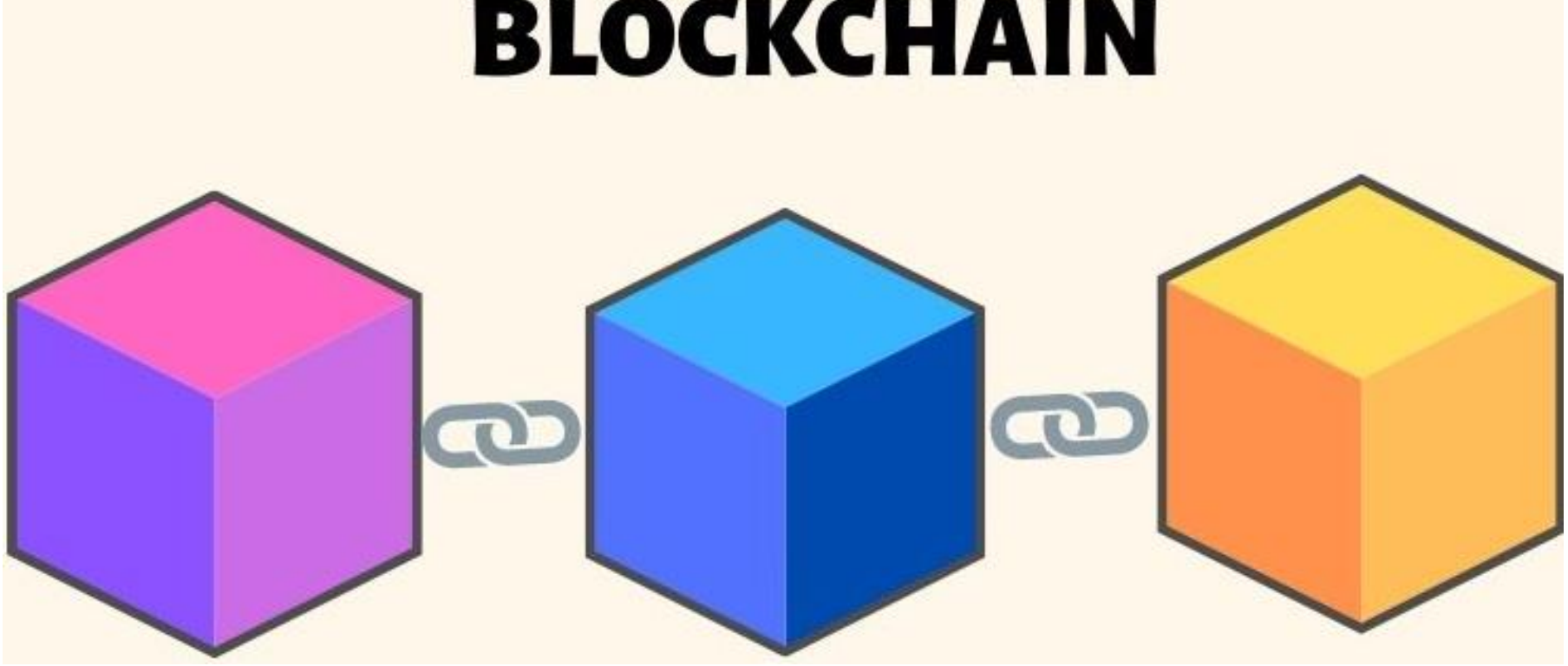
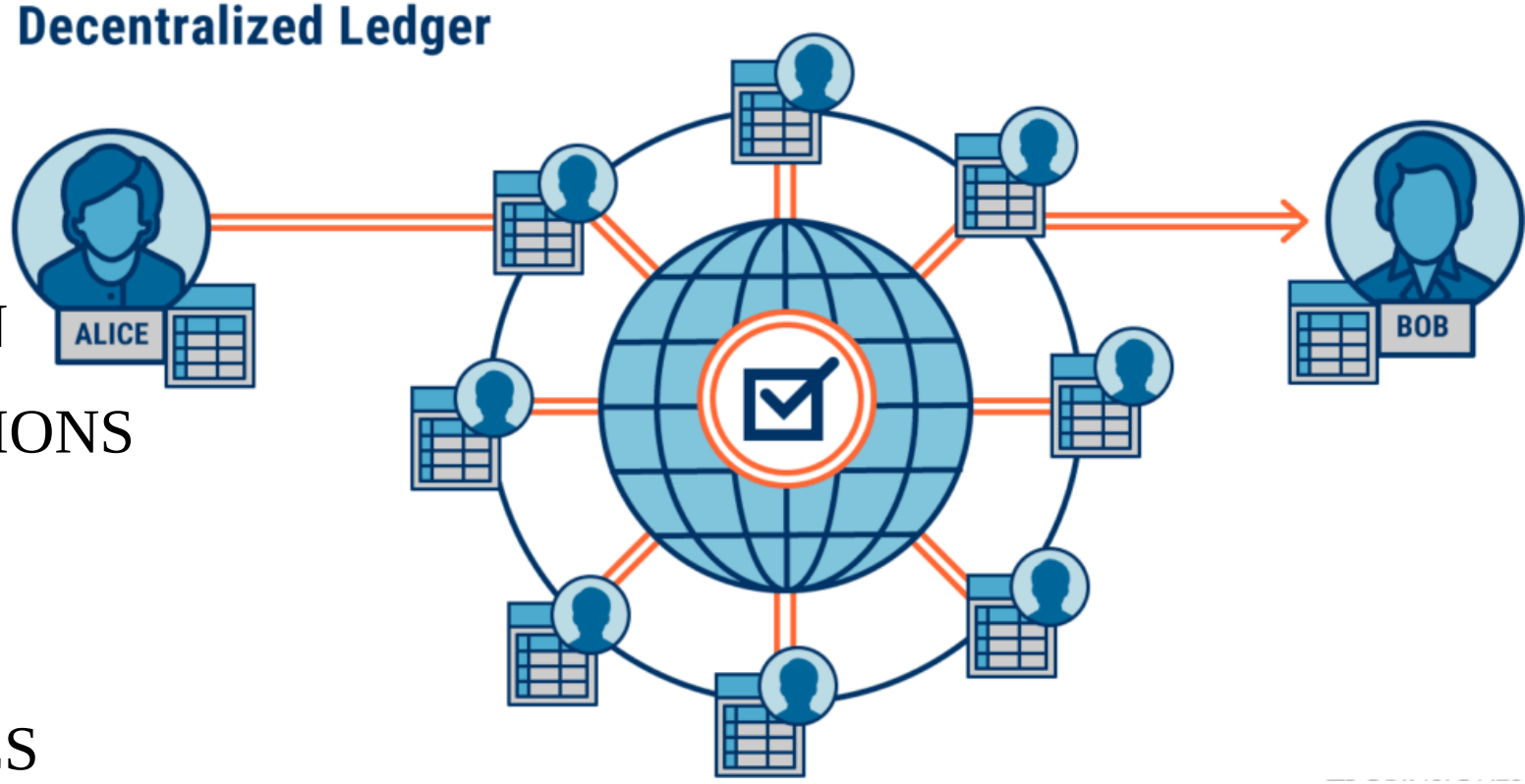


UNIT 2

OVERVIEW

Lecturer: Ph.D Lê Quang Huy

CONTENTS



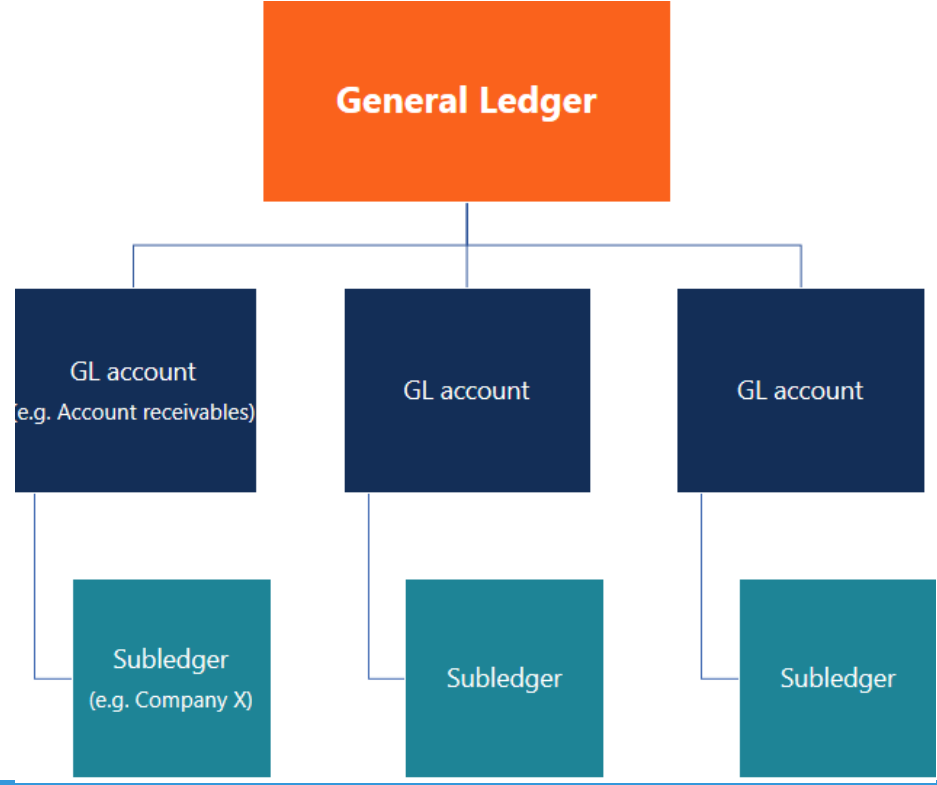
1. WHAT IS BLOCKCHAIN
2. BLOCKCHAIN EVOLUTION
3. TECHNOLOGY COMBINATIONS
4. SYSTEM ARCHITECTURE
5. PRIMARY FUNCTIONS
6. MAJOR CHARACTERISITICS
7. TAXONOMY
8. SECURITY & PRIVACY
9. APPLICATIONS & ECOSYSTEM
10. SUMMARY
11. DISCUSSION

1. WHAT IS BLOCKCHAIN

Blockchain is: chain of blocks

- decentralized ledger
- stores records in chronological order

- Distributed databases
- Open source software
- Data can only be added



General ledger

TEDDY FAB INC.
GENERAL LEDGER
December 31, 2100

Type	Date	Name	Amount	Balance
Cash Operating				25,000.00
Collect sale	1/1/2100	Turtle Toys	15,489.11	40,489.11
Collect sale	1/15/2100	Mega Corp	70,000.00	110,489.11
Pay vendor	1/16/2100	Vendor Giraffe	(45,400.11)	65,089.00
Receive loan	1/19/2100	Piggy Bank	10,000.00	75,089.00
Collect sale	1/20/2100	Blue Dolphin Toys	6,515.46	81,604.46
Continued...	Continued...	Continued...	Continued...	Continued...
Total ending				90,496.74
Cash Savings				9,500.00
Interest paid	9/30/2100		1.11	9,501.11
Interest paid	12/31/2100		2.15	9,503.26
Total ending				9,503.26
Accounts receivable				100,000.00
Collect sale	1/1/2100	Turtle Toys	(15,489.11)	84,510.89
Collect sale	1/15/2100	Mega Corp	(70,000.00)	14,510.89
Collect sale	1/20/2100	Blue Dolphin Toys	(6,515.46)	7,995.43
Sale	2/15/2100	Mega Corp	26,500.00	34,495.43
Continued...	Continued...	Continued...	Continued...	Continued...
Total ending				20,000.00
Parts inventory				
Continued...	Continued...	Continued...	Continued...	Continued...
Raw materials inventory				
Continued...	Continued...	Continued...	Continued...	Continued...
Work in process inventory				
Continued...	Continued...	Continued...	Continued...	Continued...
Finished goods inventory				
Continued...	Continued...	Continued...	Continued...	Continued...

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Record of all accounting transactions

Debits = Credits

1. WHAT IS BLOCKCHAIN

- Double Entry Accounting
- Triple entry Bookkeeping

Alice's Books

Debit	Credit
5	
	2
	9
10	

Bob's Books

Debit	Credit
	5
2	
9	
	10

Alice's Books

Debit	Credit
5	
	2
	9
10	

Bob's Books

Debit	Credit
	5
2	
9	
	10

Public Book (Immutable ledger)

