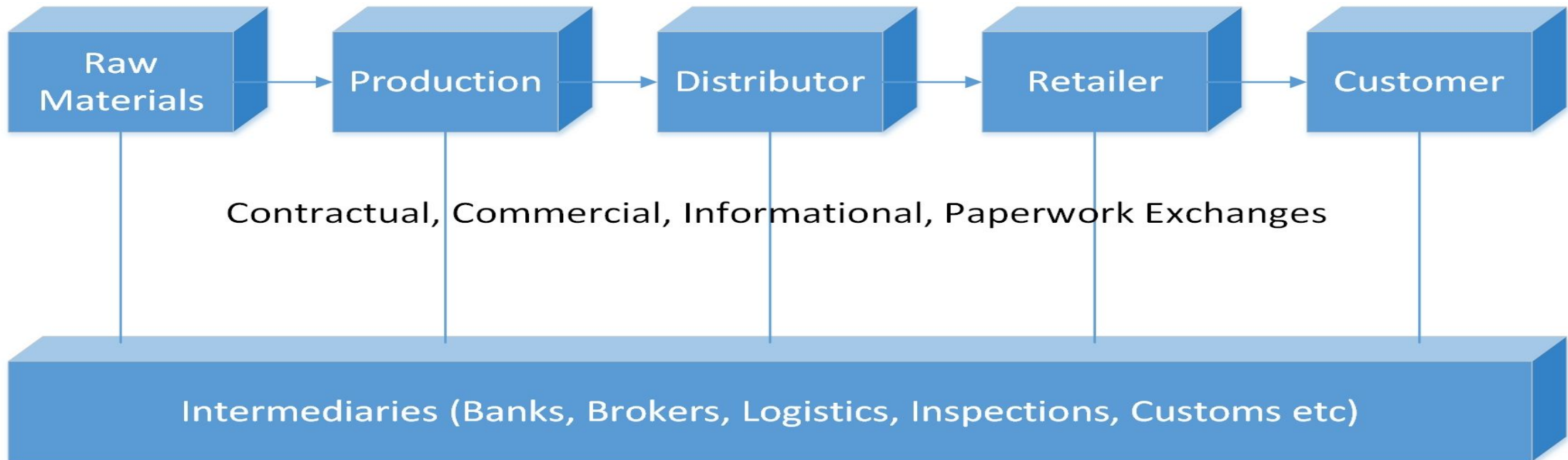
Trust is Expensive



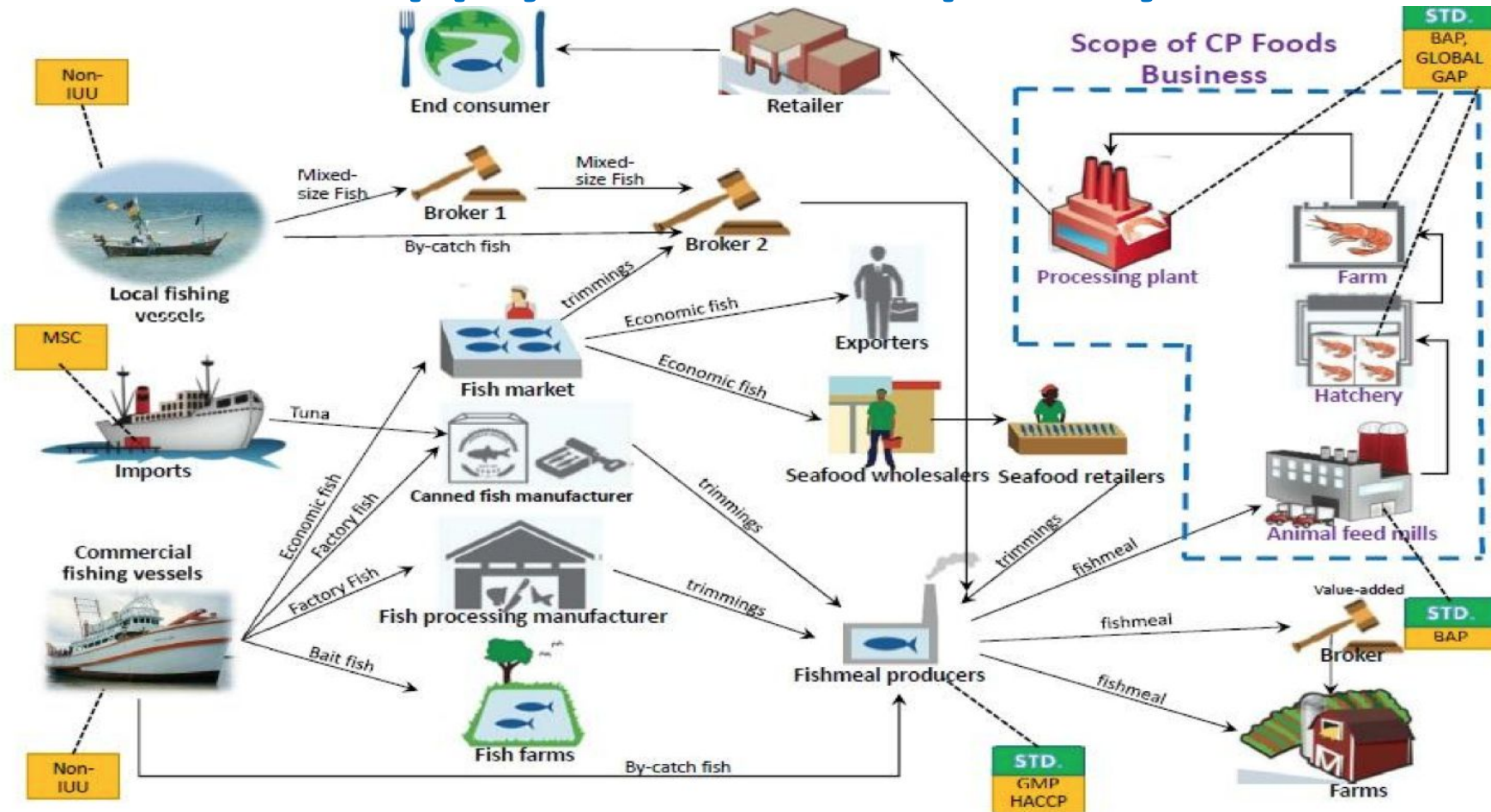
Blockchain is to transactions what the Internet
is to communication

