Blockchain Business Development

Blockchain Platforms Architecture

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Taxonomy of Blockchain Platforms

	Archetypes of Blockchain Technology Implementation		
Archetype	**Private Blockchain**	**Permissioned Blockchain**	**Public Blockchain**
Governance	Private	Consortium	Open
Decision process	Centralized	Distributed	Decentralized
Access	Restricted	Permissioned	Public
Accountability	Single entity	Multiple entities	None/Anonymous
Cost	Localized	Shared	Diffused
Trust mechanism	Authenticated audit trail	Trustee	Consensus
Illustrative system	Maersk shipping info pipeline	R3 Corda	Ethereum
Metaphor	Private estate	Membership club	Public square

Public Blockchain Platforms

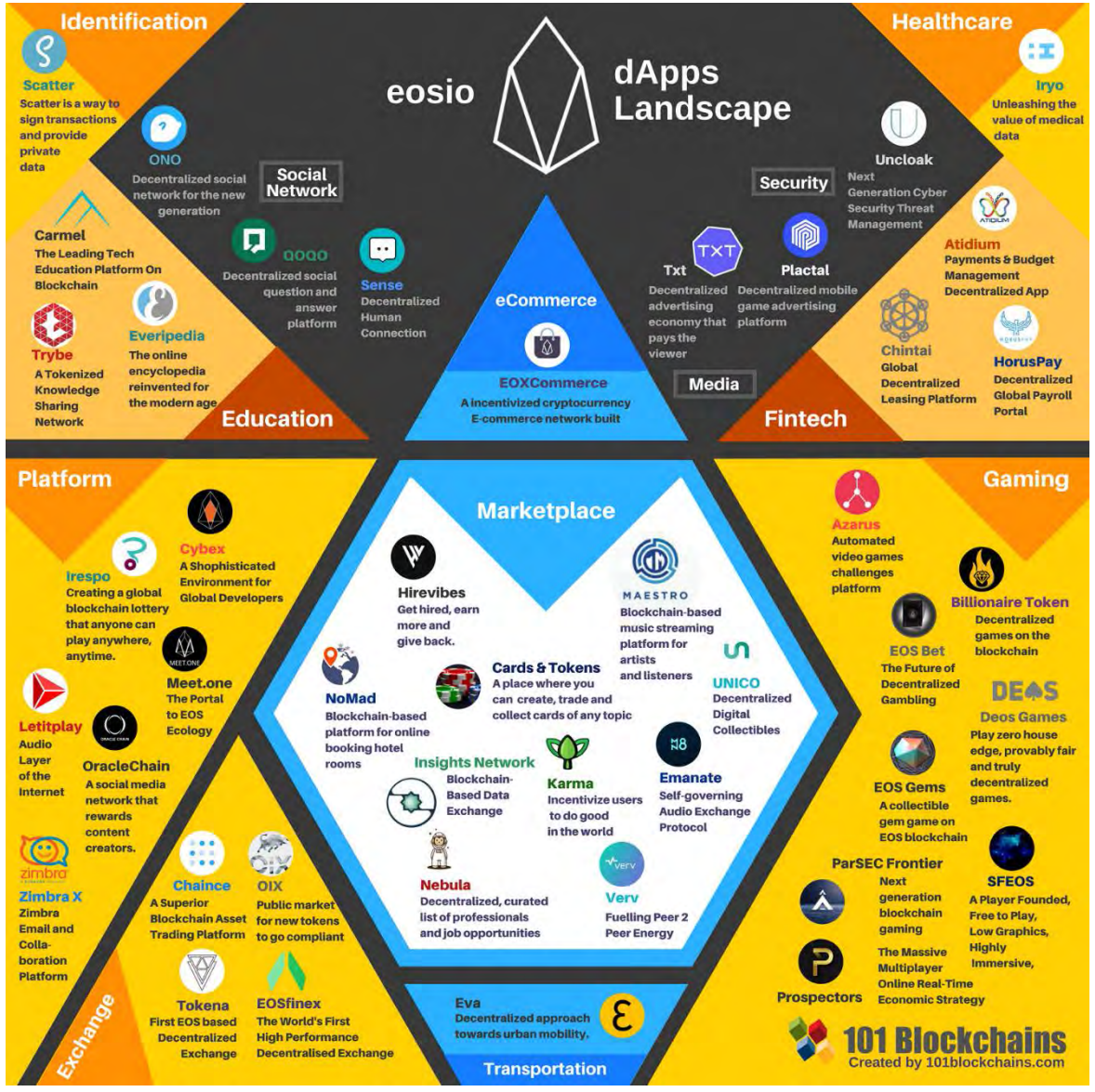
- Examples: Bitcoin, Ethereum, and EOS

First blockchain platform for cryptocurrency (Blockchain 1.0)

