Smart Ledgers & World Trade – Revolutionary Or Mundane?

World Traders' Lunchtime Lecture

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2 June 2021

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Outline

Assess & appraise
- What are ledgers?
- History and applicability of ledgers
- What are blockchains?

Lookaheads & likelihoods
- What are smart ledgers?
- What are smart contracts?
- The rise of the cryptocurrencies, mining, bitcoin, and altcoins

Options & outcomes
- Myths & legends
- Blockchain, more than a data structure?

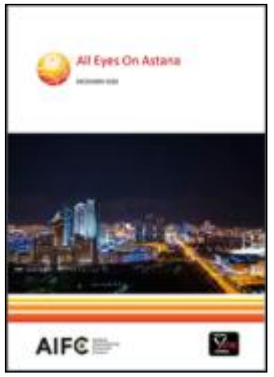
Understanding & undertaking
- The central third-party problem
- Mutual distributed ledgers in action
- Governance of mutual distributed ledgers

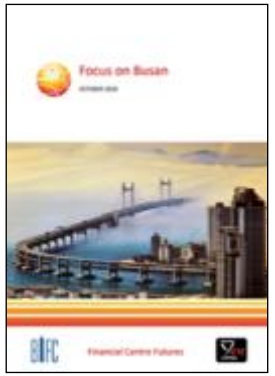
Securing & scoring – trade

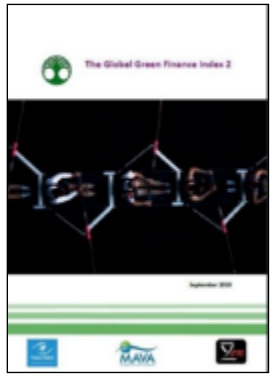
Discussion

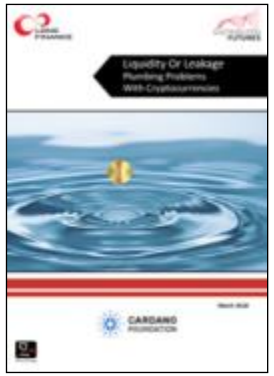
"Get a detailed grip on the big picture."
Chao Kli Ning

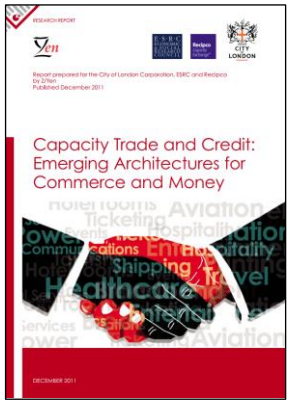
Research











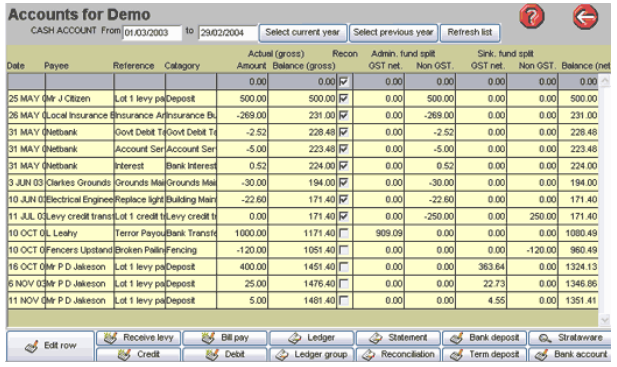
Allegory With Stone Soup?

Basics Of Smart Ledgers

‘Internet-of-Record(s)’

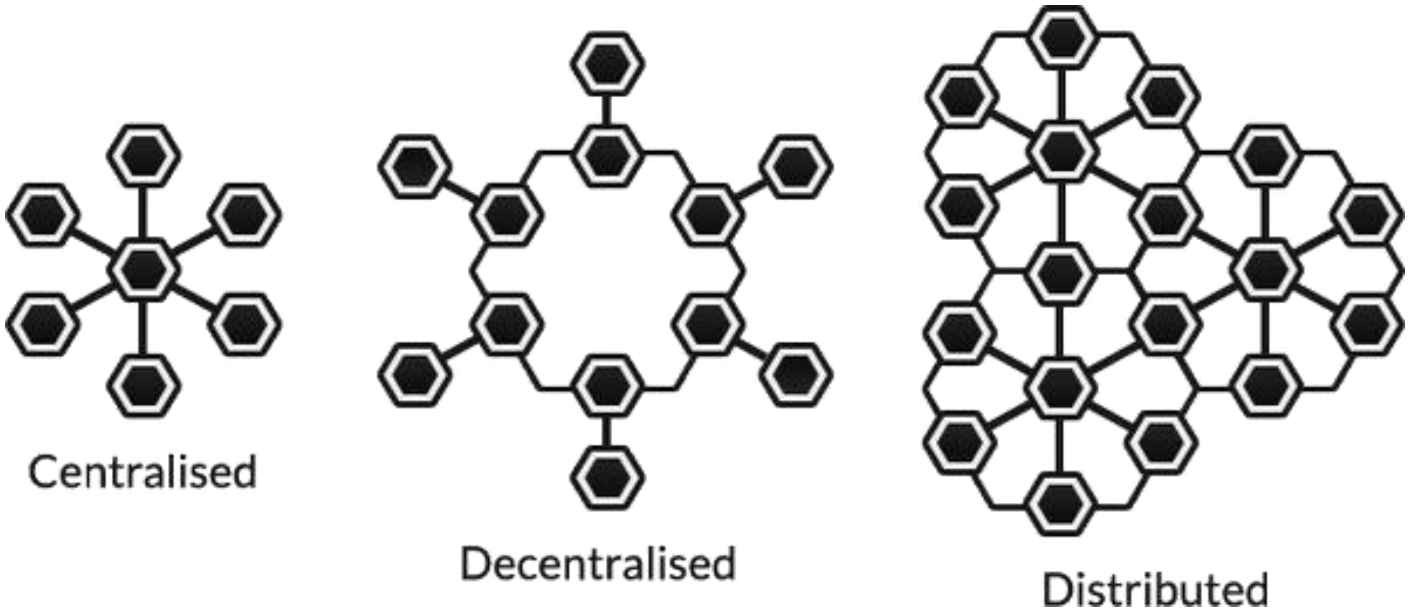
“A ledger is a book, file, or other record of financial transactions.”

Christopher Watrous Ledger Book, Durham, 1817 (Vedder Library)



[SOURCE: https://en.wikipedia.org/wiki/Tally_stick]
[SOURCE: http://www.rootsweb.ancestry.com/~nygreen2/wpeF7.jpg]
[SOURCE: https://en.wikipedia.org/wiki/Ledger]

Using Peer To Peer (P2P) Networks



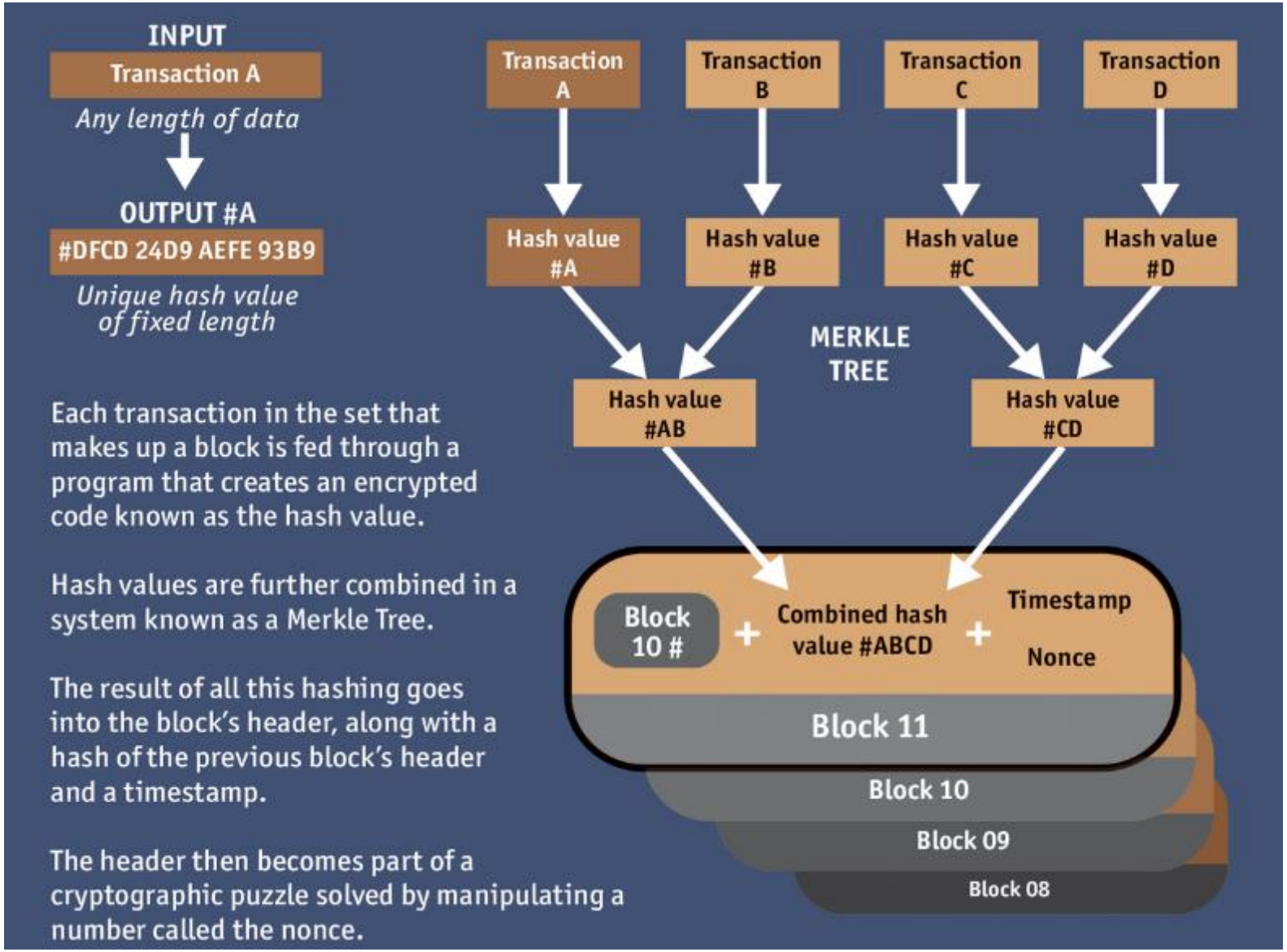
napster

gnutella

skype

[Nick Williamson, “What Is A Blockchain?” (12 April 2015) - http://blog.credits.vision/what-is-a-blockchain/]

Overview Of ‘Chains’