Supply Chain - Today

- US businesses alone spent **\$1.48 trillion USD** in logistic expenses in 2015
- Bilateral contractual links to form a (supply) chain
- Every link can be a bottleneck for information flow, trust erosion and technology gaps.



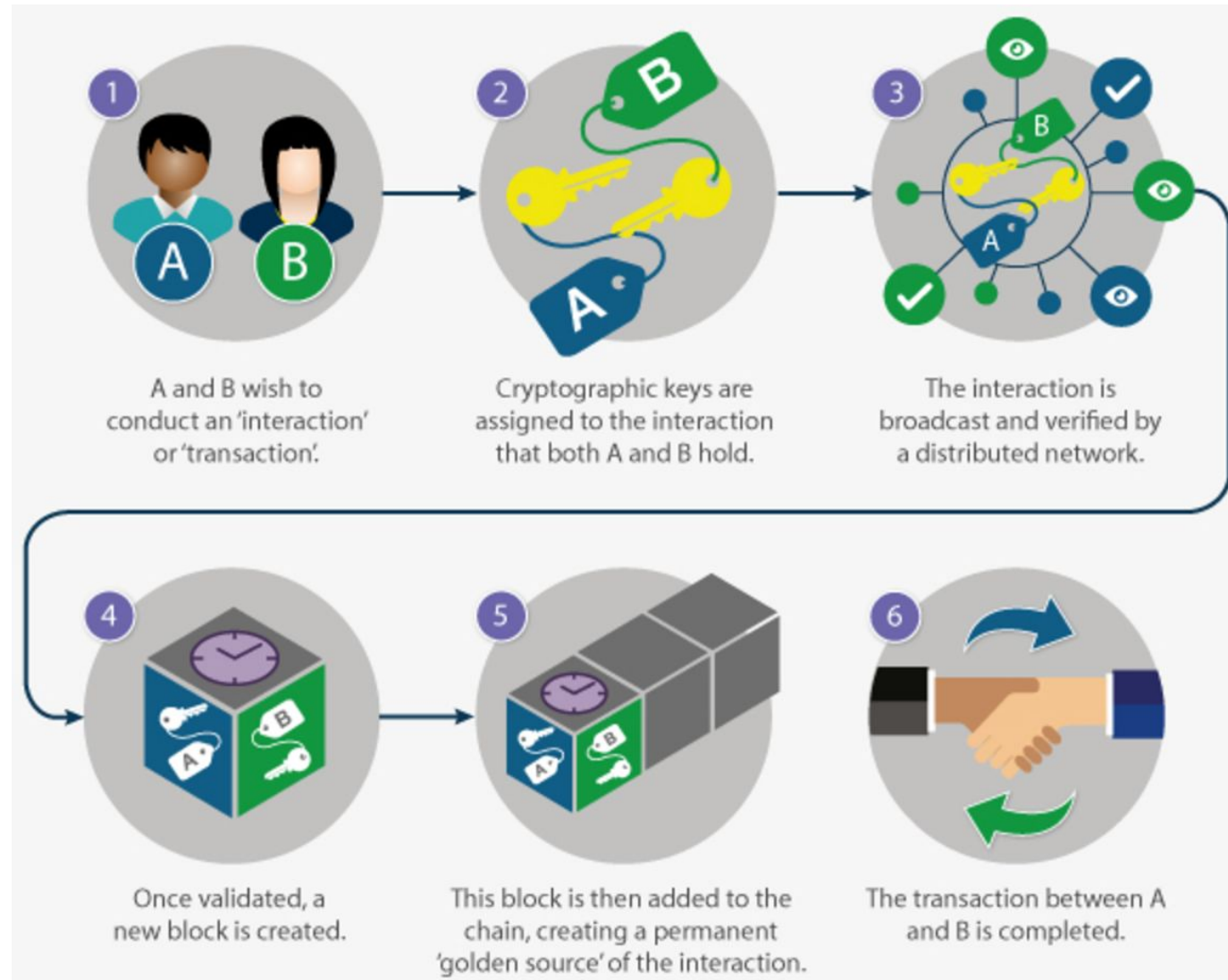
Supply Chain Complexity



Source: Sal Forest Report submitted to Oxfam (March 2014); CPF study

What is a Blockchain?

Persistent & pervasive peer-to-peer distributed ledger.



Blockchain.....So What?