Alice	Bob
-5	5
2	-2
9	-9
-10	10

Government , Banks/Financial institution, Auditors

Top Benefits of Double Entry Accounting

Top Benefits of Triple Entry Accounting

REDUCES ERRORS

CREATES A PAPER TRAIL

PREPARING FINANCIAL STATEMENTS

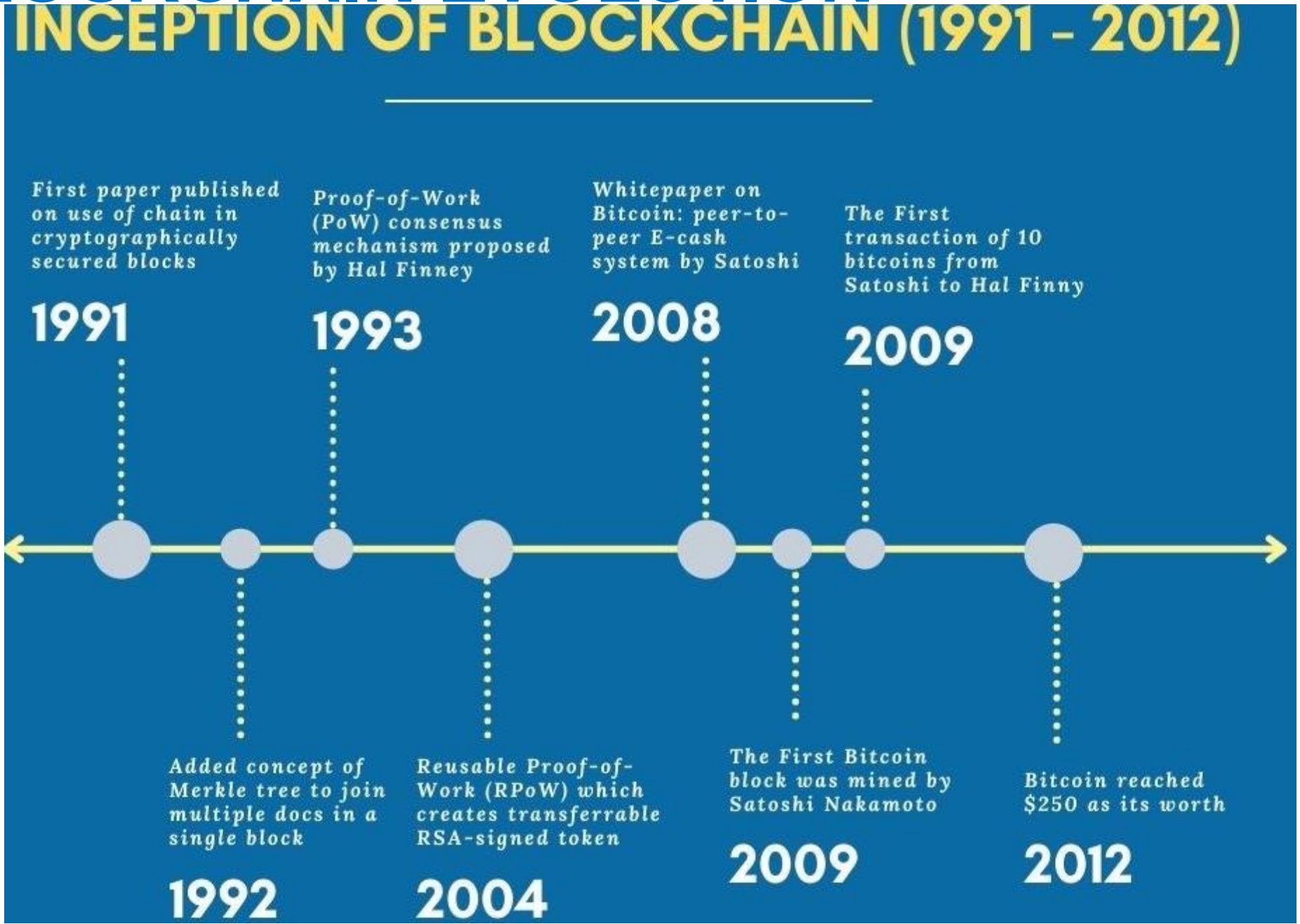
DISTRIBUTED CONTROL

PRECISION AND ACCURACY

ELECTRONIC CONTRACTS

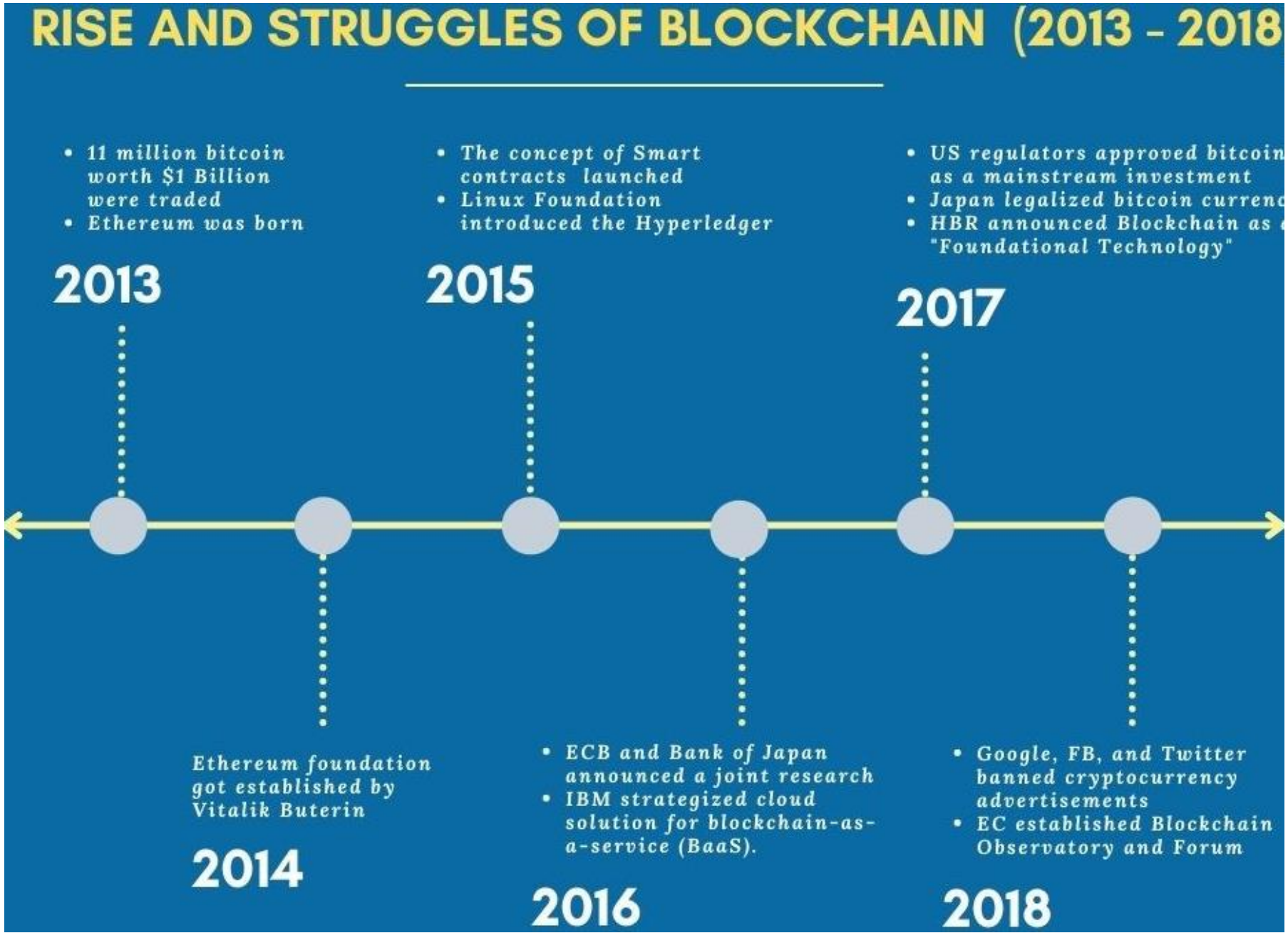
2. BLOCKCHAIN EVOLUTION

- Stage 1



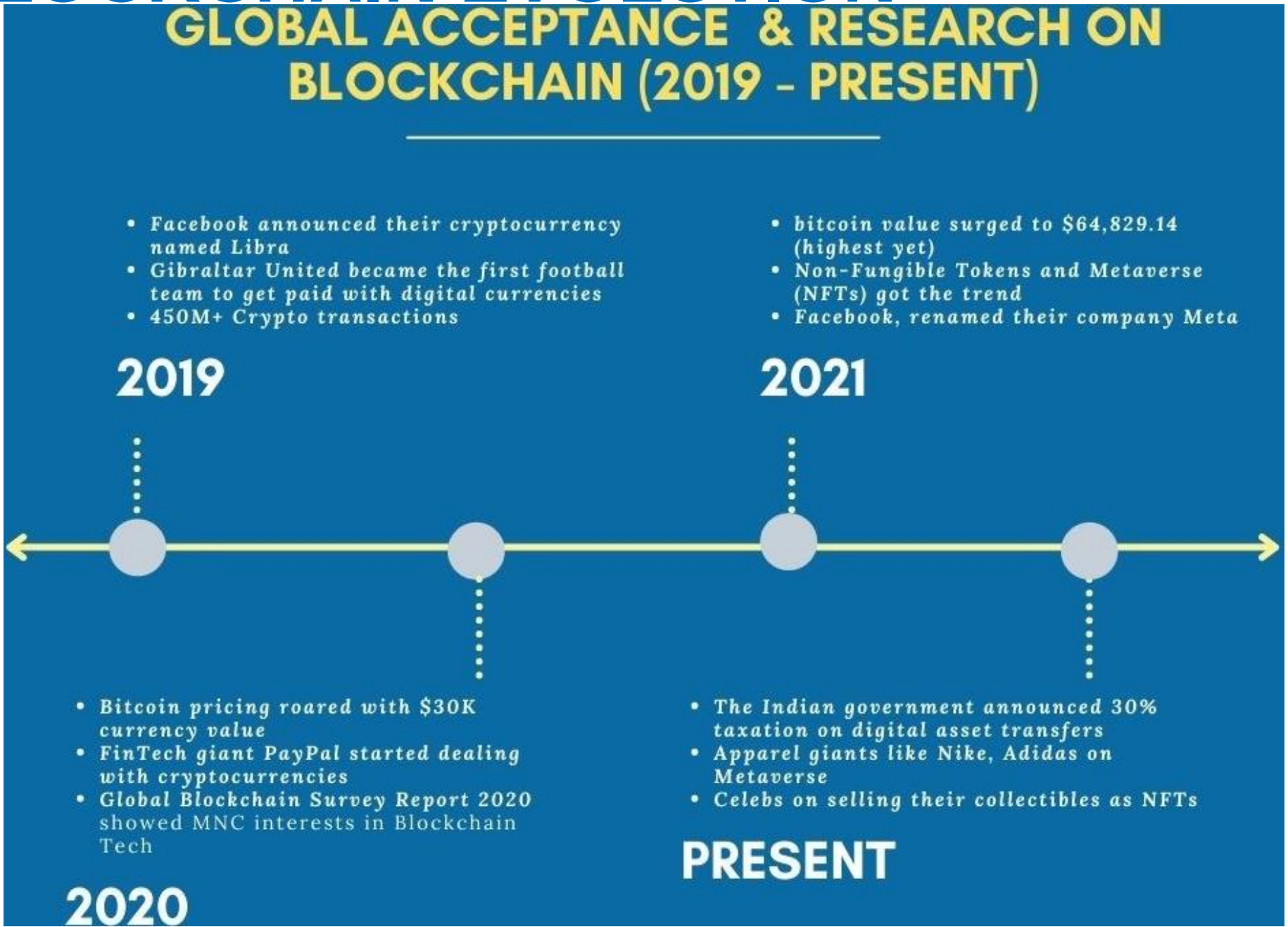
2. BLOCKCHAIN EVOLUTION

- Stage 2



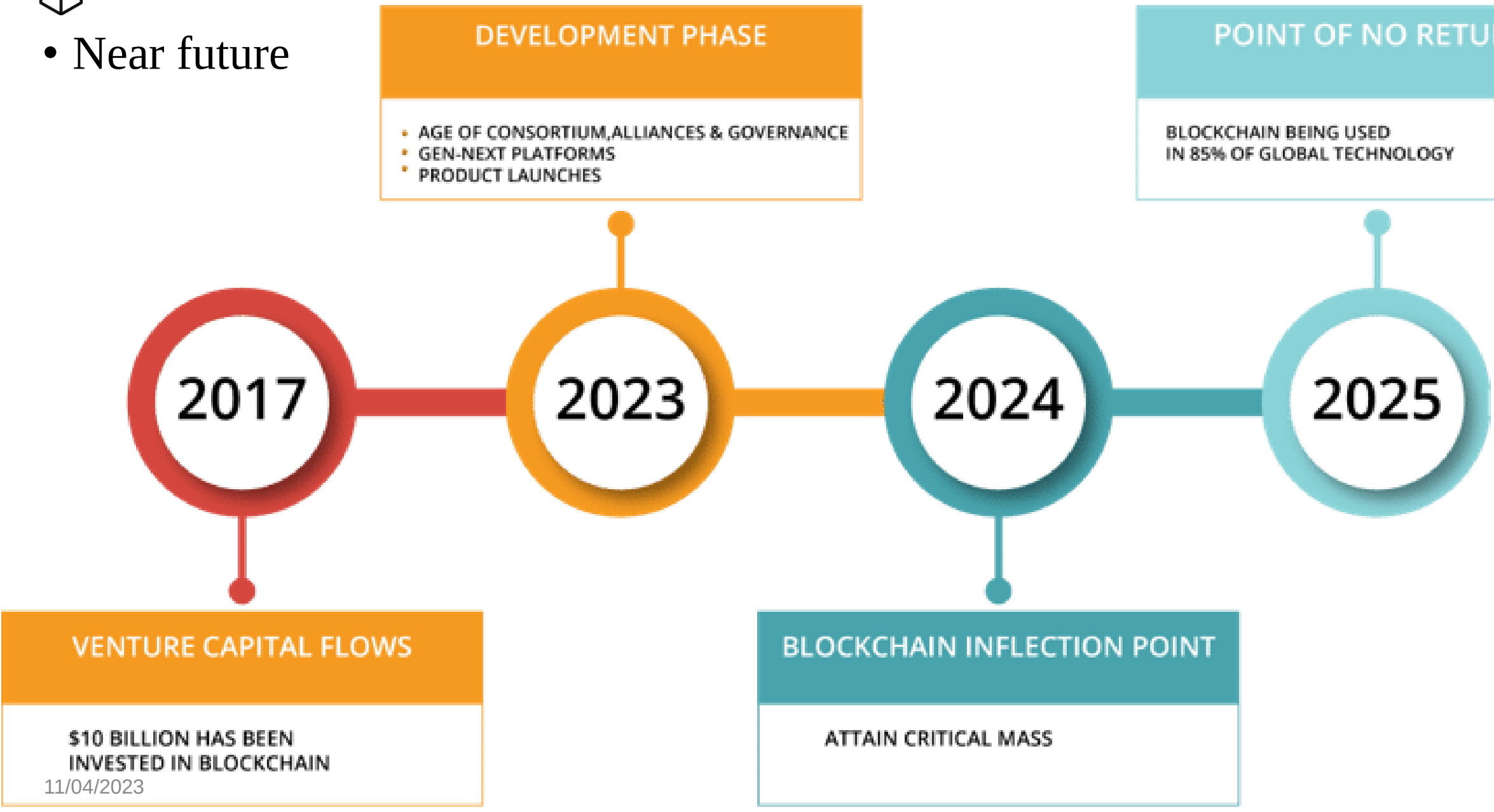
2. BLOCKCHAIN EVOLUTION

- Stage 3



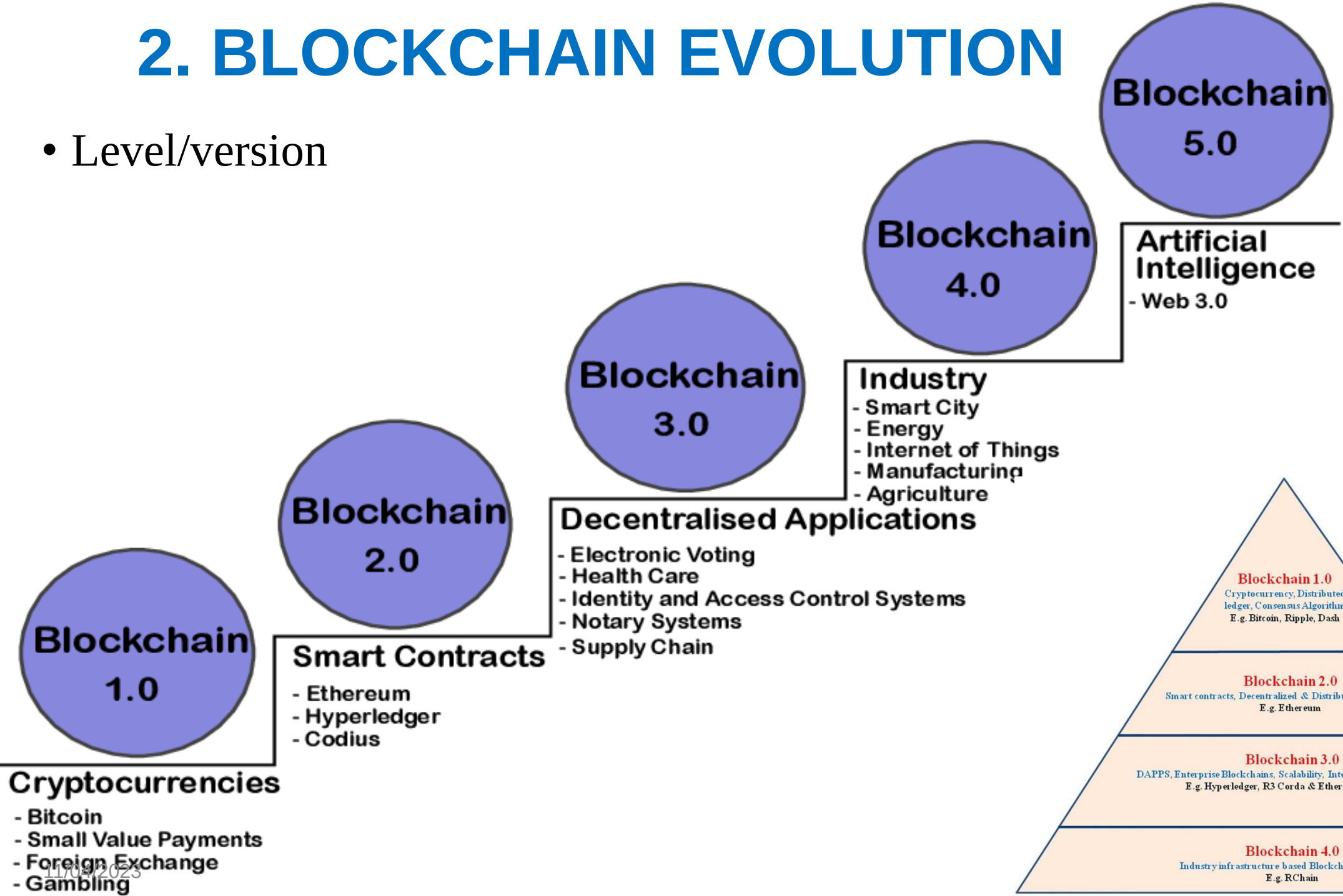
2. BLOCKCHAIN EVOLUTION

- Near future



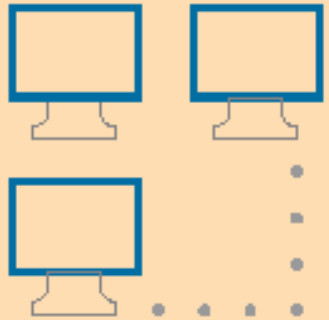
2. BLOCKCHAIN EVOLUTION

- Level/version



3. TECHNOLOGY COMBINATIONS

Blockchain is a combination of three concepts/technologies



Peer-to-Peer Networks

Every network paritcipant acts as both client and server

Cryptography

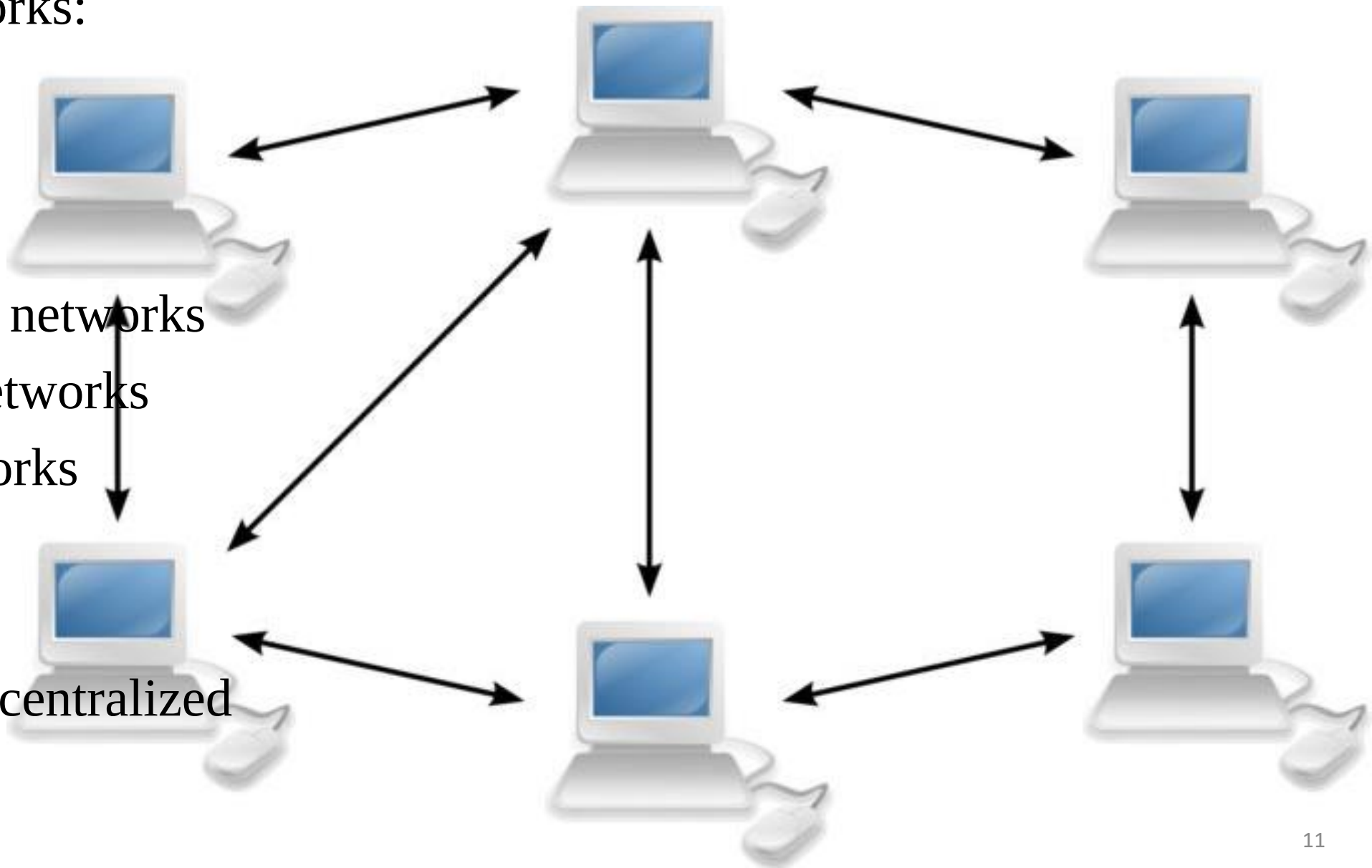
Ensures security, transparency, and privacy