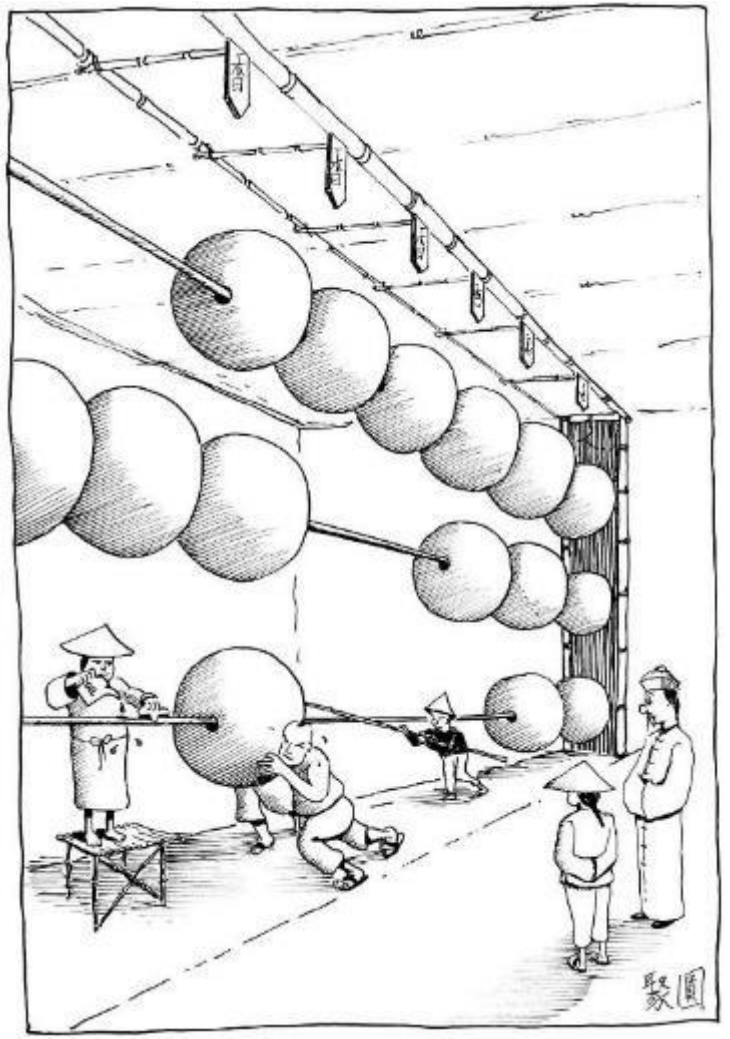


Possibly Distributively Ledgerable

Financial Instruments, Records, Models		Public Records		Private, Semi-Private/Semi-Public Records		Physical Keys, Intellectual Property, Other Records	
Currencies	Derivatives	Land & Property Titles	Vehicle Registries	Contracts	ID	Home Key	Hotel Key
Commodities	Insurance Policies	Shipping Registries	Satellite Registries	Signature	Will	Office Key	Car Key
Trading Records	Private and Public Equities	Business License	Business Ownership Records	Trust	Escrow	Deposit Box Key	Mail Box Key
Certificates of Deposit	Bonds	Incorporation / Dissolution Records	Regulatory Records	Other Classifiable Data	High School / University Degrees	Internet Of Things	Copyrights & Patents
Voting Rights (Financial Services)	Credit Data	Criminal Records	Passport	Professional Qualifications	Certifications	Licenses	Digital Rights Management
Collateral Management	Client Monies Segregation	Birth / Death Certificates	Voting ID	Human Resources Records	Medical Records	Trademarks	Proof Of Authenticity / Authorship
Mortgage / Loan Records	Crowd-Funding	Health & Safety Inspections	Tax Returns	Accounting Records	Business Transaction Records	Cultural Events	Historical Events
P2P Lending	Microfinance	Building & Other Types Of Permits	Court Records	Locational Data	Genome & DNA	Documenta-ries	Big Data
Account Portability	Airmiles / Corporate Tokens	Government / Listed Companies	Accounts & Annual Reports	Arbitration	Genealogy Trees	SIM Cards	Archives

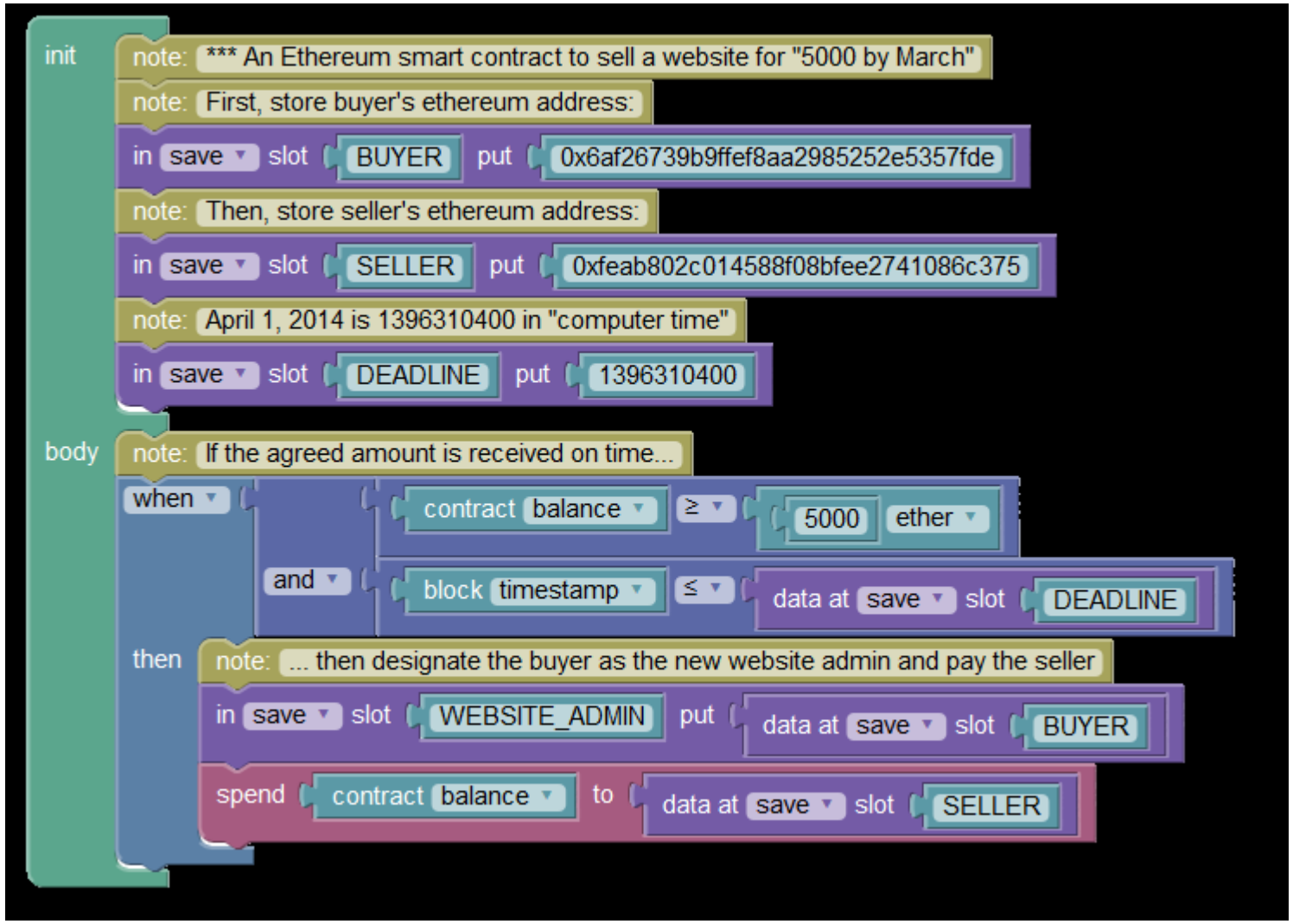
Lookaheads & Likelihoods

What Are Smart Ledgers?



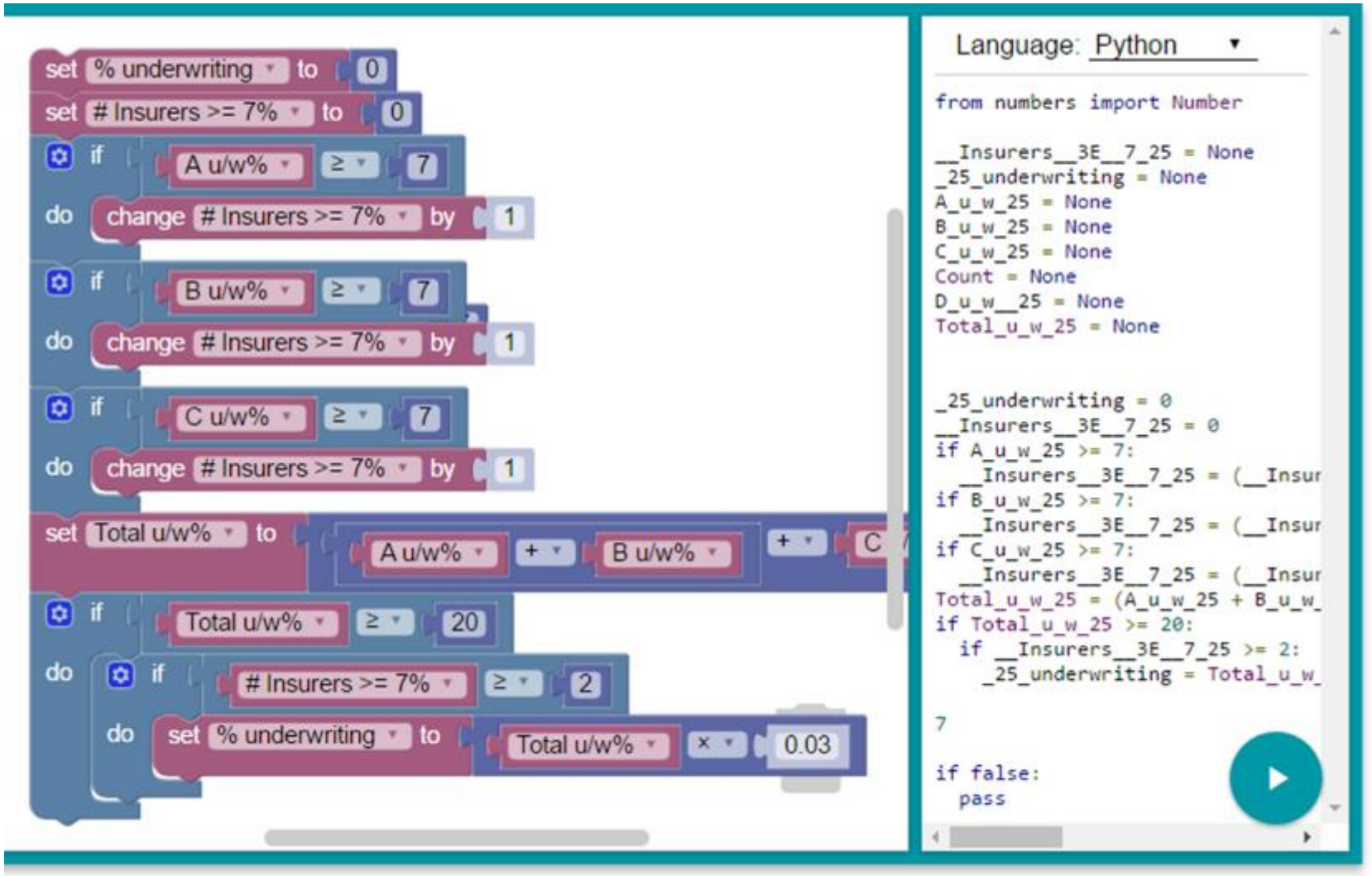
“Get a big picture grip on the details.”
Chao Kli Ning