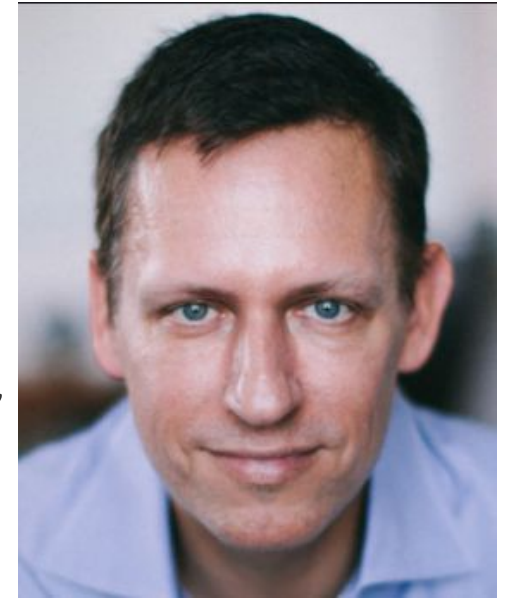


“The Blockchain’s distributed consensus model is the most important invention since the Internet itself”.

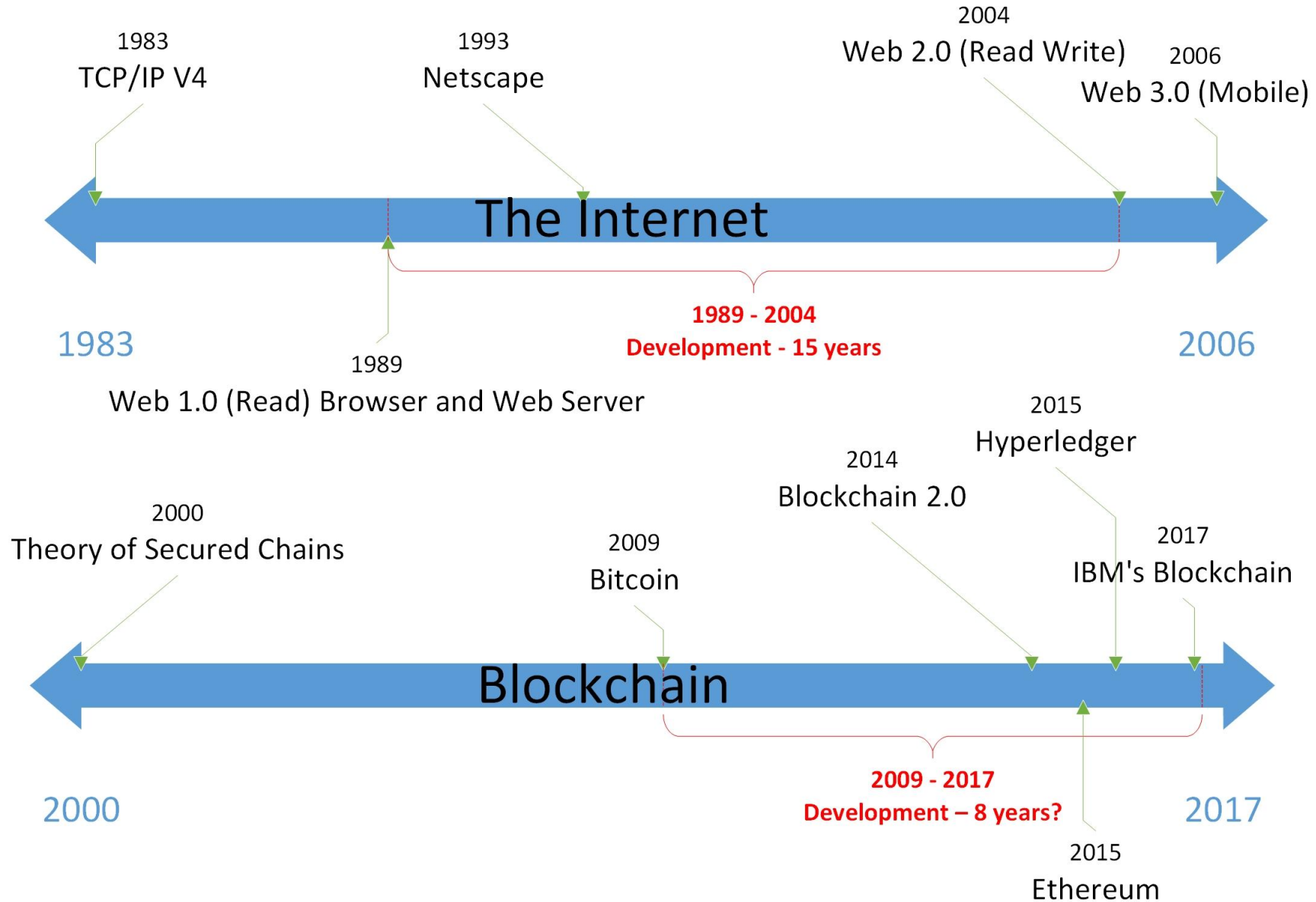
Marc Andreessen, inventor of Netscape, thought leader & top Venture Capitalist.

“I do think Bitcoin is the first [encrypted money] that has the potential to do something like change the world.”

Peter Thiel, Co-Founder of Paypal.



Parallels with the evolution of the Internet



Supply Chain will benefit from Blockchain adoption

Supply Chain - Today

Lack of Transparency

- Inflexible
- Unable to adjust production based on demand.
- Production/sourcing challenges directly impact delivery schedule.
- Delays: real-time business decisions are difficult.