Game Theory

Creates economic incentives through reward systems

3. TECHNOLOGY COMBINATIONS

Peer-to-Peer Networks:

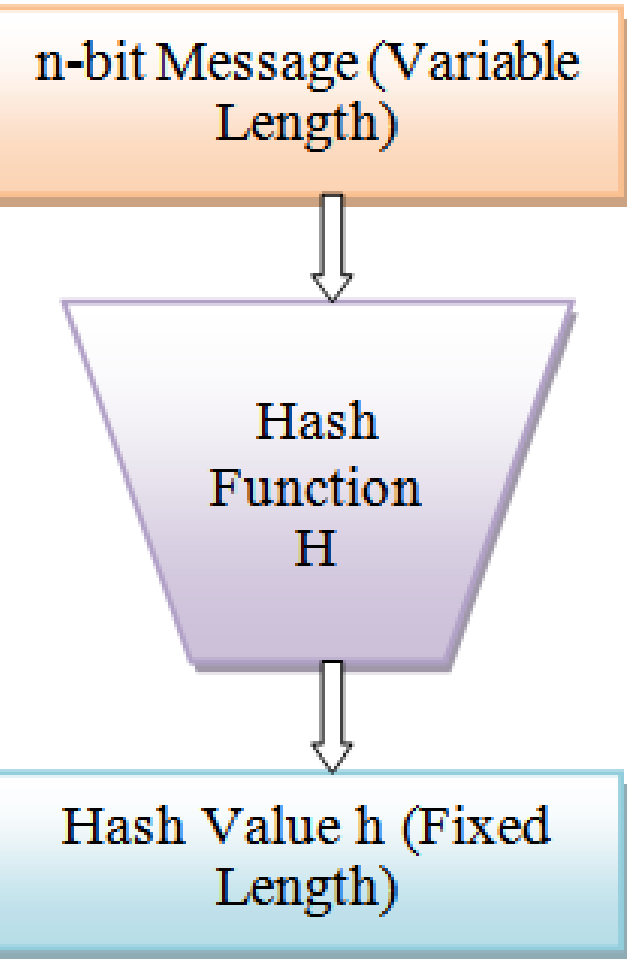


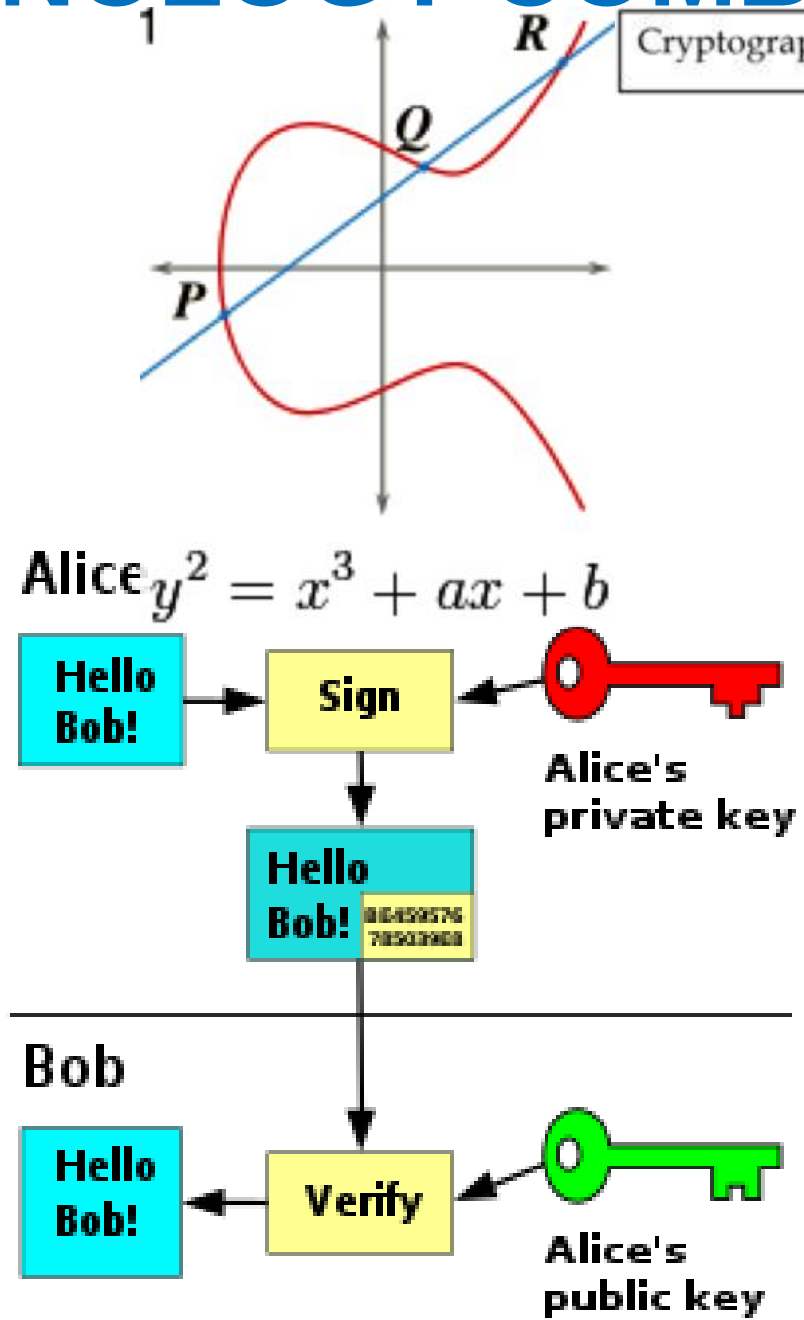
- Unstructured P2P networks
- Structured P2P networks
- Hybrid P2P networks

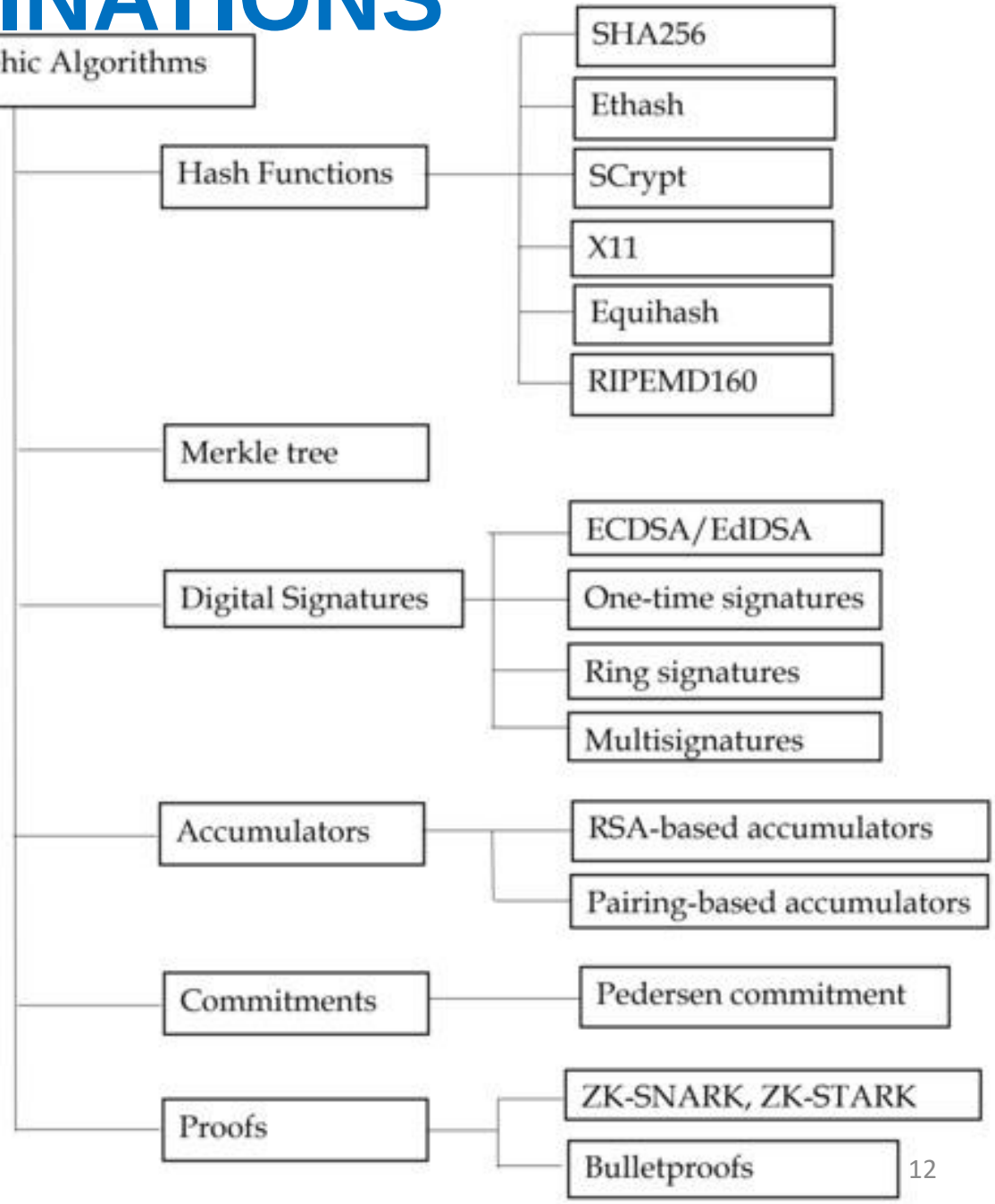
- Distributed vs. decentralized

3. TECHNOLOGY COMBINATIONS

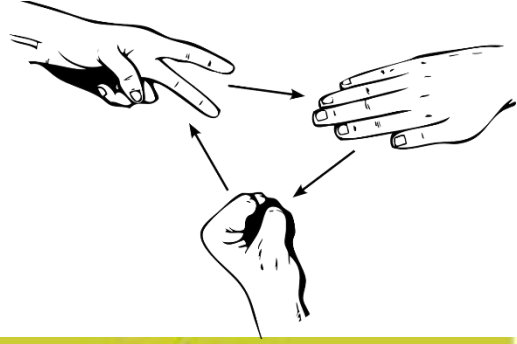
Cryptography







3. TECHNOLOGY COMBINATIONS

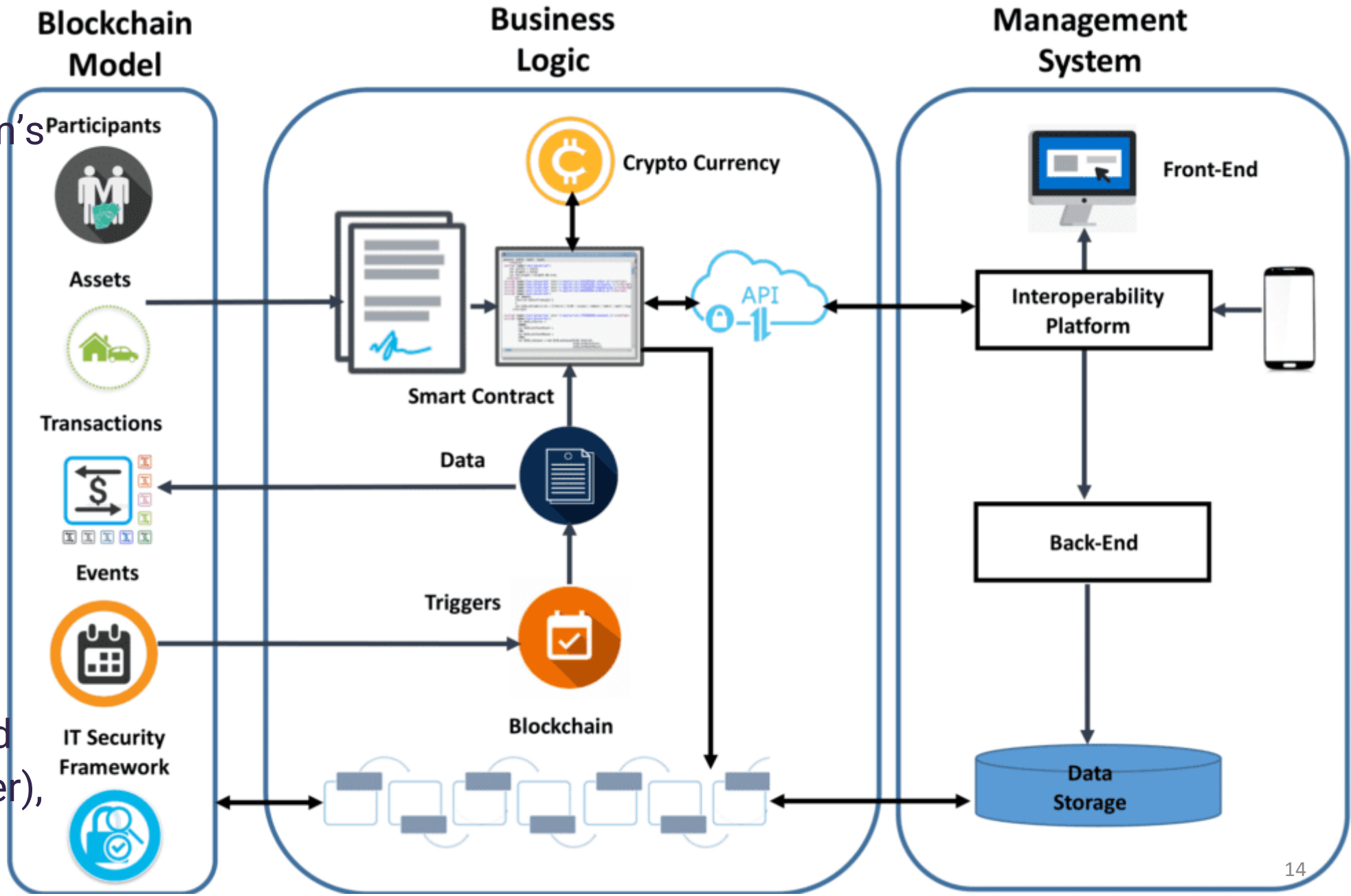


Game theory: study

- how and why people make decisions
- predict people's decisions in tricky situations
- conflict and cooperation

4. SYSTEM ARCHITECTURE

- **Blockchain Model**: guarantee the system's integrity and safety.
- **Business Logic**: correlation between internal and external managing events and the consensus algorithms used
- **Managing system:** drawing a distinction between persistence (model), calculus and processing (controller), and display (view).



