



Governance for New Leadership

PBA Bali

11-12th September 2025

Primavera de Filippi, Nathalie Boyke, Lovisa Björna

Welcome!

Kick-Off Meeting #2

Agenda

- Recap
- Module overview
- Module logistics
- Q&A



Lecture 1

Public Value of Blockchains

Primavera de Filippi

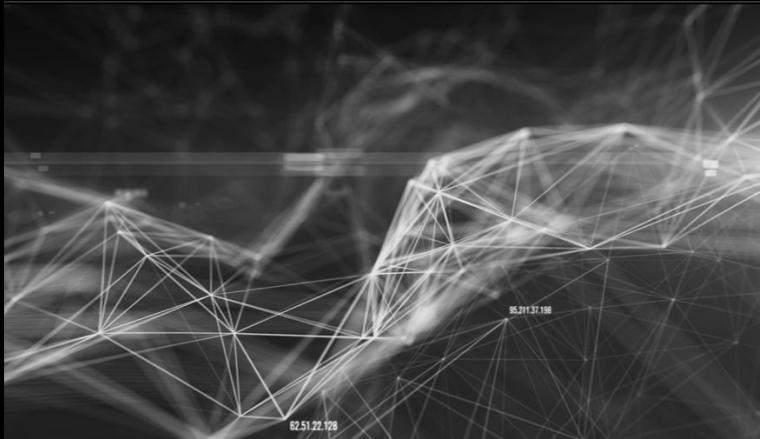
(1) DECENTRALIZED DATABASE



(2) GLOBAL & TRANSNATIONAL



(3) RESILIENT



(4) NON-COERCIVE



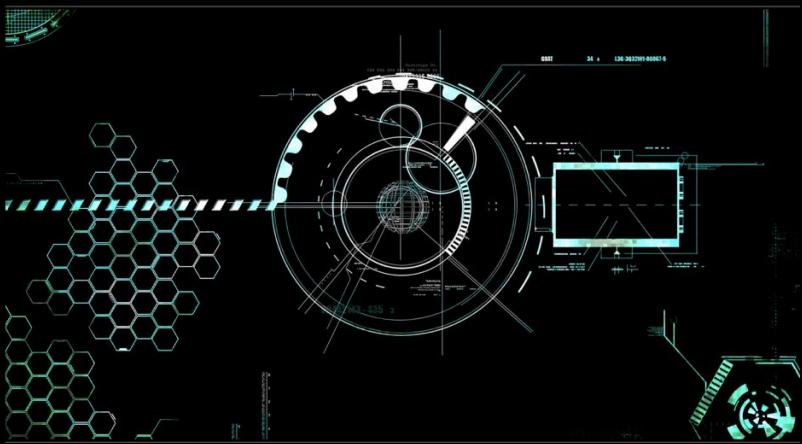
(5) TAMPER-RESISTANT



(6) TRANSPARENT



(7) NON-REPUDIABLE



(9) GUARANTEE OF EXECUTION





BLOCKCHAIN AS... TRUSTLES TECHNOLOGY

Antonopoulos:

"Shift from trusting people ... to trusting math"

"Don't trust, Verify"

The Economist:

"Trust Machine"

Werbach:

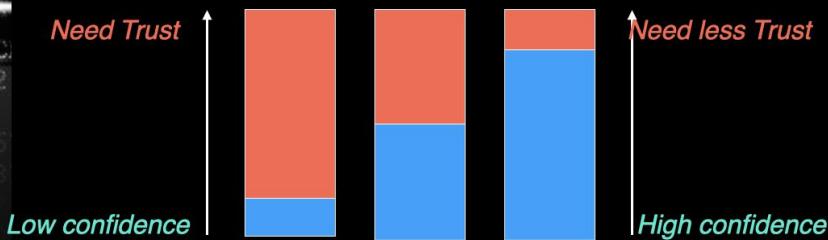
"Trustless Trust"



BLOCKCHAIN AS... CONFIDENCE MACHINE

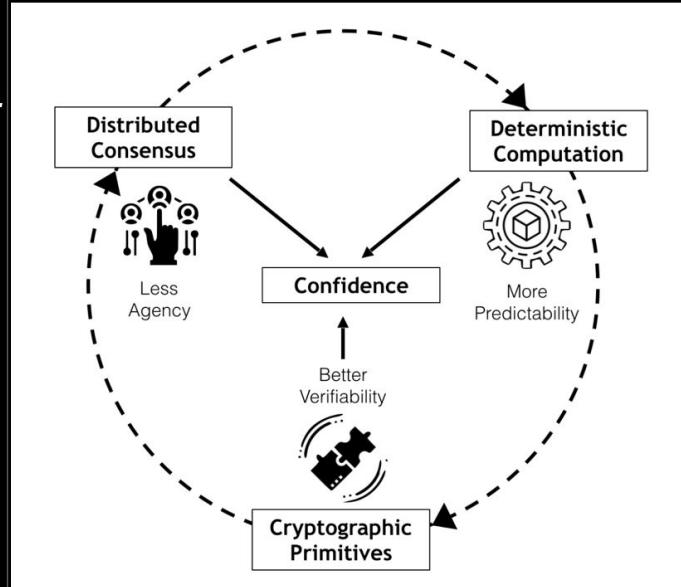
*It is **not** about **eliminating trust** altogether,
but rather about **maximizing confidence**,
in order to indirectly **reduce the need for trust**.*

- The **higher** the **predictability** of the system,
- The **higher** the **confidence** in the system,
- The **lower** is the **need for trust** in the system.

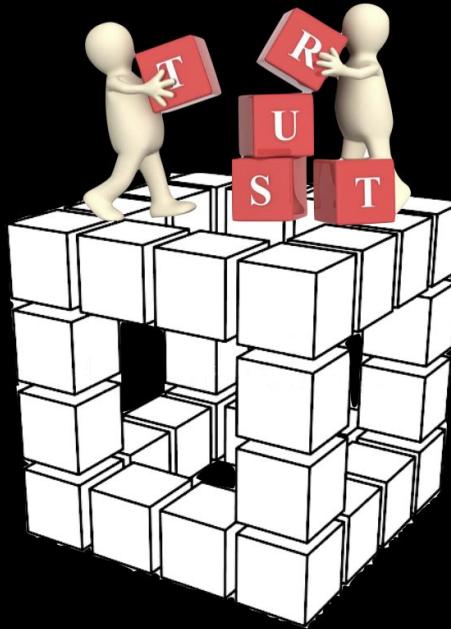


CONFIDENCE FACTORS

- (1) **Mathematics & Cryptography**
 - Hashing functions, Public-Private Key, etc.
- (2) **Economic incentives & Game Theory**
 - Utility function
 - Distributed Consensus
- (3) **Expert systems**
 - Open Source code
 - Public verifiability of every operation



BLOCKCHAIN AS... (positive definition)
CONFIDENCE MACHINE



TRUST
IN INSTITUTIONS

CONFIDENCE
IN TECHNOLOGY

BLOCKCHAIN AS... (positive definition)

CONFIDENCE MACHINE

WHO DID WHAT WHEN?