Closed Ecosystem

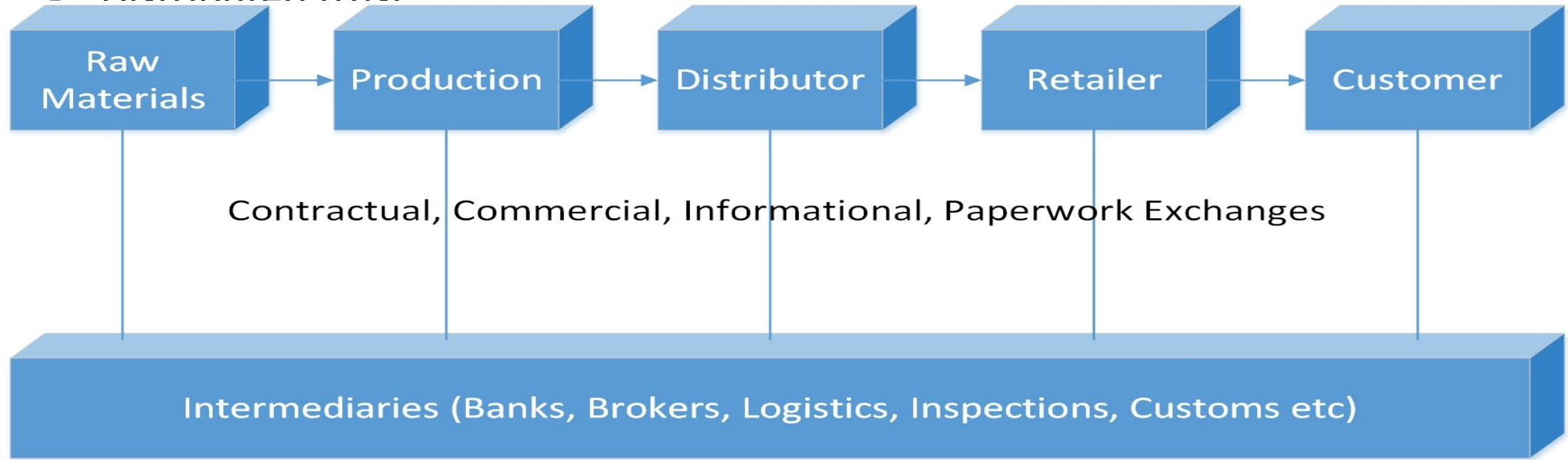
- Barrier for entry is high.
- Not all players are focussing on improving efficiency.

Expensive

- Due to inefficiencies.
- Globalization challenges.
- Fraud

Supply Chain with Blockchain

- Open ecosystem that enables controlled collaboration
- Distributed trust



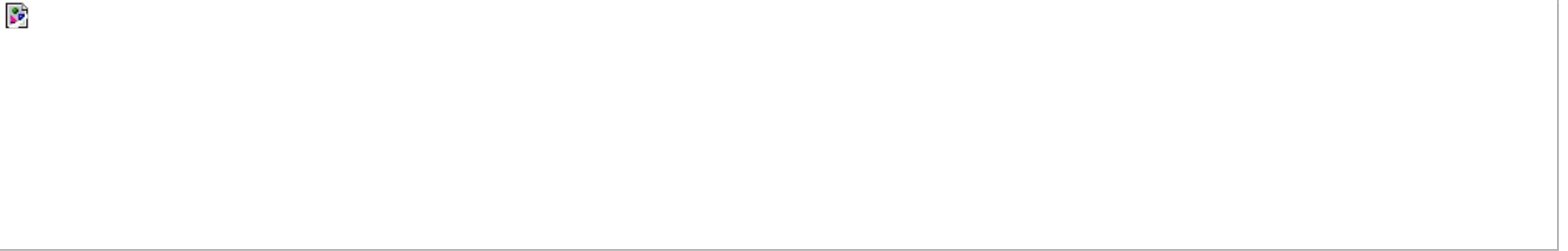
Container shipment giant goes paperless

*“Maersk had found that a single container could require stamps and approvals from as many as **30** people, including customs, tax officials and health authorities.”*

The New York Times



Disruption Stages



Replace paper

Self-driven trucks 24/7

Shared manufacturing,
Mass market 3D printing

Supply Chain Players

E-COMMERCE LOGISTICS



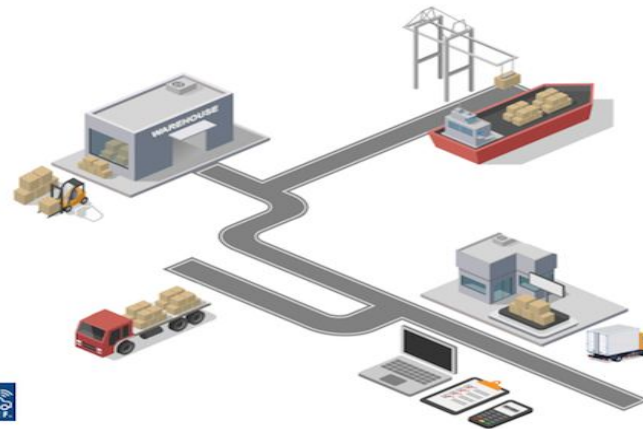
INVENTORY MANAGEMENT



FREIGHT & SUPPLY CHAIN VISIBILITY



WAREHOUSING



TRUCKING



ENTERPRISE RESOURCE PLANNING



LAST-MILE DELIVERY



SENSORS / ASSET TAGGING



CBINSIGHTS



What Are The Barriers to Adoption?