4. SYSTEM ARCHITECTURE

Monolithic Blockchains:

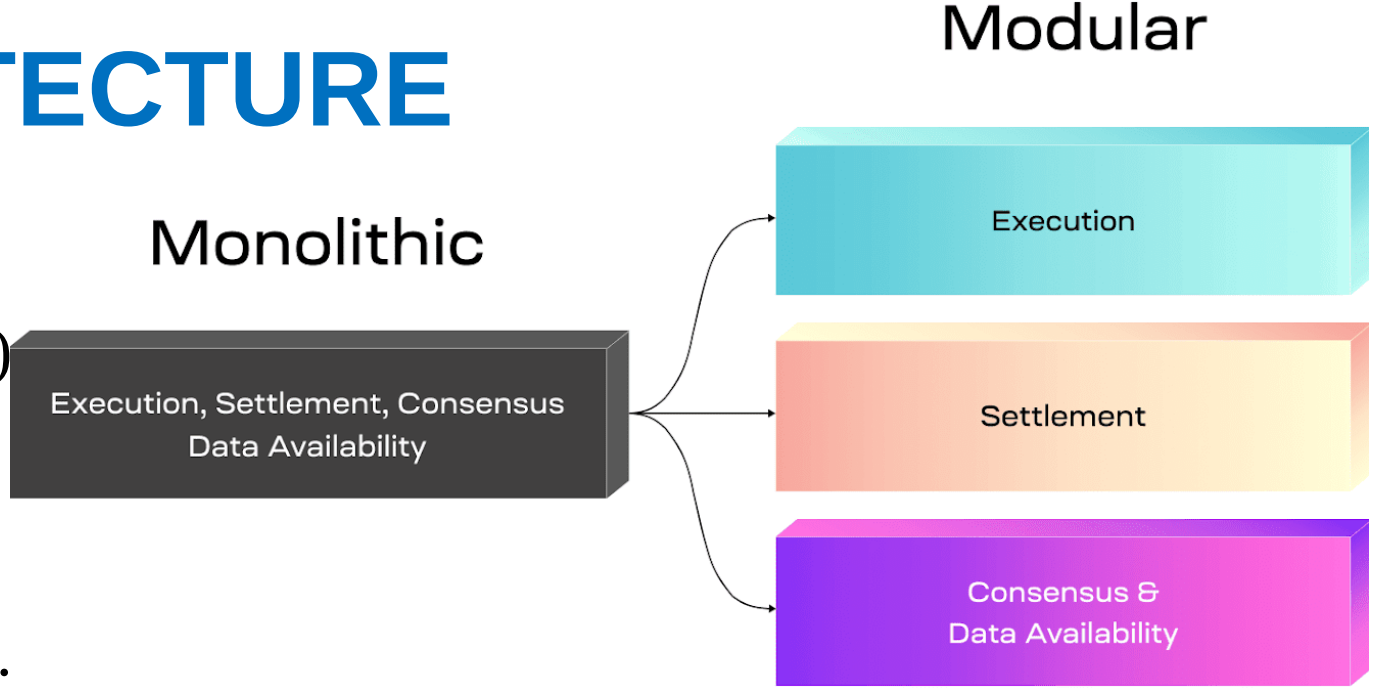
- a blockchain do everything (4 functions)

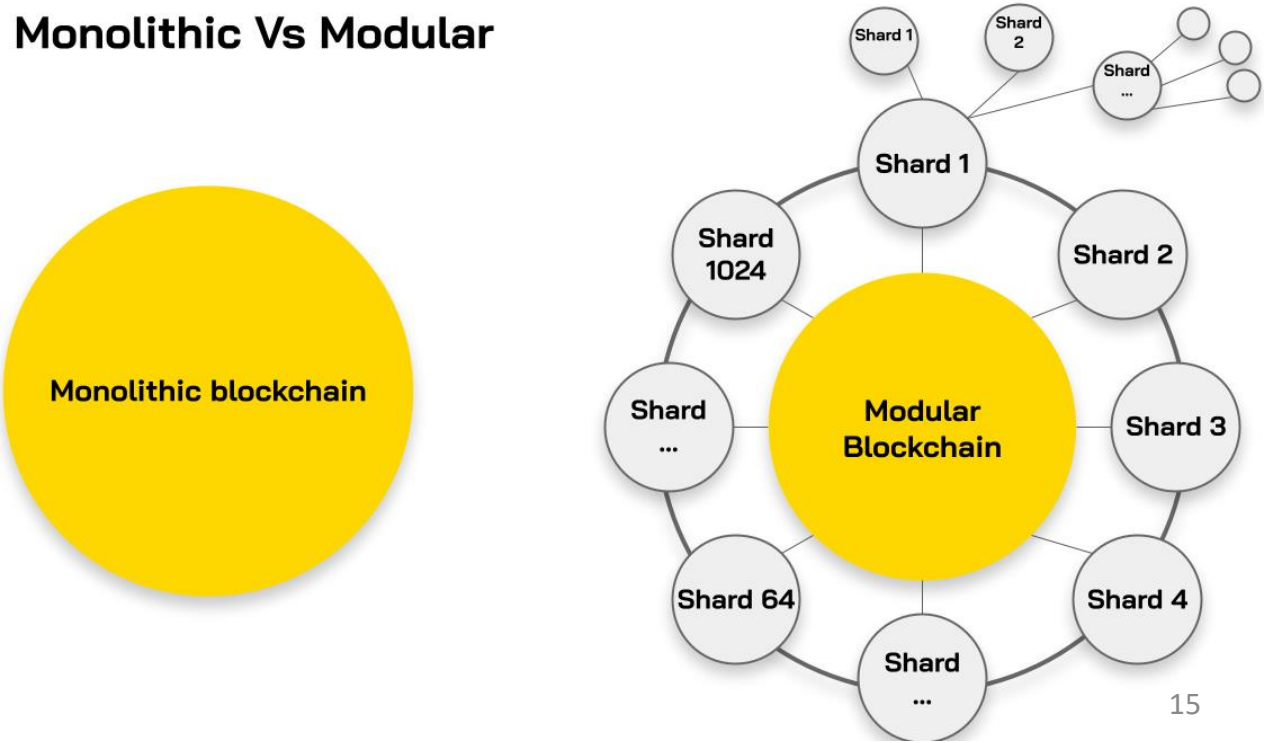
Benefits

- Protection/Security: put secure transactions in force on their own nodes.
- Usage: offer extra value in the long run, provided users continue to use the token.

Drawbacks:

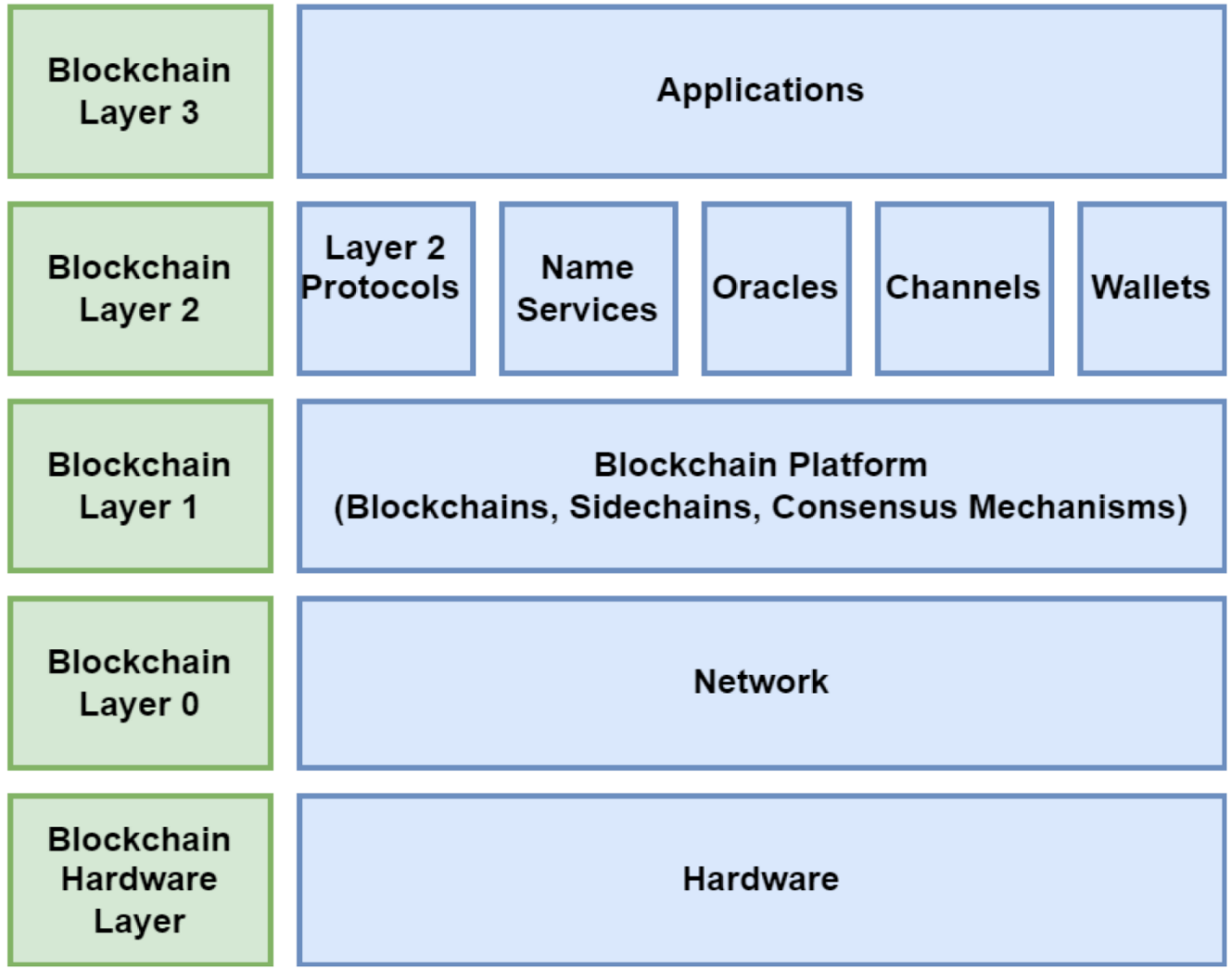
- High hardware requirements: for increase the number of transactions process.
- Limited control: Apps must follow the predetermined rules of the chain



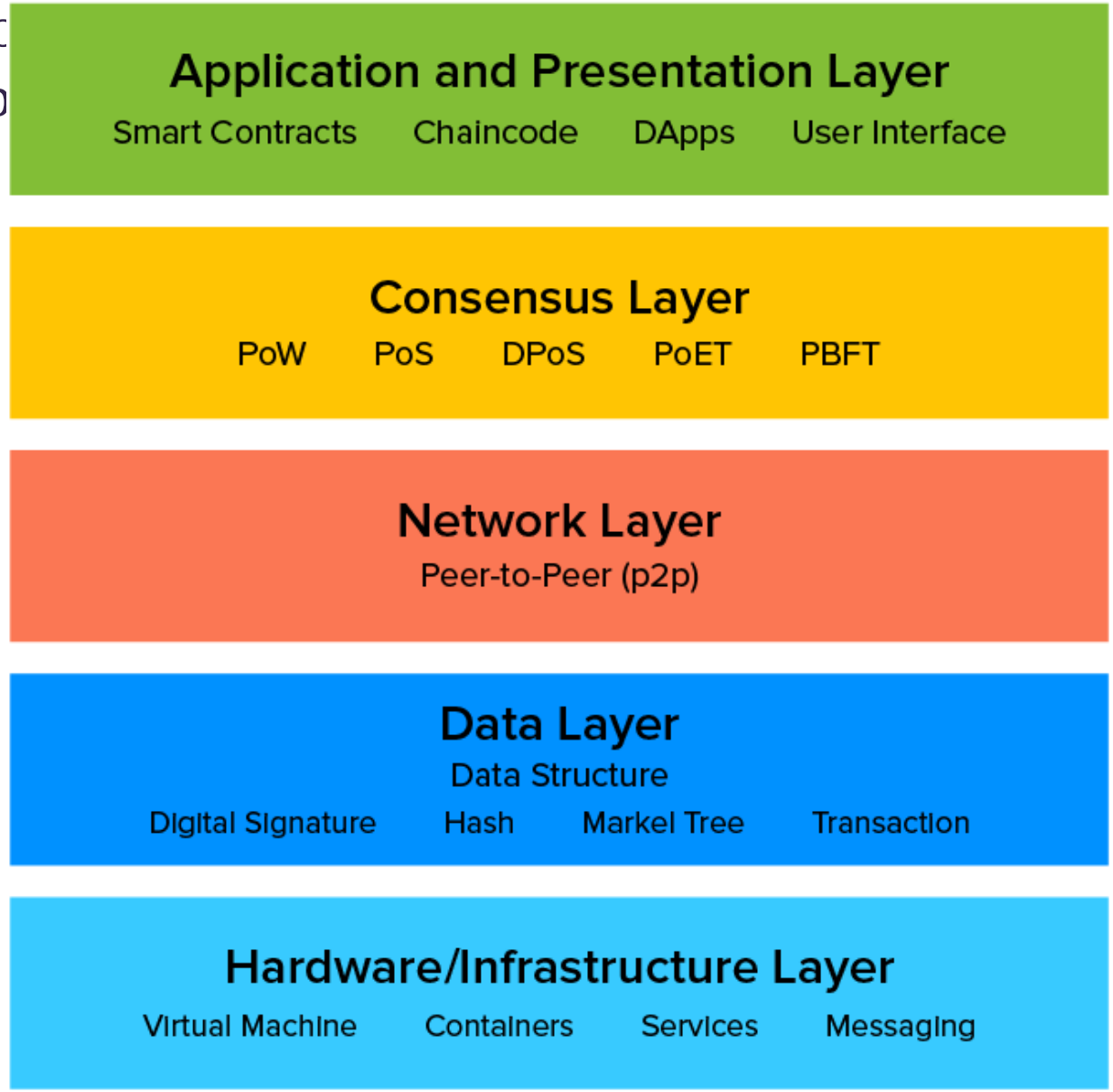


4. SYSTEM ARCHITECTURE

- Model represents how the functional components c
  are interconnected in one's perception or for a purp