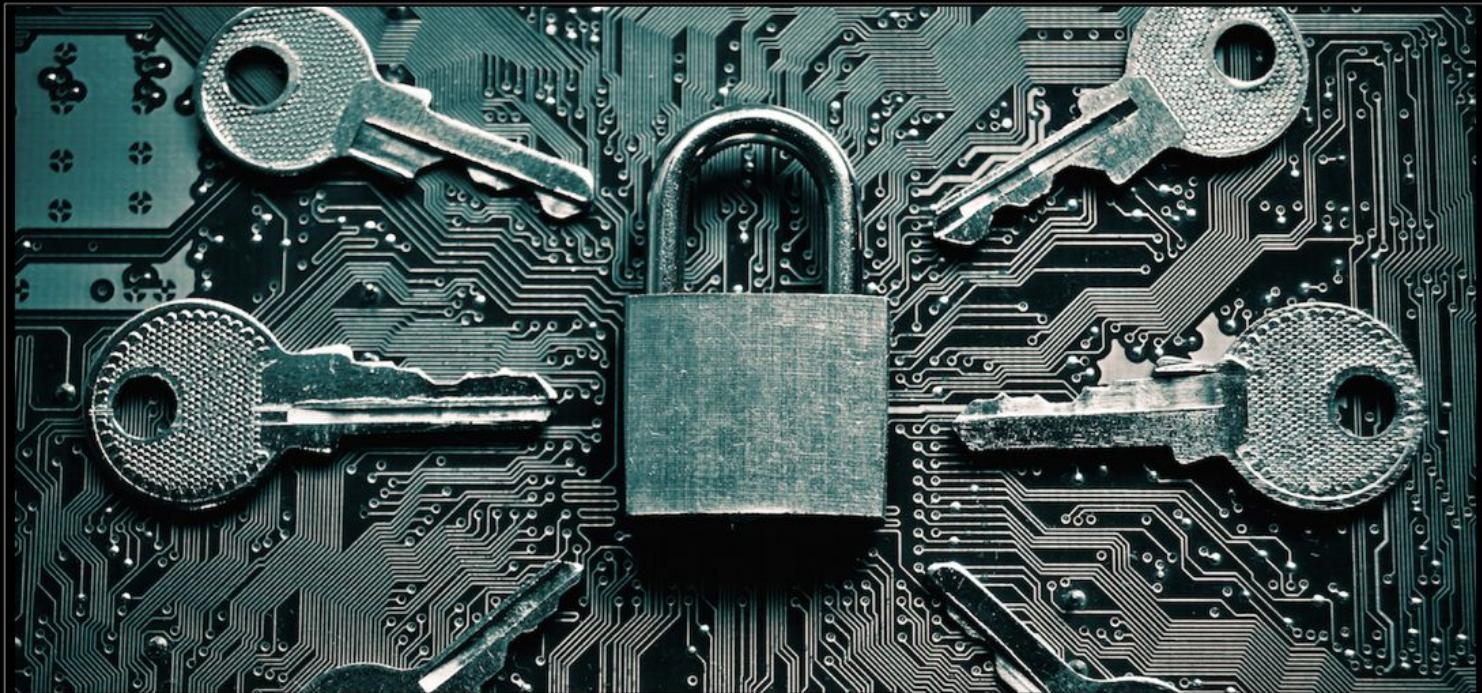


TRANSPARENT

TAMPER-RESISTANT

TIME-STAMPED

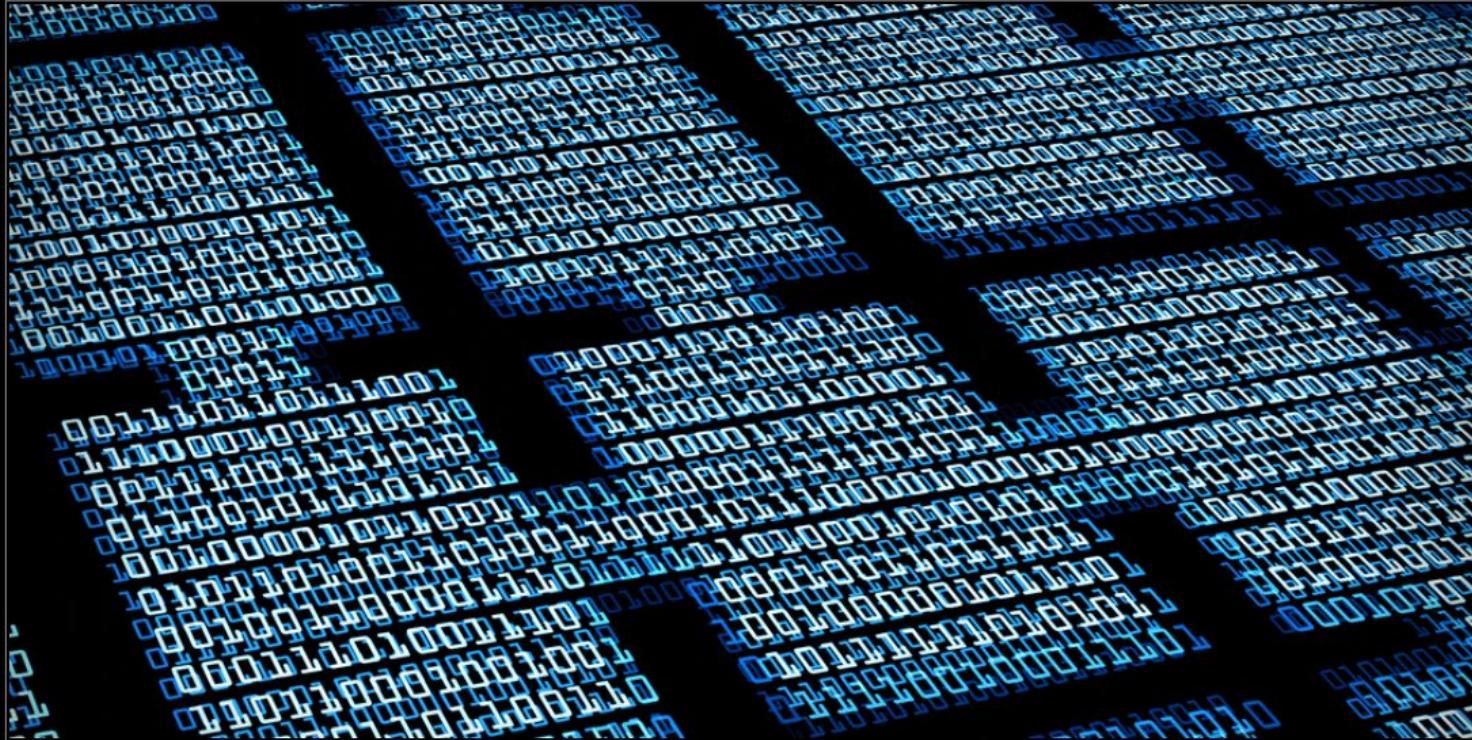
WHO



NON-REPUDIATION

TRANSACTIONS SIGNED BY PRIVATE KEYS

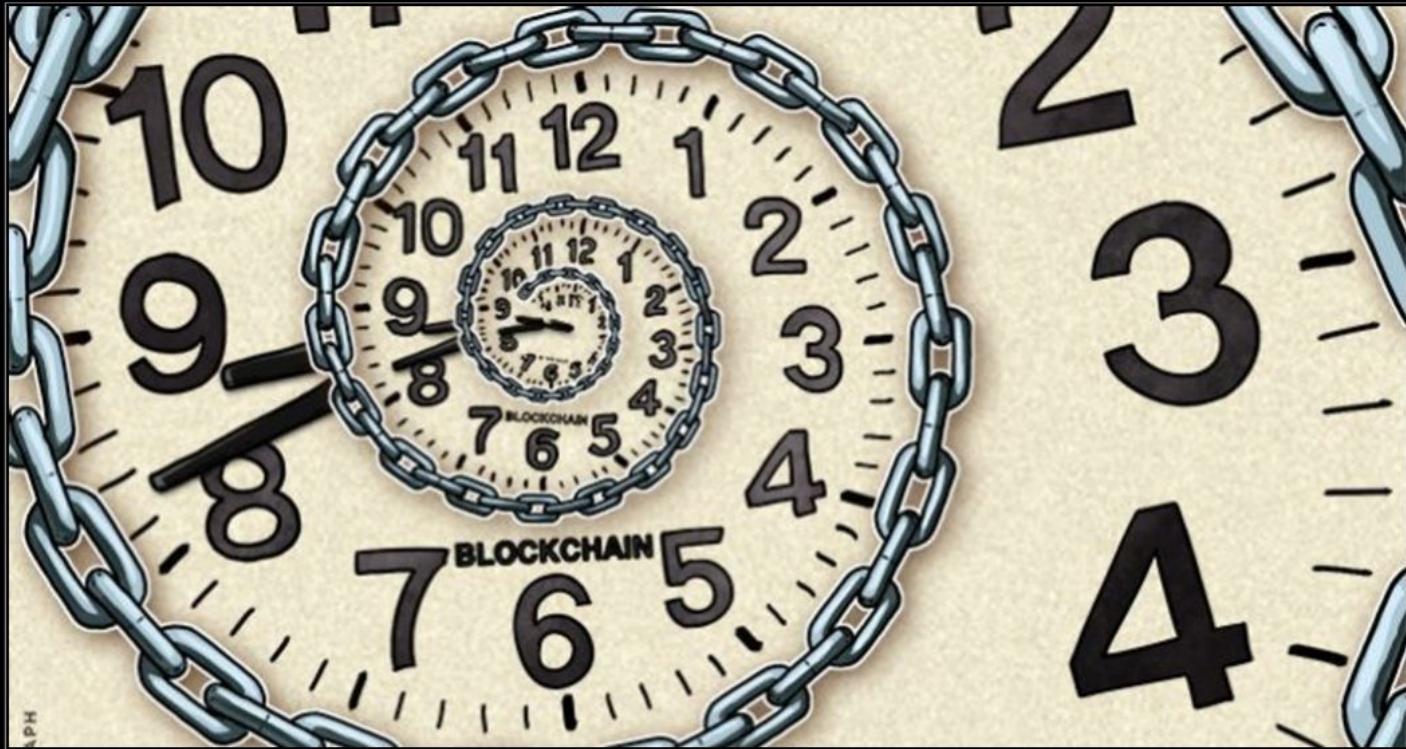
WHAT



DATA INTEGRITY

RESISTANT TO **MANIPULATION & CORRUPTION**

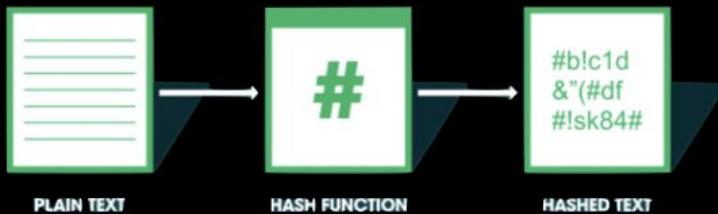
WHEN



TIME STAMPS

CHRONOLOGICAL ORDERING OF EVENTS

HASHING FUNCTION



DIGITAL FINGERPRINT



CERTIFIED REGISTRIES



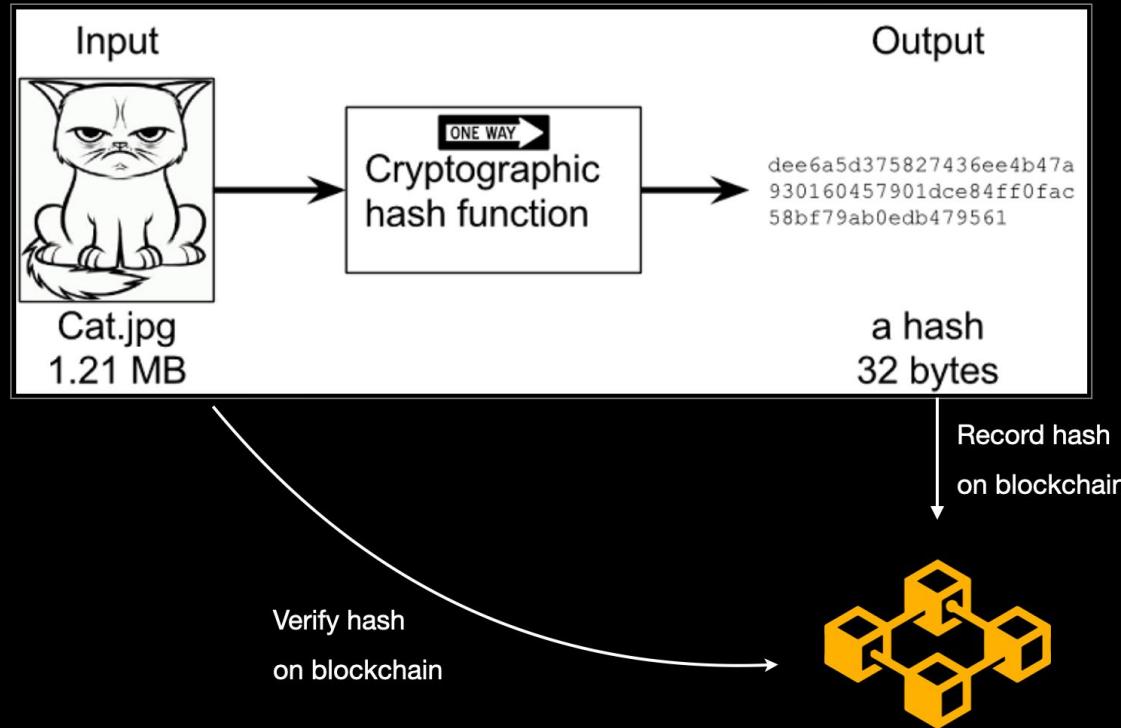
RESISTANT TO **MANIPULATION & CORRUPTION**

PROOF OF EXISTENCE

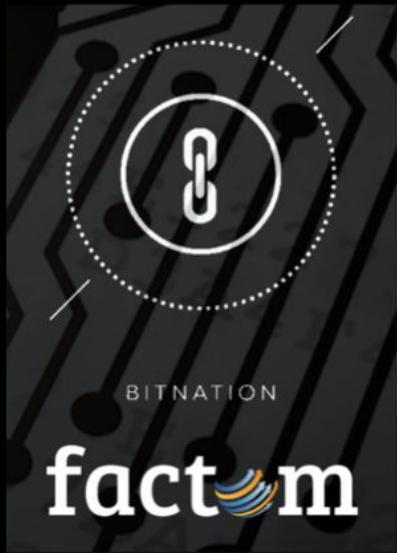


DIGITAL FINGERPRINTS

HASHING



NOTARY SERVICES



Blockchain Based Notary Proof Of Concept

Blocknotary

Acronis

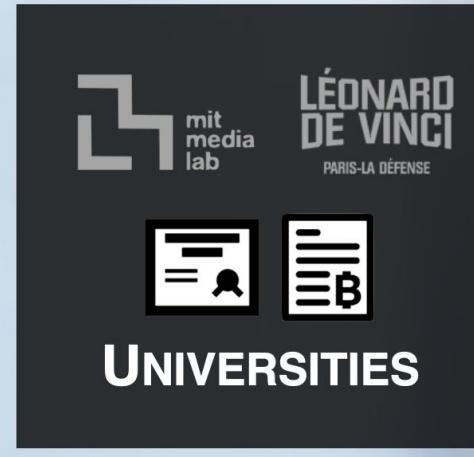
**EUROPEAN BLOCKCHAIN
SERVICES INFRASTRUCTURE**

TAMPER-RESILIENT + TIME-STAMPED LAND REGISTRIES





CERTIFICATIONS



No need to rely on **centralized authority for verification**
Reduce risk of **forging** : reliable solution to avoid any academic fraud

OPEN BADGES

Data & Information **Inside**

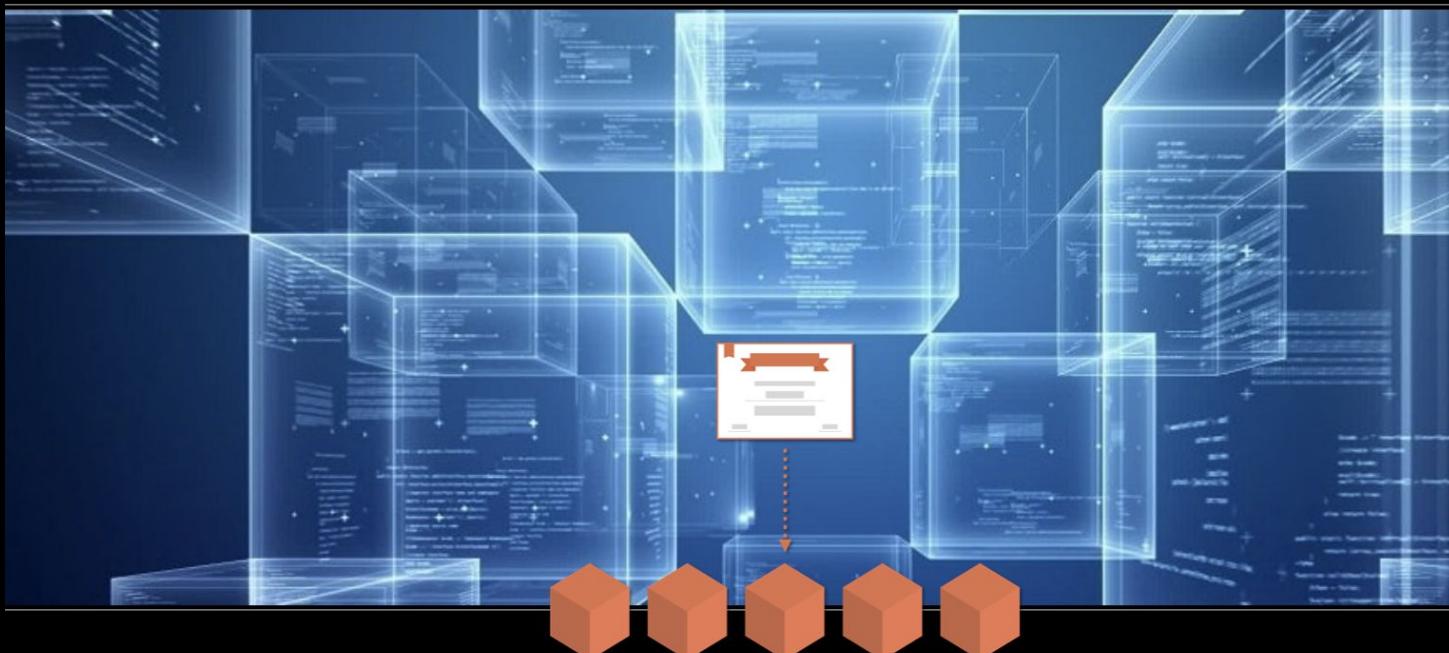
Alignment
Badge Criteria
Badge Description
Badge Name
Digital Signature
Evidence

Expiration Date
Issued Date
Issuer
JSON-LD
Recipient
Verification



 BLOCKCERTS

CREDENTIAL MANAGEMENT & ACCESS CONTROL



Attestations / Certifications

A man in a dark suit stands with his arms crossed, silhouetted against a bright, textured background.

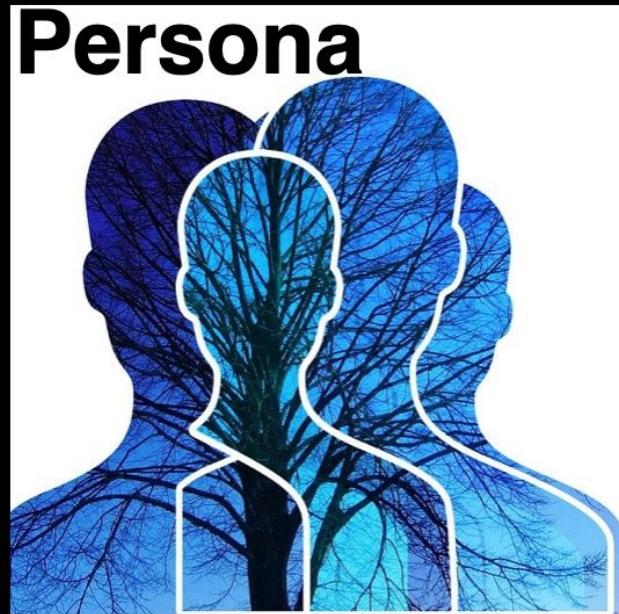
WHO

PSEUDONYMITY

*The same person can hold multiple personas,
depending on the social context that is taken
in consideration*

Relates to the way in which individuals
“authenticate” themselves to the system

Attributes



*Property of a person that qualifies it
as a member of a given set (or class)*

- *endogenous (e.g. height, gender)*
- *exogenous (e.g. student, French)*

*Not unique to an entity:
multiple entities may share the same attributes*

Self-Sovereign Identity



Identities are controlled by the individual and therefore remain portable

People can choose with whom their data can be shared and for what purposes

Soulbound Tokens



PROOF OF ATTENDANCE PROTOCOL

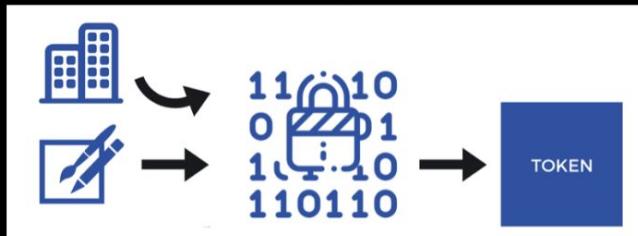


NFT = Non-Fungible Tokens



ASSET-BACKED TOKENS

- Inclusion in a blockchain of a deed declaring ownership or the existence of an asset
- Represents genuine proof of ownership or the real existence of said asset.