Barriers to Adoption

CULTURAL CHALLENGES

- Resistance from Intermediaries
- Governance: Regulation & Legislation
 - Explicit blessing from regulators needed

TECHNOLOGY CHALLENGES

- Adopting new technology
 - InterOperability
- Lack of standards
- Security: Public vs. Private
- Scale & Performance challenges: Low throughput, high latency issues

Overcoming the Barriers to Blockchain Adoption

Inspired by the history & architecture of the Internet
The Ecosystem Building blocks addresses
Standardization, Interoperability, Unification, Security

Commercial

Applications: The Interface

Sector Specific OSeS

Industrial grade security

Open Source

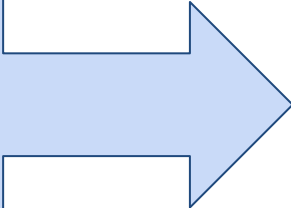
Industry APIs & Standards Protocols

Interoperable blockchains: Sidechains

Security Standards

Overcoming the Barriers to Blockchain Adoption

I- A peer-to-peer network
that sits on top of the
Internet



Application	HTTP SMTP DNS Telnet
Transport	TCP UDP
Internetwork	IP
Network	Wi-Fi Bluetooth Ethernet

II- Layered Approach:
Scalability, Performance,
Evolution

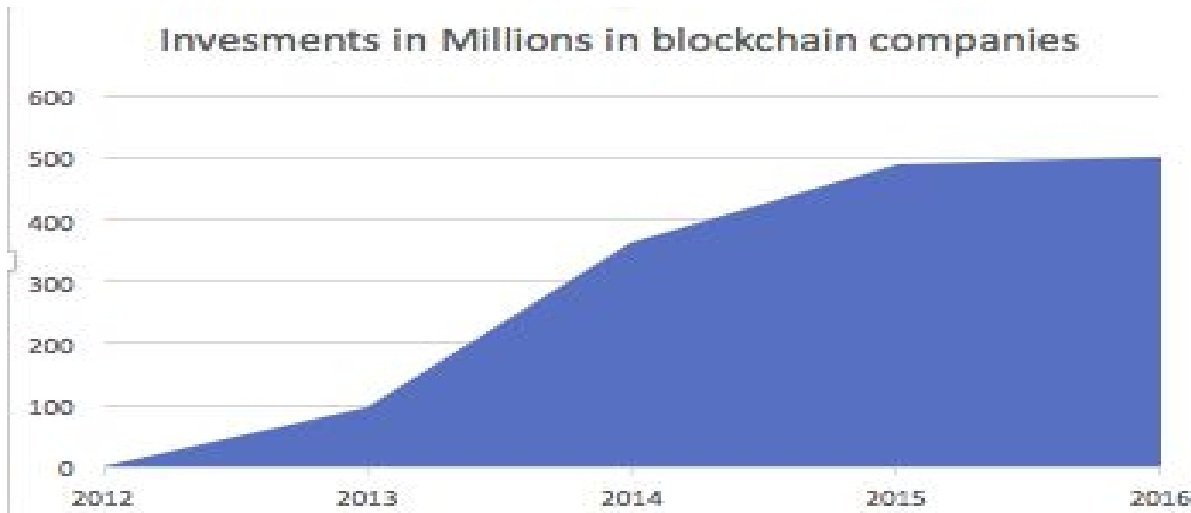


Application	Bitcoin
Smart Contract	Smart Legal Agreements DAO: Decentralized Autonomous Organization
Shared Ledger	Private Permissioned Permissionless

What is going on today?

Entrepreneurs & Technology enabling Blockchain Fever

1 - Venture Capital: \$1.5 Billion Invested over past four years



2 - New Source of Revenues:

Large companies like IBM and Microsoft see this technology as a new source of revenue and are leading technology efforts

3 - Business Operations Improvements, Business Model Decentralization:

Reducing Cost, Creating Value

Overcoming the Barriers to Blockchain Adoption

Blockchain as a Service (BaaS)

Focusing on the Applications: Addressing Experimentation,
Integration & Time to market



IBM **Bluemix**TM



Deloitte.



Conclusion:

Blockchain, a Foundational Technology

The Blockchain disruption has started: Already disrupting Financial Technology

Scalable trust solution has been found

Supply Chain is next and is going to be big, and fast

Supply chain is finally going to get its technological revolution

Transformations like smart contracts will take more time

As they will require major social & institutional buy-in

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- <http://www.coindesk.com/bitcoin-venture-capital/>

Appendix

How can you benefit?