First blockchain platform supporting smart contract (Blockchain 2.0)

First blockchain platform for business applications across the world (Blockchain 3.0)

Dapps based on EOS Blockchain Platforms



Consortium Blockchain Platforms

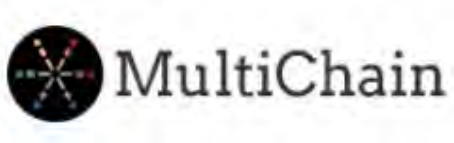
- Examples: Hyperledger fabric, Corda

- Contrubuted by IBM and Digital Asset
- Modular architecture for enterprise solutions
- Confidentiality is achieved
- No cryptocurrency

- Developed by R3 consortium
- Initially for the financial sector, now for healthcare, supply chain, and other sectors
- Enhanced privacy and access control
- No cryptocurrency

Private Blockchain Platforms

- Examples: Multichain

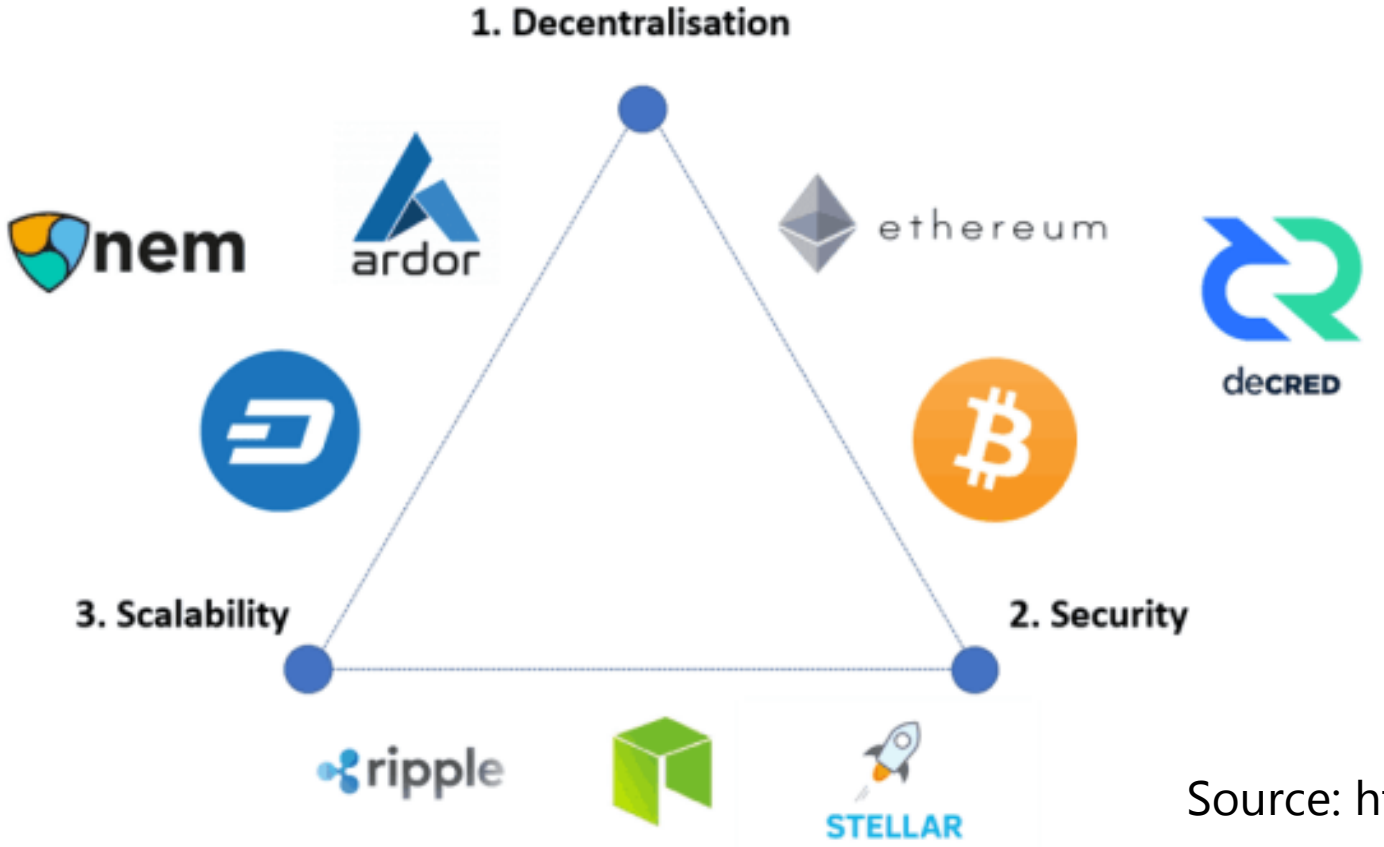


  - Rapid deployment: two steps to create a new blockchain and three to connect to an existing one
  - Unlimited assets: issue millions of assets on a blockchain