RULES OF ACCOUNTABILITY
ENCODED INTO THE TECHNOLOGY
AND **AUTOMATICALLY ENFORCED** BY IT

CHECKS & BALANCES
(ENFORCED BY 3RD PARTIES)



**WHO WATCHES
THE WATCHER?**

TECHNICAL ACCOUNTABILITY



PROOF OF RESERVE
—REAL-TIME AUDITING—

MULTI-SIGNATURES
—CONTROLLED EXPENDITURES—

KEYLESS WALLETS
—NO CUSTODY—



AUTOMATED COMPLIANCE

REAL TIME AUDITS



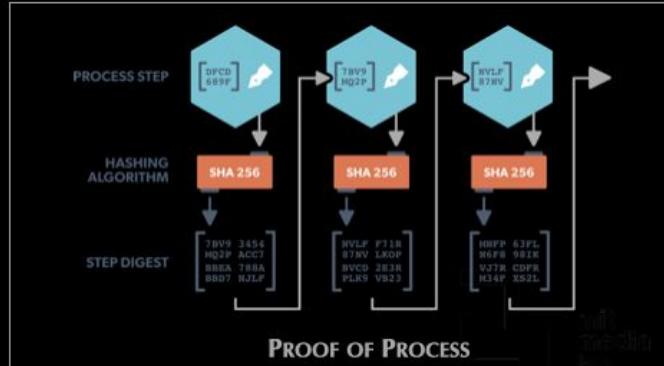
PROOF OF COMPLIANCE



DATA INTEGRITY

ZERO-KNOWLEDGE PROOF

AUTOMATED REPORTING

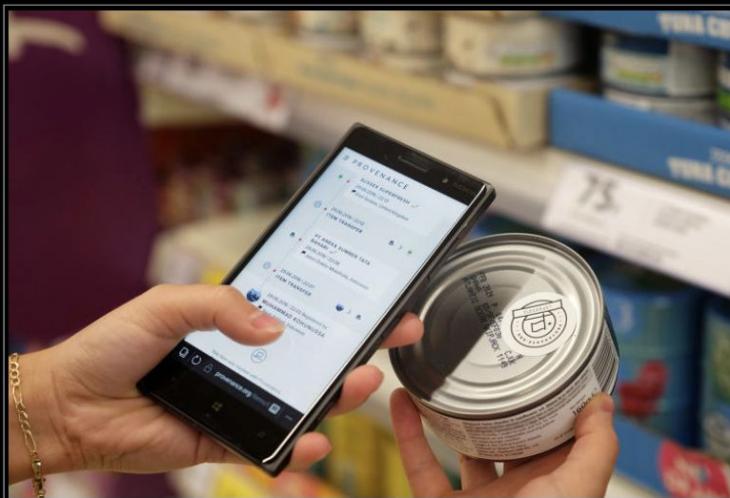


GUARANTEE OF EXECUTION



SMART CONTRACTS

PROOF OF PROVENANCE & SUPPLY CHAIN



Cyber Security

 WIKIPEDIA
The Free Encyclopedia

☰ 2007 cyberattacks on Estonia

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

Beginning on 27 April 2007, a series of [cyberattacks](#) targeted websites of [Estonian](#) organizations, including [Estonian parliament](#), banks, ministries, newspapers and broadcasters, amid the country's disagreement with [Russia](#) about the relocation of the [Bronze Soldier of Tallinn](#), an elaborate Soviet-era grave marker, as well as war graves in [Tallinn](#).^{[1][2]} Most of the attacks that had any influence on the general public were [distributed denial of service](#) type attacks ranging from single individuals using various methods like [ping floods](#) to expensive rentals of [botnets](#) usually used for [spam](#) distribution. Spaming of bigger news portals commentaries and [defacements](#) including that of the [Estonian Reform Party](#) website also occurred.^[3] Research has also shown that large conflicts took place to edit the English-language version of the Bronze Soldier's Wikipedia page.^[4]



2008

Blockchain technology

Scalable blockchain technology KSI is developed by Estonian cryptographers.

 Challenge

To mitigate threats of insider data manipulation in Estonia's registries following the 2007 cyberattacks.

 Effect

Estonia has become a pioneer of blockchain technology. Several government registries are backed by KSI blockchain.



Decentralizing markets





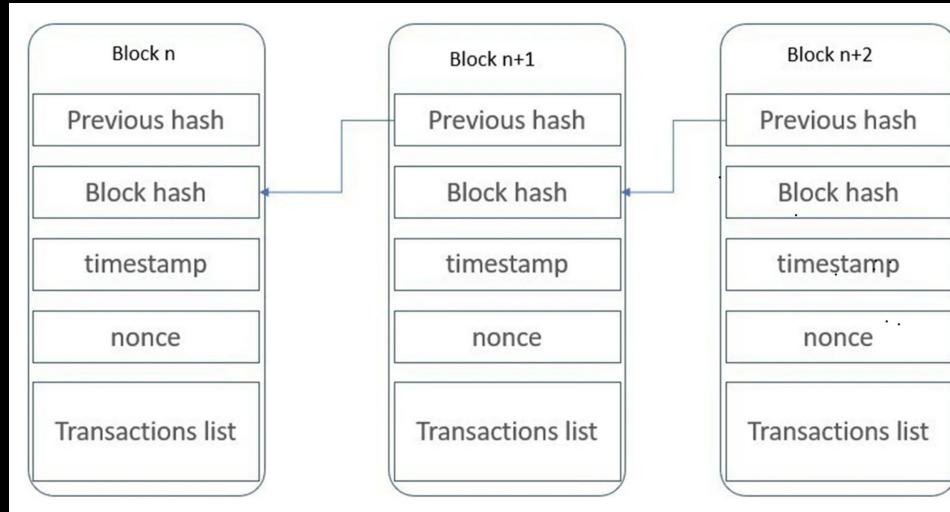
Lecture 2

Fields of Application

Nathalie Boyke

The technical architecture of blockchain grants useful features to use cases

Transparency



Tamper resistance

Secure data base

Timestamping

Financialization/
tokenization

Autonomous
code execution

Due to these features blockchain has been integrated in various use cases to render improvements for both the private and public sector

Use Case 1 (tokenization and autonomous code execution): microfinance for small farmers

Example: Ethicshub: <https://www.ethichub.com/en>

>> Takeaway

Use Case 2 (transparency): secure sharing of supply chain data between actors

Example: TWIN: <https://www.twin.org/home>

>> Takeaway

Use Case 3 (tamper resistance/ secure database): secure public records

Example: KSI blockchain in e-Estonia:

<https://e-estonia.com/solutions/cyber-security/ksi-blockchain/>

>> Takeaway

Other popular use cases to be aware of

- Identity solutions (less reliance on big tech intermediaries)
- Remittances and stable coins (blockchains offer efficiency here)
- CBDCs

>> Takeaway

Closing exercise

>> Takeaway

Lecture 3

Local Case Studies

Lovisa Björna

#1

Traceability of the Indonesian Fisheries Chain

#2

Smart Delivery Web3 App

“HalalChain”

#3

FisherDAO



Lecture 4

Drivers & Barriers for Public Adoption

Lovisa Björna

What is the state of public blockchain adoption?



Crypto Adoption

- **659 million global crypto owners (8.2% of population)** - [Crypto.com, 2024](#)
- **Top 5 countries from Global Crypto Adoption Index:** India, Nigeria, Indonesia, USA, Vietnam
 - a. **13% growth in 2024** (from 583M to 659M users)

Blockchain Adoption

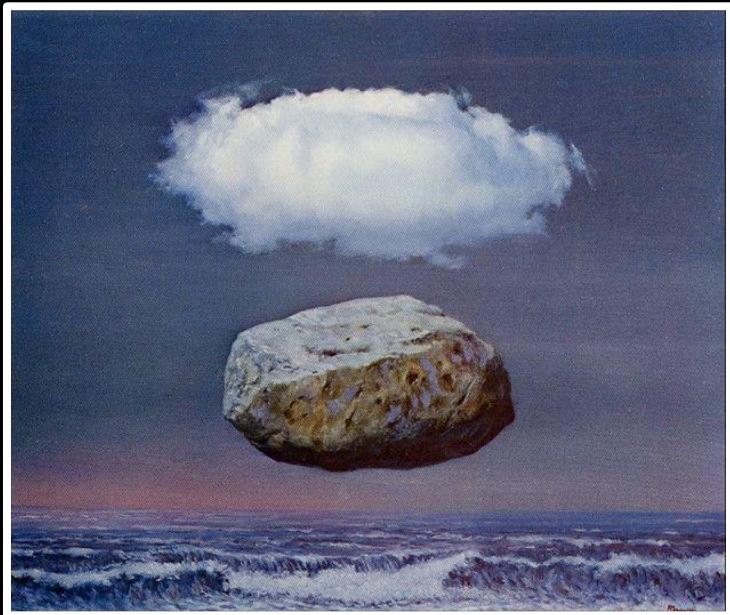
What are drivers & barriers?

Drivers

- **Financial inclusion:** 1.4B unbanked population seeking alternatives [World Bank Global Findex 2025](#)
- **Inflation hedge:** Countries with >10% inflation show higher adoption
-

Barriers

- **Technological Literacy / User experience:** 49% cite lack of understanding as biggest obstacle - [TGM Research, 2024](#)
- **Regulatory uncertainty:** Creates "state of limbo" for investors and markets - [Global Regulatory Trends, 2024](#)
- **Volatility concerns:** Identified as key adoption barrier - [Kaspersky, 2024](#),



Who are agents of change?



PESTEL Workshop

Political: Regulatory landscape,
government initiatives

Economic: Market conditions,
financial incentives

Social: Public perception, digital
literacy

Technological: Infrastructure,
interoperability

Environmental: Energy
consumption, sustainability

Legal: Compliance frameworks,
legal clarity

Wrap up & Take Aways

Day 2

Lecture 1

Blockchains and

Regulation

Primavera de Filippi

UNREGULABILITY ?

“ALEGALITY”

Outside the purview of the law



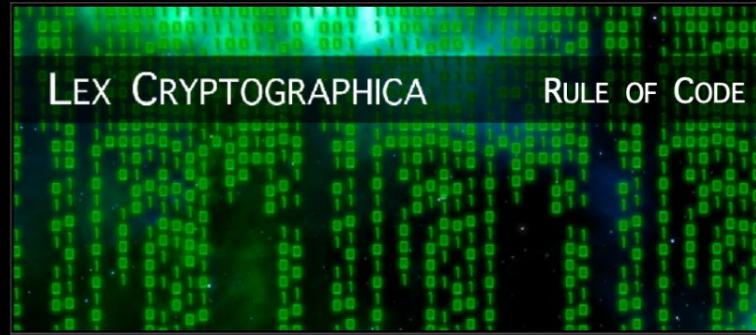
CODE IS LAW

(Lawrence Lessig —2000)



LEX INFORMATICA

RULE BY CODE

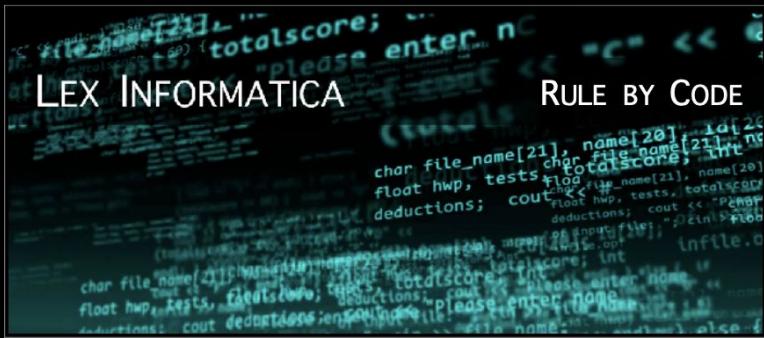


LEX CRYPTOGRAPHICA

RULE OF CODE

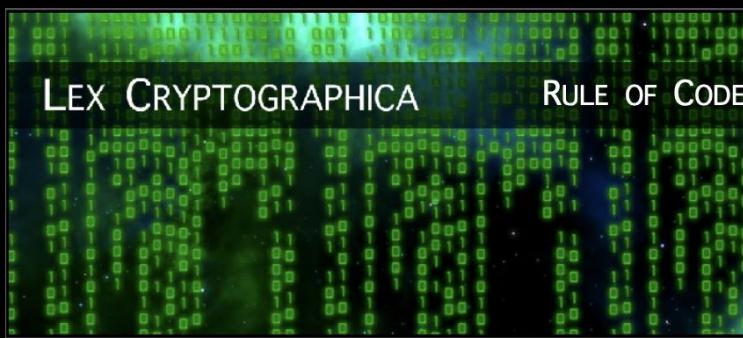
CODE IS LAW

(Lawrence Lessig —2000)



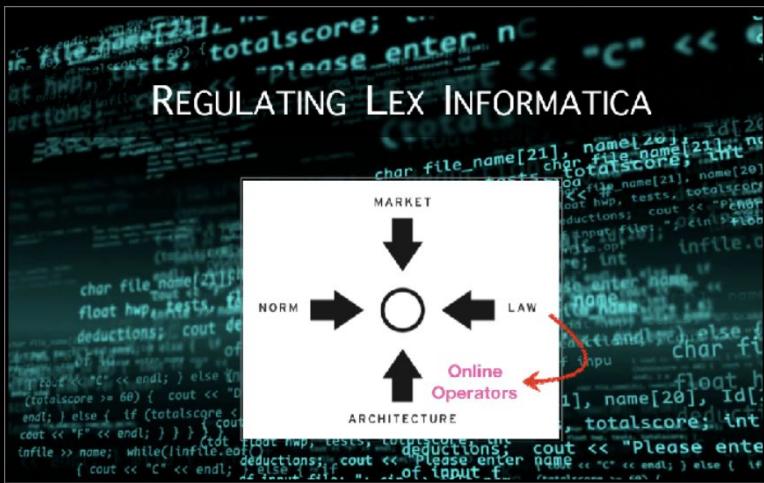
LEX INFORMATICA

RULE BY CODE



LEX CRYPTOGRAPHICA

RULE OF CODE



REGULATING LEX INFORMATICA

CODE IS LAW

(Lawrence Lessig —2000)

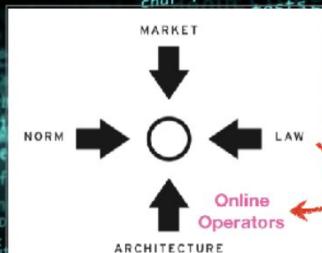
LEX INFORMATICA

RULE BY CODE

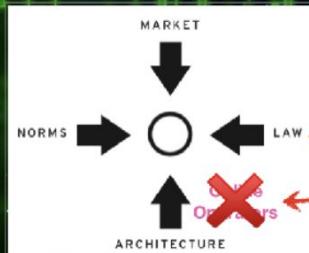
LEX CRYPTOGRAPHICA

RULE OF CODE

REGULATING LEX INFORMATICA



REGULATING LEX CRYPTOGRAPHICA



LEGAL CHALLENGES



Responsibility

- no single party responsible for a blockchain



Territoriality

- issues of jurisdiction and applicable law



Pseudonymity

- Difficult to identify the actors involved

UNREGULABILITY ?