- **Business Leader / Investor**

- a. Competitive advantage by reducing cost
- b. Opportunities for new business models
- c. Investment Opportunities

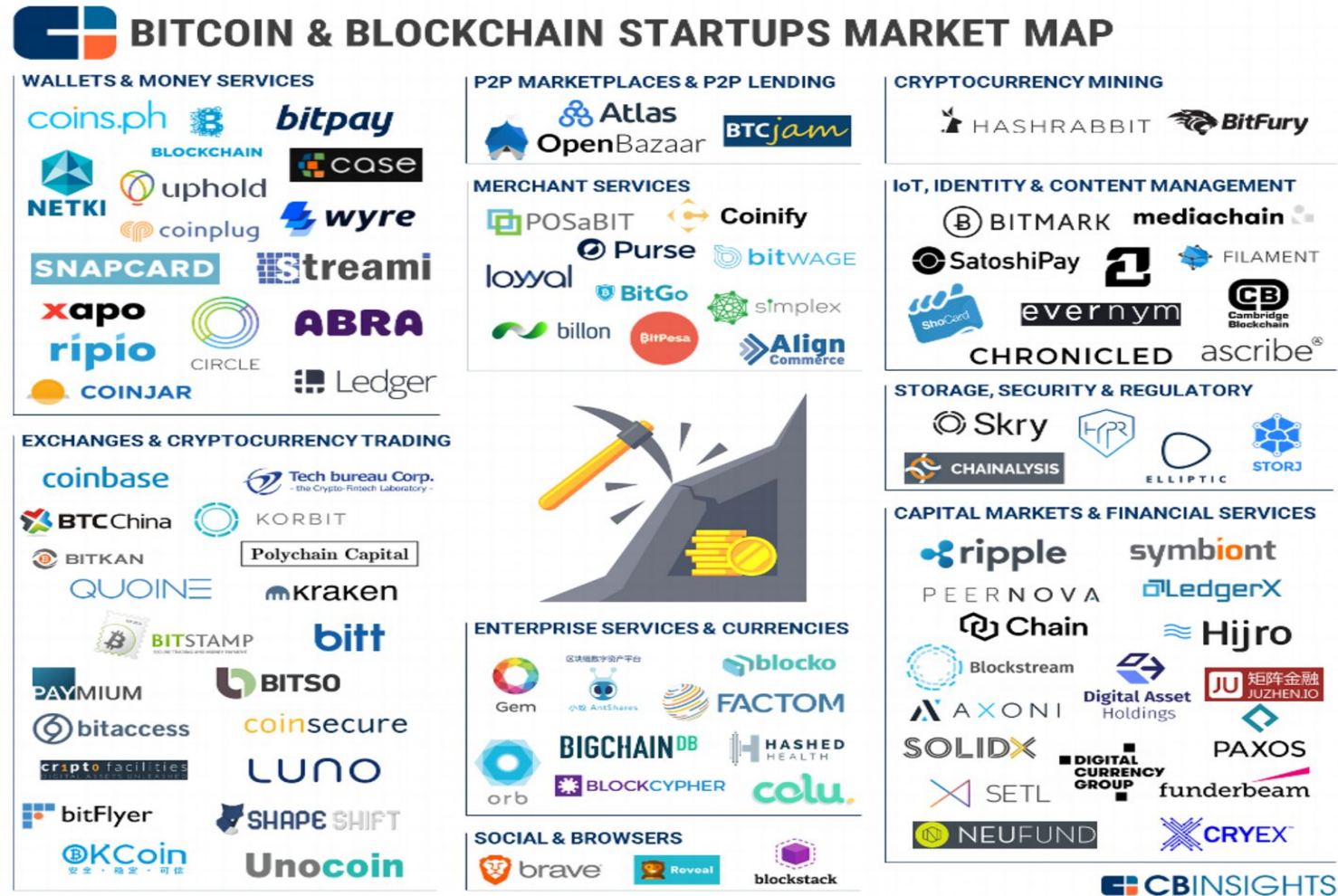


- **Consumer**

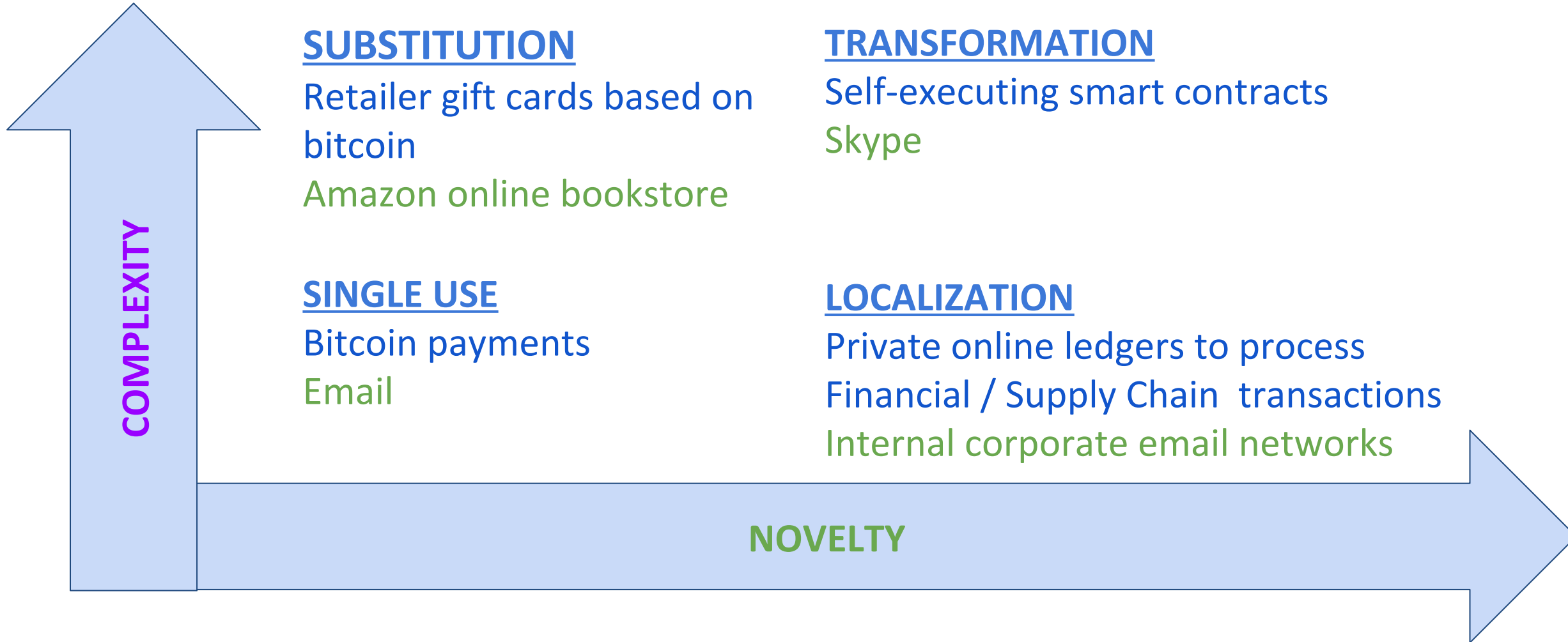
- a. Lower prices
- b. Better choices
(environment, organic)