Smart Contract



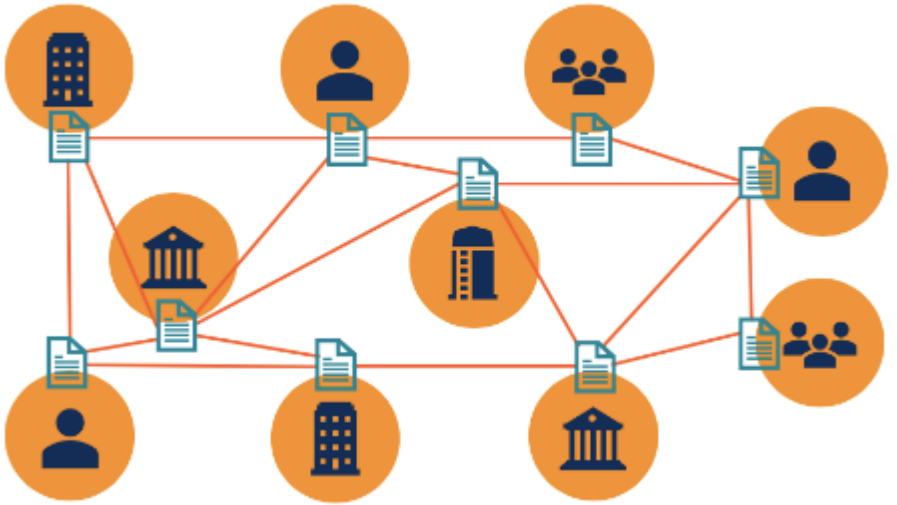
www.bitcoinsuisse.ch

Smart? Follower Syndicate In Code

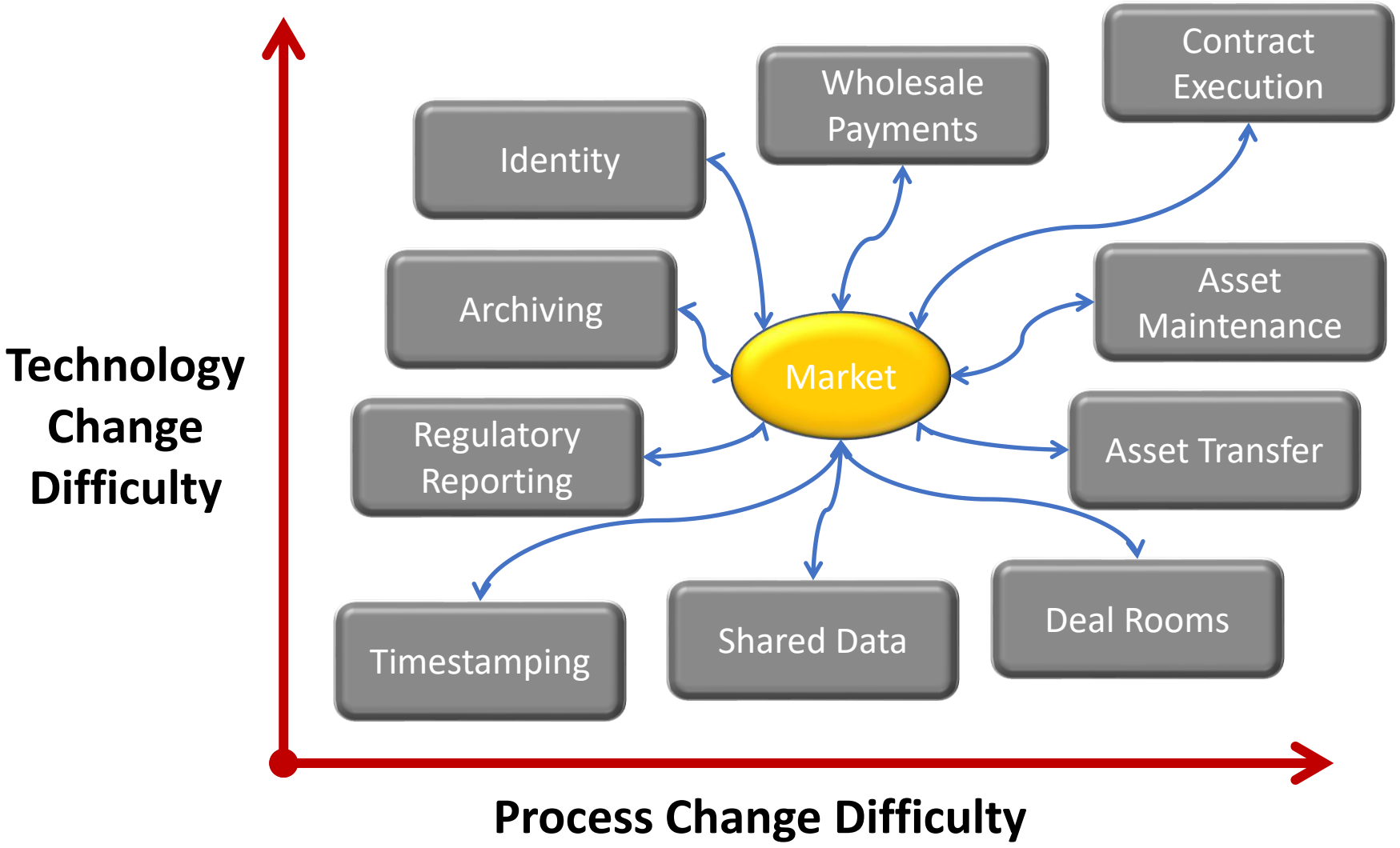


Terminology Evolving

- **ledger** – a record of transactions
- **distributed** – divided among several or many, in multiple locations
- **distributed ledger (DL)** - a record of transactions shared in common and stored in multiple locations
- **mutual distributed ledger technology (DLT)** – a technology that provides an immutable record of transactions shared in common and stored in multiple locations
- **blockchain** - "a transaction database shared by all nodes participating in a system based on the Bitcoin protocol"
- **smart ledger** – DLT with embedded, executable code



Generic 'Anti-Cheating' Devices - Performing with Integrity



Central Registry As Trusted Third Party?

Validates – entries

Safeguards – transactions

Preserves – historic record

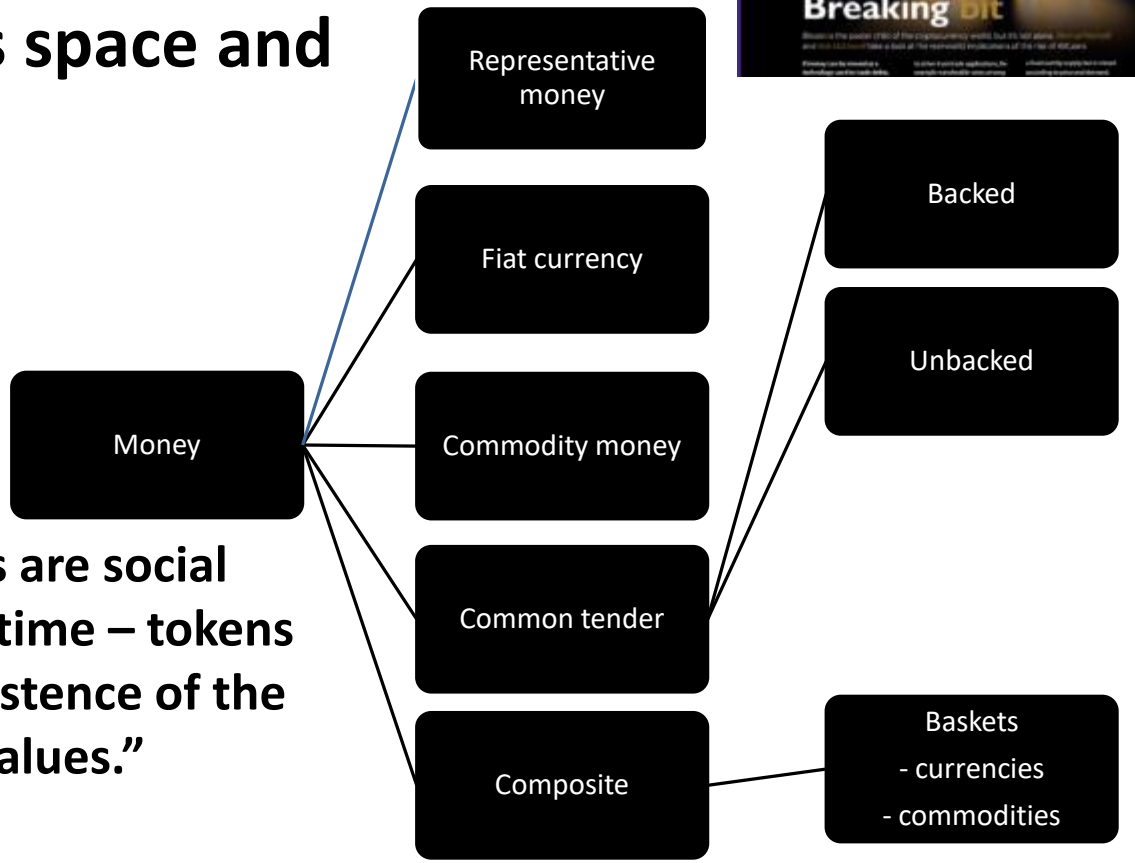
What Money Consumes Is Obvious, It Consumes Attention…

Global wealth circa US$ 360 tn, cryptocurrencies 0.6%, Bitcoin 0.3%

All gold ever mined, 197,576 tonnes @ US$ 60 M/tonne = US$ 11,854,560,000,000, cryptocurrencies 17%, Bitcoin 8.5%