  - Developer friendly, customizable, and flexible security (support multisignatures, external private keys...)

Comparison of Popular Blockchain Platforms

	Ethereum	Hyperledger fabric	EOS	Corda	MultiChain	OpenChain
Industry focus	Cross-Industry	Cross-Industry	Cross-Industry	Financial Services	Financial Services	Digital Asset Management
Governance	Ethereum developers	Linux foundation	ECAF	R3	CoinPrism	Linux foundation
Mode of operation	Public, private	Permissioned, private	Public	Permissioned	Permissioned, private	Permissioned
Consensus	POW	PBFT	DPOS	Pluggable Framework	POW	Partionned Consensus
Supported Language	Solidity	Go, Java	C++/Rust/ Python/Solidity	Kotlin, Java	C, C++, Python, JavaScript	JavaScript
Currency	Ether	None	EOS token	None	None	None
Transaction fee	Ether	None	None	None	None	None
Privacy	No	Yes	No	Yes	Yes	Yes

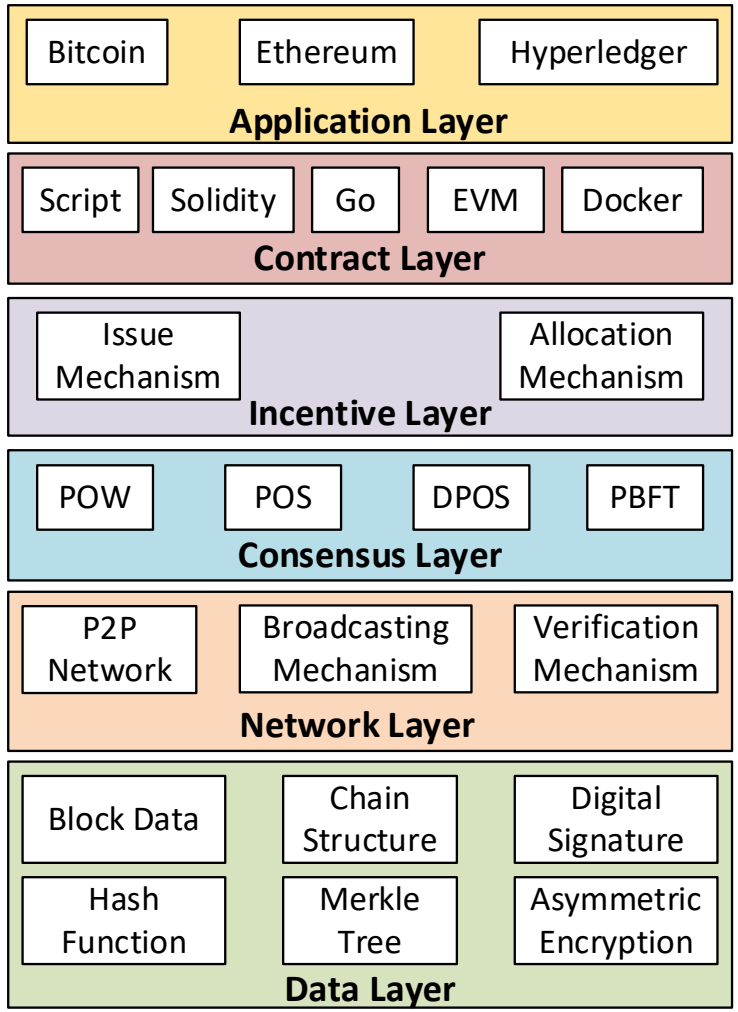
Blockchain Trilemma (impossible triangle)



