Blockchain & Distributed Ledgers

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When we interact/transact with others, we often delegate **Trust** to **Intermediaries**

Ledger ~ Agreed State ~ Collection of Transactions

	ABC Co. Ltd			Page 2
	General Journals			
Date	Descriptions	Folio	Debit	Credit
2007				
28-Feb	Cash at Bank	GL1	3,000.00	
	Trade Debtors	GL20		3,000.00
	(Being collection from trade debtors for the month of February 2007)			
2007				
28-Feb	Trade Debtors	GL20	2,000.00	
	Sales	GL30		2,000.00
	(Being sales for the month of February 2007)			
2007				
28-Feb	Cash at Bank	GL1	7,500.00	
	Sales	GL30		7,500.00
	(Being cash sales for the month of February 2007)			
2007				
28-Feb	Cash at Bank	GL1	300.00	
	Rental Income	GL31		300.00
	(Being rental income for the month of February 2007)			
2007				
28-Feb	Purchases	GL35	6,500.00	
	Cash at Bank	GL1		6,500.00
	(Being cash purchases for the month of February 2007)			

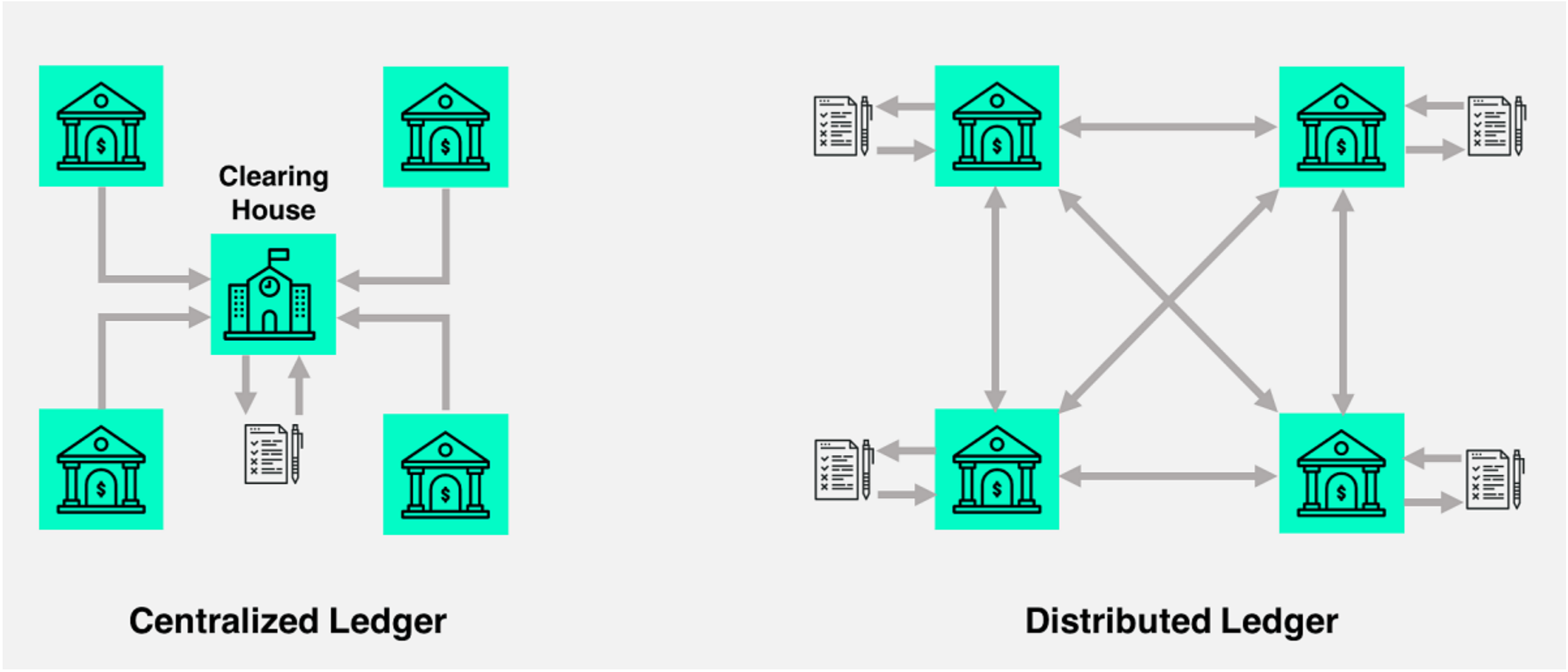
sources:
https://upload.wikimedia.org/wikipedia/commons/e/e6/Ledger.png
http://www.accountingcrashcourse.com/wp-content/uploads/2009/09/General-Journals.png