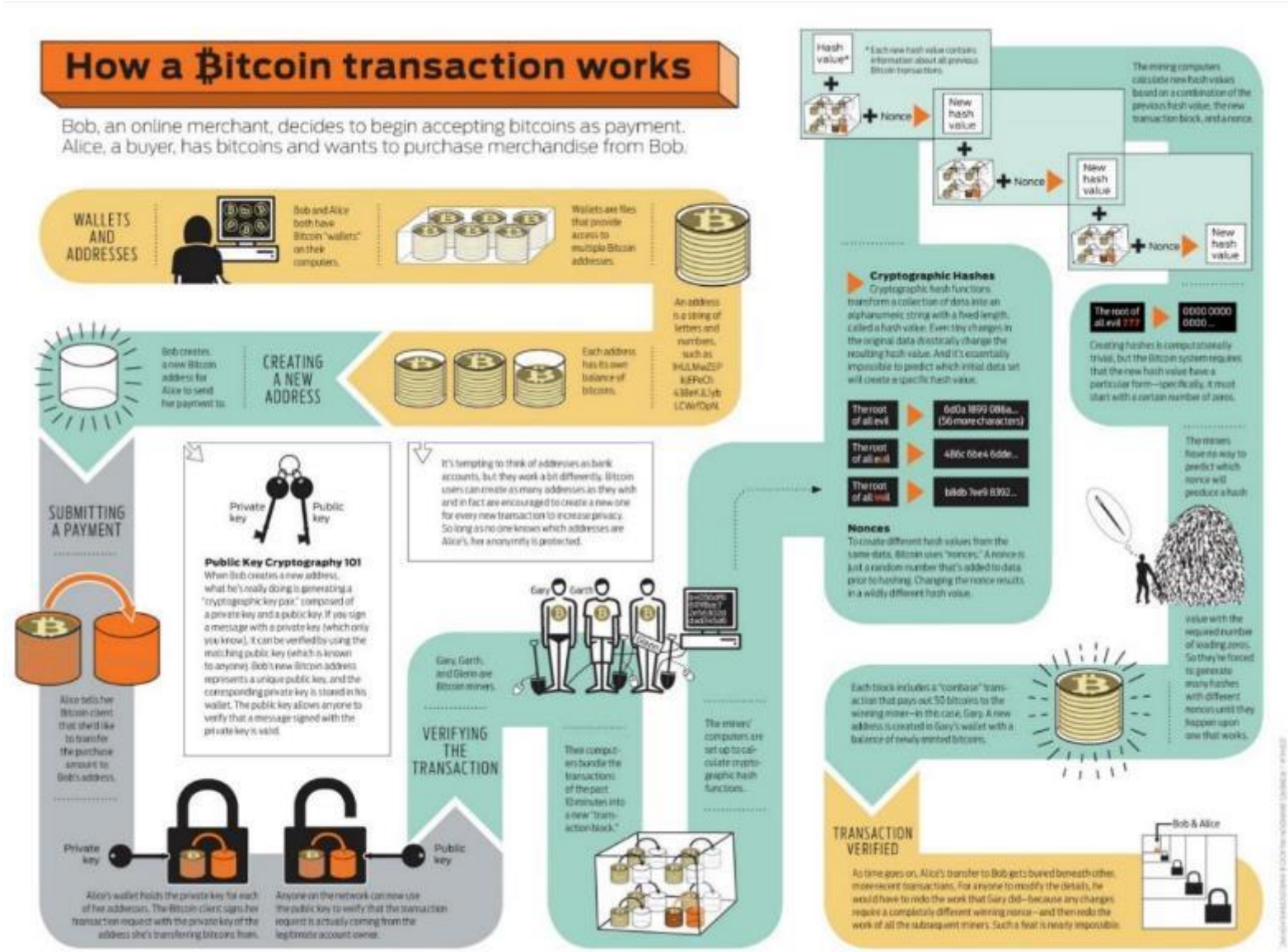
Money As Technology

“Money is a technology communities use to trade debts across space and time.”



“Tokens of indebtedness are social desires frozen at a point in time – tokens depend on the future persistence of the community and its values.”

Bitcoin Primer



Spectrum.ieee.org "How a Bitcoin Transaction Works"

Options & Outcomes

Myths & legends

- Brand new technology?
- Economics doesn’t matter?
- Speed doesn’t matter?
- Payments?

Myth - New

United States Patent [19]

Ehrsam et al.

[11] **4,074,066**

[45] **Feb. 14, 1978**

[54] **MESSAGE VERIFICATION AND TRANSMISSION ERROR DETECTION BY BLOCK CHAINING**

[75] Inventors: **William Friedrich Ehrsam,** Hurley; **Carl H. W. Meyer,** Kingston; **John Lynn Smith; Walter Leonard Tuchman,** both of Woodstock, all of N.Y.

[73] Assignee: **International Business Machines Corporation,** Armonk, N.Y.

[21] Appl. No.: **680,404**

[22] Filed: **Apr. 26, 1976**

[51] **Int. Cl.**[2] **H04L 9/02**

[52] **U.S. Cl.** **178/22**

[58] **Field of Search** ..... 178/22; 35/4; 340/146.1 AL

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,657,699	4/1972	Rocher et al.	178/22
3,725,579	4/1973	Sturzinger	178/22

Primary Examiner—Samuel W. Engle
Assistant Examiner—S. A. Cangialosi
Attorney, Agent, or Firm—Edwin Lester

[57] **ABSTRACT**

A message transmission system for the secure transmission of multi-block data messages from a sending station to a receiving station.

The sending station contains cryptographic apparatus operative in successive cycles of operation during each of which an input block of clear data bits is ciphered under control of an input set of cipher key bits to generate an output block of ciphered data bits for transmission to the receiving station. Included in the cryptographic apparatus of the sending station is means providing one of the inputs for each succeeding ciphering cycle of operation as a function of each preceding ciphering cycle of operation. As a result, each succeeding output block of ciphered data bits is effectively chained to all preceding cycles of operation of the cryptographic apparatus of the sending station and is a function of the corresponding input block of clear data bits, all preceding input blocks of clear data bits and the

FINANCIAL TIMES

December 14, 2015 1:59 pm

Blockchain believers seek to shake up financial services

Jane Wild

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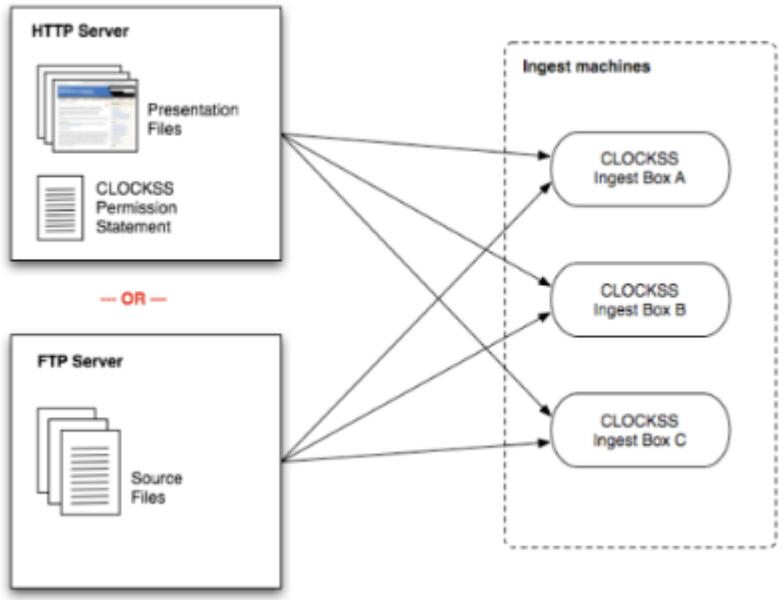
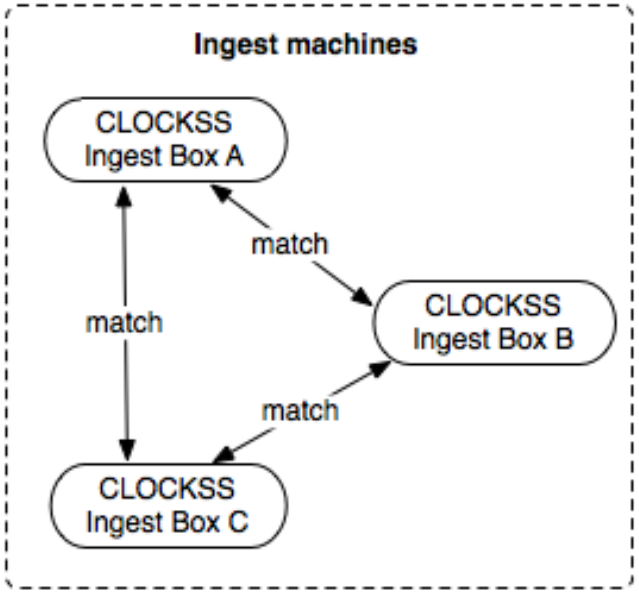
Meet one of the innovators looking at mainstream applications for the infrastructure behind bitcoin

"Included in the crypto graphic apparatus of the sending station is means providing one of the inputs for each succeeding ciphering cycle of operation as a function of each preceding ciphering cycle of operation. As a result, each succeeding output block of ciphered data bits is effectively chained to all preceding cycles of operation…"

Myth - New

Example





Lots of copies keep stuff safe!

[SOURCE: https://www.clockss.org/clockss/How_CLOCKSS_Works - February 2016]

Myth – Economics Doesn't Matter

Annualized Total Bitcoin Footprints

Carbon Footprint	Electrical Energy	Electronic Waste
52.66 Mt CO2	110.86 TWh	10.04 kt
Comparable to the carbon footprint of **Sweden**.	Comparable to the power consumption of **Netherlands**.	Comparable to the e-waste generation of **Luxembourg**.

Single Bitcoin Transaction Footprints

Carbon Footprint	Electrical Energy	Electronic Waste
545.03 kgCO2	1147.43 kWh	103.90 grams
Equivalent to the carbon footprint of **1,207,971** VISA transactions or **90,838** hours of watching Youtube.	Equivalent to the power consumption of an average U.S. household over **39.33** days.	Equivalent to the weight of **1.60** 'C'-size batteries or **2.26** golf balls. (Find more info on e-waste here.)

https://digiconomist.net/bitcoin-energy-consumption/

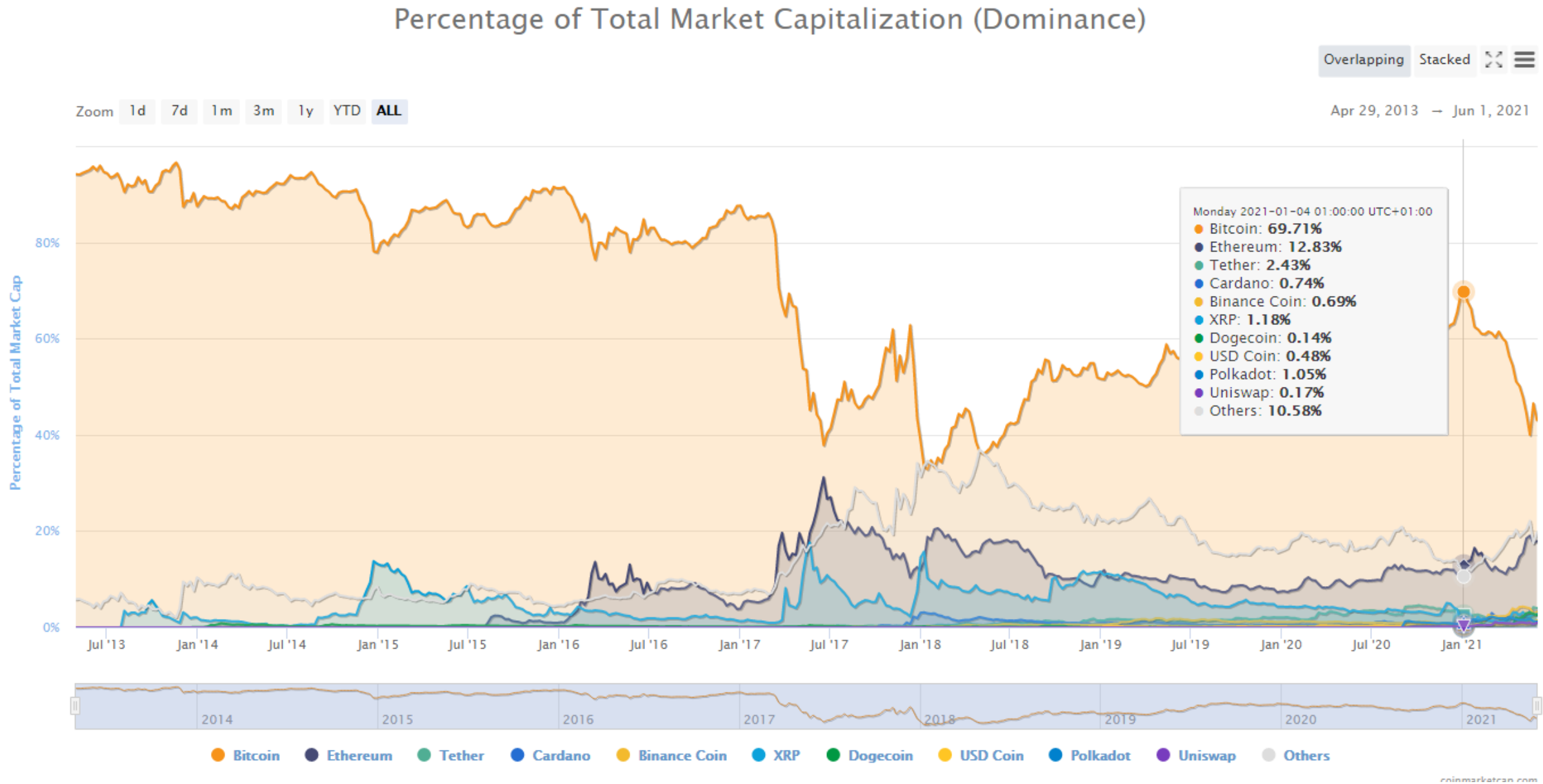
Myth – Economics & Speed Don't Matter

Factor	Bitcoin	Ethereum	ChainZy
Speed – transactions per second	**7 tps**	**30 tps**	**2,000 to 100,000 tps**
$/transaction	**$20**	**$12.50**	**<$0.000001**
Validation time	**10 minutes**	**15 seconds**	**0.0001 second**