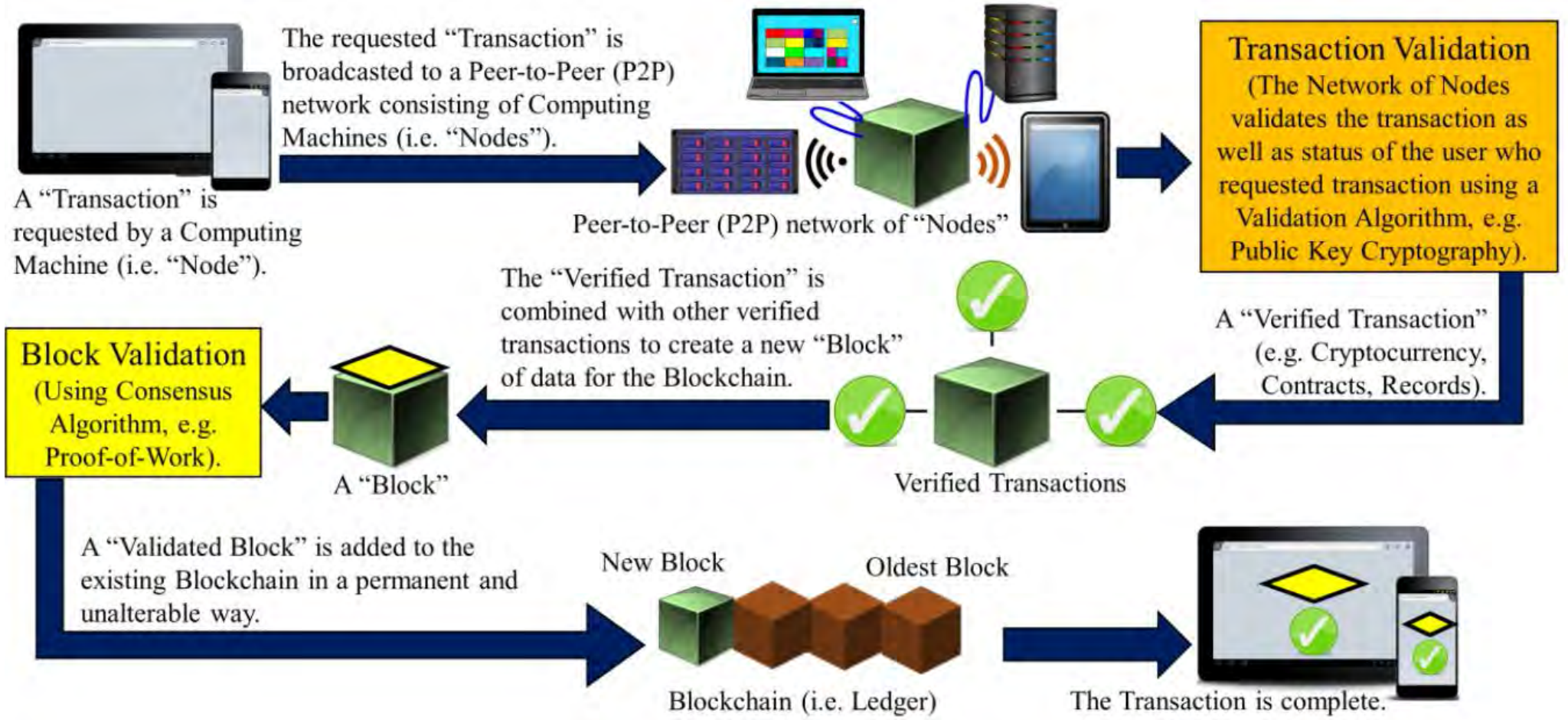
Source: https://toshitimes.com/

- Decentralization, security, and scalability cannot be achieved simultaneously!!!