If we had a trusted **Shared Ledger** many of those Intermediaries would no longer be necessary

1. Shared, distributed **Ledger**
2. Immediate **Consensus** on "State of the World"
3. **Tamper-Proof** (Immutable)
4. **Auditable**
5. **Transactions** change the state

sources:
https://commons.wikimedia.org/wiki/File:Server-based-network.svg
http://www.gjermundbjaanes.com/img/posts/distributed_ledger.png

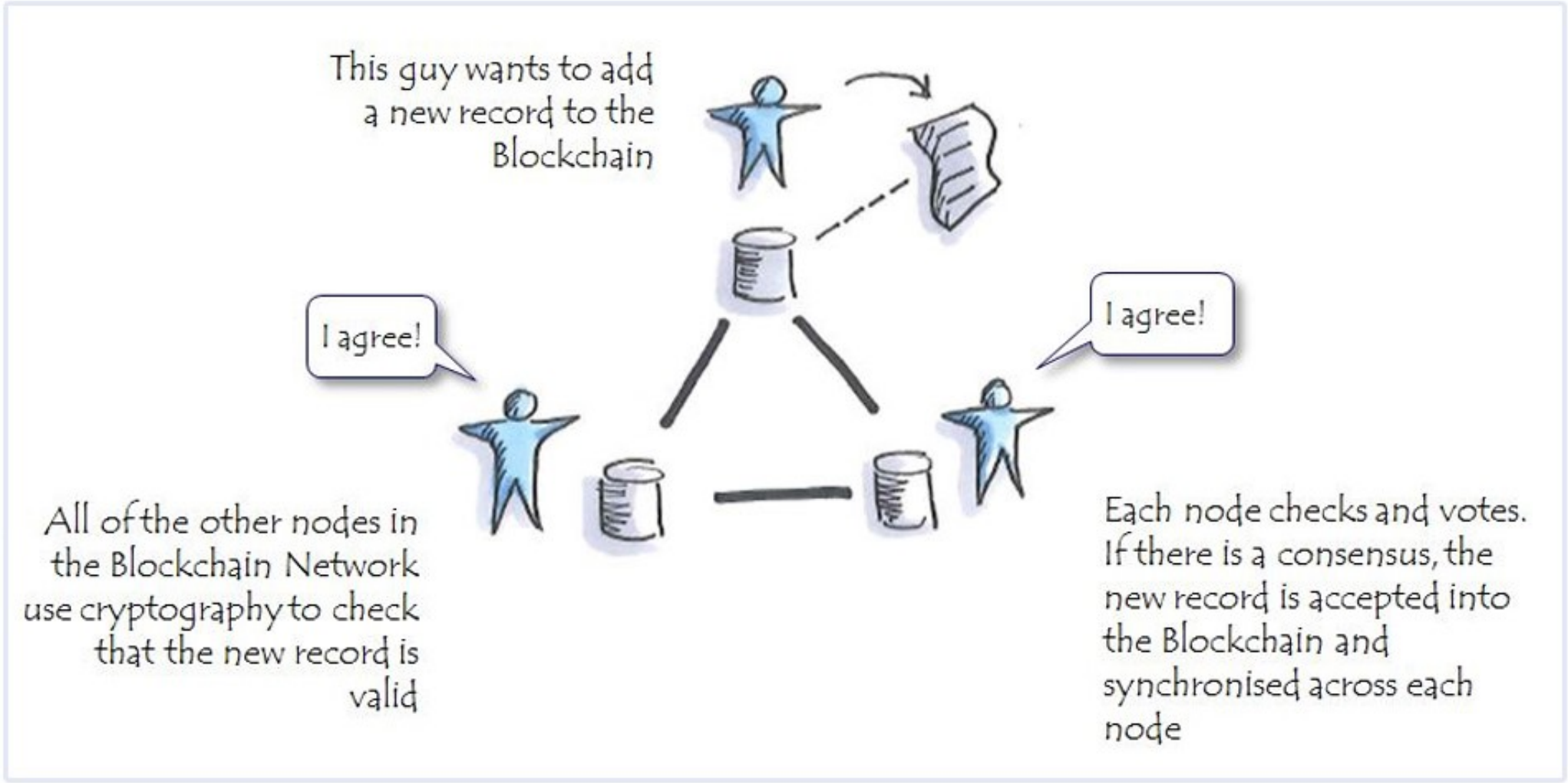
Centralized vs. Distributed Ledger



sources:
https://tradeix.com/distributed-ledger-technology/

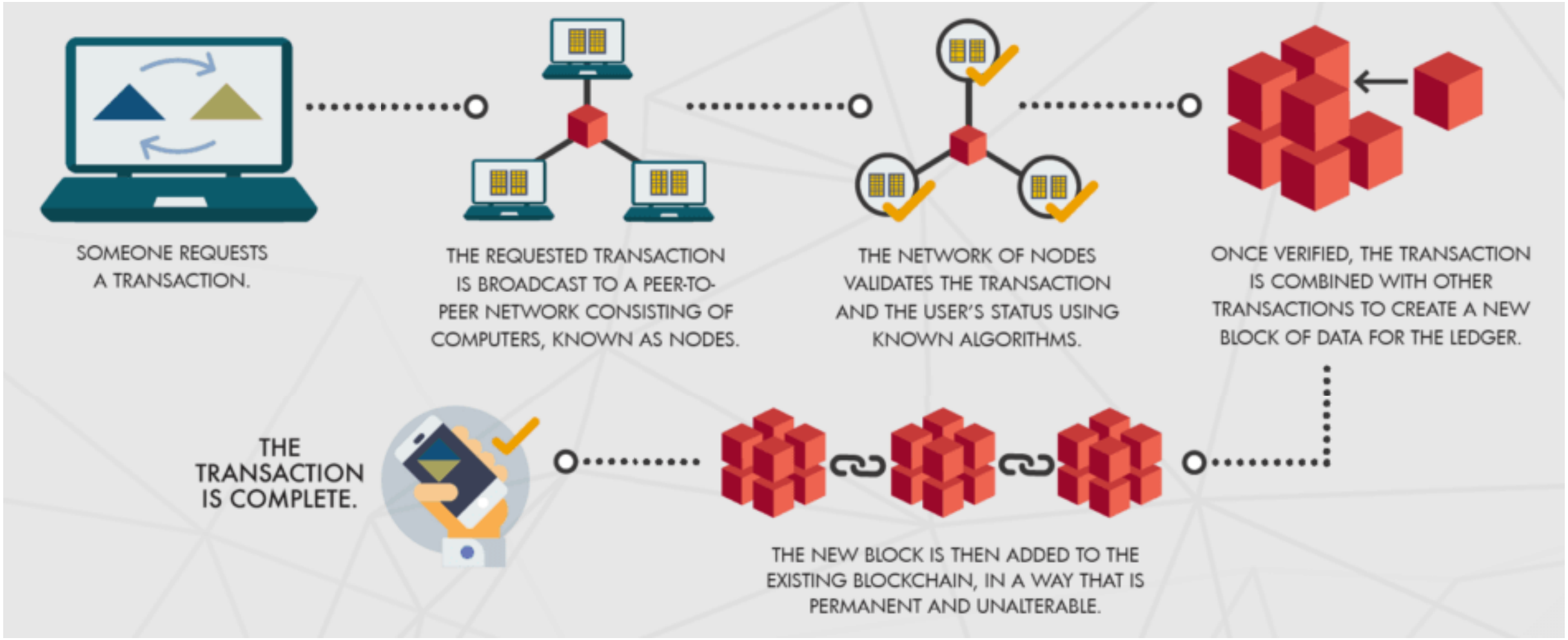
Consensus = Whatever is agreed upon

Corollary: When participants can't reach consensus, a split of the participants occurs