“ALEGALITY”

Outside the purview of the law

“NO BLOCKCHAIN IS AN ISLAND”



New avenues for regulation?
~~intervention~~

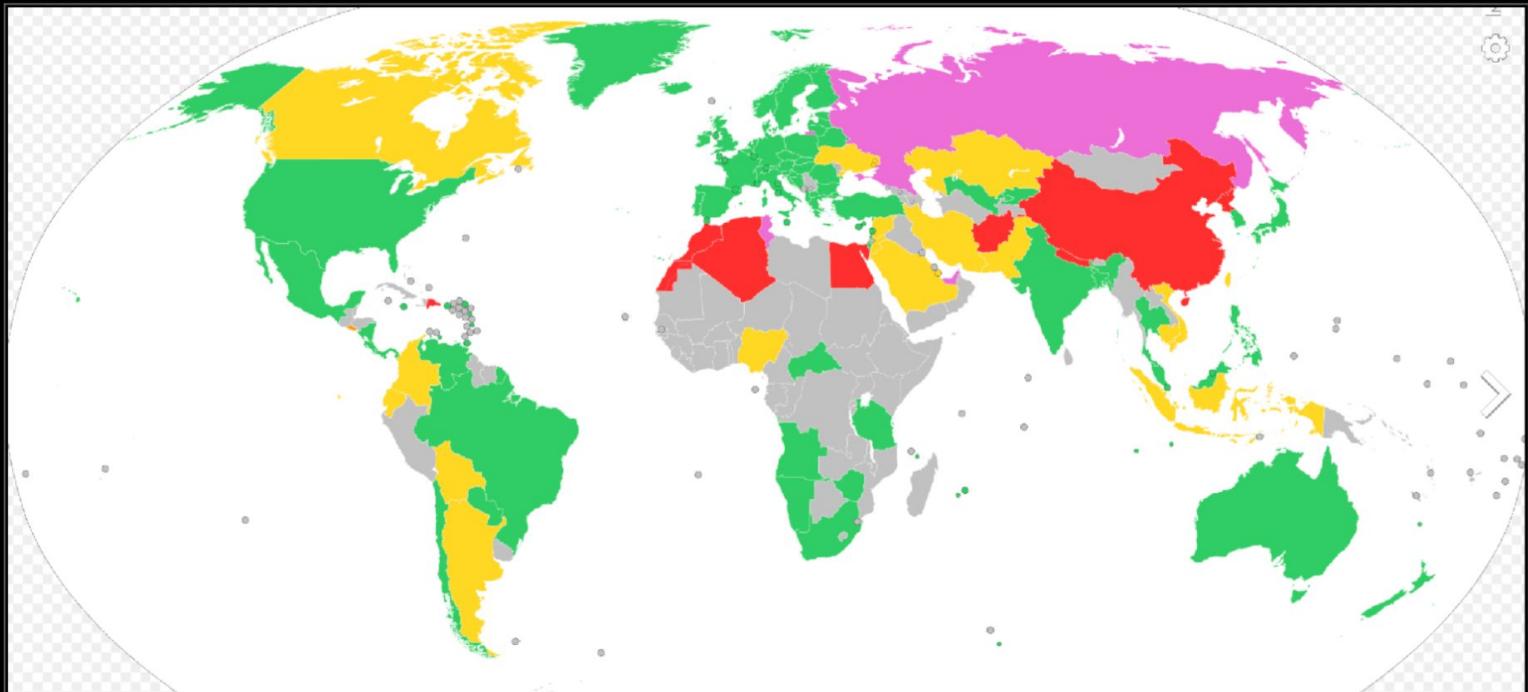


CRYPTOCURRENCIES

Regulatory Framework

BITCOIN LEGALITY

No coordinated approach across countries



Legal status of bitcoin

- █ **Legal tender** (bitcoin is officially recognized as a medium of exchange)
- █ **Permissive** (legal to use bitcoin, with minimal or no restrictions)
- █ **Restricted** (some legal restrictions on the usage of bitcoin)
- █ **Contentious** (interpretation of old laws, but bitcoin is not directly prohibited)
- █ **Prohibited** (full or partial prohibition on the use of bitcoin)
- █ **No data** (no information available) [v te](#)

EUROPE

- Bitcoin regarded as “currency”
- Subject to AML / CTF regulations



USA

- Bitcoin as “commodity” / personal property
- Subject to taxation for capital gain



MULTIPLE SHADES OF REGULATION

EL SALVADOR

- Bitcoin as legal tender



KOREA

Strict licensing requirements
Certification of financial Reg authority (ISMS) + AML



INDIA

- From ban to regulation



CYBER-LAW

OR

Larry Lessig



Frank H. Easterbrook

THE LAW OF THE HORSE

FUNCTIONAL EQUIVALENCE



Applying existing legal rules
to novel technologies that serve equal functions



Money ?

Commodity ?

Securities ?

THE LAW OF THE PLATYPUS

Financial Regulations for Crypto

Commodity Futures Trading Commission (CFTC)

- Oversee derivative and future contracts
- Including “digital commodity” platforms & trading
- Including market manipulation
(cf. Mango Markets “oracle manipulation”)



Financial Crimes Enforcement Network (FinCEN)

- Money Laundering and Terrorist Financing rules for Money Services Businesses

Financial Action Task Force (FATF)

- Travel Rule (requiring AML compliance) for transfers of cryptocurrencies (June 2019)

Federal Trade Commission

- Protects consumers against unfair or deceptive practices

Treasury's Office of Foreign Assets Control (OFAC): criminal to transact with blocked entities list

State regulations

New York:

- BitLicense (2014) requiring license for virtual currency business activities



Florida:

- Includes virtual currencies in state's money transmitter regulations
- Requires certain intermediaries to obtain a state-issued license

Wyoming:

- Crypto-focused banks as new depository institutions
- DAO Supplemental Bill, recognising DAOs as LLCs
- Wyoming Stable Token Act: fully backed by US dollars

Utah:

- DAO Act (inspired by DAO Model Law) recognise DAOs as equivalent to domestic LLC

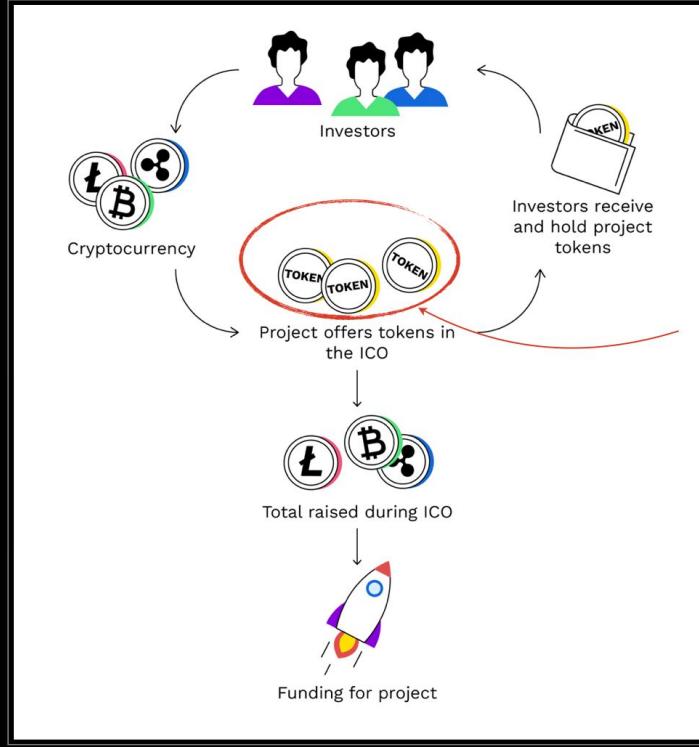


INITIAL COIN OFFERING

IPO vs. ICO



- ISSUE SHARES OF A COMPANY
- CENTRALIZED BY STOCK EXCHANGE
- HEAVY REGULATED BY AUTHORITIES
- ISSUE CRYPTOCURRENCY TOKENS
- OPERATED VIA A SMART CONTRACT
- UNREGULATED ?



Legal Qualification ?

Legal qualification must take into account:

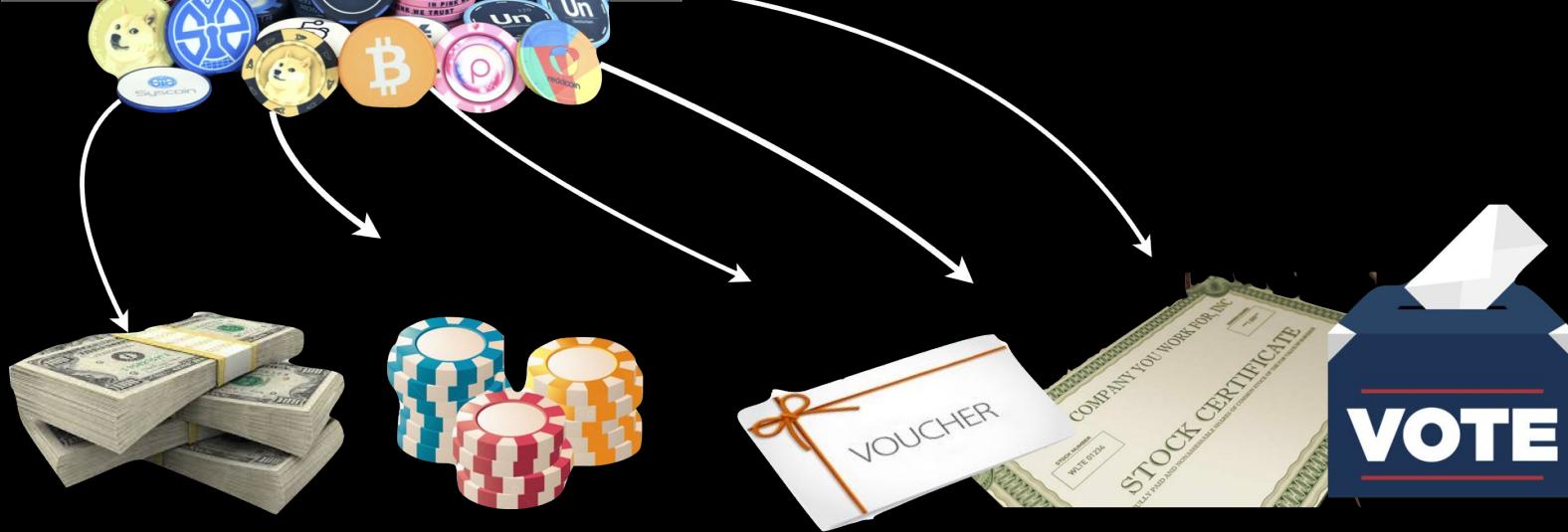
- *the original function of the token (why it was issued)*
- *the practical applications of that token
(beyond the control and intention of the issuer)*

FUNCTIONAL EQUIVALENCE



Many tokens usually qualify as multiple classes:

- Payment tokens
- Utility tokens
- Governance tokens
- Investment tokens
- Asset-backed tokens



COMMON LAW: EXPANDING THE SCOPE OF EXISTING REGULATIONS



- **USA**—Howey test to determine whether an ICO qualifies as “investment contracts”
 - (a) investment of money
 - (b) in a common enterprise
 - (c) for an expectation of profits
 - (d) deriving solely from the efforts of others
 - SEC interpretation of ICOs as securities via “substance over form”
 - Munchee case: Even if a token has its own “utility”, it can ALSO be a security

- **UK**—FCA Guidance

- Not all ICOs qualify as securities, but some definitely do:
 - Security tokens : tokens that provide rights and obligations similar to regulated instruments (shares, collective investments, etc.)
 - Unregulated tokens : utility tokens that do not (also) qualify as e-money or security tokens.
- ICOs need to be assessed on a case-by-case basis (need to look at the substance, rather than the label ascribed to it)

- **Hong Kong**— Securities and Futures Commission (SFC)

- ICOs are not regulated if they offer “utility tokens”
- Some tokens might qualify as financial securities, especially if they have the features of traditional securities

Financial Regulations for Crypto

Security & Exchange Commission (SEC):

2nd Trump Administration:

US Deputy Attorney General's memorandum to DoJ (April 2025)

abandon the practice of “regulation by prosecution”

call for prosecutors not to file charges for violations of regulations that involve digital assets, such as unlicensed money transmitter regulations, securities classification questions, and unregistered securities offering violations



Toomey Stablecoin Bill : stablecoins that do not offer interest are not securities

Ripple XRP: Cryptocurrencies are considered securities when purchased by institutional buyers, but not by retail investors purchased on exchanges - because secondary market (July 2023)

However, crypto-exchanges are regulated by the SEC: broker-dealer license if trading securities
(cf. Coinbase enforcement action against Coinbase staking rewards program, as unregistered securities)

SEC also regulates coin offerings or sales to institutional investors (= no ICOs for US persons)

CIVIL LAW: NEW REGULATORY FRAMEWORKS FOR ICOs



- France
 - ICOs not regulated as securities, need for specific regulatory policy
 - AMF consultation
 - Loi PACTE law introducing a non-mandatory visa for ICOs
 - Mini-bonds: obligations can be issued via blockchain tech

- Germany— Federal Financial Supervisory Authority (BaFin)

- ICOs can fall under the scope of existing regulations, depending on design
 - Distinction between security token, currency token, utility token (unregulated)

- Switzerland—FINMA

- FINMA's distinction between (a) payment tokens, (b) utility tokens, (c) asset tokens, investment tokens <— securities
 - Initially very friendly to ICOs, subsequently initiated several investigations
 - NOTE : The same token can qualify as both a utility token and an investment token

MiCA Crypto Assets

1. **Utility Tokens:** grant access to a platform
2. **Asset-referenced Tokens:** stable coins (eg. DAI)
3. **E-money Tokens:** (eg. USDC)