Blockchain Architecture: Six Layers

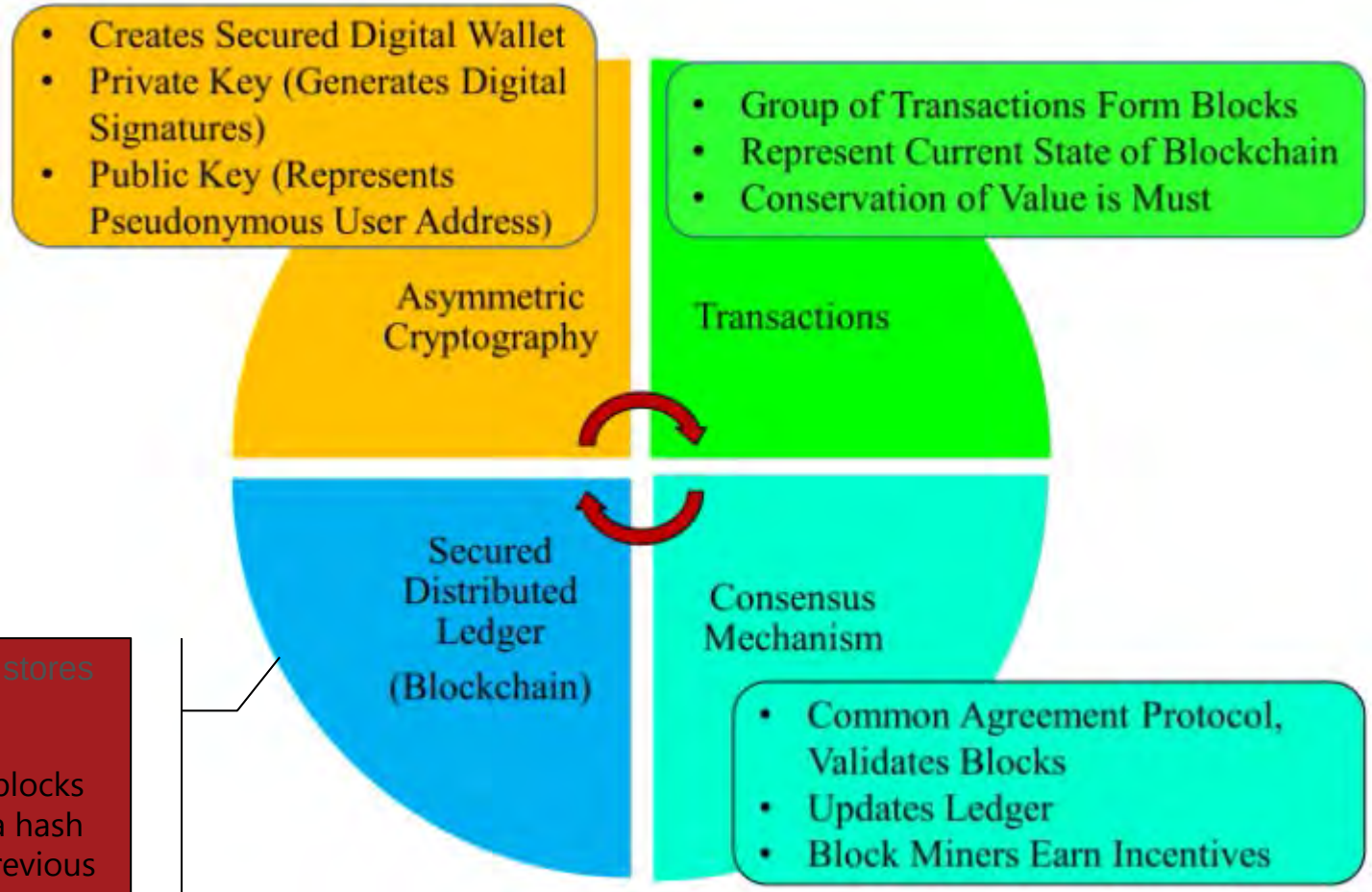


How does a Blockchain Work?