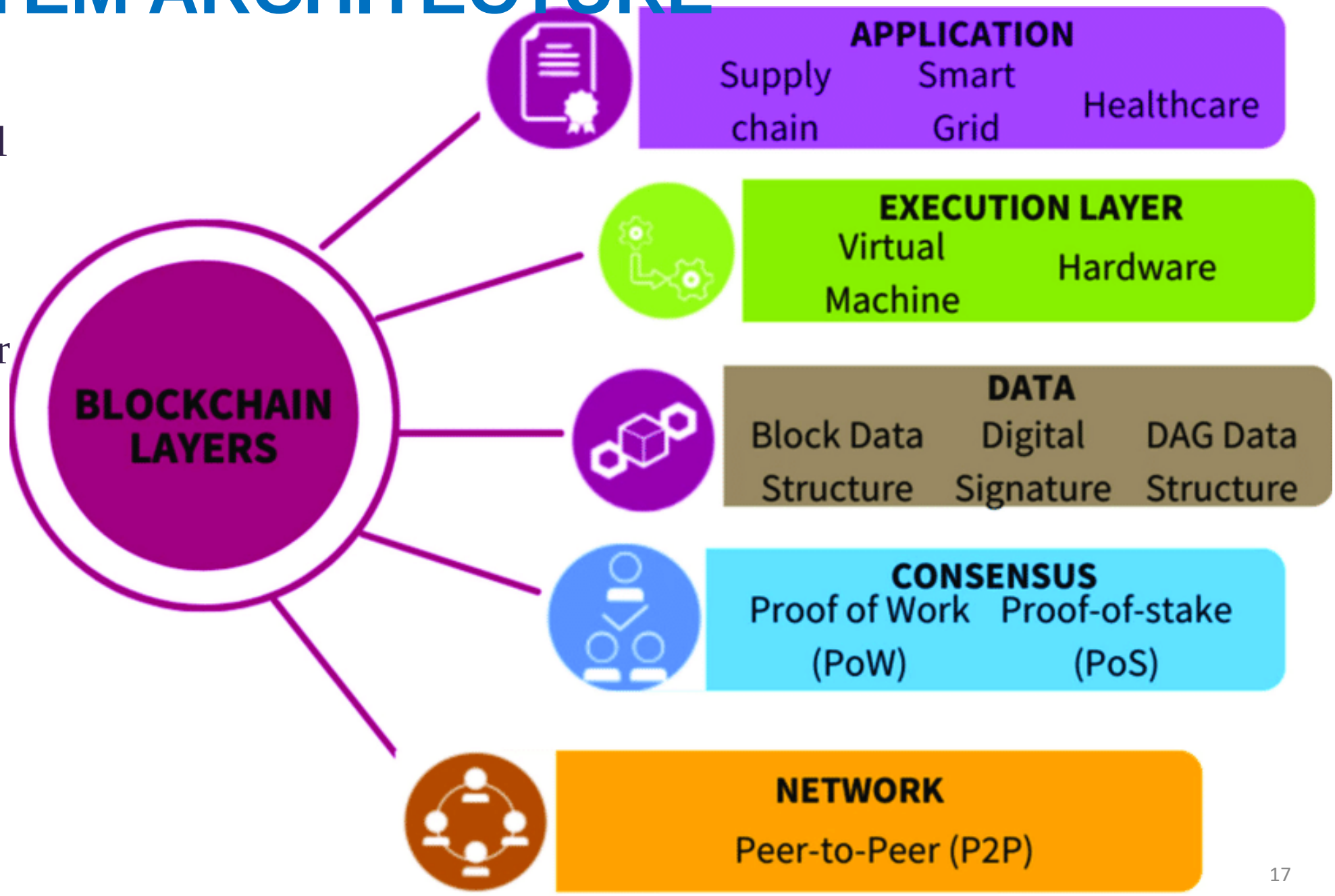


Blockchain layered architecture



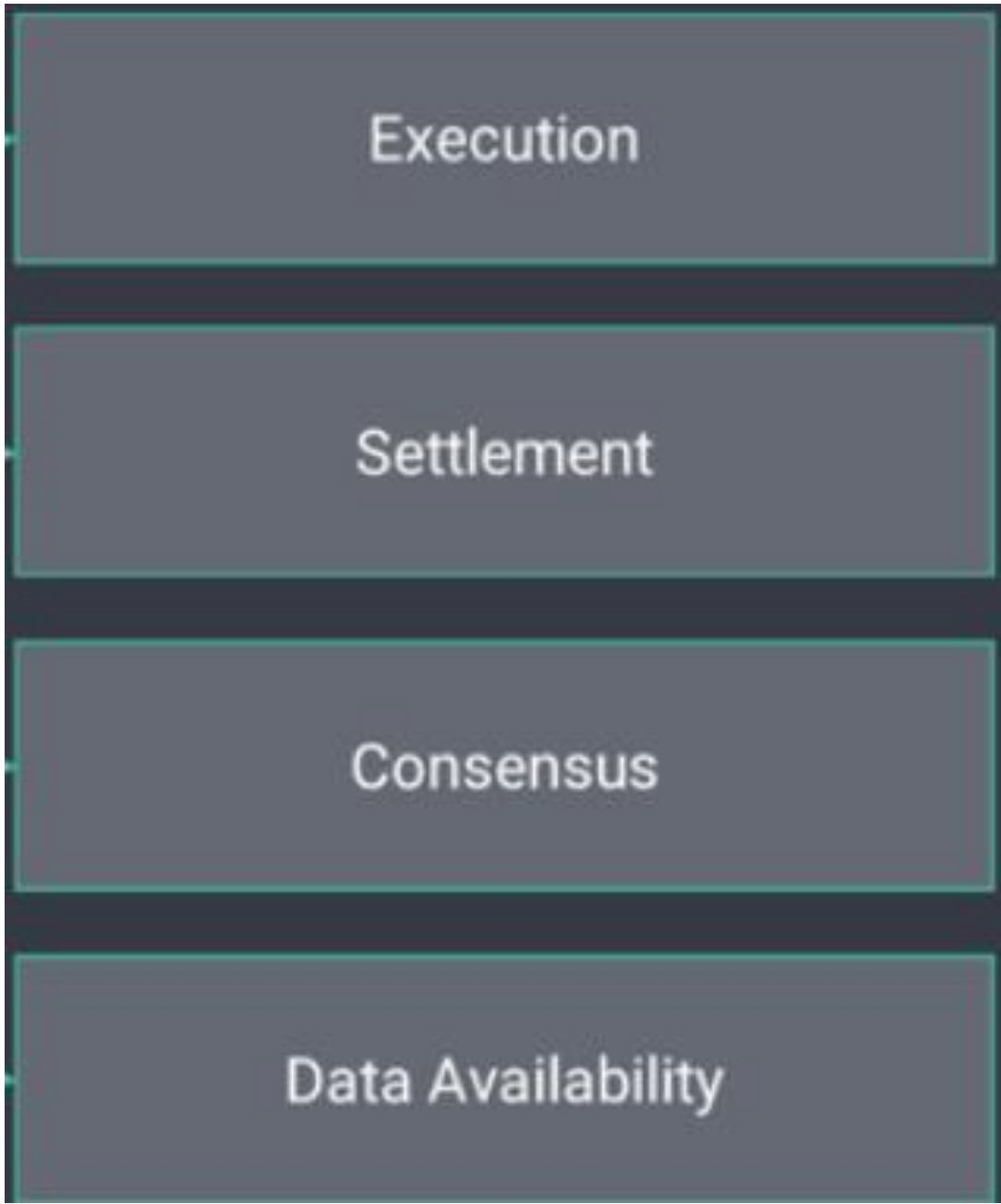
4. SYSTEM ARCHITECTURE

- Model represents how the functional components of a system are interconnected in one's perception or for a purpose.



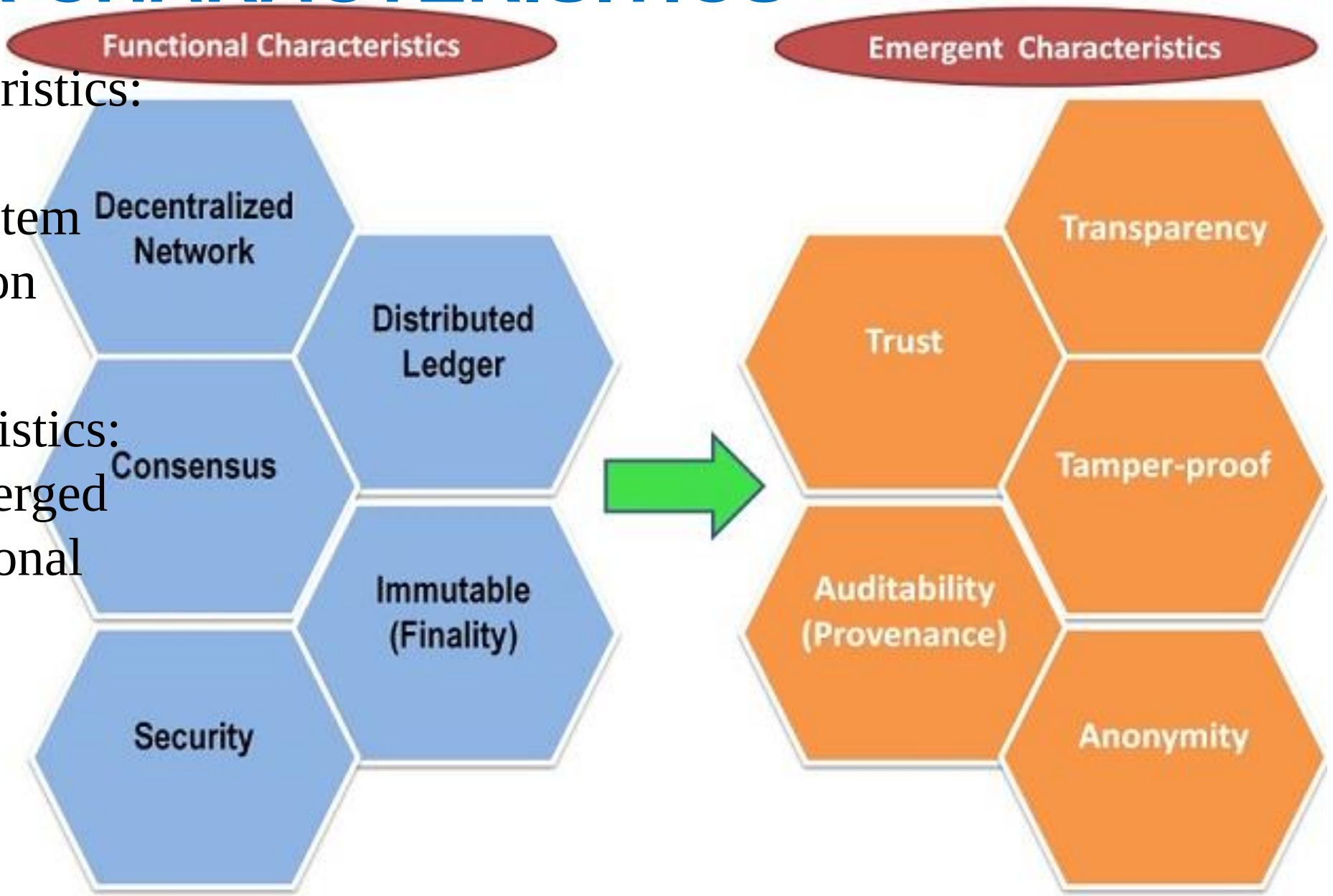
5. PRIMARY FUNCTIONS

- Execution: Process transactions
- Settlement: Dispute resolution and bridge (optional)
- Consensus: Order transactions
- Data availability: Ensure data is available



6. MAJOR CHARACTERISITICS

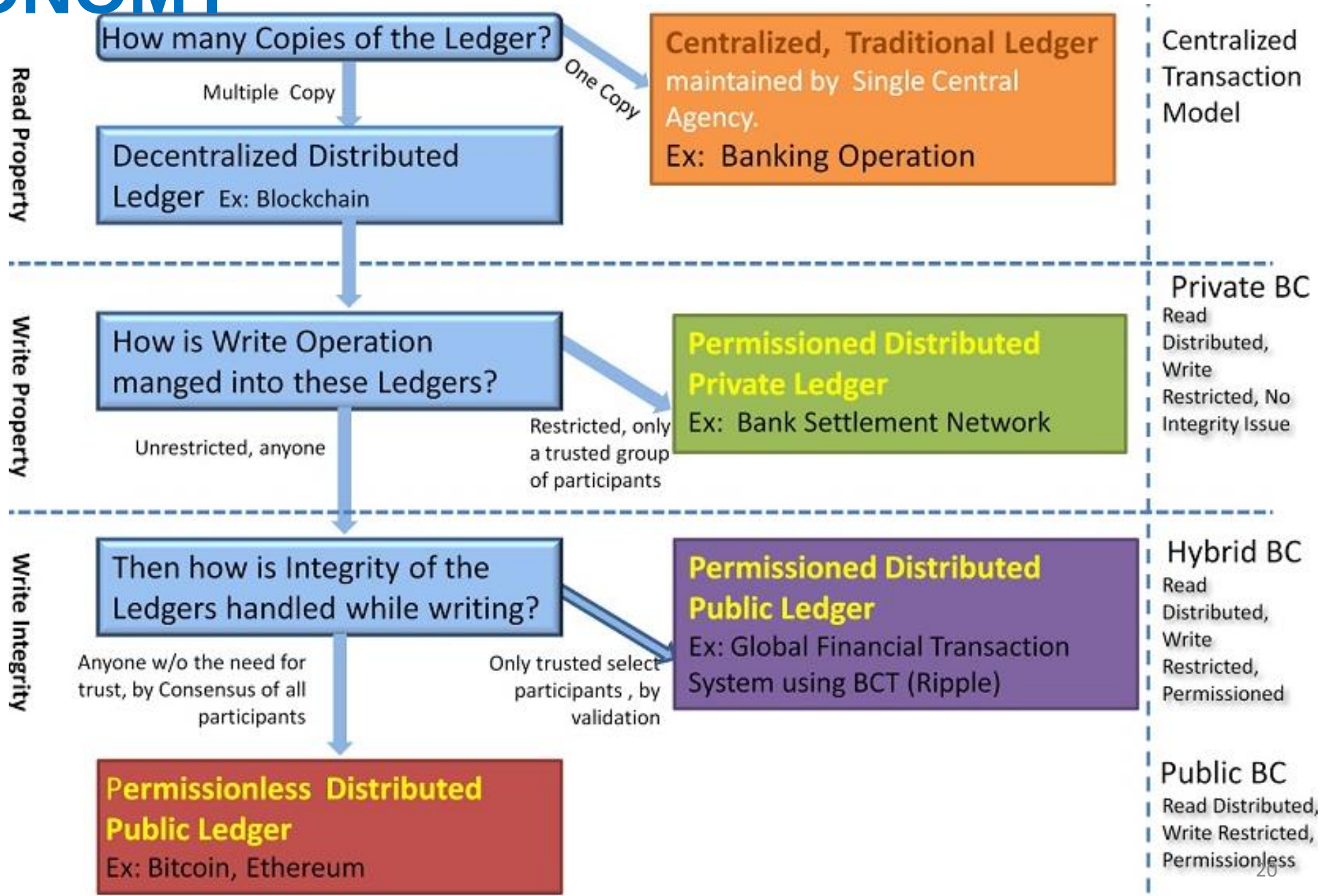
- Functional characteristics: mandatory for functioning, the system may exist or function properly
- Emergent characteristics: are derived, are emerged as a result of functional characteristics.