Vs

Security Tokens (MiFID II)

Obligations for issuers of Crypto-Assets

1. Issued by legal entity with authorisation to issue crypto-assets
2. Publication of white paper (~ prospectus) approved by reg authority.
3. Significant asset-referenced tokens under supervision of European Banking Authority
4. Obligation to act honestly, fairly and professionally



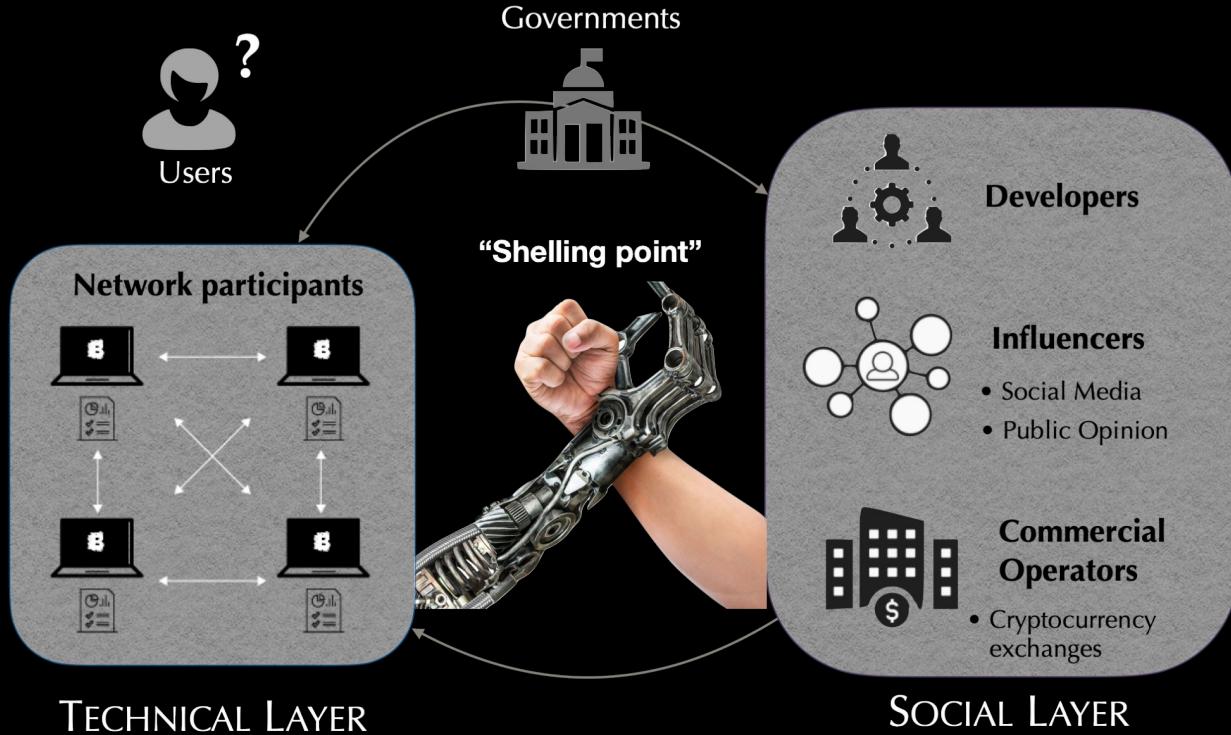
Unless CA Services are provided in a ‘fully decentralized’ manner without intermediary operations (DeFi exception)

“NO BLOCKCHAIN IS AN ISLAND”



New avenues for regulation?
~~intervention~~

BLOCKCHAIN BETWEEN REGULATION & GOVERNANCE



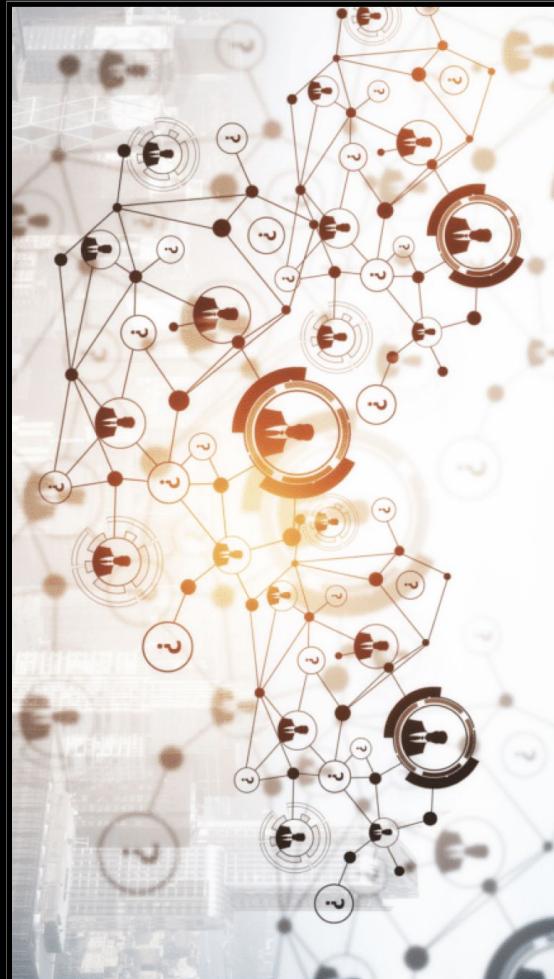
USERS

CRIMINALISATION

- ❖ Prohibit the use of a particular blockchain
- ❖ Prohibit the use of specific blockchain apps
- ❖ Legal liability for providing financial resources to illicit applications deployed on a blockchain.

LIMITATIONS

- ❖ Problematic (cf. online piracy)
- ❖ Transnationality of blockchain networks
- ❖ Pseudonymity of users



OLD INTERMEDIARIES

INTERNET ACCESS PROVIDERS



INFOMEDIARIES



- ❖ Obligation to filter Internet traffic (e.g. China)
- ❖ Slow down traffic towards a specific blockchain
- ❖ De-referencing of illicit blockchain apps
- ❖ No advertisement for these apps (e.g. ICOs)

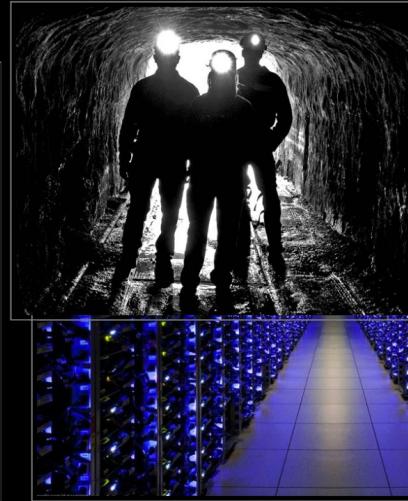
NEW INTERMEDIARIES

CRYPTOCURRENCY EXCHANGES AND COMMERCIAL OPERATORS



- ❖ Obligation to comply with regulatory constraints
- ❖ Possible to block or censor specific transactions

MINING POOLS



MINERS



- ❖ Obligation to ignore / censor specific transaction
- ❖ Economic incentives (e.g. taxation)

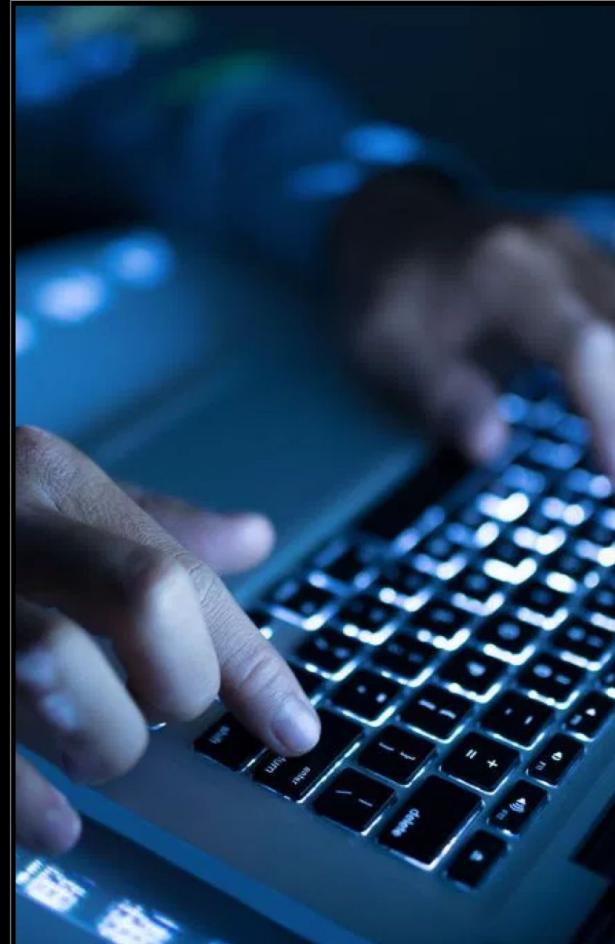
DEVELOPPERS

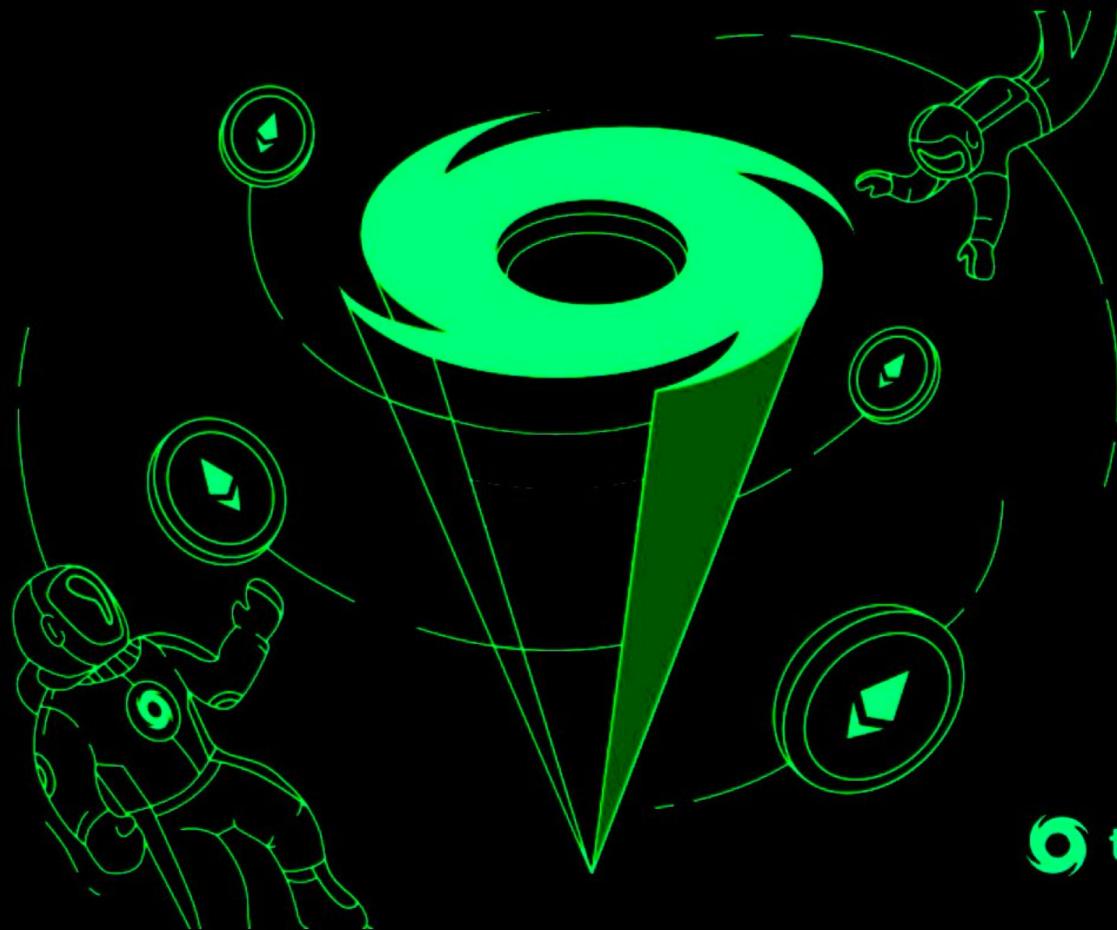
BACKDOORS

- ❖ Obligation to introduce *backdoors* in the code in order to provide “veto right” to public authorities
 - ❖ Loss of guarantees of execution
 - ❖ Risk of creating new vulnerabilities

FIDUCIARY LIABILITY REGIME

- ❖ *Fiduciary duties* towards users (Walsch)
 - ❖ Could jeopardise the liability regime of OpenSource
- ❖ *Vicarious liability for illicit applications*
 - ❖ Visa's for registering legitimate applications?
 - ❖ Risk of encouraging the anonymity of apps





 **tornado**

OFAC SANCTIONS

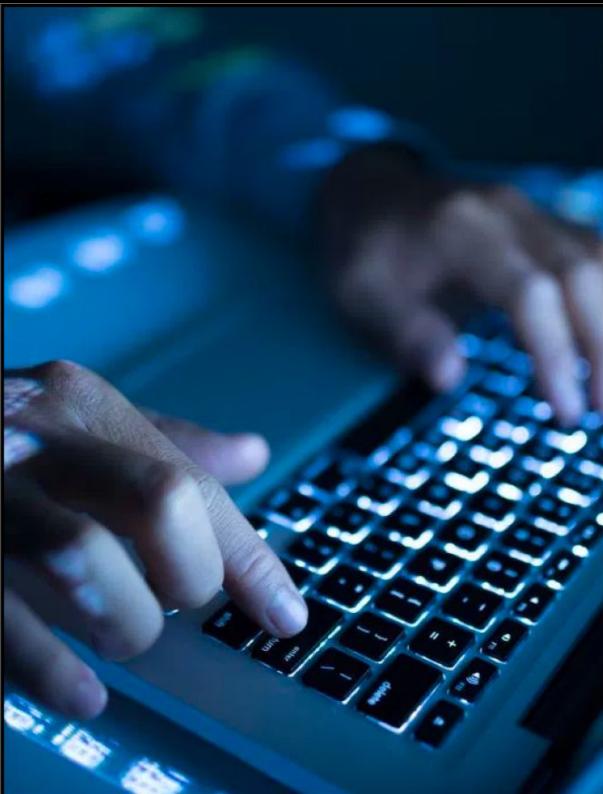
NO LEGAL ENTITY
JUST A SMART CONTRACT

Aug 8th / Nov 8th: OFAC sanctioned Tornado Cash
for its alleged use by the Lazarus Group (North Korea)
for laundering funds from hack of US-based crypto-firms