Puthal D, Malik N, Mohanty S P, et al. Everything you wanted to know about the blockchain: Its promise, components, processes, and problems[J]. IEEE Consumer Electronics Magazine, 2018, 7(4): 6-14.

Core Components of Blockchain



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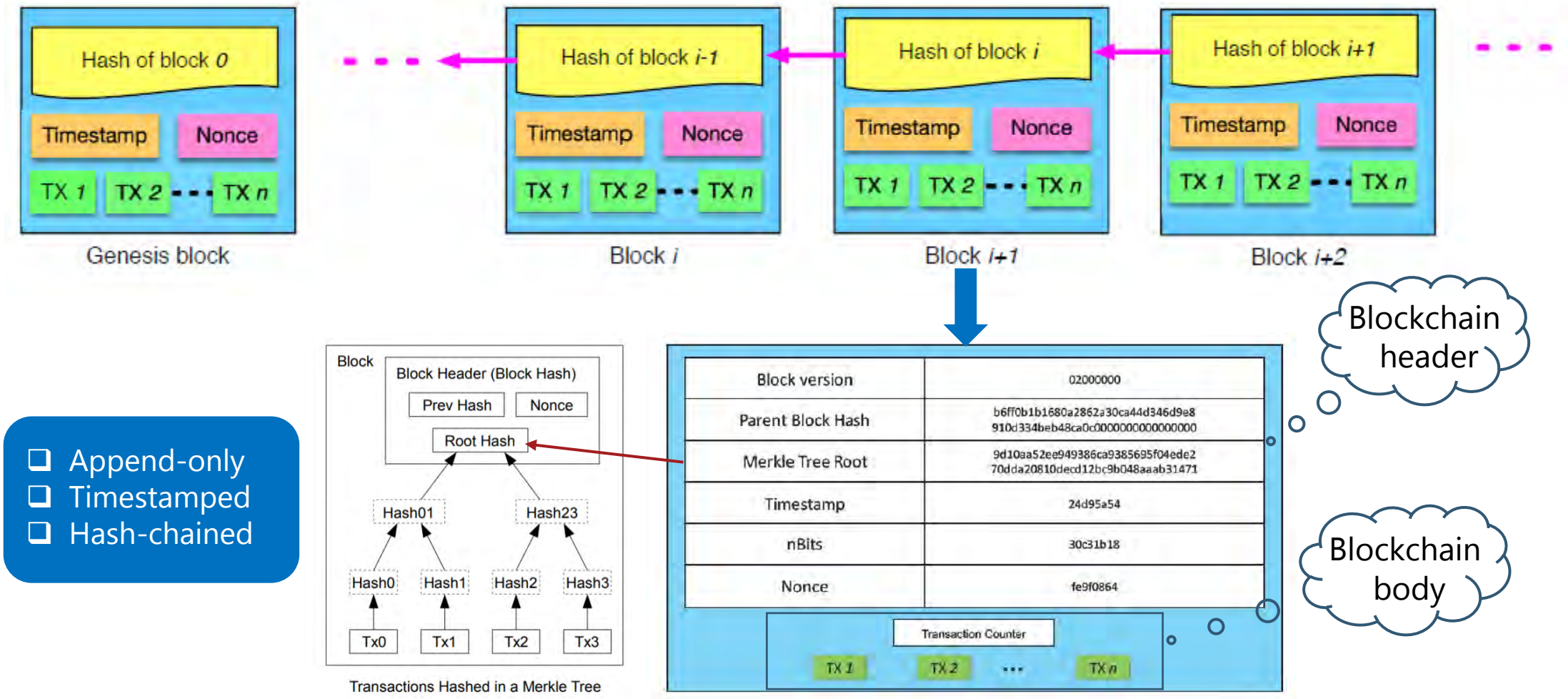
Blockchain Data Structure: Block, Hash Chain, and Transactions



- Append-only
- Timestamped
- Hash-chained

Zheng Z, Xie S, Dai H N, et al. Blockchain challenges and opportunities: A survey. International Journal of Web and Grid Services, 2018, 14(4): 352-375 (Ctation: 910).