Google search	40,000 a second
Visa payments	65,000 a second
Twitter	600 a second
Facebook	700 a second
Bombay Exchange	4,600 a second

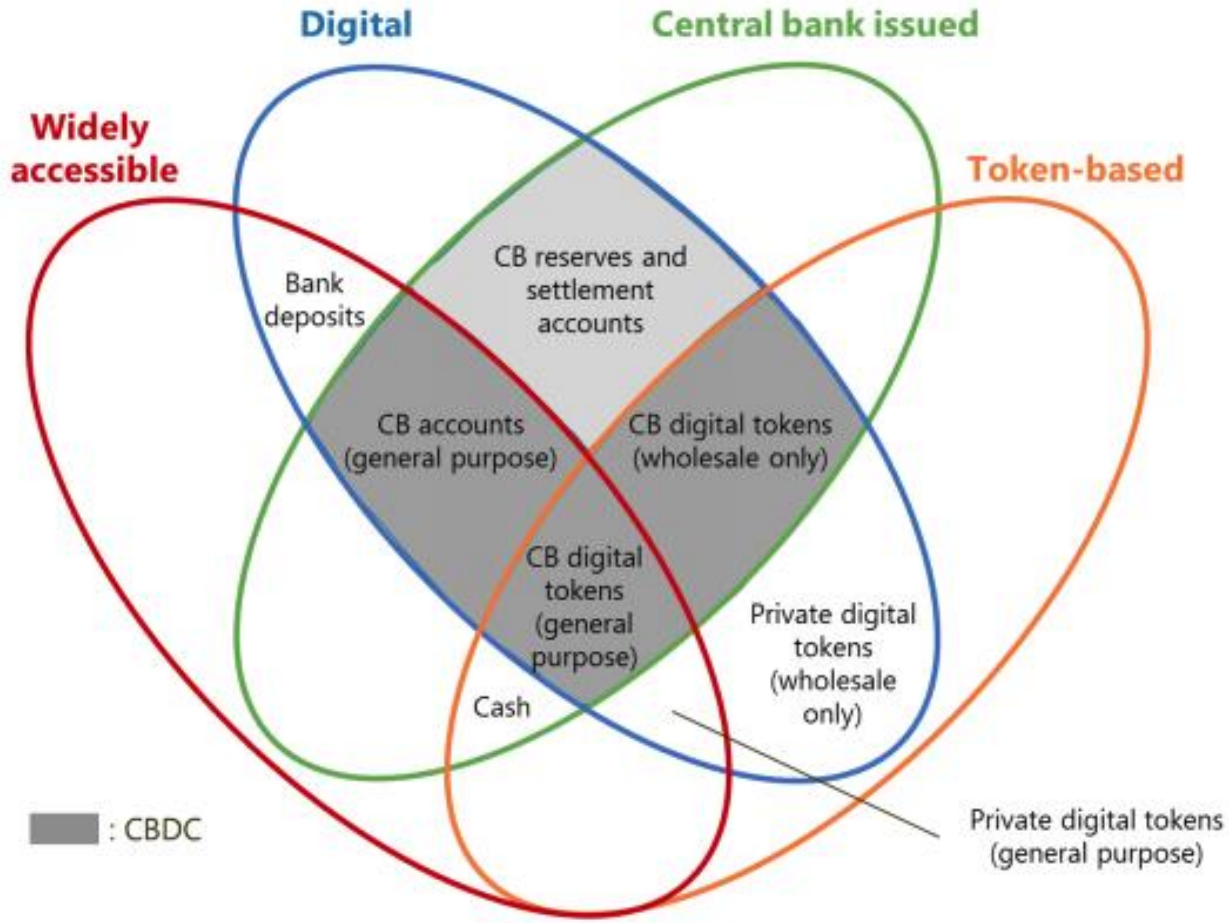
Myth - Payments

Crypto Cockroaches?



Central Bank Digital Currencies Are Not Cryptocurrencies

The money flower: a taxonomy of money — Graph 1



Notes: The Venn-diagram illustrates the four key properties of money: *issuer* (central bank or not); *form* (digital or physical); *accessibility* (widely or restricted) and *technology* (account-based or token-based). *CB* = central bank, *CBDC* = central bank digital currency (excluding digital central bank money already available to monetary counterparties and some non-monetary counterparties). *Private digital tokens (general purpose)* include crypto-assets and currencies, such as bitcoin and ethereum. *Bank deposits* are not widely accessible in all jurisdictions. For examples of how other forms of money may fit in the diagram, please refer to the source.

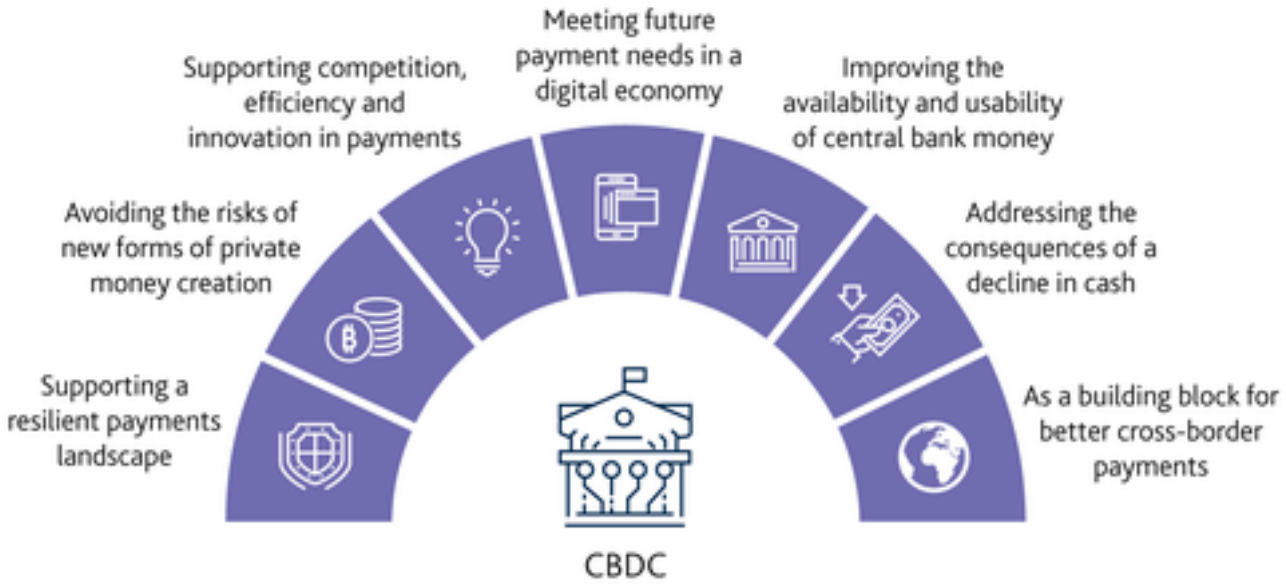
Source: Based on Bech and Garratt (2017).

https://www.bis.org/publ/qtrpdf/r_qt1709f.pdf

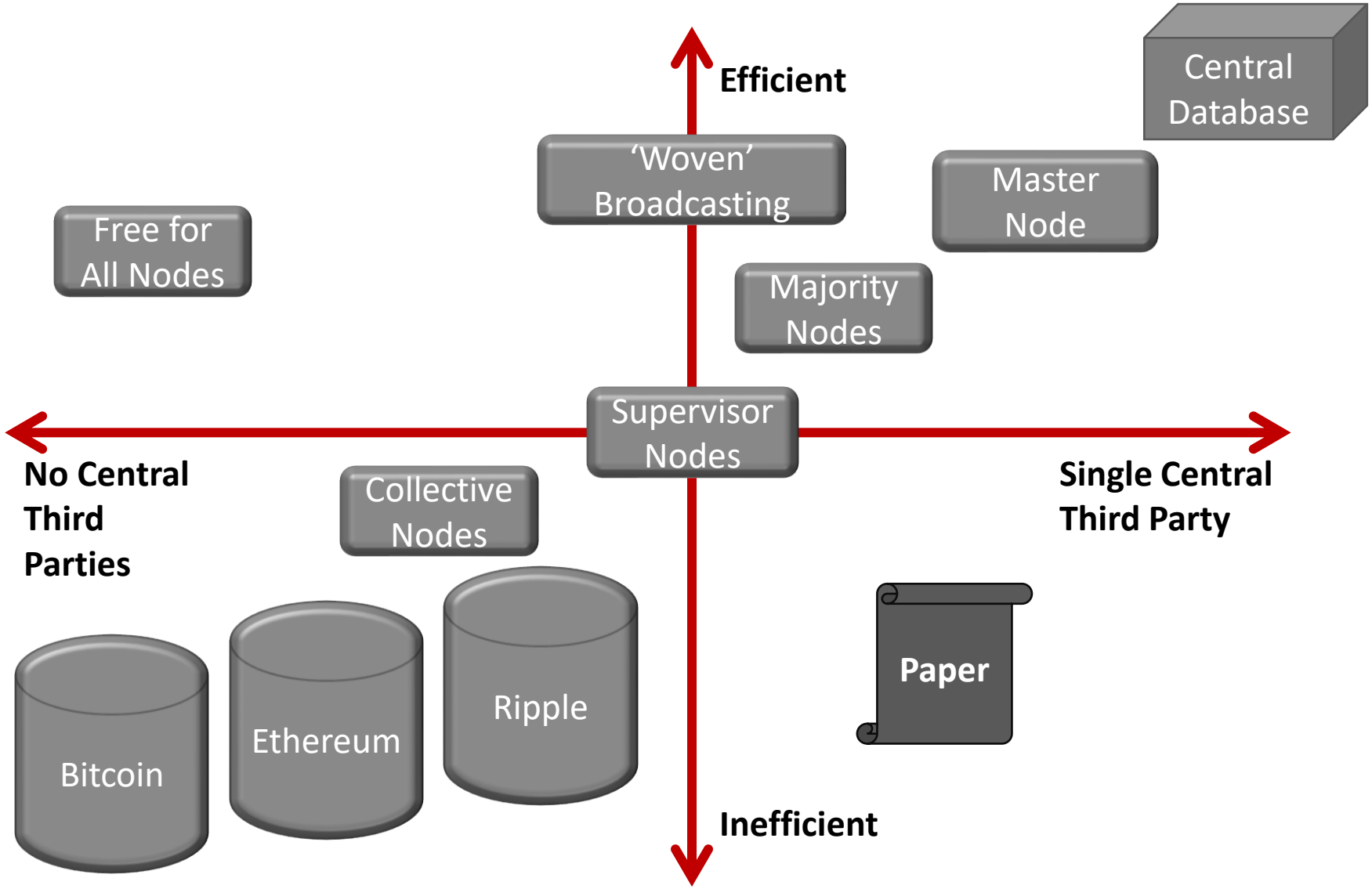
When The Pixie Dust Settles

"You'll see her after the third glass"

- not necessarily blockchain
- privacy?
- fractional reserve banking works how ?&*!
- Mainelli's economic corollary to Godwin's law of Nazi analogies - taxation Nazis?