U.S. Persons
(Strict liability)



Core Developpers
(Legitimate vs illegitimate uses)



Miners and Validators
& Crypto-exchanges
(Vicarious liability)

CHILLING



U.S. Persons
(Strict liability)

EFFECTS



Core Developpers
(Legitimate vs illegitimate uses)

dYdX



Miners and Validators
& Crypto-exchanges
(Vicarious liability)

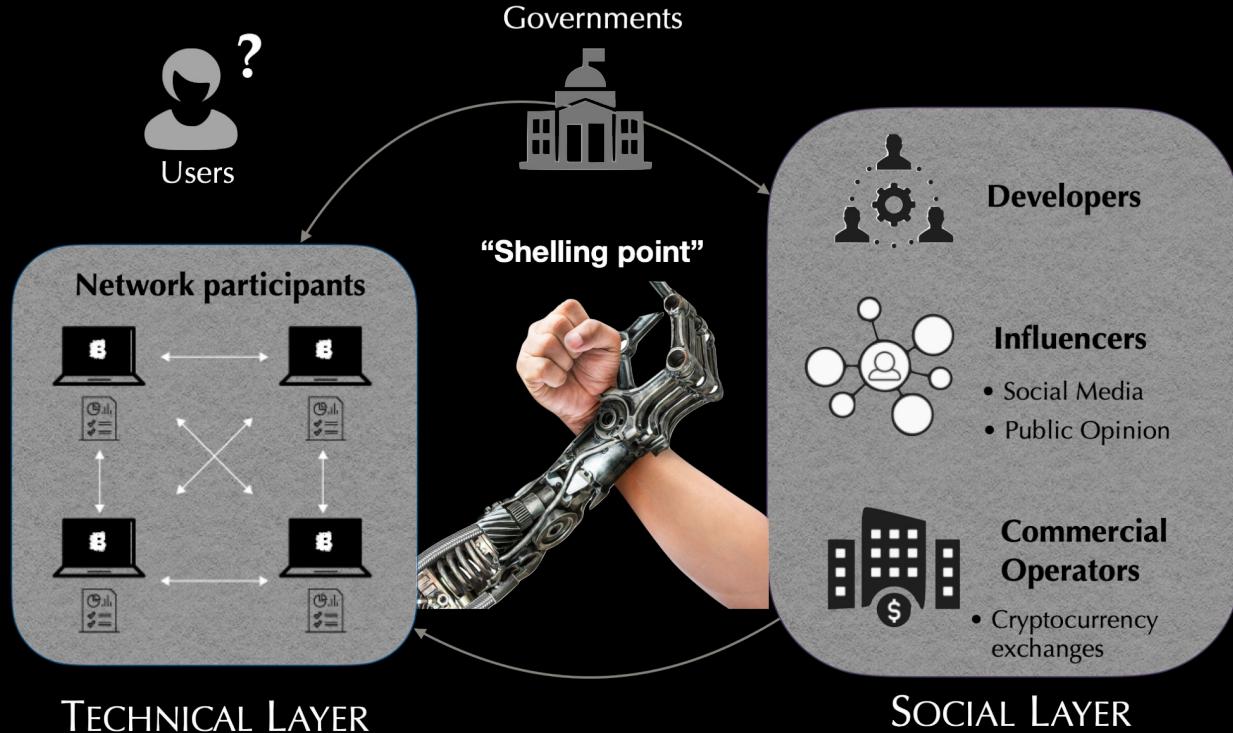
Nov 2024:

US Court of Appeals for the 5th Circuit ruled that
the immutable smart contracts used by Tornado Cash do
NOT qualify as "property" under federal law

⇒ the Office of Foreign Assets Control lacked authority to
sanction Tornado Cash software directly, as opposed to
the rogue persons or entities who abuse it!



BLOCKCHAIN BETWEEN REGULATION & GOVERNANCE





Blockchain Legality & Regulation

Guest Lecture + Q & A

Judith de Boer (Tornado Cash Lawyer)

Lecture 2

Crypto Industrial Politics

Nathalie Boyke

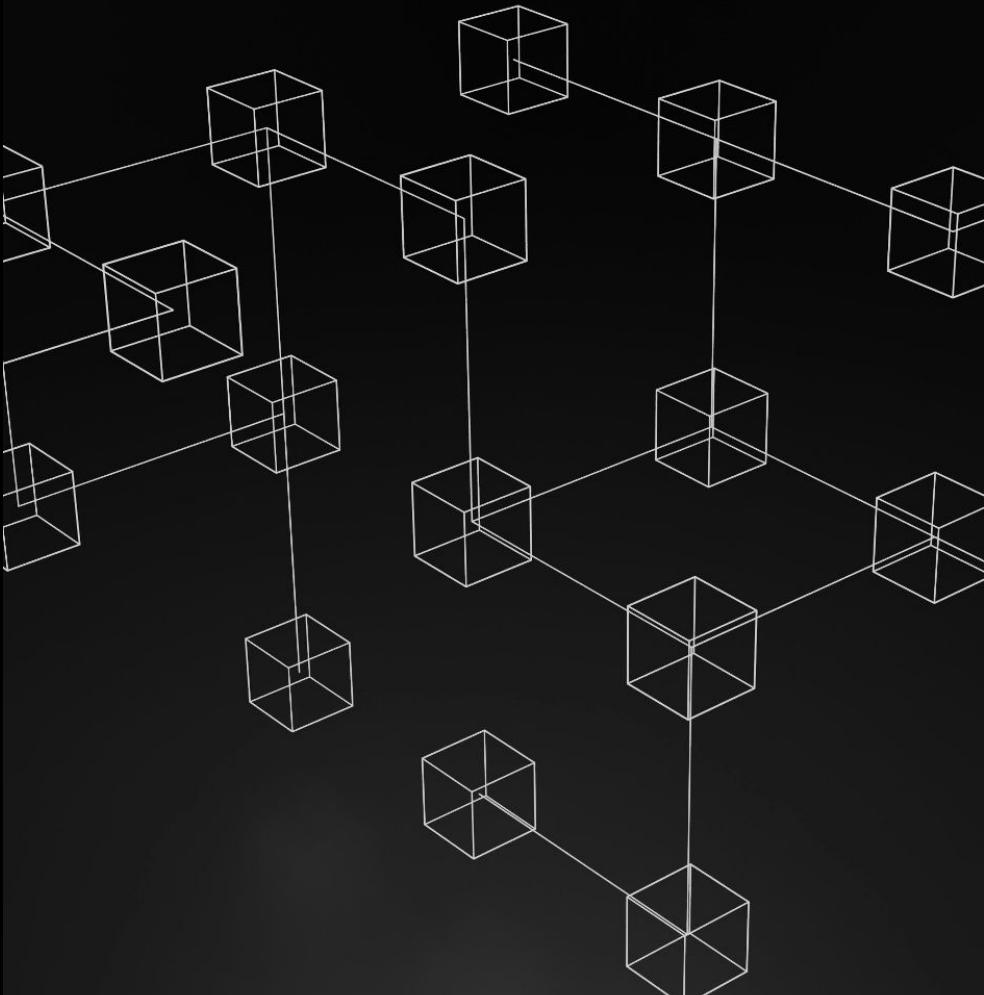
"When the winds of change blow, some people build walls, and others build windmills."

Ancient Chinese proverb

The Tech-World Today

- Tech is evolving at an exponential speed
- The internet creates more global companies
- Tech-founders have options, which questions existing tech-hubs.

Is this an opportunity?



Why the Web3 Industry has Impact

- **Massive market potential:** Blockchain tech revenue is projected to rise from ~\$58B in 2025 to over \$1.4T by 2030.
- **Jobs & skills growth:** 15–20K active listings worldwide, with 35% in Asia-Pacific, signaling regional career expansion.
- **New asset classes:** Tokenization could unlock \$2T in real-world assets, boosting liquidity and investment channels.
- **Institutional legitimacy:** With the crypto market valued at \$4T+, Web3 is no longer niche — it's central to global finance.



National Competitiveness

Who is in the race to attract the Web3 industry?

Comparative Heatmap: Policy

Jurisdiction	DeFi friendliness	Web3/Tokenization posture	Why
Singapore	High	Very high	Monetary Authority Singapore (MAS): stablecoin framework + Project Guardian tokenization pilots; no DAO entity per se.
UAE (Dubai/Abu Dhabi)	High	High	Virtual Assets Regulatory Authority rulebooks; Abu Dhabi Virtual Assets guidance + fiat-referenced token (stablecoin) consultation; explicit bans on privacy/algorithmic stables.
EU (MiCA)	Medium	High	MiCA stablecoin/CASP regimes live; DeFi/DAOs largely out-of-scope for now. GDPR poses unresolved challenges for blockchain immutability. AML/ Travelrule also live
United States	Medium (state dependent)	Medium	No unified federal crypto law; stablecoin clarity from GENIUS Act ; DAO LLC available in Wyoming.



DeFi Regulations Emerge – DAOs Still in uncertain

- Most hubs now regulate tokens, stablecoins, and service providers.
- But DAOs remain a gray zone — partially addressed only in Wyoming, ADGM, foundations.
- Legal certainty for DAOs = next frontier for innovation and competitiveness.

DAO Legal Certainty – Comparative Overview

Jurisdiction	What They Offer (DAO Pathways)	DAO legal clarity	What's Missing / Lacking
Singapore	No DAO-specific law, but foundations, companies, or trusts widely used. DAOs can access MAS tokenization pilots (Project Guardian).	Medium	No recognition of DAOs as autonomous entities. Liability/accountability still sits with legal wrapper.
UAE (Dubai/ADGM)	Foundation structures (esp. ADGM) actively marketed for DAOs. VARA/ADGM frameworks give clarity on token issuance & governance.	Medium	DAOs not recognized as self-standing. Still need a responsible legal entity. Heavy restrictions on privacy coins/stables limit scope.
European Union	MiCA governs tokens, CASPs, stablecoins. AML/Travel Rule applies.	Low-Medium (not harmonized)	No DAO definition. GDPR vs. blockchain immutability unresolved. DAOs risk being “joint controllers” → high liability.
United States	Wyoming & Tennessee DAO LLCs: allow smart-contract-based governance inside LLC framework. GENIUS Act brings stablecoin clarity for DAO treasuries.	Medium-High (state-level)	Federal law fragmented. DAO LLC only valid at state level → weak cross-border recognition.

Discussion: Where would you place Indonesia?

- Weaknesses, Strength, Opportunities, Initiatives?

Why Indonesia is set for Web3 Growth

Demographics

Median age **30.4** (ASEAN avg. 30.9) → youngest large economy in region

190M working-age people → largest labor pool in ASEAN

Digital Penetration

212M Internet users (~75% of population)

356M mobile connections (125% penetration; 96% broadband)

Top 5 worldwide in smartphone users

Talent & Value Proposition

Large, digitally native workforce + strong developer base

Scale globally from Indonesia: talent + affordability + lifestyle

Expat Appeal

Bali & Jakarta: global hubs for talent & founders

High quality of life, cultural vibrancy, and strong digital infra

Capital Flows

Asia leads Web3 funding: SP, HK attract billions from VCs

ASEAN's largest market (**270M people**) = scale investors can't ignore.

Spillover capital: Regular clarity can redirect regional investments

Digital Transformation

- Rethinking Systems with Web3

Case Study 1: Estonia – Digital Government on Blockchain

KSI Blockchain is a **public state infrastructure** integrating **ID, health, taxes, voting systems** and **business registries**. Blockchain ensures data integrity and immutability in the system. Through it, Citizens and businesses have **one secure digital identity** for all services.

Impact/Benefits:

- Radical efficiency
- Fraud prevention
- Global revenue stream
- Trust in government

2008

Blockchain technology

Scalable blockchain technology KSI is developed by Estonian cryptographers.



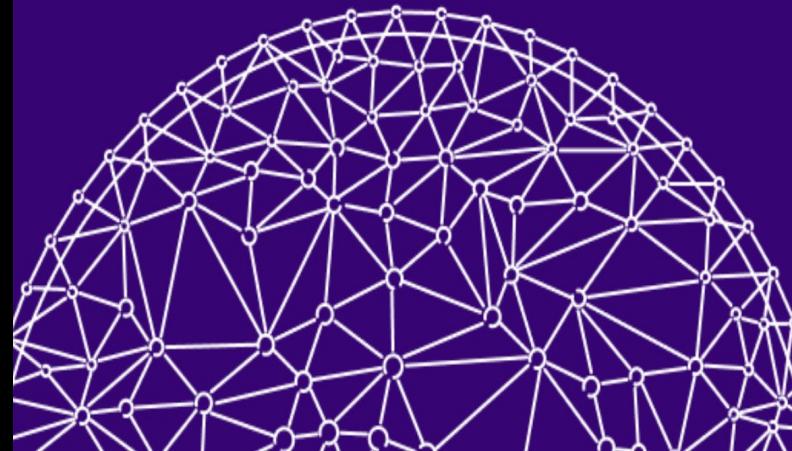
Challenge

To mitigate threats of insider data manipulation in Estonia's registries following the 2007 cyberattacks.



Effect

Estonia has become a pioneer of blockchain technology. Several government registries are backed by KSI blockchain.



Case Study 2: Singapore – collaboratively exploring tokenized finance

Project Guardian uses DeFi protocols in a controlled environment to **simulate real-world trades with smart contracts and tokenized assets**. The project is a collaborative effort launched in 2022 by the Monetary Authority of Singapore, DBS, JPMorgan, SBI and others.

Impact/Benefits:

- Blueprint for regulated DeFi
- Capital efficiency
- Global attraction
- Interoperability



Project Guardian

Enabling Open and
Interoperable Networks



Case Study 3: UAE – Real Economy Tokenization

The UAE (Dubai's VARA and Abu Dhabi's ADGM) created comprehensive legal frameworks for digital assets and actively deploys blockchain in trade and government services. Flagship initiatives include the **Trade Chain** (trade documentation on-chain, 80% faster handling), **blockchain land registries**, and **cross-border CBDC pilots (mBridge)**.