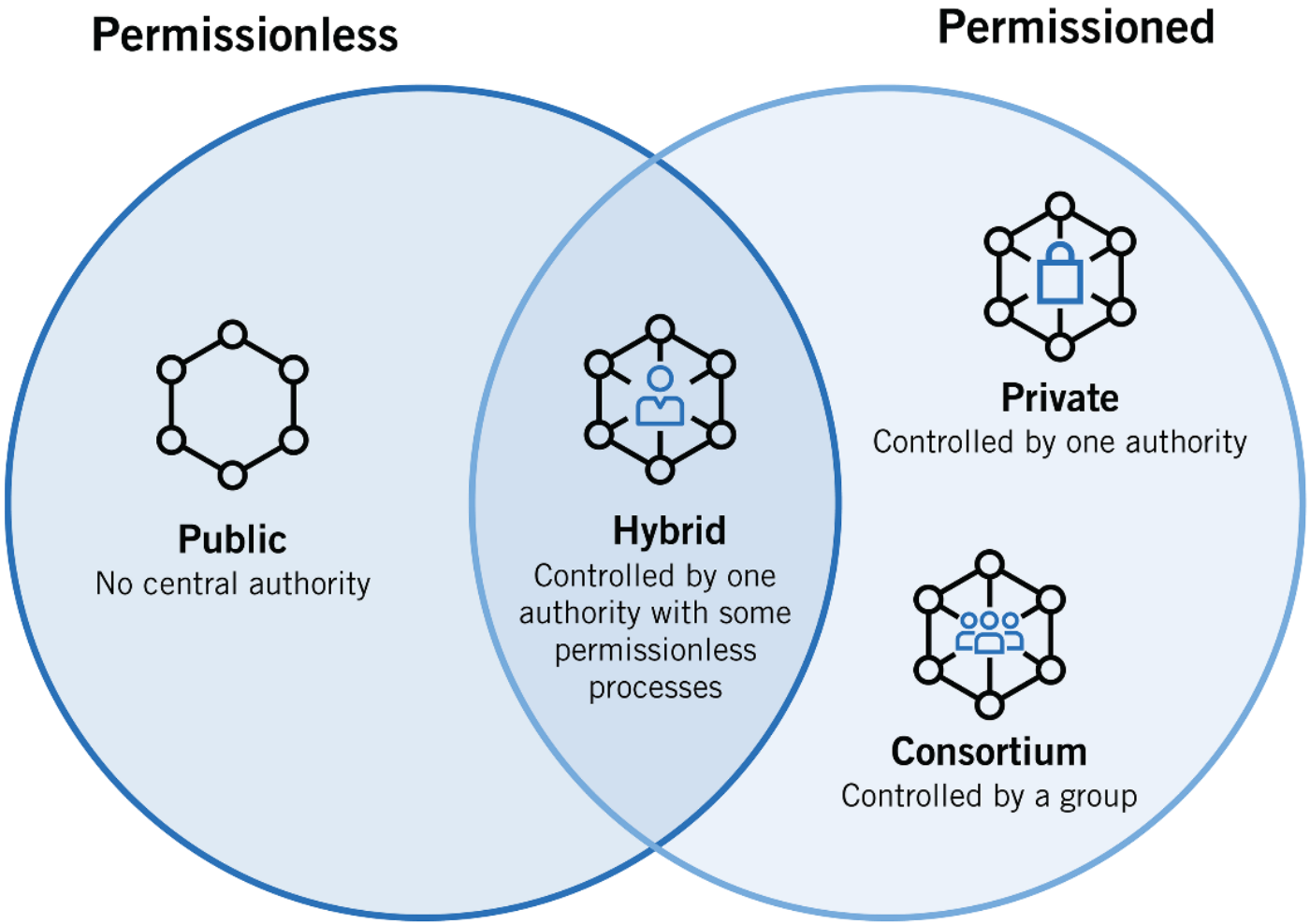
Block Chain Characteristics

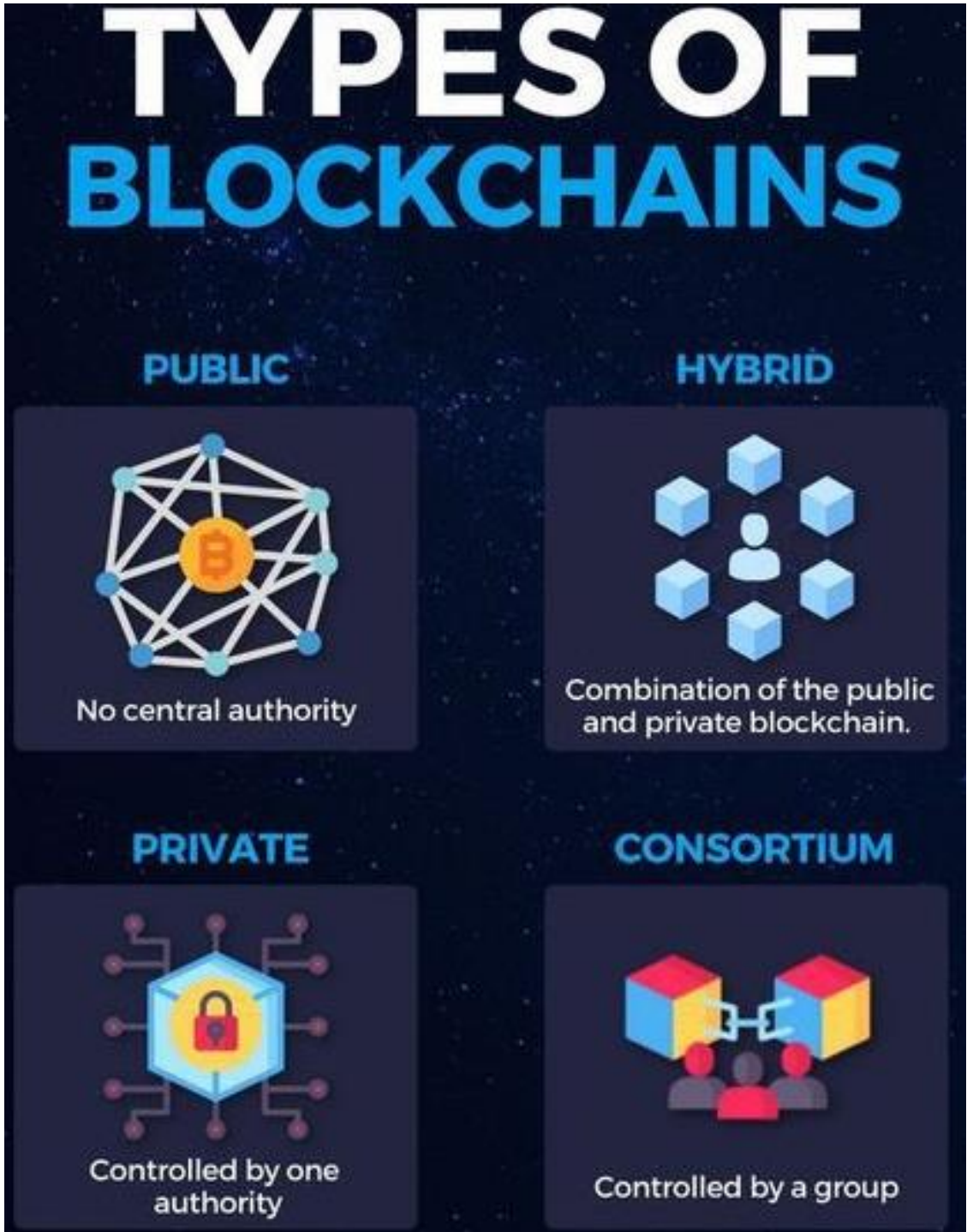
7. TAXONOMY

- Access Control



7. TAXONOMY

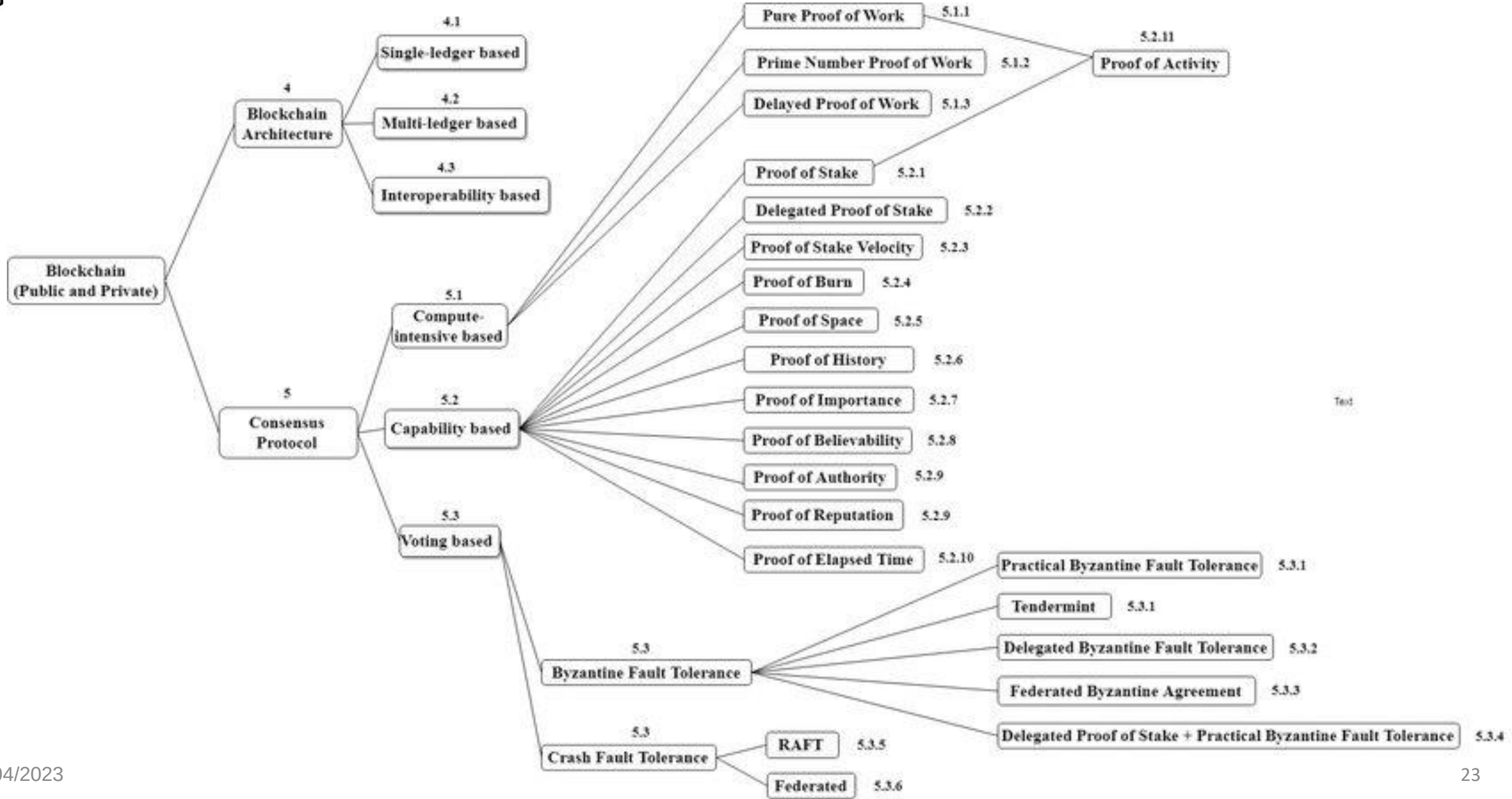

Permissionless
Permissioned
Public
No central authority
Hybrid
Controlled by one authority with some permissionless processes
Private
Controlled by one authority
Consortium
Controlled by a group


TYPES OF BLOCKCHAINS
PUBLIC
No central authority
HYBRID
Combination of the public and private blockchain.
PRIVATE
Controlled by one authority
CONSORTIUM
Controlled by a group

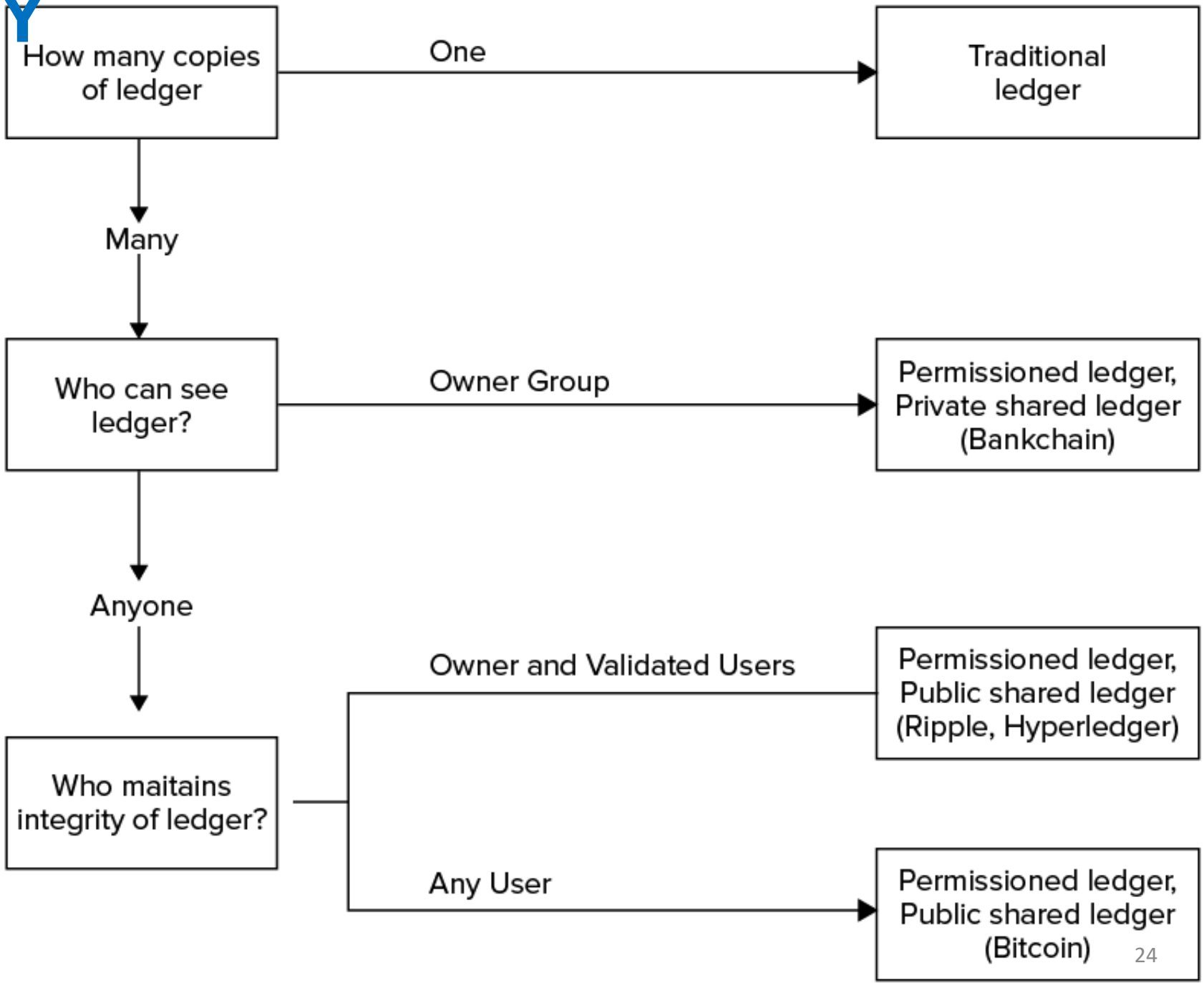
7. TAXONOMY

	Public	Private	Hybrid
Permission	open	Permissioned	Permissioned
Speed	Slow	fast	fast
Consensus	Proof-of-work	proof-of-stake/ Pre-approved participations	Pre-approved participations
Identity	Not known	known	known
Trust	Trustless	trusted	trusted
decentralised	Fully	no	Partly

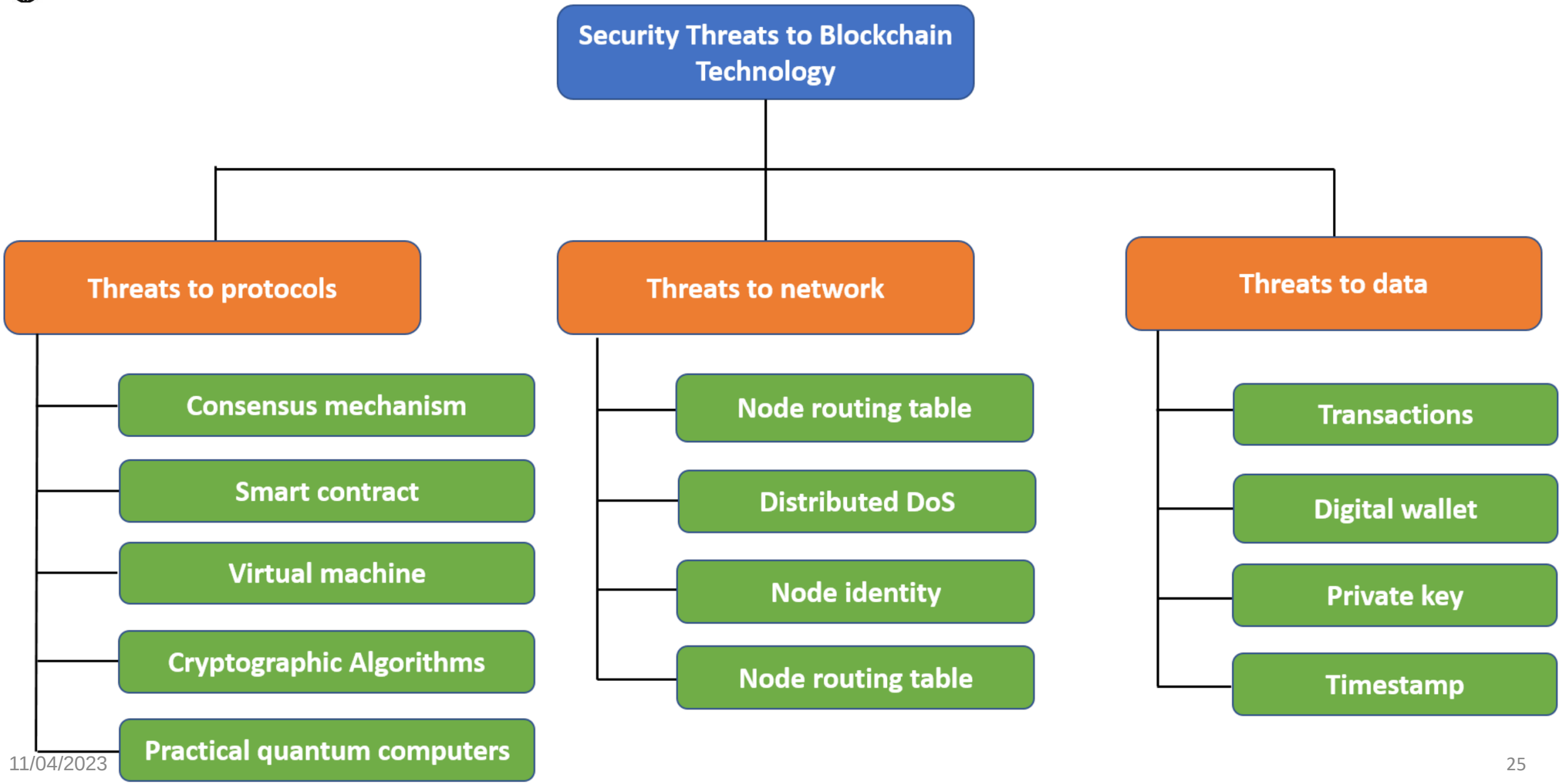
7. TAXONOMY


Blockchain (Public and Private)
4
Blockchain Architecture
4.1
Single-ledger based
4.2
Multi-ledger based
4.3
Interoperability based
5
Consensus Protocol
5.1
Compute-intensive based
5.2
Capability based
5.3
Voting based
Pure Proof of Work
5.1.1
Prime Number Proof of Work
5.1.2
Delayed Proof of Work
5.1.3
Proof of Stake
5.2.1
Delegated Proof of Stake
5.2.2
Proof of Stake Velocity
5.2.3
Proof of Burn
5.2.4
Proof of Space
5.2.5
Proof of History
5.2.6
Proof of Importance
5.2.7
Proof of Believability
5.2.8
Proof of Authority
5.2.9
Proof of Reputation
5.2.9
Proof of Elapsed Time
5.2.10
5.2.11
Proof of Activity
5.3
Byzantine Fault Tolerance
Practical Byzantine Fault Tolerance
5.3.1
Tendermint
5.3.1
Delegated Byzantine Fault Tolerance
5.3.2
Federated Byzantine Agreement
5.3.3
Delegated Proof of Stake + Practical Byzantine Fault Tolerance
5.3.4
5.3
Crash Fault Tolerance
RAFT
5.3.5
Federated
5.3.6

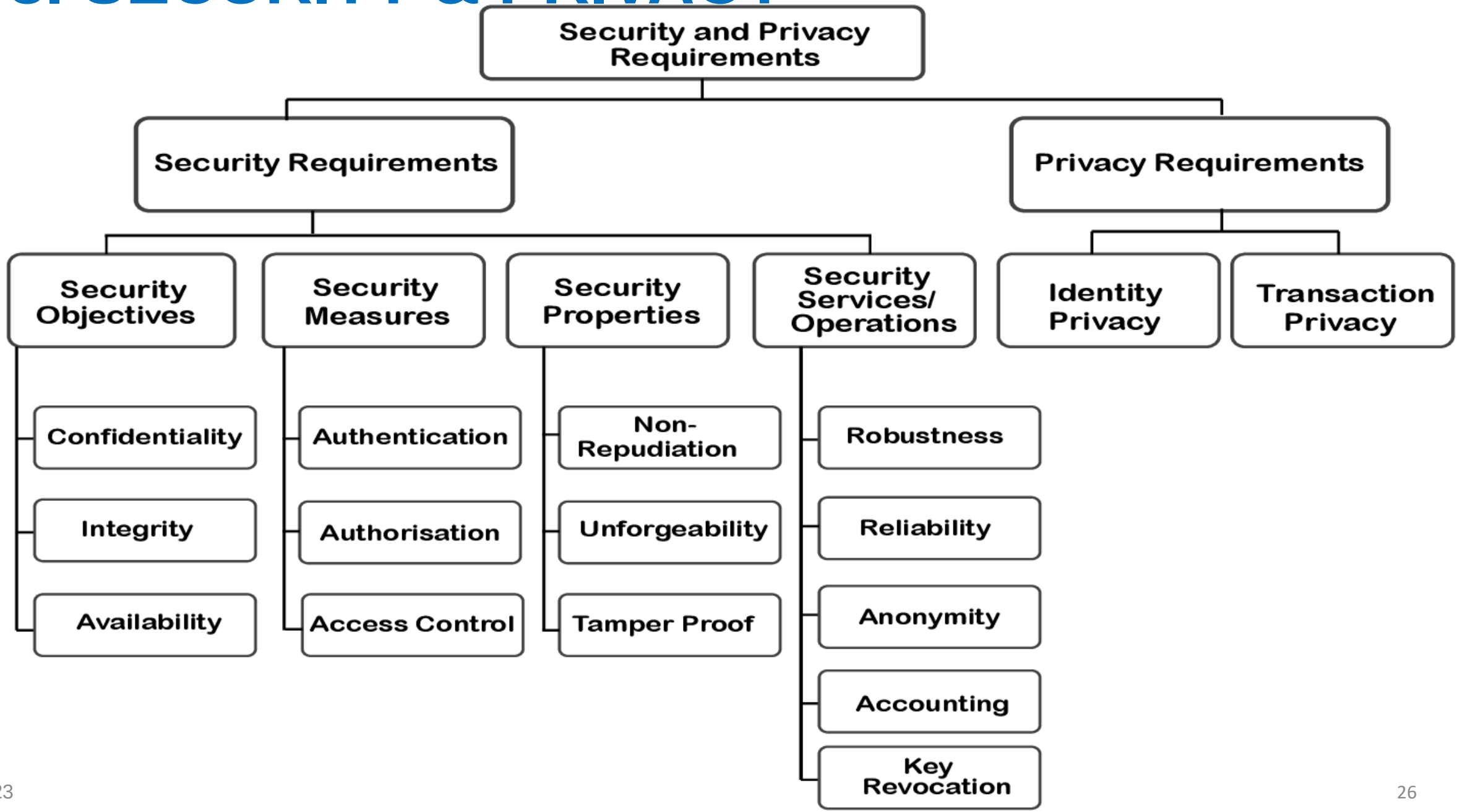
7. TAXONOMY


How many copies of ledger
One
Traditional ledger
Many
Who can see ledger?
Owner Group
Permissioned ledger, Private shared ledger (Bankchain)
Anyone
Who maitains integrity of ledger?
Owner and Validated Users
Permissioned ledger, Public shared ledger (Ripple, Hyperledger)
Any User
Permissioned ledger, Public shared ledger (Bitcoin)