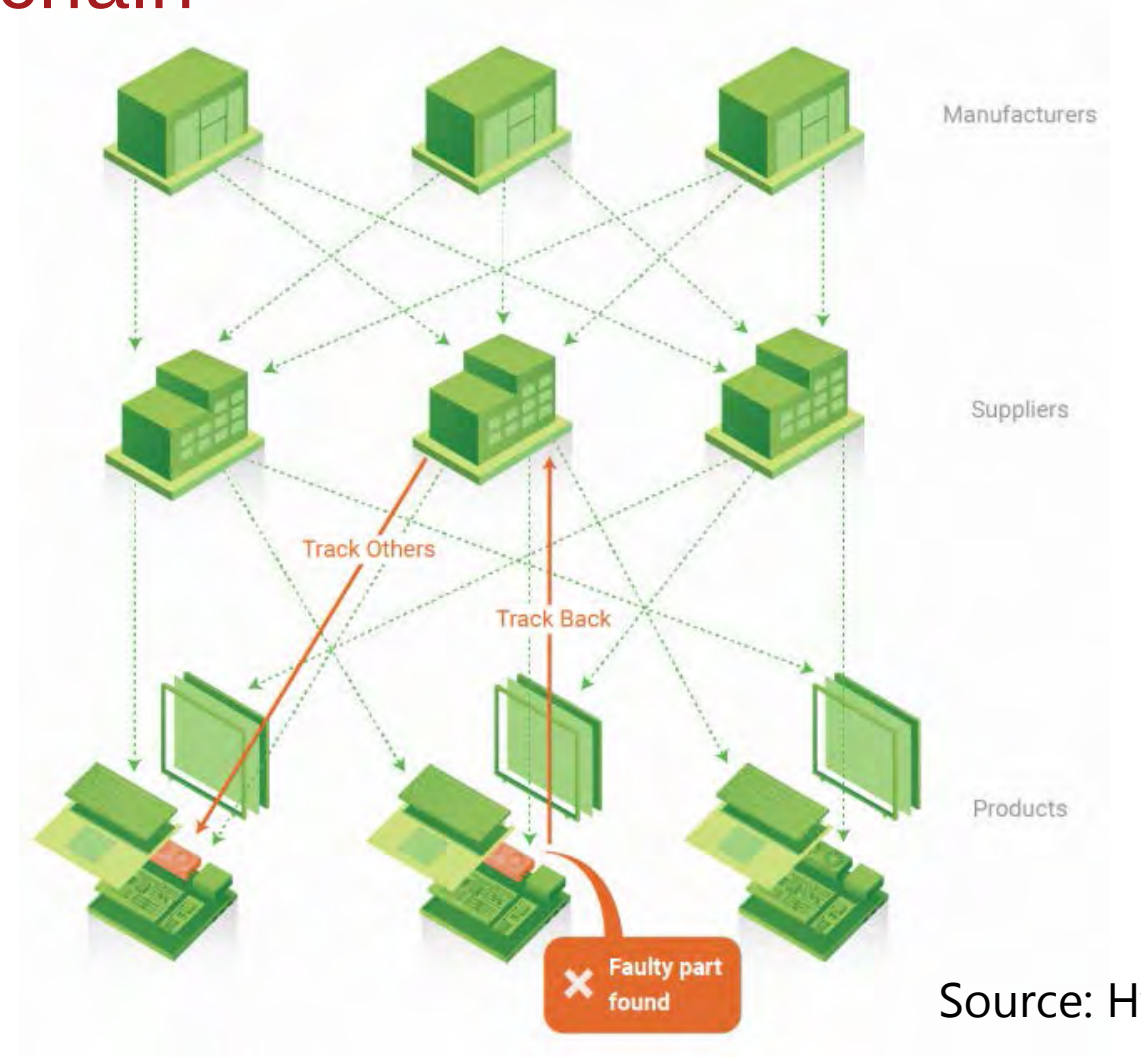
How to choose a blockchain platform for your development?