Impact/Benefits:

- Faster settlement
- Lower costs
- Fractional ownership
- Trusted global hub
- Fraud prevention

DUBAI CHAMBER SIGNS DIGITAL SILK ROAD INITIATIVE

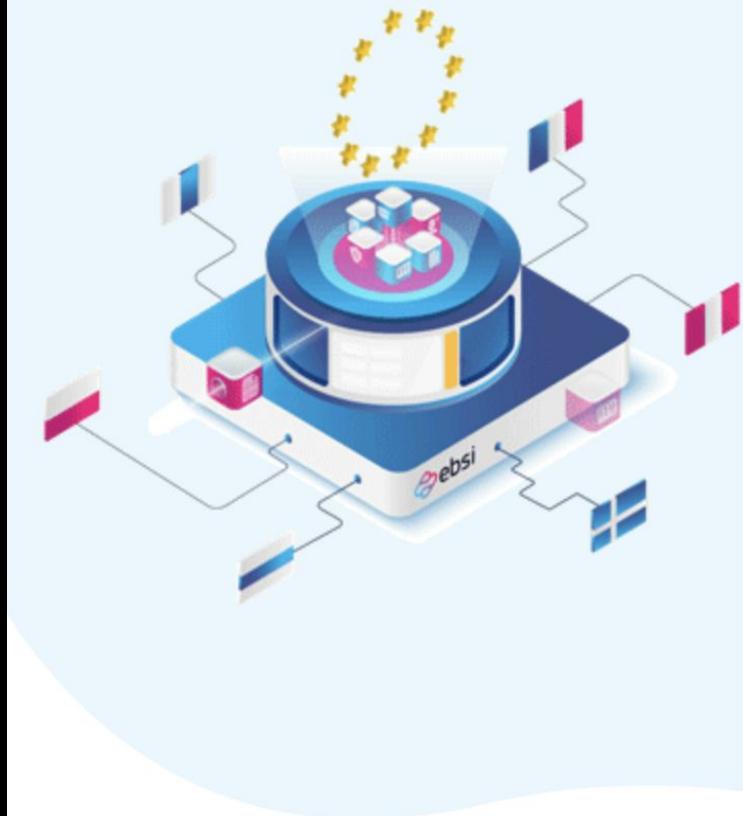


Case Study 4: EU – Transnational blockchain for Public Services

The **European Blockchain Services Infrastructure (EBSI)** is an EU-led, pan-national blockchain network designed to enable **cross-border non-financial applications such as** identity solutions to enable **cross-border diploma verification**. (e.g. Italy-Belgium Universities) or **Digital Product Passports (DPPs)** that include verifiable data on **carbon footprint, origin, and compliance**.

Impact/Benefits:

- Student & worker mobility
- Trusted supply chains
- Fraud prevention
- Government trust
- Safe experimentation



Key Takeaways: Web3 & Policy

- **Web3 ≠ speculation** → It is infrastructure for identity, finance, and trade.
- **Case studies show:** Governments cut costs, boost trust, and attract capital.
- **Policy levers matter:** Clear rules for tokens, stablecoins, and DAOs convert uncertainty into investment.
- **Indonesia's edge:** young, digital-native population + largest ASEAN market.
- **Strategic moment:** With clarity, Indonesia can position itself as a **trusted leader in digital transformation**.



Thank you!

Lecture 3

Regulatory Equivalence

Primavera de Filippi

REGULATORY EQUIVALENCE

MAPPING LEGAL FORMALITIES
TO TECHNOLOGICAL GUARANTEES
IN THE BLOCKCHAIN SPACE



Primavera De Filippi

Harvard / CNRS

@yaoeo

REGULATORY EQUIVALENCE FOR BLOCKCHAIN TECH



- 1. How can Blockchain Systems comply with existing regulations ?*
- 2. How can they streamline regulatory compliance via tech guarantees ?*

2 TYPES OF EQUIVALENCE:



FUNCTIONAL EQUIVALENCE

*As regards the tools available
to comply with specific legal rules
(e.g. electronic contracts, e-sig)*



REGULATORY EQUIVALENCE

*As regards the means available
to achieve a regulatory objective
(e.g. lower risks, transparency)*

FUNCTIONAL EQUIVALENCE



Functional equivalence allows the establishment of equivalence between two technological artefacts:

- *One that is already covered within the realm of a legal rule*
- *Another that is not (yet) encompassed by it
(e.g., written signatures and electronic signatures).*

FUNCTIONAL EQUIVALENCE



Applying existing legal rules
to novel technologies that serve equal functions

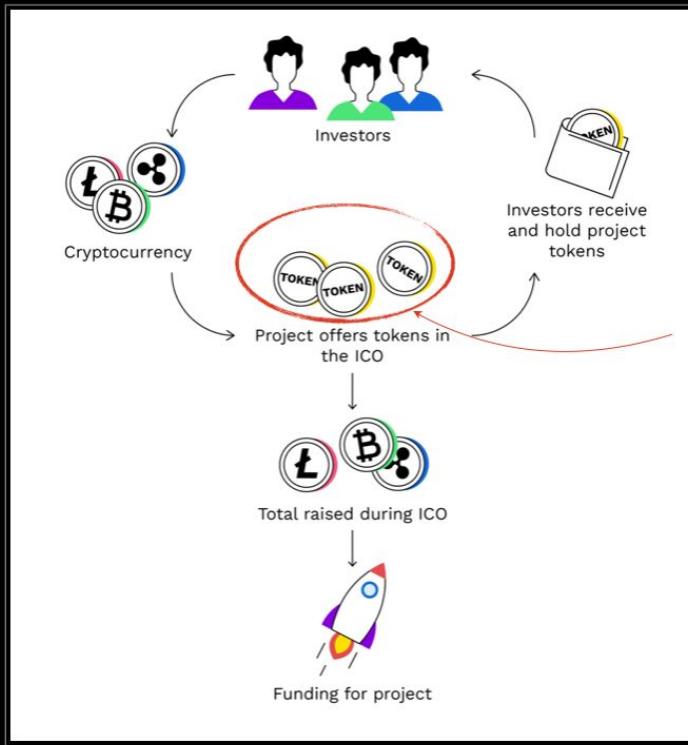


INITIAL COIN OFFERING

IPO vs. ICO



- ISSUE SHARES OF A COMPANY
- CENTRALIZED BY STOCK EXCHANGE
- HEAVY REGULATED BY AUTHORITIES
- ISSUE CRYPTOCURRENCY TOKENS
- OPERATED VIA A SMART CONTRACT
- UNREGULATED ?



Legal Qualification ?

Legal qualification must take into account:

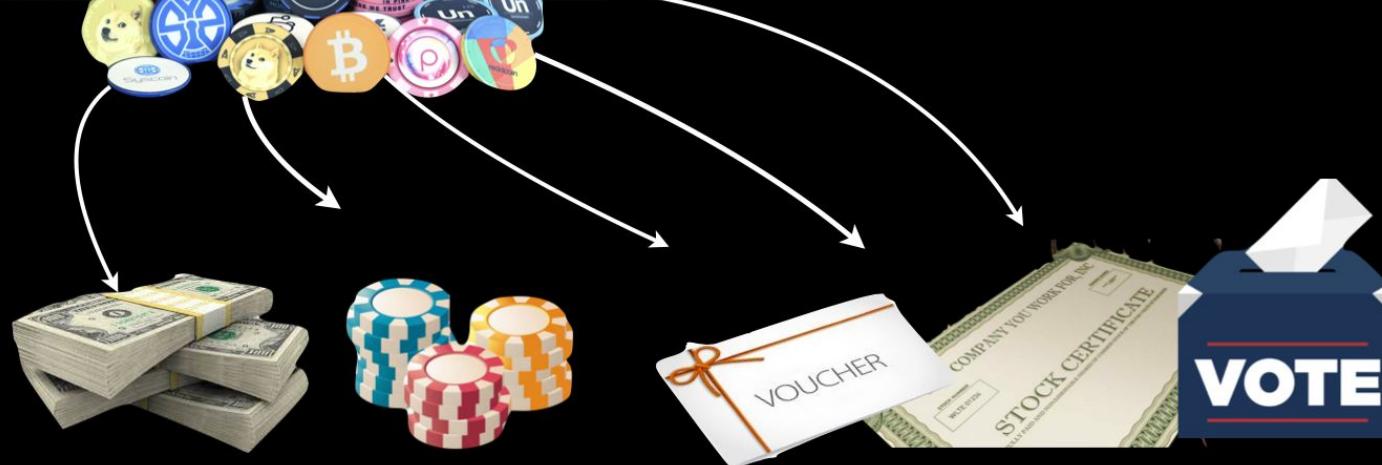
- *the original function of the token (why it was issued)*
- *the practical applications of that token (beyond the control and intention of the issuer)*

FUNCTIONAL EQUIVALENCE



Many tokens usually qualify as multiple classes:

- Payment tokens
- Utility tokens
- Governance tokens
- Investment tokens
- Asset-backed tokens



FUNCTIONAL EQUIVALENCE

Money ?

Commodity ?

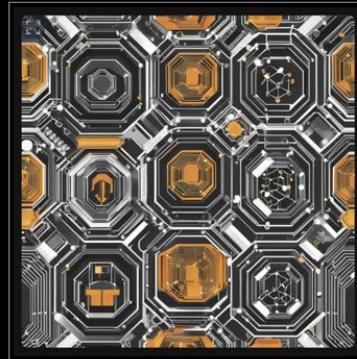
Securities ?



BLOCKCHAIN AS A PLATYPUS

REGULATORY COMPLIANCE ?

Regulatory compliance can be challenging for blockchain systems



(1) Because they need to comply with multiple regulatory frameworks at the same time

(2) Because it is hard to reconcile:

- the expectations of legal system (designed for legacy institutions with counter-party risk)
- the distinctive properties of blockchain systems, which are fundamentally intermediated in ways that do not undermine the basic technological guarantees of blockchain tech.

REGULATORY EQUIVALENCE



From Legal Constraints
to Technical Guarantees

“Don’t trust, Verify”

REGULATORY EQUIVALENCE



Regulatory equivalence establish the equivalence between:

- *the policy objectives of specific legal provisions, and*
- *the implications of adopting a particular technological artefact as an alternative way to achieve regulatory compliance.*

PRINCIPLE-BASED REGULATORY APPROACH

Security laws designed to limit the risk of investors in investment contracts

From a Regulatory Equivalence perspective:

- ★ similar risks should be treated in a similar manner
 - If ICOs pose similar risks to IPOs (in degree and in kind), they should be subject to similar laws
 - If they don't want to fall within existing regulations ICOs must provide lower risks than IPOs



- Escrow System

Progressive disbursing of funds based on Milestones, so that both investors and token issuers are protected



- Locking / Vesting periods

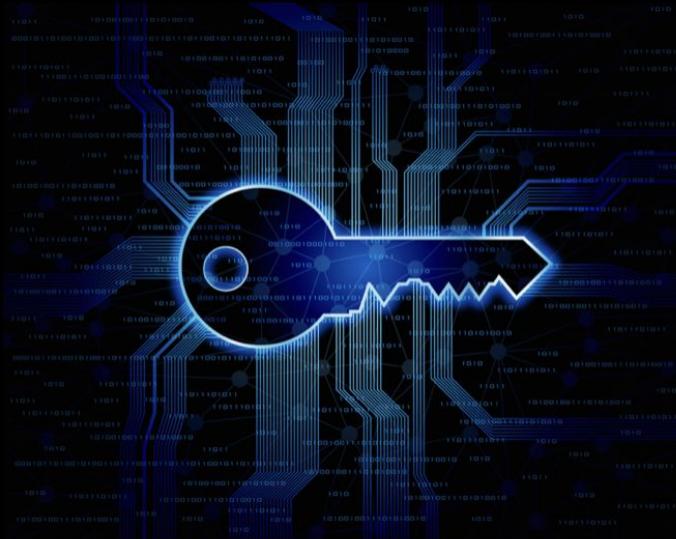
- (1) Ensure the alignment of management team and investors with long-term success
- (2) Prevents ppl to engage into speculative practices such as “pump and dump”.



- Speculative capping

e.g. by offering a constant supply of tokens at pre-determined price (decided by smart contract) regardless of current market price

TECHNICAL ACCOUNTABILITY



PROOF OF RESERVE

—REAL-TIME AUDITING—

Prove the full reserve of funds in custody
reducing the need for additional audits.

KEYLESS WALLETS

—NO CUSTODY—

Provide service to customers without holding their funds
Thus removing counter-party risks of centralised entity



REGULATORY COMPLIANCE

REAL TIME AUDITS



IDENTITY MANAGEMENT



AUTOMATED REPORTING



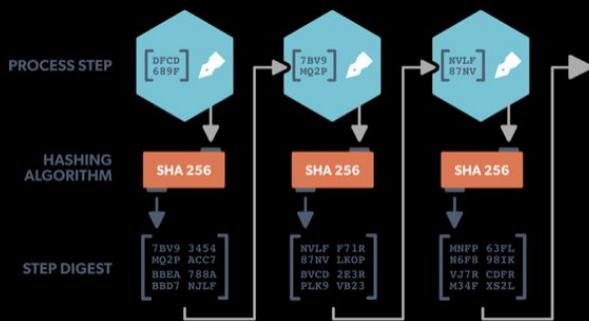
GUARANTEE OF EXECUTION



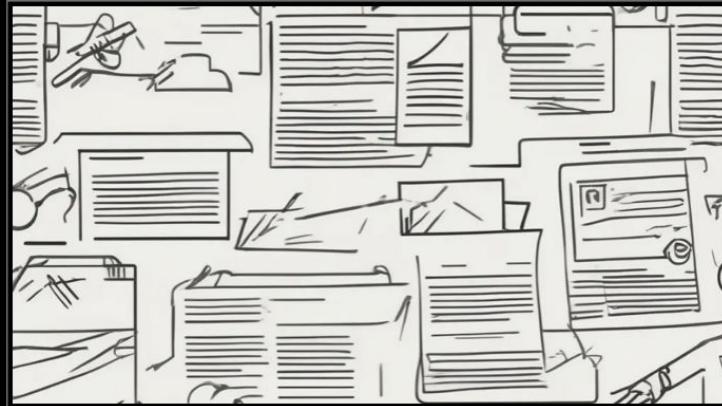
CORPORATE GOVERNANCE

Used to replace traditional corporate rules & bureaucratic procedures for budget approval

MULTI-SIGNATURES —CONTROLLED EXPENDITURES—



PROOF OF PROCESS



CERTIFICATION

- OPERATION CONTROL
- NO MANIPULATION
- EX-POST VERIFICATION
- DATA INTEGRITY

Regulatory Equivalence:

Addressing existing legal challenges in the blockchain space

DAO: Legal Recognition & Member's Liability



ooki

Ooki DAO operating as unregistered derivatives exchange

CFTC filed a complaint alleging it violates the Commodity Exchange Act by allowing users to engage in retail commodity derivative trading)

Requirement to “register” the trading platform (the protocol) and conduct customer due diligence

Allegation that Ooki was intentionally structured as a DAO to avoid regulatory oversight thanks to user’s pseudonymity

CFTC did not sue the individuals (as general partnership), but communicated directly to the DAO (on public forums) to warn the token holders.



db

@tier10k

...