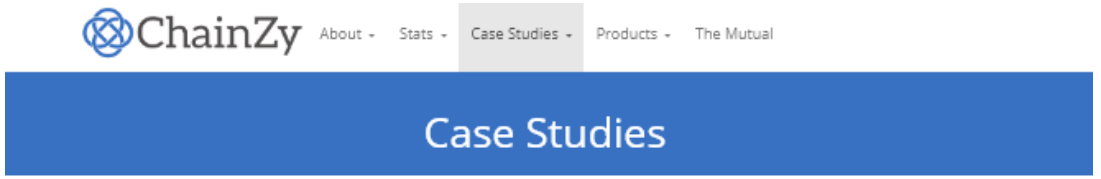


Cryptocurrency ≠ DLT, Mistrust Costs Coins



Apps Exist, But They’re Boring

ChainZy.com



ChainZy is a set of working products handling tens of millions of transactions per year. The ledgers are sometimes viewable, and the clients below give some idea of the breadth of applications or demonstrations already complete (* = viewable ledger, L = live application, D = demonstration/pilot).

TimeChainZ - Clinical Assessments *L

TimeChainZ - MovieSweep *L

TimeChainZ - States of Alderney *L

TimeChainZ - Youthinmind L

TimeChainZ - Regulatory Reporting For High-Frequency Trading D

TimeChainZ - Book Publishing Download Authentication L

IDChainZ - Mobile Application D

SmartChainZ - FastTrackTrade *L

SmartChainZ - Fishface L

SmartChainZ - IoT Refrigerator Timestamping D

SmartChainZ - Cyber-Catastrophe Insurance-Linked-Security Index *L

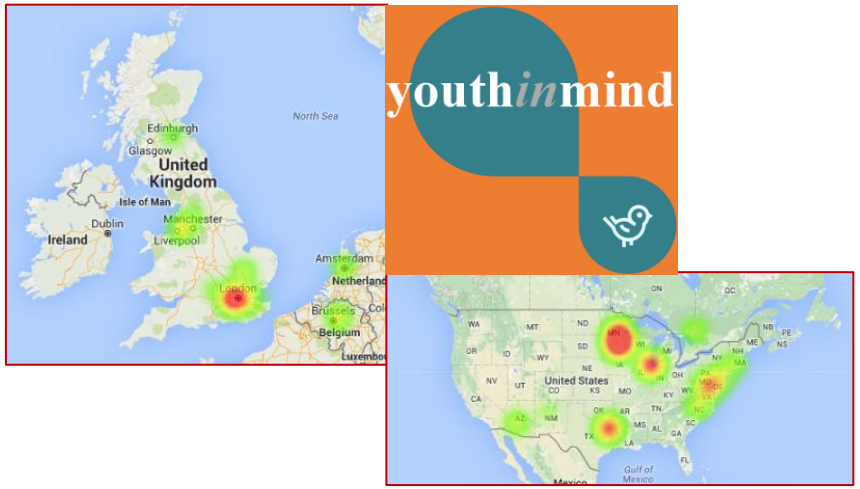
TimeChainZ - Catenae Uses ChainZy For Firedoor Inspections L

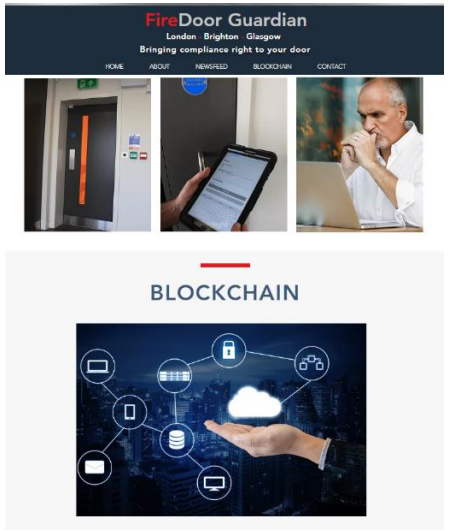
TimeChainZ - SafeShare Insurance L, now D