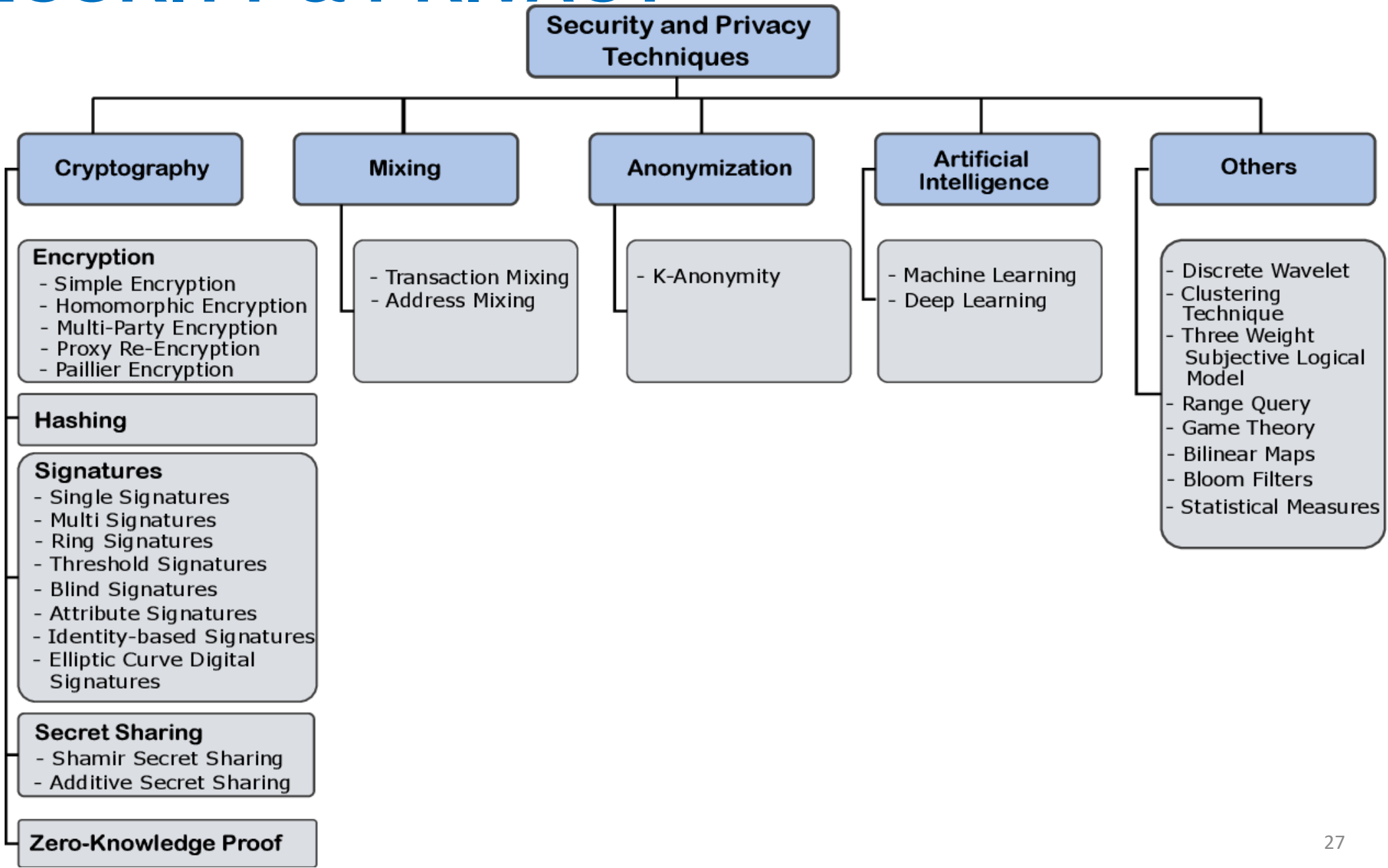
8. SECURITY & PRIVACY



8. SECURITY & PRIVACY



8. SECURITY & PRIVACY



9. APPLICATIONS & ECOSYSTEM

- Popular blockchain applications

1 Financial Industry

Blockchain's secure features enables people and entities to safely perform financial transactions from anywhere in the world.

ASSET MANAGEMENT

Blockchain technology simplifies all processes and actions in managing assets (i.e., portfolio management, trading/transaction of cryptocurrencies). Record encryption also reduces error in the process.

INSURANCE CLAIMS PROCESSING

The encryption features of blockchain oversee any fraudulent or suspicious actions in an account. The real-time compound also speeds up verification and claims processing.

CROSS-BORDER PAYMENTS

Money transfers and payments online are made more secure, fast, and less prone to delays and errors with blockchain technology.

2 Smart Contracts

Smart contracts powered by blockchain get rid of the third party in overseeing the creation and completion of contracts. Instead, people can use pre-drafted contracts, which can be modified and shared in one ledger.

ENTERTAINMENT

The ledger provides a transparent transmission of royalties to everyone included in the label. It also helps musicians and other artists easily and quickly monitor and claim royalties for their work.

HEALTHCARE

Smart contracts provided for payers, providers, and drug manufacturers makes way for a convenient and easy management of digital records. When a patient seeks a form of care, that procedure is recorded in the blockchain.

GOVERNMENT

Blockchain technology can set up a decentralized system that prevents any form of voting fraud or suspicious movements in the network.

3 Digital IDs

Blockchain technology will eliminate the need for physical identification, and replacing it with digital IDs. This can resolve the issue of Identity theft, and allow millions of people to claim and control their identities.

IDENTITY VERIFICATION

Blockchain's multi-step and multi-factor identity verification process eclipses the levels of security that traditional password protection offers.

SECURE IDENTITIES FOR THE DECENTRALIZED WEB

Big data and data sharing by third party companies has resulted in intrusive advertising. Blockchain-based identification will mean that no third- parties are able to access your personal data without consent.

4 Blockchain Internet-of-Things

Blockchain strengthens and streamlines the interconnectedness of IoT. It eliminates third-party entities; and simplifies the action and flow of all connected devices.

BLOCKCHAIN-ENABLED IOT

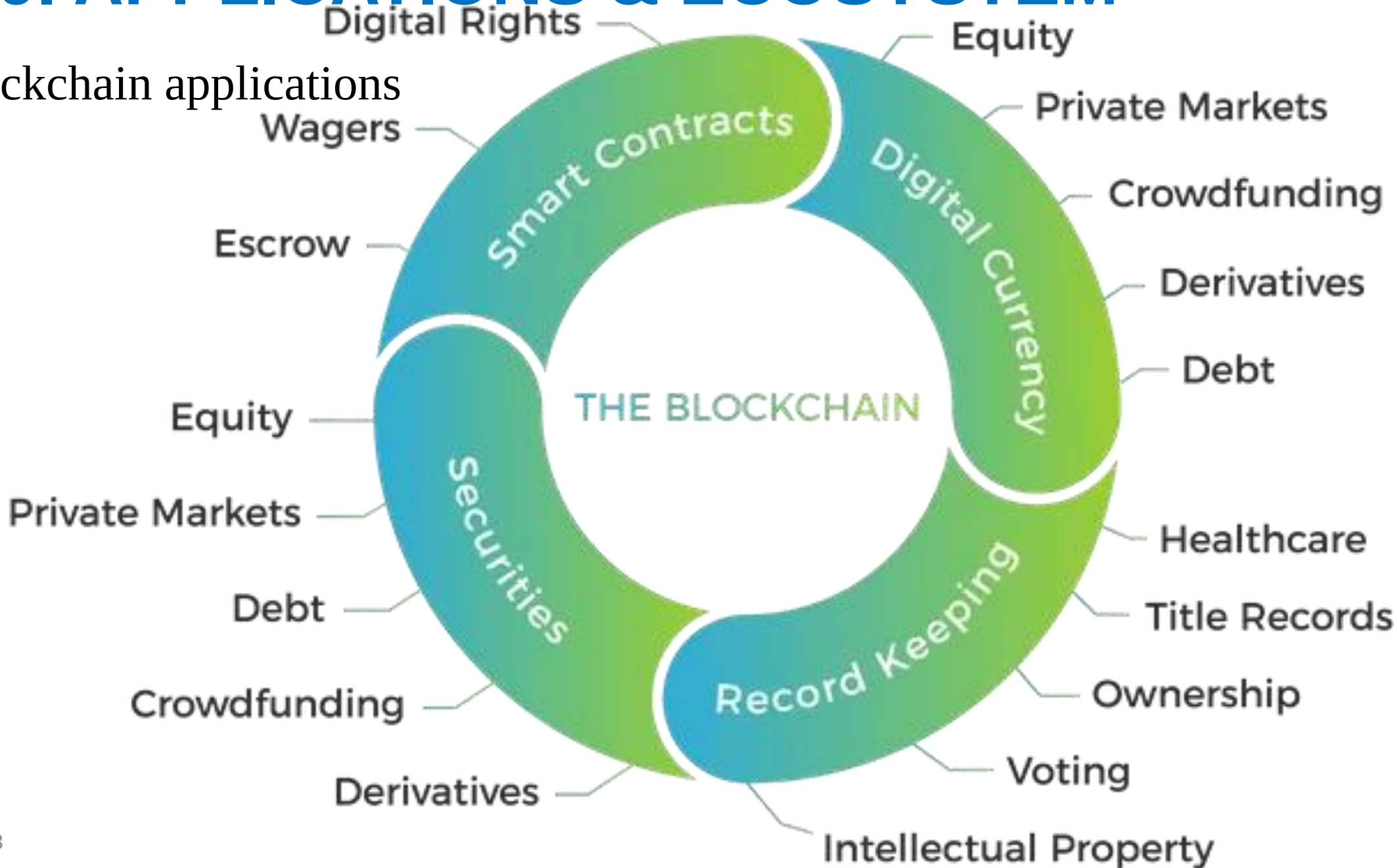
All information transmitted from IoT devices are recorded on the blockchain. This means that goods can be digitally identified and protected from fraud.

INFORMATION ANALYSIS

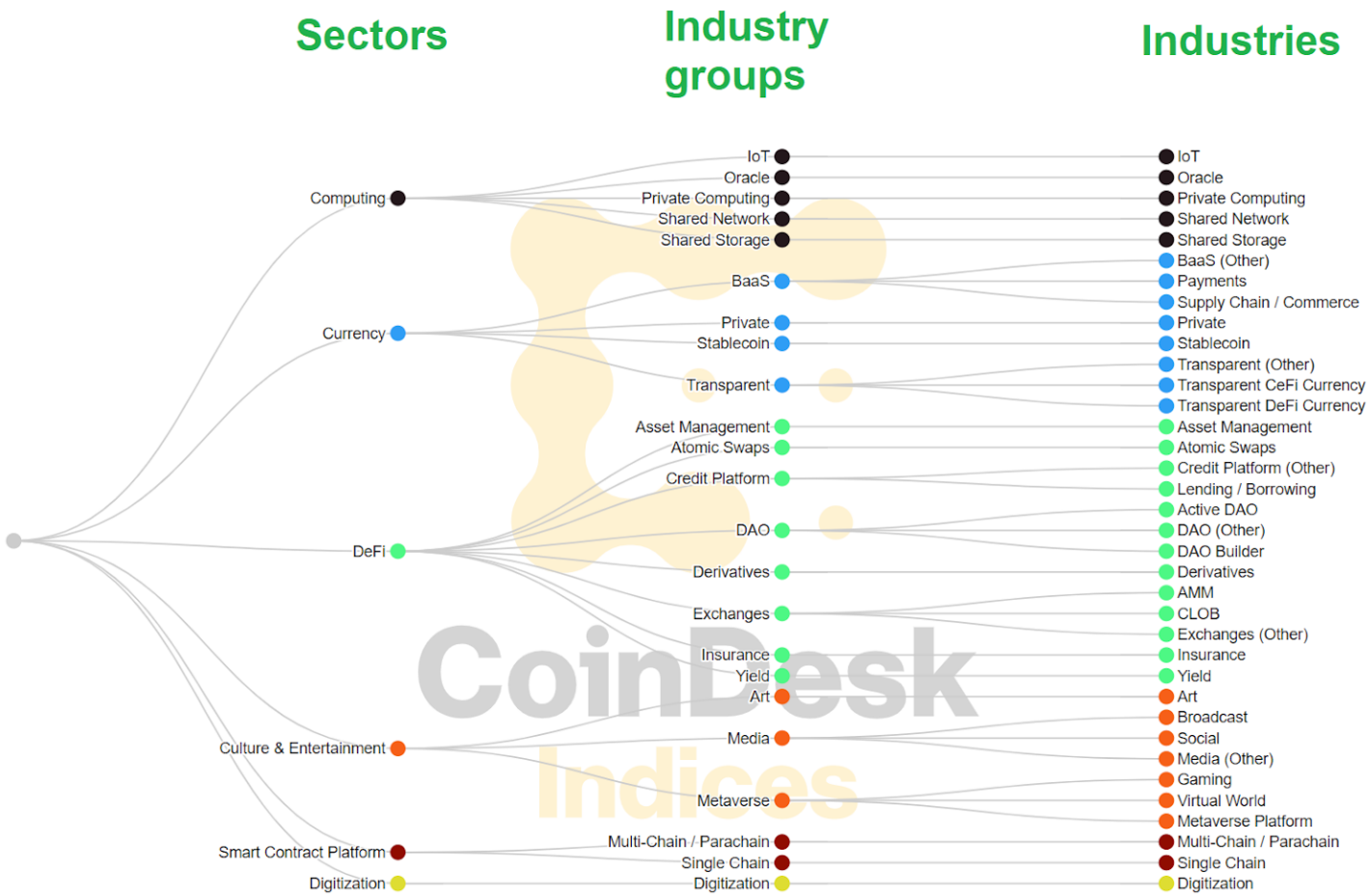
When it comes to big data, blockchain enables data to be shared and interoperable, making it usable for immediate cases.