- Something to be considered based on your requirement
  - Type of network (public, private, or consortium)
  - Language used (Go, Solidity....)
  - Currency (what is it and how do users obtain it? Or free)
  - Security and privacy (access control, user identity privacy, and data confidentiality)
  - Scalability (how well a platform scales with network size and the number of validated transactions, related to consensus algorithms)
  - Flexibility (if the platform can be used for many purposes, i.e., the variety of supported applications)

How to choose a blockchain platform for your development?

- Other possible concerns
  - Usability (how difficult learning to use a platform is)
  - Support and documentation (the quality and quantity of documentation and developer resources for each platform)
  - Development (the development history of a platform, a longer history generally suggests a platform is better developed)
  - Open source

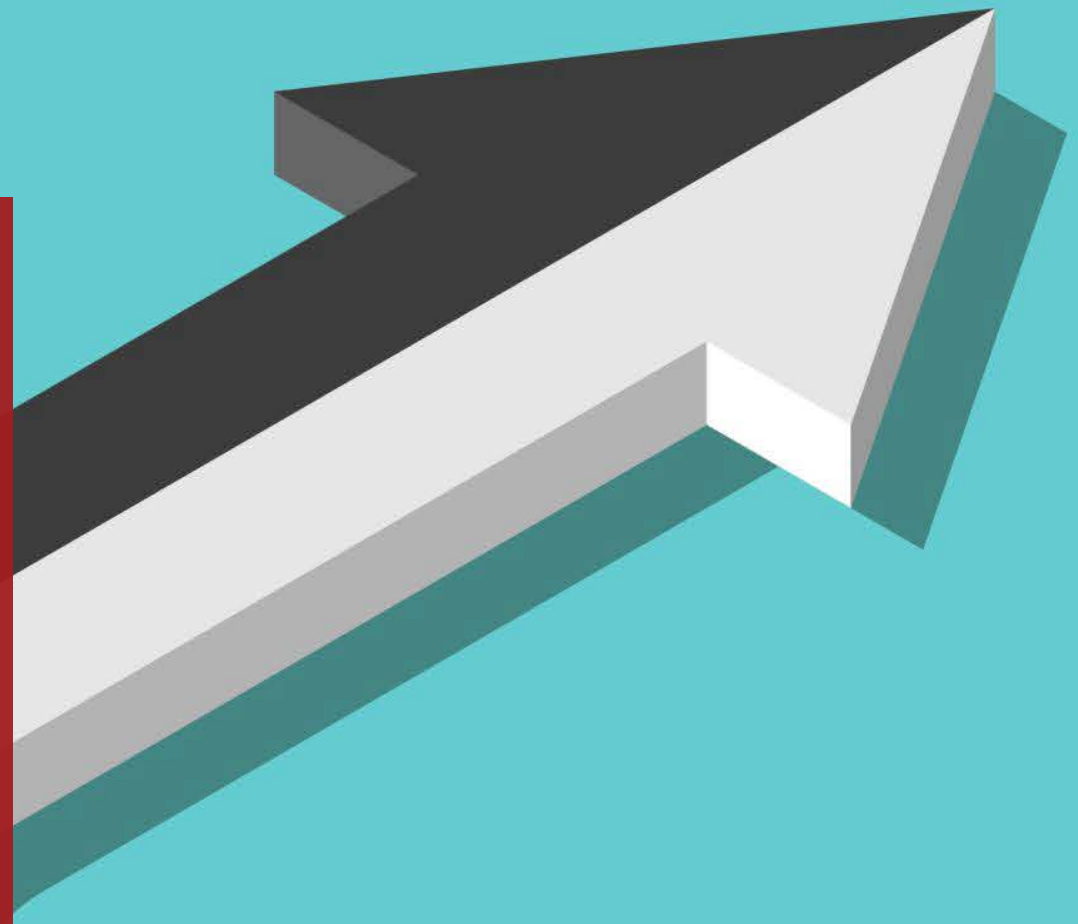
An example: Hyperledger fabric use case in manufacturing supply chain



- Consortium blockchian
- Transparent transactions for blockchain peers (traceability)
- Chaincode to realize business logic

Source: Hyperledger fabric use cases

- Types of blockchain implementations and the representative platforms
- The features of each blockchain platform and their differences
- Blockchain trilemma
- How to choose a blockchain platform for Dapp development



Next lecture on

Smart contract development

30/9/2020 at 12:35-16:05 online