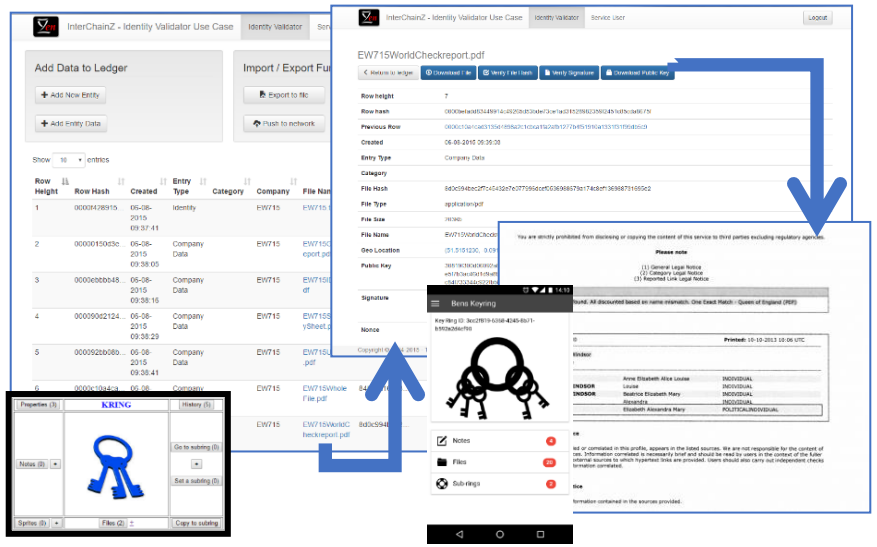
GeoChainZ - GeoGnomo D

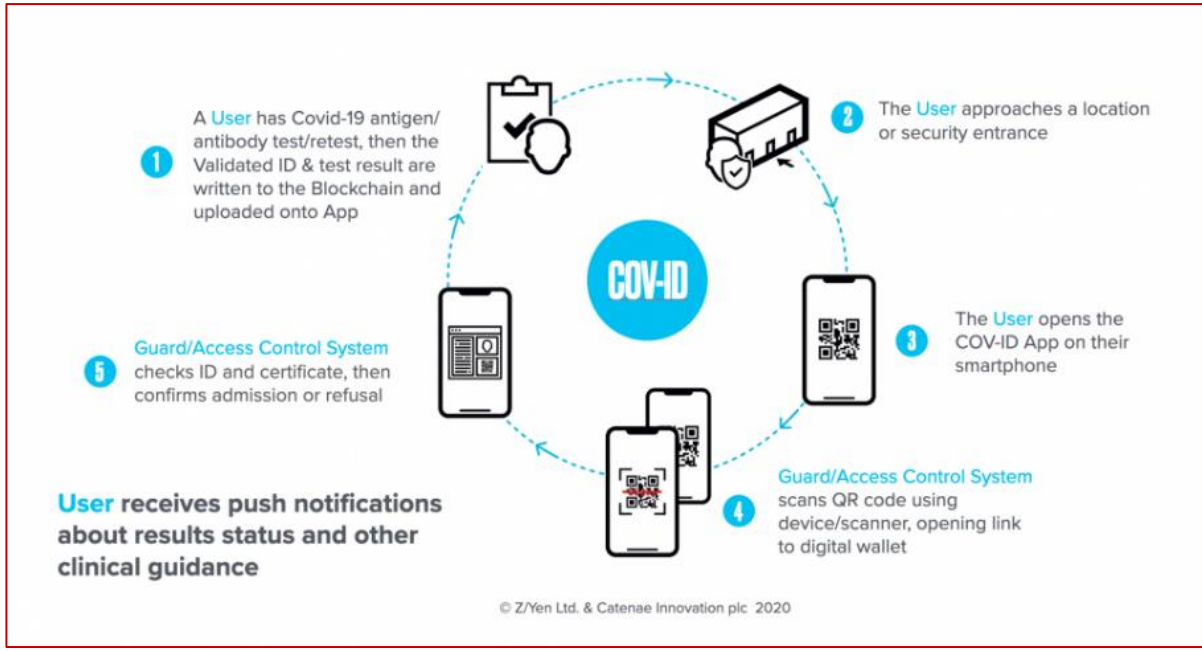
GeoChainZ - GeoTono D

Firedoor, YouthInMind, Metrognomo, IDchainZ, Cov-ID.io





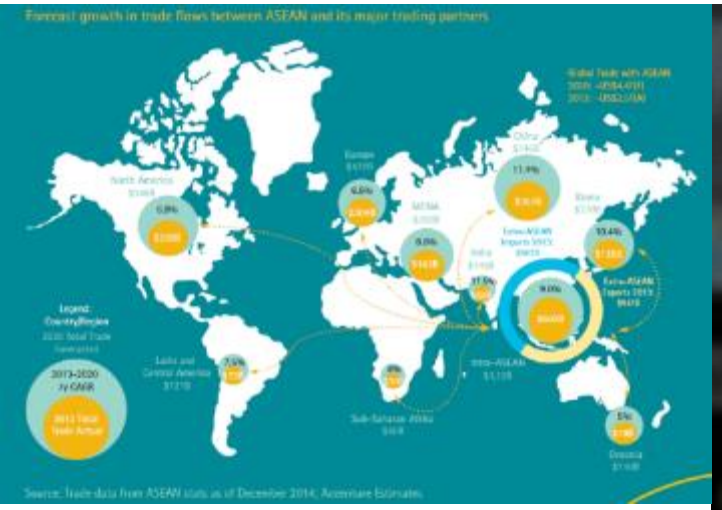


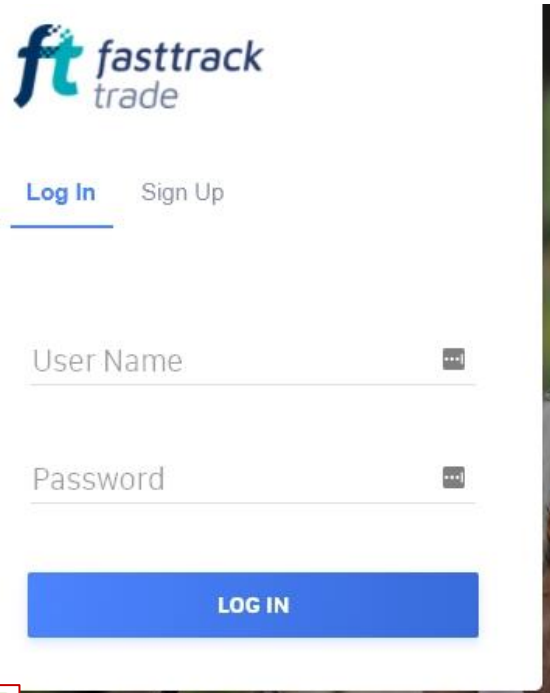


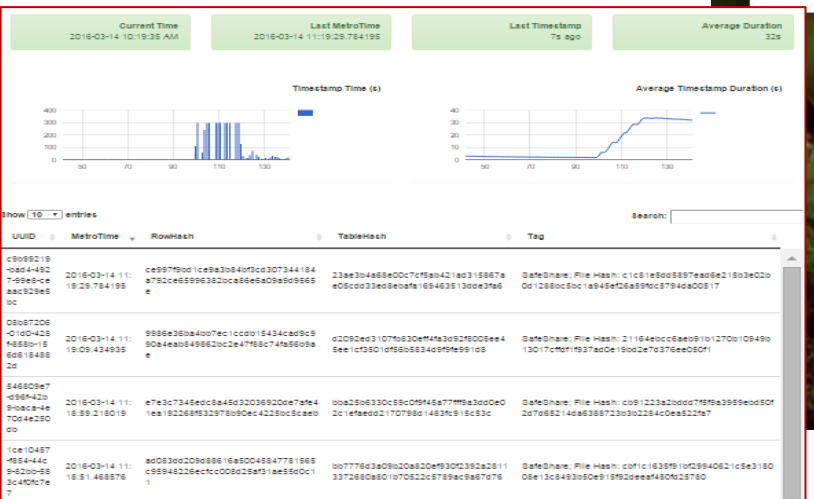
Securing & Scoring

Trade?

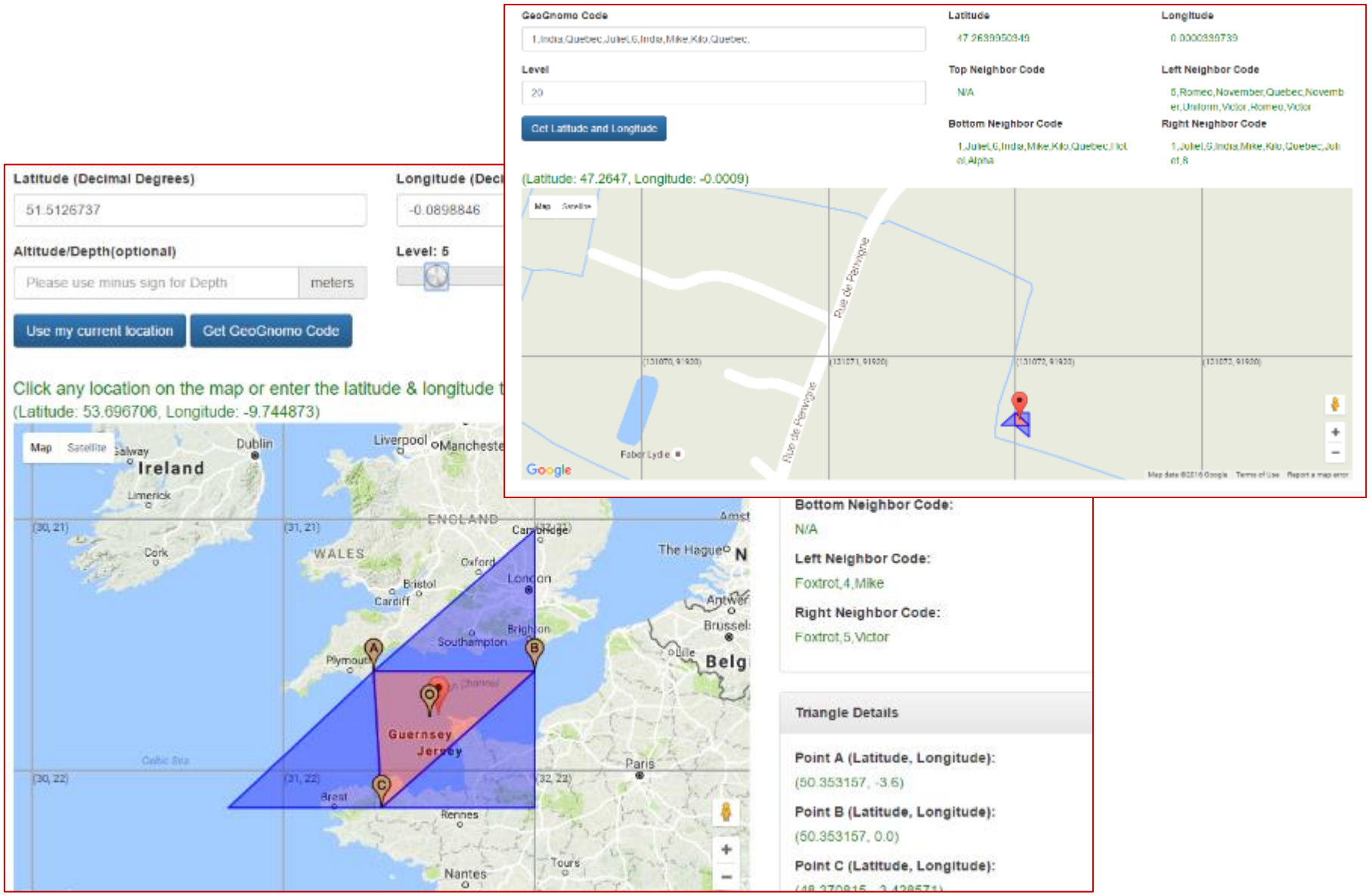
CHOGM - Data Sharing



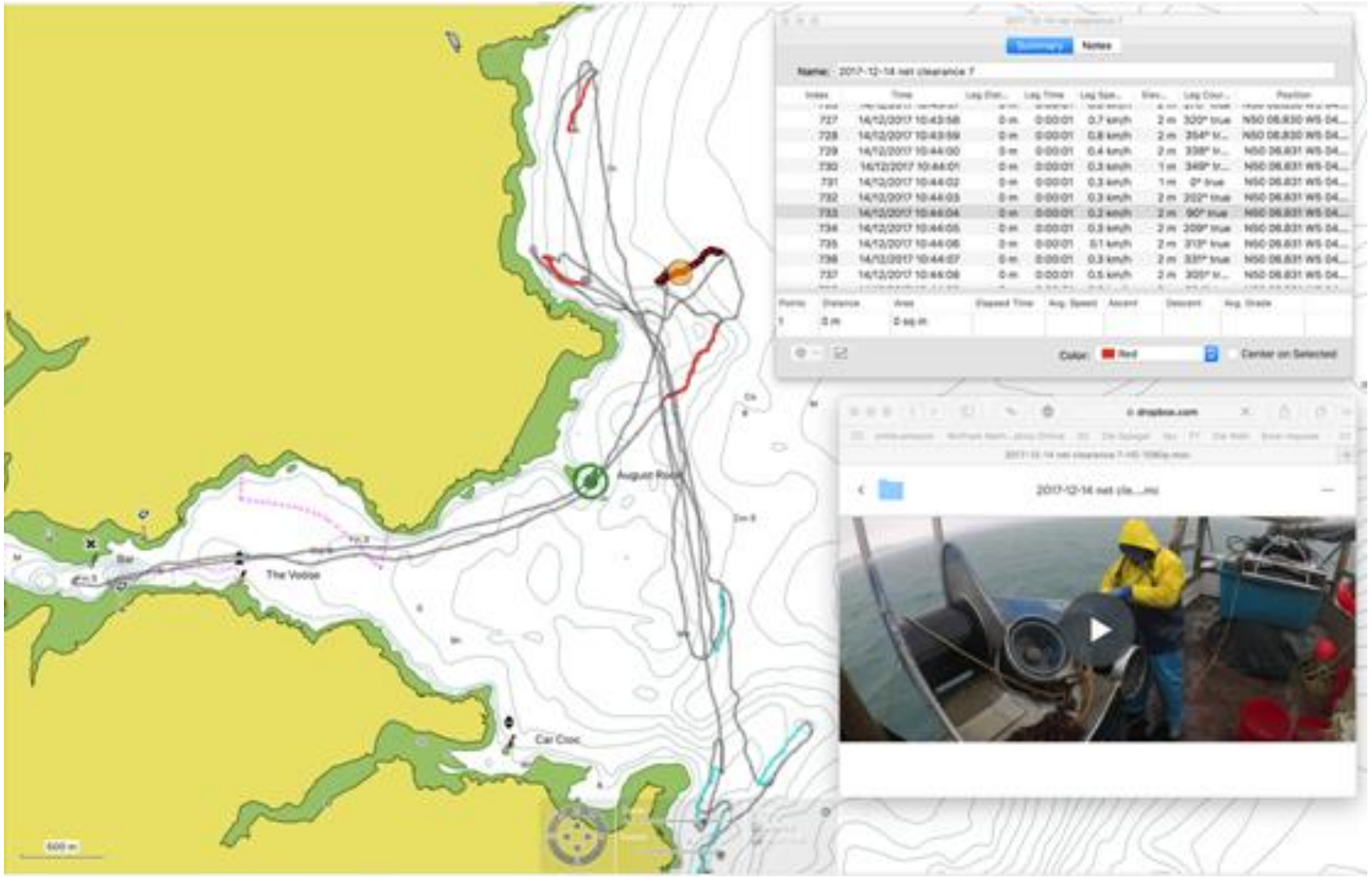




GeoGnomo – Geostamping



Fishface



House of Commons Terrace Pavilion - 17 April 2018

World Traders' Contribution To Debate

World Trade

International trade creates and channels wealth and prosperity throughout the world. An efficient and effective global trading system allows goods and services to flow to where they are needed most, through price signalling. In turn, trade generates value through economies of scale and specialisation.

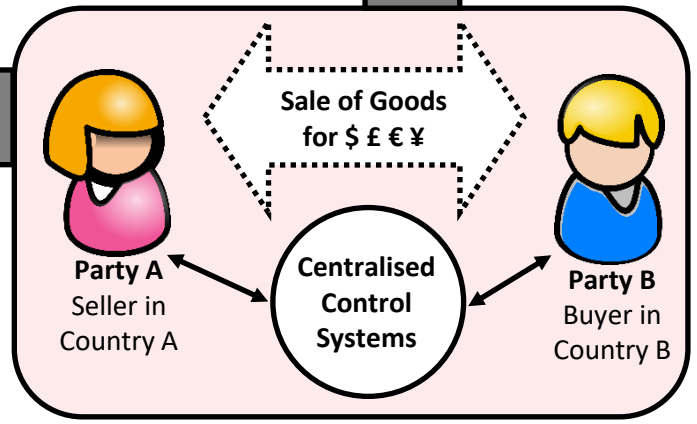
International trade allows countries to exploit economies of scale by producing for a bigger mass market than would be achievable domestically. The efficiency gains are then transferred to consumers through lower prices. Other economic benefits are channelled to workers through higher salaries.