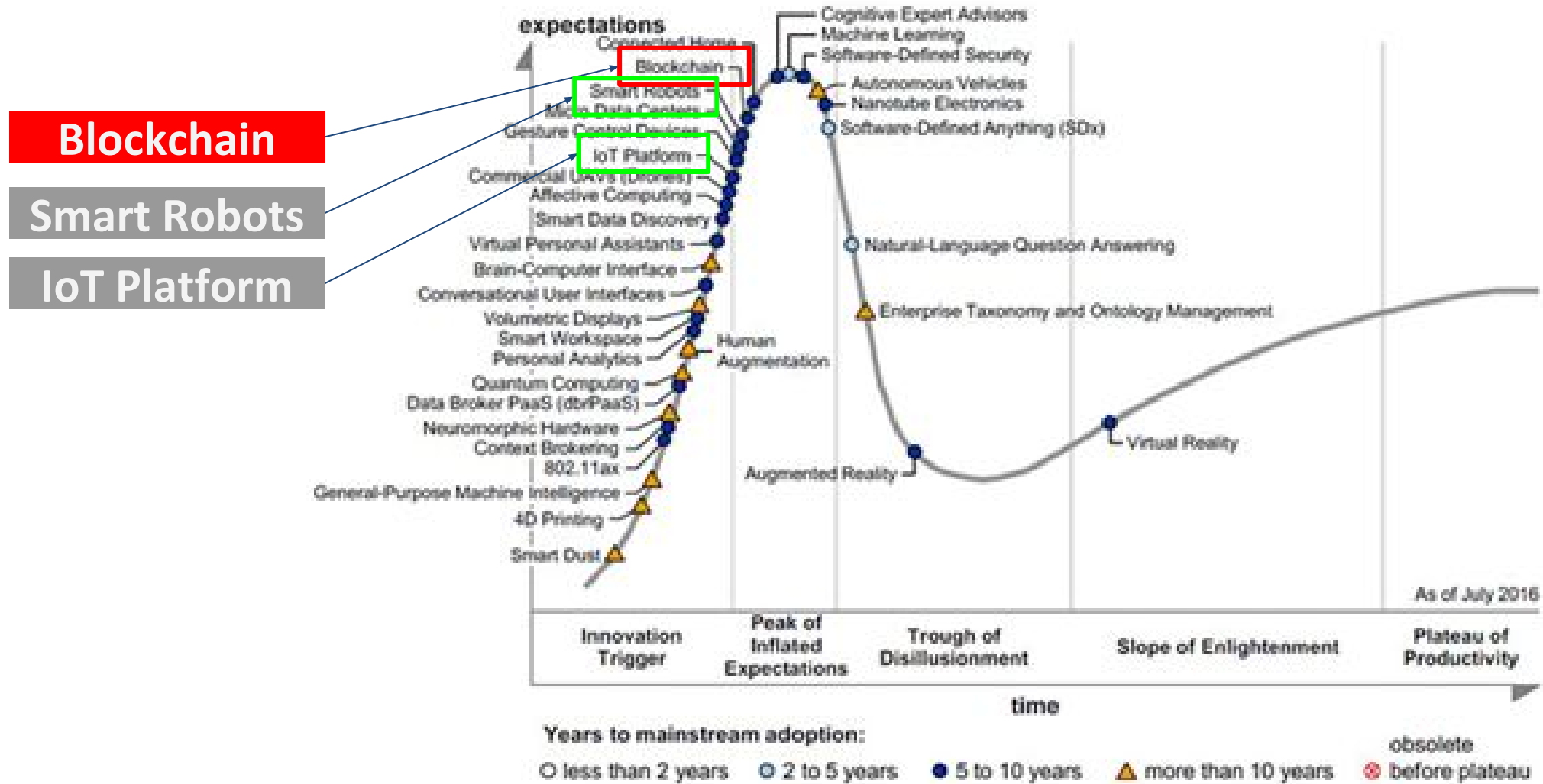
Entrepreneurs & Technology enabling Blockchain Fever