9. APPLICATIONS & ECOSYSTEM

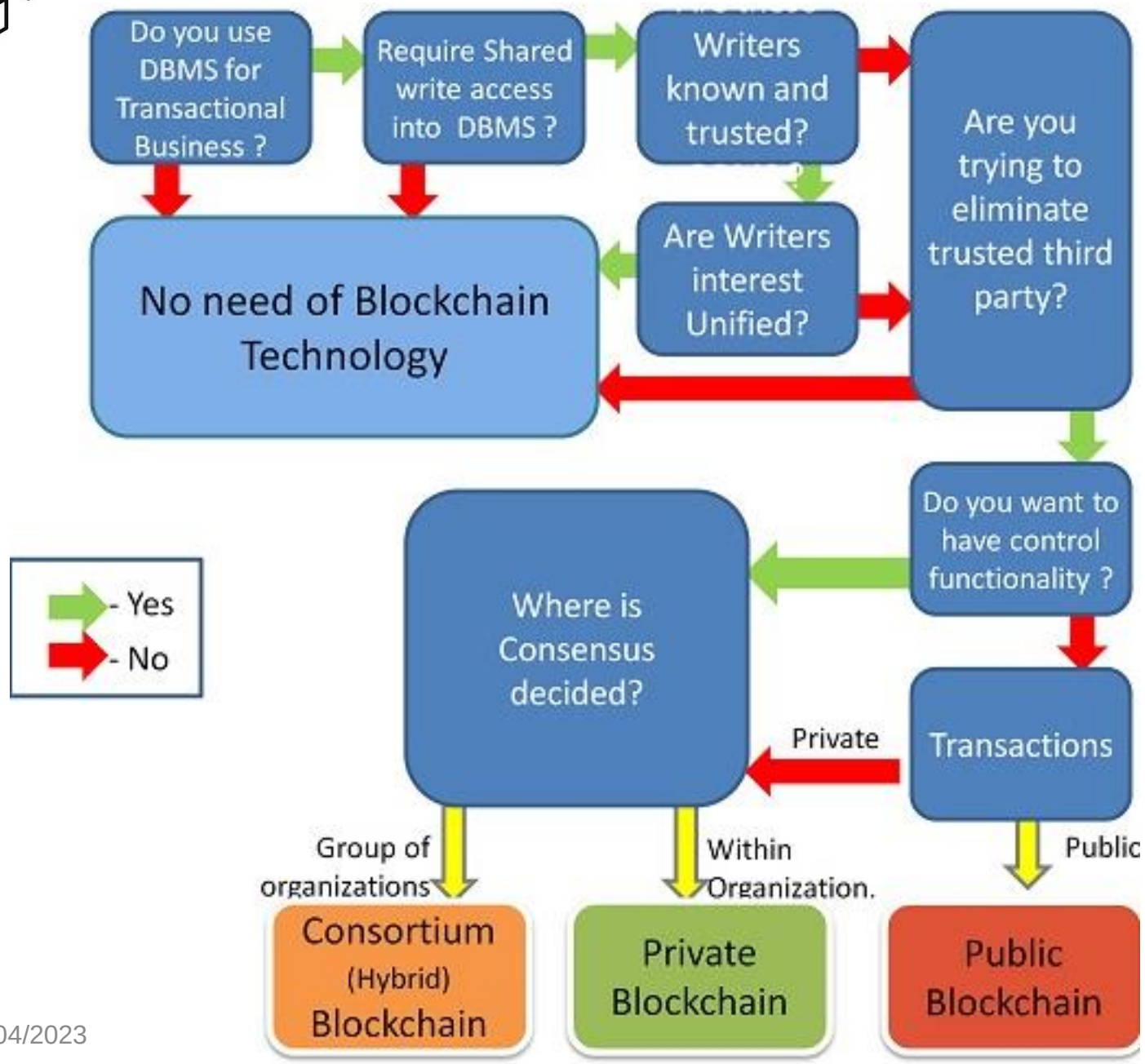
- Blockchain applications

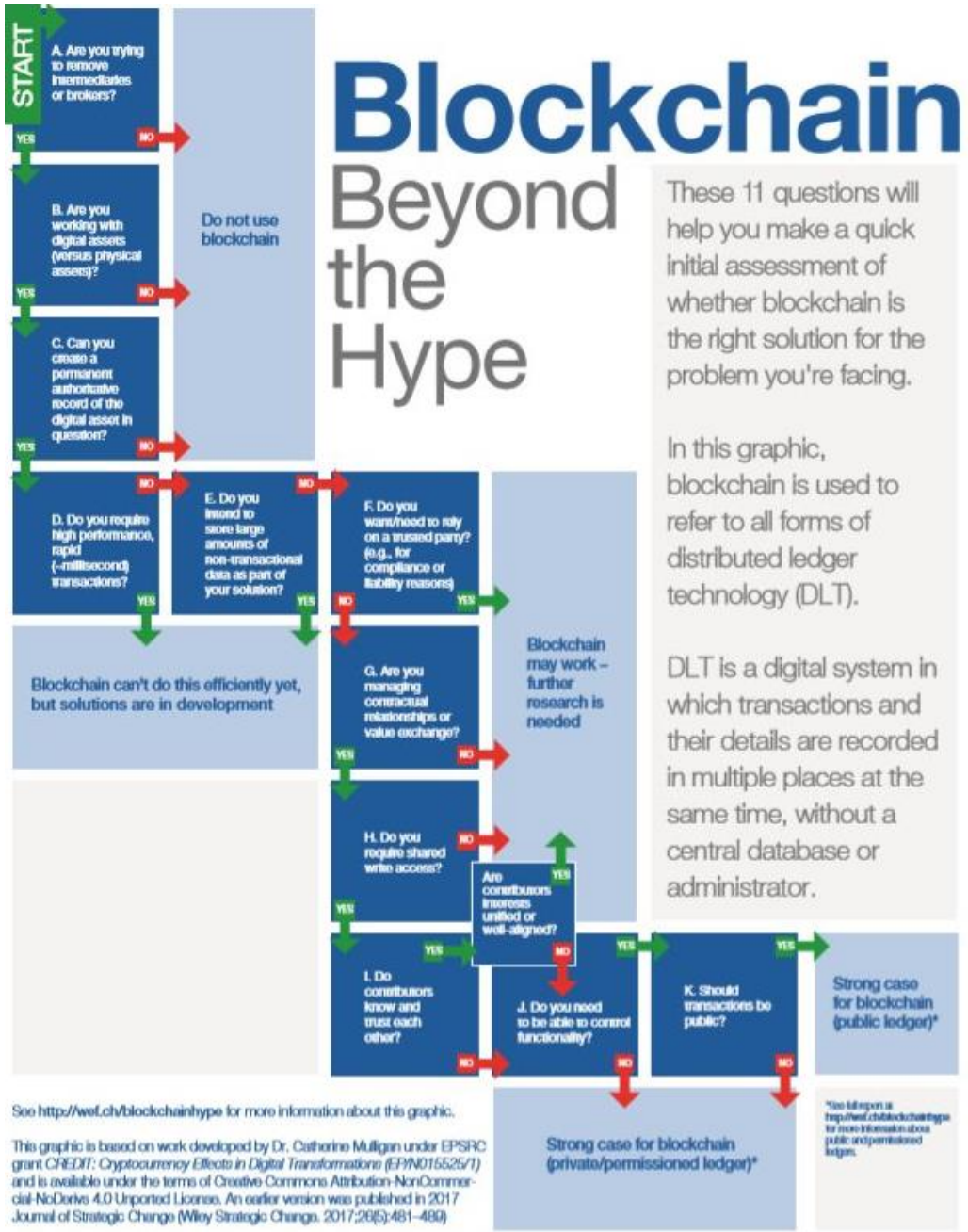


9. APPLICATIONS & ECOSYSTEM

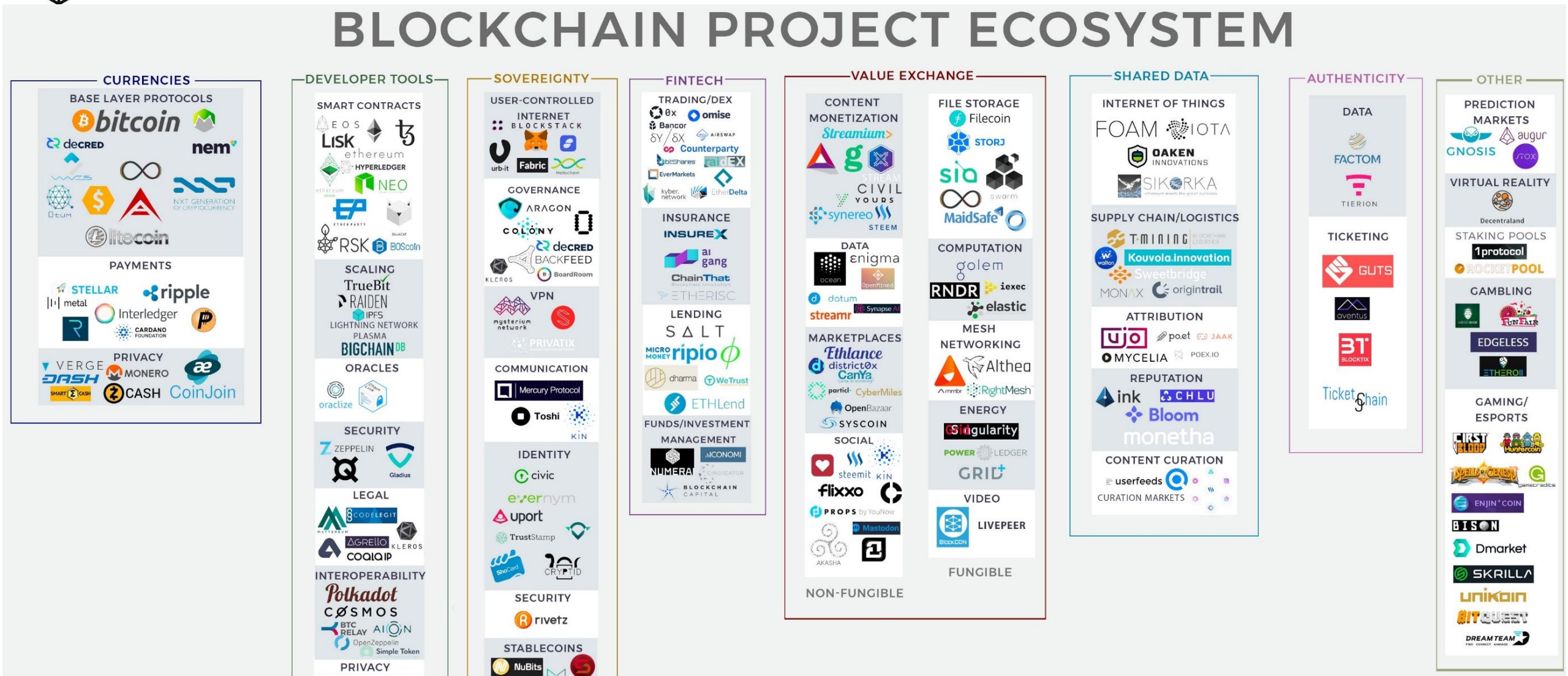


9. APPLICATIONS & ECOSYSTEM





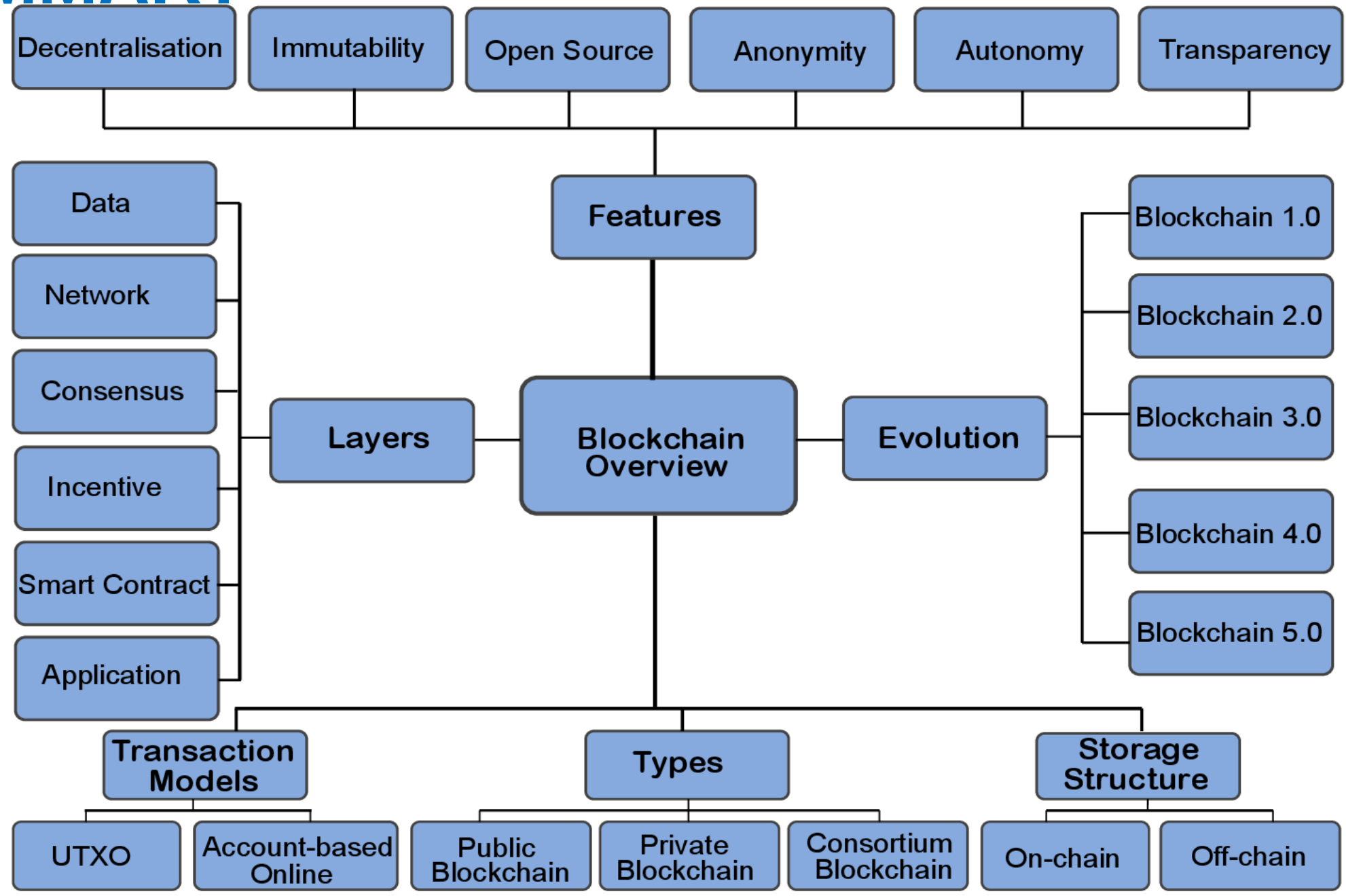
9. APPLICATIONS & ECOSYSTEM



compound

@JOSH_NUSSBAUM

10. SUMMARY

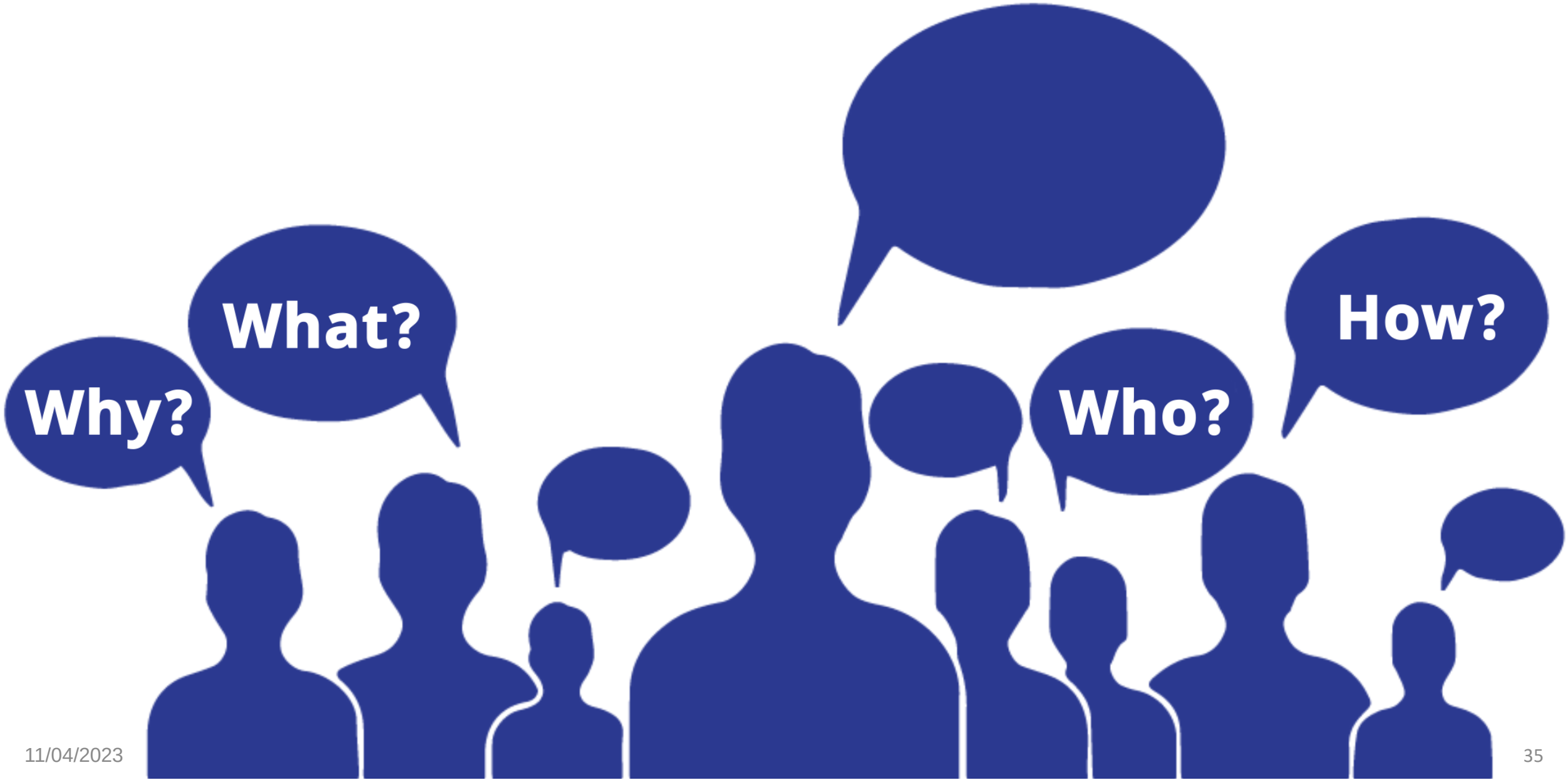

Decentralisation
Immutability
Open Source
Anonymity
Autonomy
Transparency
Features
Data
Network
Consensus
Incentive
Smart Contract
Application
Layers
Blockchain Overview
Evolution
Blockchain 1.0
Blockchain 2.0
Blockchain 3.0
Blockchain 4.0
Blockchain 5.0
Transaction Models
Types
Storage Structure
UTXO
Account-based Online
Public Blockchain
Private Blockchain
Consortium Blockchain
On-chain
Off-chain

10. SUMMARY

Blockchain:

- new method of managing data distributed
- Technology Combined by: P2P netwwork cryptography, game theory.
- Major characteristic: decentralization, transparency, immutability
- Applications: currency, smartcontract, recordkeeping, securrity
- Still development and is applying, changing some field

11. DISCUSSION



FINISH