"The Commission defines the Ooki DAO unincorporated association as those holders of Ooki tokens that have voted on governance proposals with respect to running the business"

If you are an Ooki token holder who voted on governance proposals you just got charged...

Legislative interventions ?

UK



LAW COMMISSION LAUNCHES
CALL FOR INFORMATION ON
DECENTRALISED AUTONOMOUS
ORGANISATIONS

Belgium

Working group to define a DAO worker status in Belgium:

Our goal is to accelerate the adoption of Web3 (aka crypto) in Belgium. This is a broad topic. So we decided to focus with this working group on creating a legal status for DAO workers. Many Belgians are looking for new remote job opportunities that can give them the flexibility they need. While the current economy has been hardly hit with the pandemic, there is a new booming worldwide crypto economy looking for talent. By creating a legal status, we will attract talented people in our country and offer great new opportunities to Belgian people.

Legal Recognition

Need for LEGAL PERSONALITY / LEGAL CAPACITY:

For DAOs interface with the ‘off-chain’ legal system

Need for (partial) LIMITED LIABILITY:

To protect members and contributors of DAOs

TAXATION issues:

To help DAOs comply with tax regulations

Need for LEGAL CERTAINTY and predictability:

To allow for the global adoption of DAOs by the world at large

WYOMING

Wyoming law recently became the first state to allow DAOs to register and operate in the state as limited liability companies, thus granting DAOs many of the same legal rights and protections as those enjoyed by traditional business entities.

May 25, 2022

VERMONT

Under Vermont's Limited Liability Company Act, a DAO can register as a Blockchain Based LLC (BBLLC), and thereby gain an official legal status that allows it to enter into contractual agreements and offer liability protection to its members.

Jul 6, 2022

WHY NOT INCORPORATE?

DAOs are ‘transnational’

They operate globally, regardless of national boundaries

DAOs are ‘pseudonymous’

It is difficult to ascertain the identity of their members / contributors

DAOs are ‘autonomous’

Discrepancy between legal entity and their on-chain incarnation

WHY NOT INCORPORATE?

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They operate globally, regardless of national boundaries

DAOs are ‘pseudonymous’

It is difficult to ascertain the identity of their members / contributors

DAOs are ‘autonomous’

Discrepancy between legal entity and their on-chain incarnation

DAOs are incorporated

On a decentralised, secure and tamper-resistant ledger

MODEL LAW FOR DECENTRALIZED
AUTONOMOUS ORGANIZATIONS
(DAOs)

DAO MODEL LAW

coala





COAB DAO MODEL LAW

It proposes **regulatory equivalence** between:

- **legal requirements** for corporate formation, and
- the **technological design** of decentralised autonomous organisations (DAOs).

It recognise that DAOs are essentially transnational entities that can provide tech guarantees that are equivalent (better) to the protection that current corporate laws seek to enforce by means of existing formalities and reporting requirements.

Scope of the DAO Model Law

“Decentralized Autonomous Organization” (DAO) refers to smart contracts (i.e. blockchain-based software) deployed on a public **Permissionless Blockchain**, which implements specific decision-making or governance rules enabling a multiplicity of actors to coordinate themselves in a decentralized fashion. These governance rules must be technically, although not necessarily operationally, decentralized.

NOT ALL DAOs ARE (REG) EQUIVALENT

Article 4 - Formation Requirements

To be granted legal personality, a DAO must fulfill the following requirements:

- (1) Deployment on a Permissionless Blockchain;
- (2) Provision of a unique Public Address;
- (3) Software code is posted open-source in a Public Forum;
- (4) Audit;
- (5) At least (1) GUI;
- (6) Comprehensible bye-laws
- (7) Point of contact
- (8) Dispute resolution mechanisms

No registration necessary.

NOT ALL DAOs ARE (REG) EQUIVALENT

Article 5. - Limited Liability

Members will not be held liable for any obligations incurred by the DAO beyond their contributions.

Member are responsible in tort for their own wrongful act or omission, but not personally liable for the wrongful act or omission of any other DAO.

“5(3) If the DAO refuses to comply with an enforceable judgment, order or award entered against it, the Members who voted against compliance will be liable for any monetary payments ordered in the judgment, order or award in proportion to their share of governance rights in the DAO.”

Article 20:

"The taxation of DAOs recognized by this ML will be based on the following principles:

- (1) By default, any DAO recognized by this ML will be treated as a pass-through entity for tax purposes, with no entity-level tax accruing to the DAO. Any realized gains will pass through to the DAO's Members in proportion to their Token holdings.
- (2) Where a Member itself is not a taxable entity, such as another DAO, the realized gains allocated to such Members will pass to the first taxable person in the same manner as specified in Article 20(1)."

LEGISLATIVE GENERAL COUNSEL
Approved for Filing: S. Elder
02-21-23 12:38 PM

H.B. 357
3rd Sub. (Cherry)

Representative Jordan D. Teuscher proposes the following substitute bill:

1 DECENTRALIZED AUTONOMOUS ORGANIZATIONS
2

AMENDMENTS

3 2023 GENERAL SESSION

4 STATE OF UTAH

5 Chief Sponsor: Jordan D. Teuscher

6 Senate Sponsor: Kirk A. Cullimore

7 LONG TITLE

General Description:

10 This bill allows a decentralized autonomous organization that has not registered as a
11 for-profit corporate entity or a non-profit entity to be treated as the legal equivalent of a
12 domestic limited liability company.

13 Highlighted Provisions:

- 14 This bill:
15 • enacts the Decentralized Autonomous Organization Act;
16 • defines terms under the act;
17 • establishes the requirements of a decentralized autonomous organization to be
18 recognized by the state;
19 • establishes the purposes for which a decentralized autonomous organization may be
20 formed; and
21 • establishes the membership requirements and rights of members of decentralized
22 autonomous organizations.

23 Money Appropriated in this Bill:

24 None

25 Other Special Clauses:

UTAH

March 1: UTAH passed the DAO Amendments, which implement the proposition of the

[@coalaglobal](#)

Model Law on DAOs, and bestow unregistered/unwrapped DAOs treatment equivalent to that of LLCs, so long as they fulfill certain requirements.

The Utah law gives DAOs legal personhood and limited liability - **we've introduced the LLD or limited liability DAO!**

It also clarifies that **flow through taxation** applies to a DAO

and that there are **no implicit fiduciary duties** (unless those are expressly created by the DAO).

DAO LEGAL FRAMEWORKS

- **Incorporated DAO Legislations (BBC LLC):**
 - Vermont
 - Wyoming
 - Marshall Islands
- **Non-Incorporated DAO Legislations (LLD):**
 - Utah (DAO Model Law)
- **Regulatory efforts mentioning the DAO Model Law**
 - Australia
 - United Kingdom (UK Law Commission)
 - St. Helena
 - New Hampshire

REGULATORY COMPLIANCE

REGULATORY EQUIVALENCE AS AN INCENTIVE FOR REGULATORY COMPLIANCE

- IF CANNOT REGULATE DECENTRALISED SYSTEM
- MUST GIVE INCENTIVES FOR COMPLIANCE
- CARROT VS STICK

e.g. **Legal recognition / Limited Liability**
as an incentive for DAOs to ‘voluntary’
comply with existing corporate rules

e.g. **reduced regulatory burden** on ICOs
as an incentives to design ICOs which do
reduce risks for investors and consumers



REGULATORY INNOVATION

REGULATORY EQUIVALENCE AS AN INCENTIVE FOR REGULATORY INNOVATION

- IF REGULATORS CANNOT FIGURE OUT BEST WAY TO REGULATE BLOCKCHAIN
- MUST ENCOURAGE PRIVATE SECTOR TO COME UP WITH NOVEL SOLUTIONS
- TO MEET POLICY OBJECTIVES VIA TECH

Invitation by regulators for **private actors to innovate** to find ways to be compliant with existing regulations while embracing & leveraging (rather than jeopardising) the technological guarantees of blockchain technology

**IF CAN DEMONSTRATE EQUIVALENCE TO REGULATORS
REDUCED REGULATORY BURDEN:
AGENTS CAN CHOOSE AMONGST BOTH WAY TO COMPLY
(BOTH FOR WEB3 AND BEYOND)**



Regulatory Equivalence

Navigating between
Regulatory Avoidance
and **Regulatory Compliance**

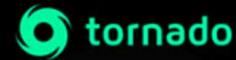


1. RECEIVE A "DEPOSIT NOTE"

2. DEPOSIT WITH HASH OF THE NOTE

3. WAIT

4. WITHDRAW WITH ZKP PROVING THE THE WITHDRAWAL IS LINKED
TO A DEPOSIT THAT IS VALID AND HAS NOT YET BEEN SPENT



Privacy Pools v0

1. RECEIVE A “DEPOSIT NOTE”

2. DEPOSIT WITH HASH OF THE NOTE

3. WAIT

4. WITHDRAW WITH

- ZKP PROVING THE THE WITHDRAWAL IS LINKED TO A DEPOSIT THAT IS VALID AND HAS NOT YET BEEN SPENT
- ZKP THAT WITHDRAWAL IS LINKED TO A SUBSET OF GOOD DEPOSITS (PROOF OF INCLUSION) OR NOT PART OF A SUBSET OF BAD DEPOSITS (PROOF OF EXCLUSION)

5. RECEIVE A “PROOF OF TRUSTED ORIGIN” TO COMPLY WITH REGULATIONS

CHALLENGES SPECIFIC TO BLOCKCHAIN SYSTEMS

TRADITIONAL COMPANIES DO NOT PUBLICLY DISCLOSE WHO IS ON THEIR PAY-ROLL
DAO'S TRANSPARENCY INHERENTLY VIOLATE FINANCIAL PRIVACY OF CONTRIBUTORS



HOW CAN DAOs COMPENSATE THEIR CONTRIBUTORS IN A PRIVACY-PRESERVING WAY
WHILE ENSURING THEY ONLY INTERACT WITH "TRUSTED" ENTITIES?

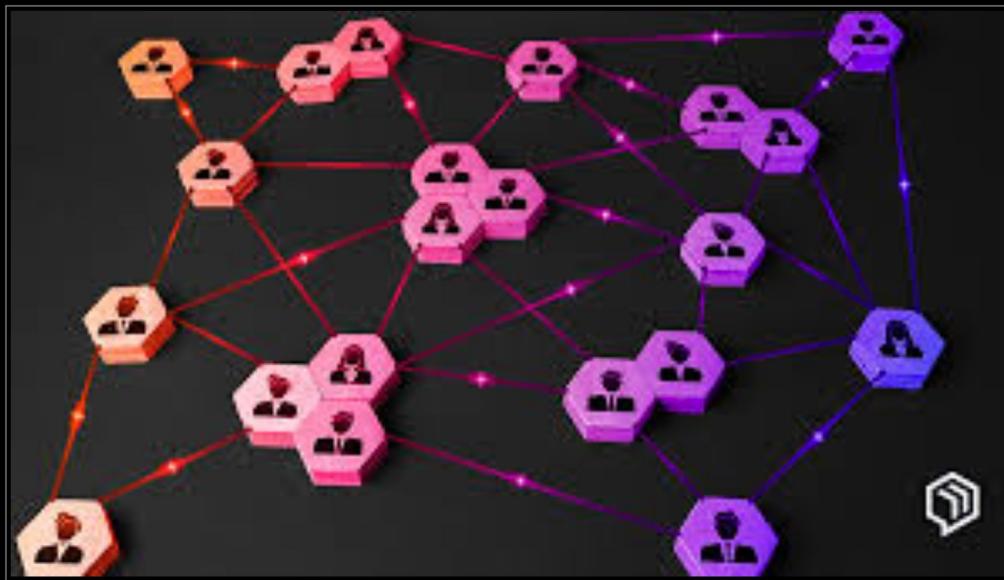


Compliant Book-Keeping for DAOs through “Proof of Trusted Origin:”

A Technical Guide

ENABLE DAOs TO REWARD CONTRIBUTORS WHILE RESPECTING THEIR FINANCIAL PRIVACY

(JUST LIKE TRADITIONAL ORGANISATIONS DO TO THEIR EMPLOYEES)



CONFLICT WITH PUBLIC VALUES?

EVEN IF BLOCKCHAIN TECHNOLOGY PROVIDES EQUAL OR SUPERIOR TECHNOLOGICAL GUARANTEES

These technical guarantees may fall short of reflecting some public values, particularly those that are implicit and not been expressly articulated in the law

- e.g. desire of regulators to scrutinise in corporate operations, through internal audits
- or additional sources of revenue for the state (e.g., filing and incorporation fees).

**THUS, LAW MAKERS AND REGULATORS MIGHT BE RELUCTANT TO
RECOGNISE THIS TYPE OF REGULATORY EQUIVALENCE.**

FOR BLOCKCHAIN TO ACT AS A

CONFIDENCE MACHINE

GOVERNANCE IS KEY

If no proper governance “of” blockchains:

- reducing the role of **publicly-accountable trusted intermediaries**
- can lead the rise of **new publicly-unaccountable intermediaries** (e.g. miners, token holders, or other blockchain stakeholders)

thereby undermining confidence in the system.

Exercise

BRAINSTORMING

- 1.- Other examples of regulatory equivalence ?
- 2.- What are the technological guarantees of blockchain that can contribute to better regulatory compliance?
- 3.- What are the challenges that blockchain systems meet when trying to comply with regulations designed for centralised entities?

Finale: Fish Bowl

- **Fish Bowl:** The future of blockchains in the public sector
 - *What are future challenges and opportunities for blockchain adoption in the public sector?*

Lecture 2

- **Mapping actors in the governance of blockchain systems**
 - *Who are the formal and informal power holders in blockchain systems?*
 - *How do internal (on-chain) governance processes interact with external (off-chain) forces?*
 - *What happens when legal frameworks and protocol rules diverge?*