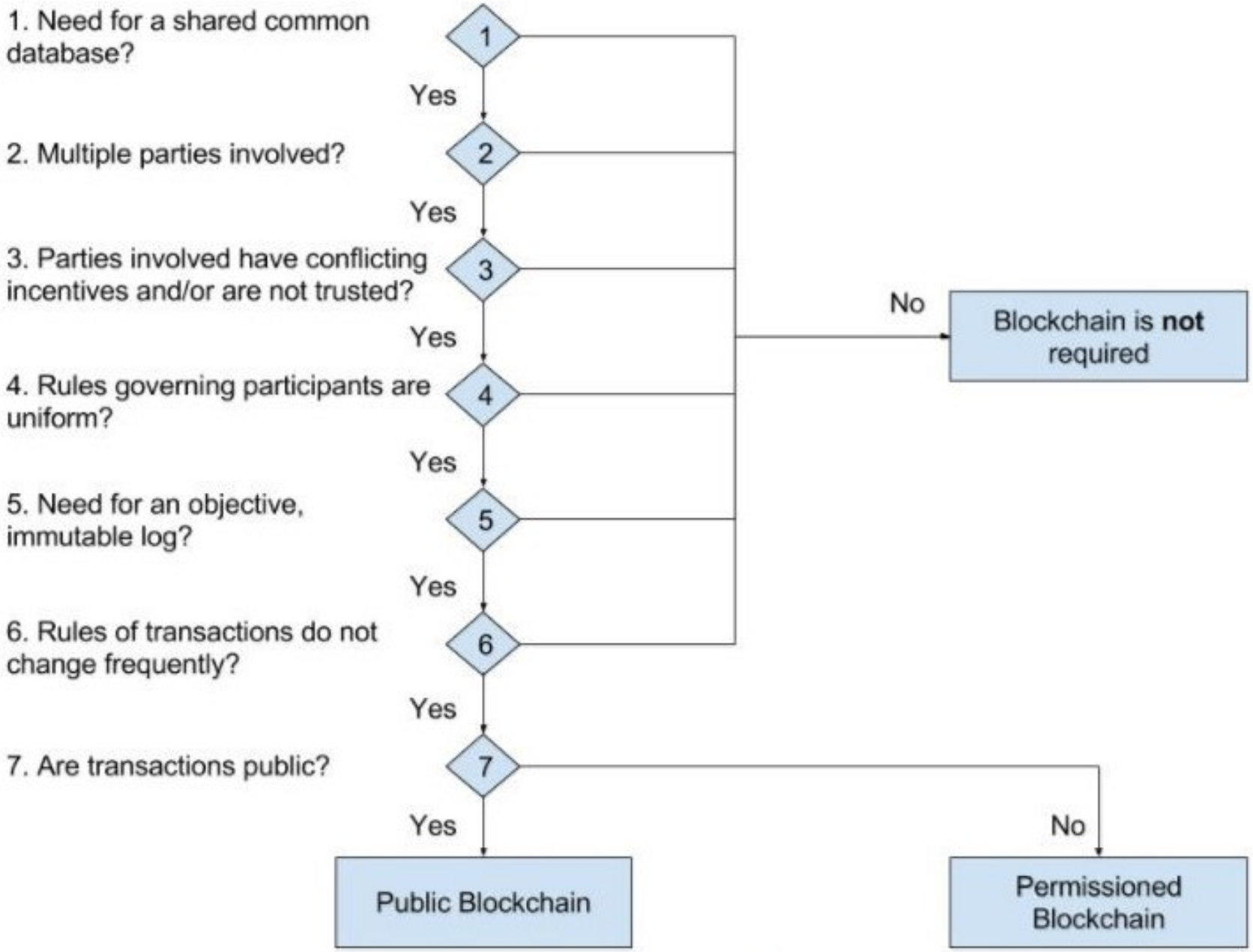
sources:
https://www.zurich.com/en/knowledge/articles/2016/10/insurers-look-to-blockchain-to-better-serve-their-clients