Barriers

- ♦Direct Barriers
  - ∗Tariffs
  - ∗Embargos
- ♦Indirect (Non-Tariff) Barriers
  - ∗Quotas
  - ∗Domestic subsidies
  - ∗Customs delays
  - ∗Varying degrees of development
  - ∗Cultural & linguistic differences

Potential Problems

- ♦Data flows liable to leaks & breaches
- ♦Lack of control
- ♦Need for data repositories
- ♦Centralised checking/verification services
- ♦Agent action/adaptation constraints



The cost of importing a single container could be reduced by around $46.

Revolutionary – Stone Soup Database Projects?

COR
CONTOUR
Contour

HLF
skuchain
EC3 Platform [Skuchain]

HLF
貿易聯動 eTradeConnect
eTradeConnect [Hong Kong Trade Finance Platform Company Limited (HKTFPCL)]

PT
Infosys Finacle
India Trade Connect

QRM
komgo
komgo

COR
MarcoPolo
Marco Polo [TradeIX]

HLF
MINEHUB
Minehub

PT
中国人民银行
People's Bank of China Blockchain Trade Finance Platform/ Bay Area Trade Finance Blockchain Platform

PT
TradeFinex
Powered By XDC Protocol
TradeFinex

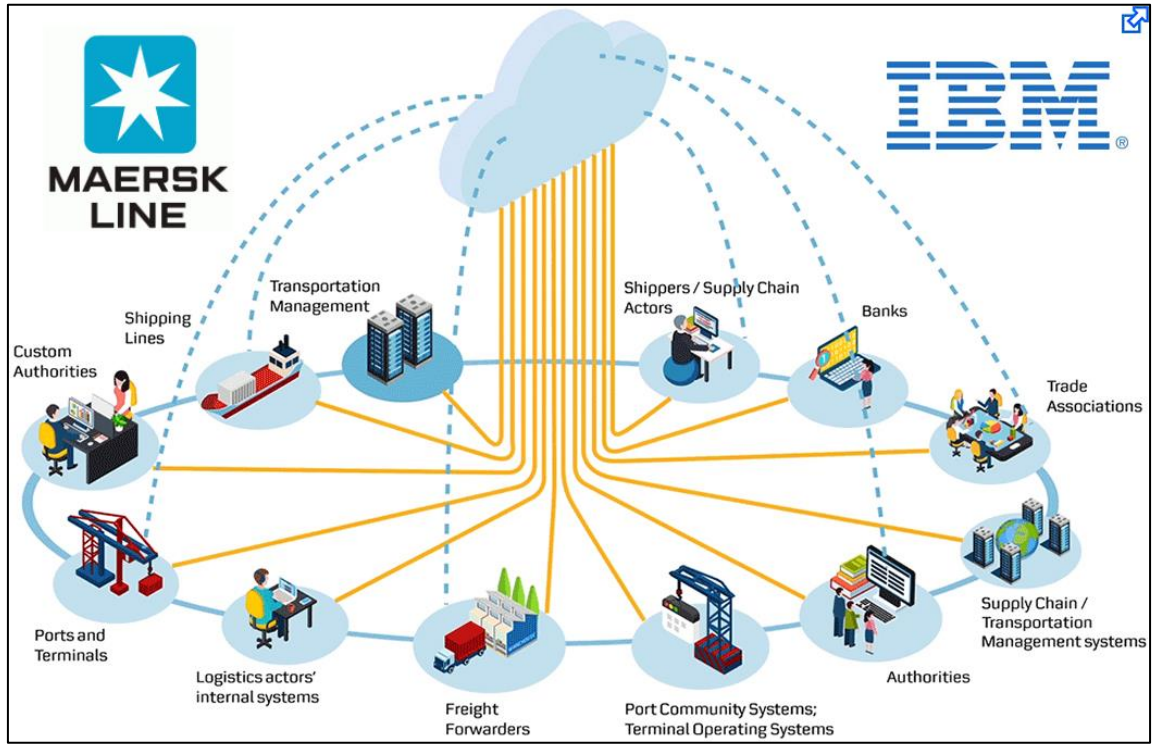
HLF
TradeWaltz
TradeWaltz [NTT Data]

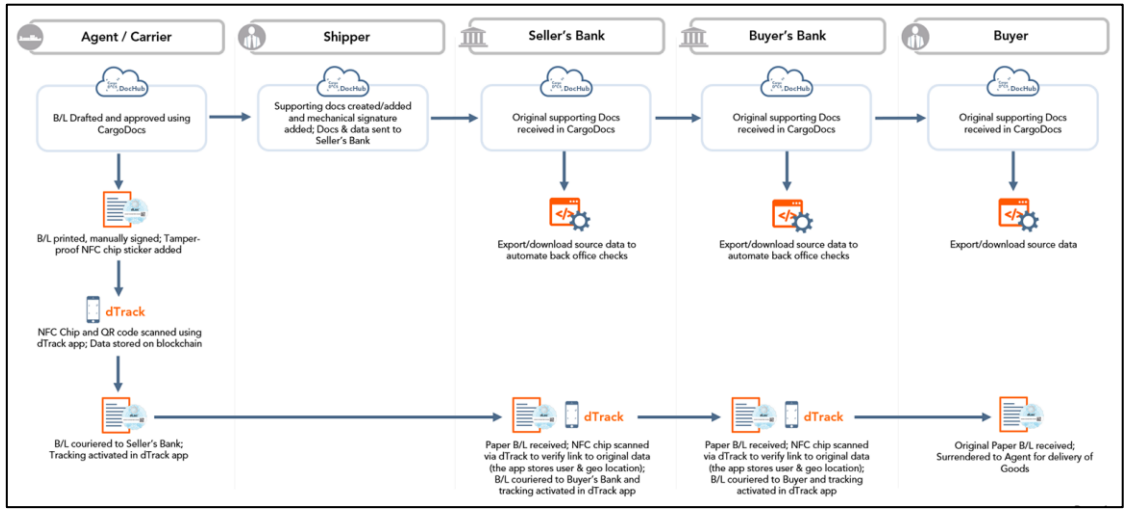
HLF
UTC
UAE Trade Connect [Etislat]

HLF
we.trade
more trust. more trade.
we.trade

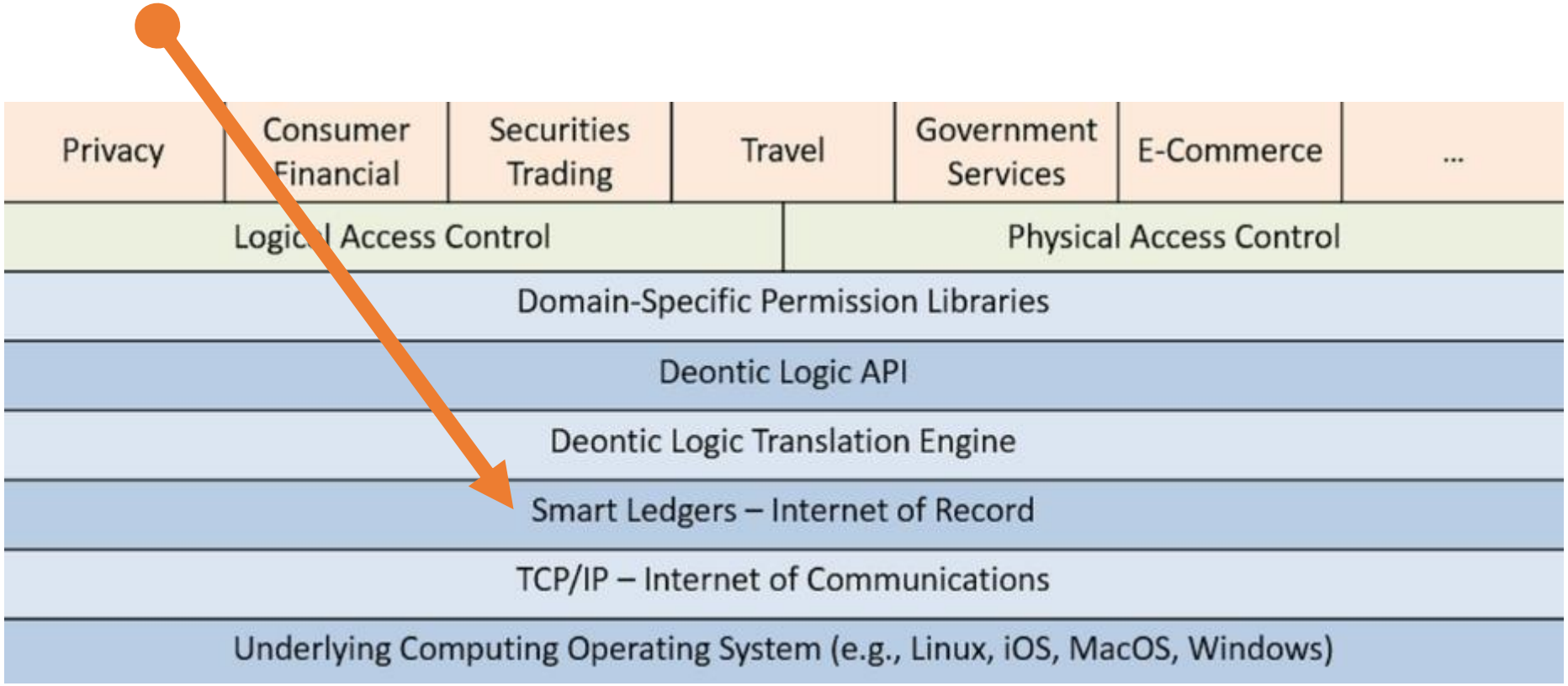
WORLD TRADE ORGANIZATION

TRADE FINANCE GLOBAL





‘Internet of Record’ – Just Independent Timestamping



Mundane - Identity, Document, & Agreement Exchange?

Theme	Service	Question
Trust	Identities/Assets	Authentication
Space	Transactions	Services
Time	Debts	Value-added
Mutuality	Contracts	Common-wealth

The Pembury Tavern
90 Amhurst Road
London E8 1JH
Tel. 020 8986 8597

Hilton Pegasus (4.1% ABV) pint £3.00
Subtotal £3.00
Bitcoin 0.0474 £3.00

Individual Pubs Limited
Pegasus House
Pembroke Avenue
Waterbeach
Cambridge
CB25 9PY

VAT reg no. 783 9983 50
A: £2.50 net, £0.50 VAT @ 20.0% Total £3.00

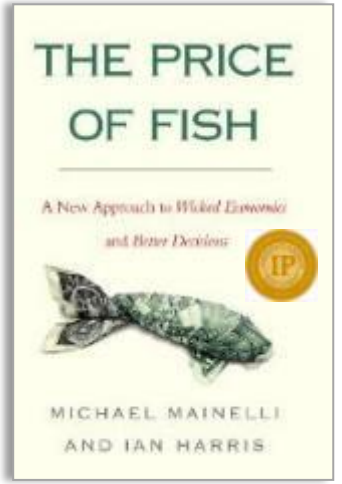
Receipt number 721636
2013-06-25

"Get a detailed grip on the big picture."
Chao Kli Ning

Questions, Comments, Answers (?)

When Would We Know Our Commerce Is Working?

"Get a big picture grip on the details."
Chao Kli Ning



Thank you!

"If you have trust I shall give you trust; if you have no trust I shall take it away."

LONG FINANCE