Blockchain Adoption Framework



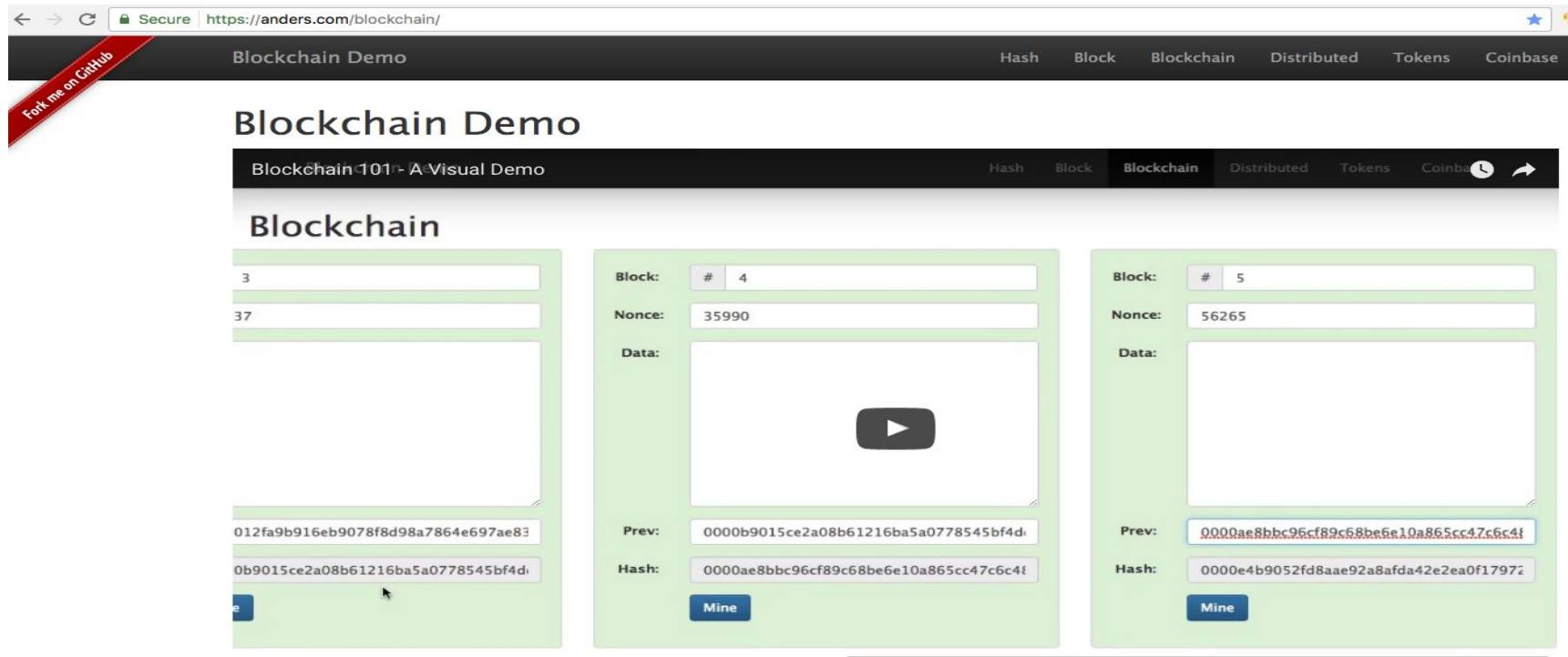
Gartner's 2016 Hype Cycle for Emerging Technology



Source: Gartner (July 2016)

How does it work? Blockchain Demo

<https://anders.com/blockchain/>



The screenshot shows a web browser at <https://anders.com/blockchain/>. The page title is "Blockchain Demo". A red banner on the left says "Fork me on GitHub". The main content area is titled "Blockchain Demo" and "Blockchain 101 - A Visual Demo". It features three blocks in a chain, each with a "Block:" field, a "Nonce:" field, a "Data:" field, a "Prev:" field, and a "Hash:" field. The first block has a "Block:" field with "# 3", a "Nonce:" field with "37", and a "Data:" field with a video player. The second block has a "Block:" field with "# 4", a "Nonce:" field with "35990", and a "Data:" field with a video player. The third block has a "Block:" field with "# 5", a "Nonce:" field with "56265", and a "Data:" field with a video player. Each block has a "Mine" button. The "Prev:" field of the second block contains the hash of the first block: "0000b9015ce2a08b61216ba5a0778545bf4d". The "Prev:" field of the third block contains the hash of the second block: "0000ae8bbc96cf89c68be6e10a865cc47c6c4f".

Blockchain Demo

Blockchain 101 - A Visual Demo

Blockchain

Block: # 3

Nonce: 37

Data:

Prev: 012fa9b916eb9078f8d98a7864e697ae83

Hash: 0b9015ce2a08b61216ba5a0778545bf4d

Mine

Block: # 4

Nonce: 35990

Data:

Prev: 0000b9015ce2a08b61216ba5a0778545bf4d

Hash: 0000ae8bbc96cf89c68be6e10a865cc47c6c4f

Mine

Block: # 5

Nonce: 56265

Data:

Prev: 0000ae8bbc96cf89c68be6e10a865cc47c6c4f

Hash: 0000e4b9052fd8aae92a8afda42e2ea0f1797z

Mine

by Anders Brownworth 1K3NvcuZzVTueHW1qhkG2Cm3viRkh2EXJp