A day in the life of a Blockchain **Transaction**



source: https://www.burniegroup.com/infographic-a-look-at-blockchain-technology/

Criteria for Blockchain Adoption



sources: https://cdn-images-1.medium.com/max/856/1*QMK4h8SzoMNFLE7eDQWPew.jpeg

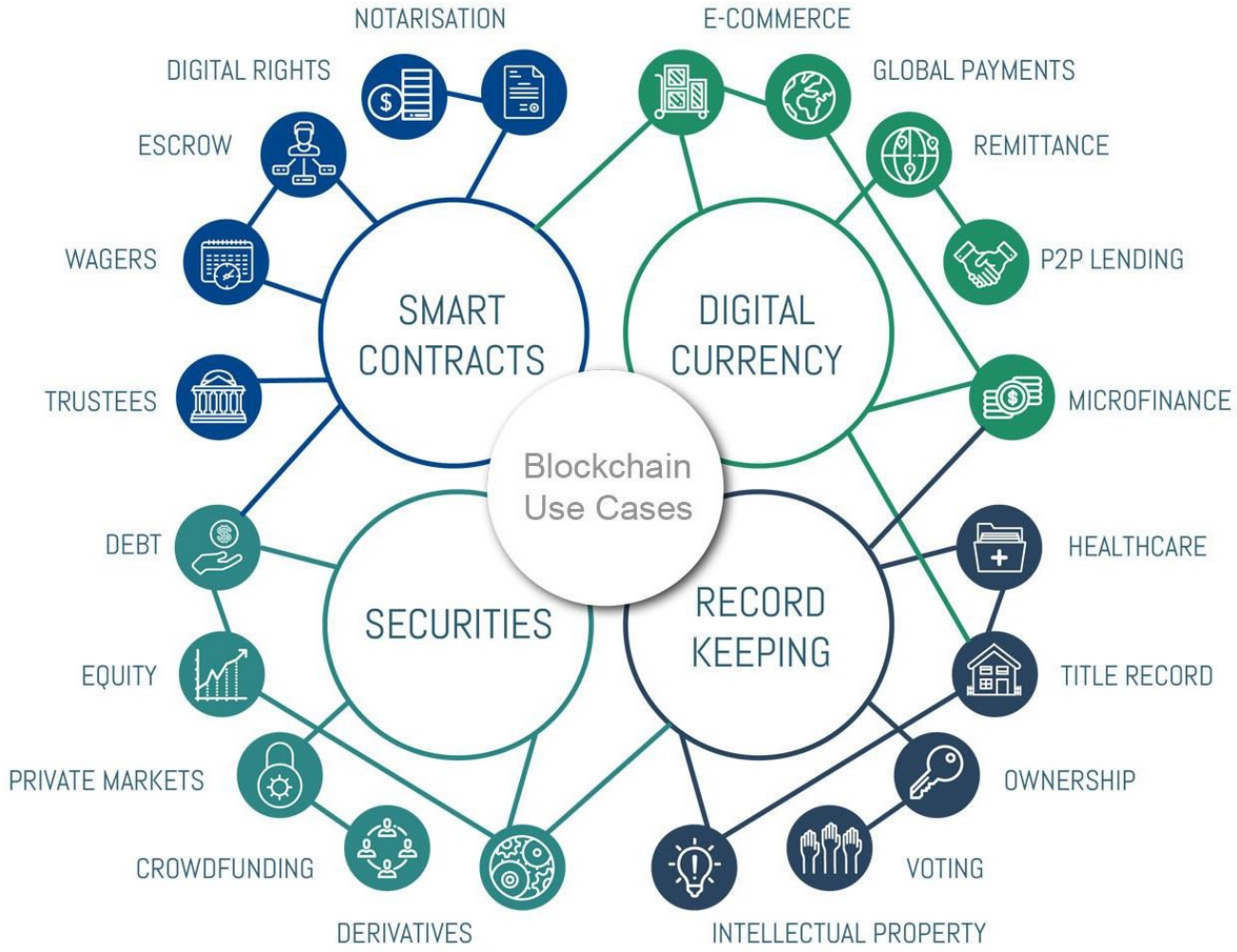
A **Consortium Blockchain** can address some Challenges Companies may find with Public Blockchains

- Group of known, semi-trusted parties
- Access granted by members
- Consensus ~ majority vote (BFT)
- Consensus can withstand 1/3 of malicious nodes
- Easier Governance

Public	Consortium
Data is Public	Privacy, Confidentiality
Transactions are Public	Private Channels
Pseudonymous	Known participants
Anyone can join	Permissioned
Anyone can access	Permissioned
Trustless Nodes	Semi-Trusted Nodes
Low tx/s	High tx/s
	GDPR Compliance

What are some of the Blockchain **Use Cases** for Companies?

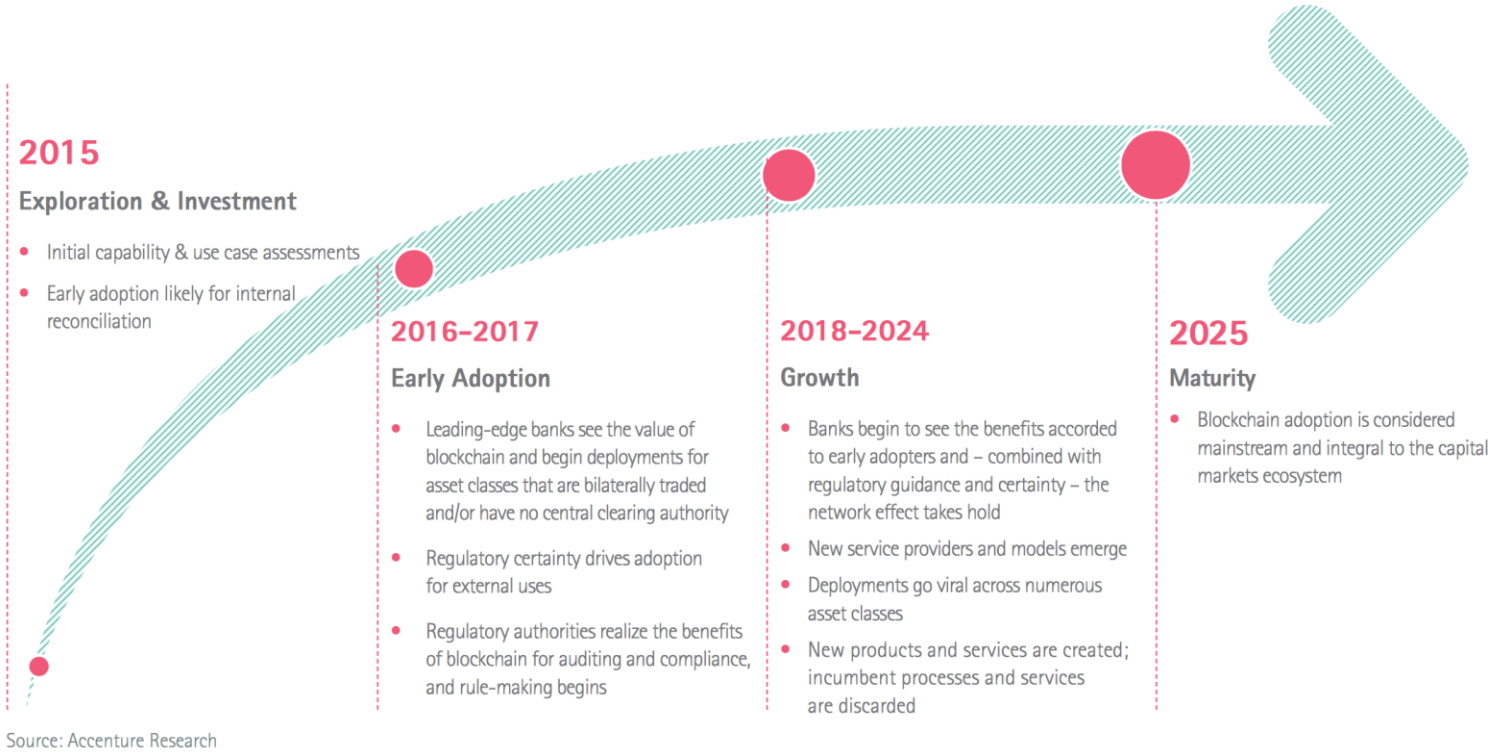
- Data Exchange between multiple parties
- End-to-End Supply Chain Transparency
- Product Traceability
- Marketplaces, Trading
- Clearance & Settlement
- Public Registries



https://medium.com/@sergiomarrero/6-emerging-categories-for-blockchain-use-cases-4650f824d130

There is large interest in Blockchain **Adoption**, with many projects underway

Maersk	cargo tracking
Port of Antwerp	container handling
Walmart	supply chain transparency
Airbus	jet plane parts tracking
UPS	supply chain transparency
FedEx	customer dispute resolution
Australian Securities Exchange	clearance & settlement
Credit Suisse	syndicated loans
Dubai Land Dept.	land registry



Source: Accenture Research

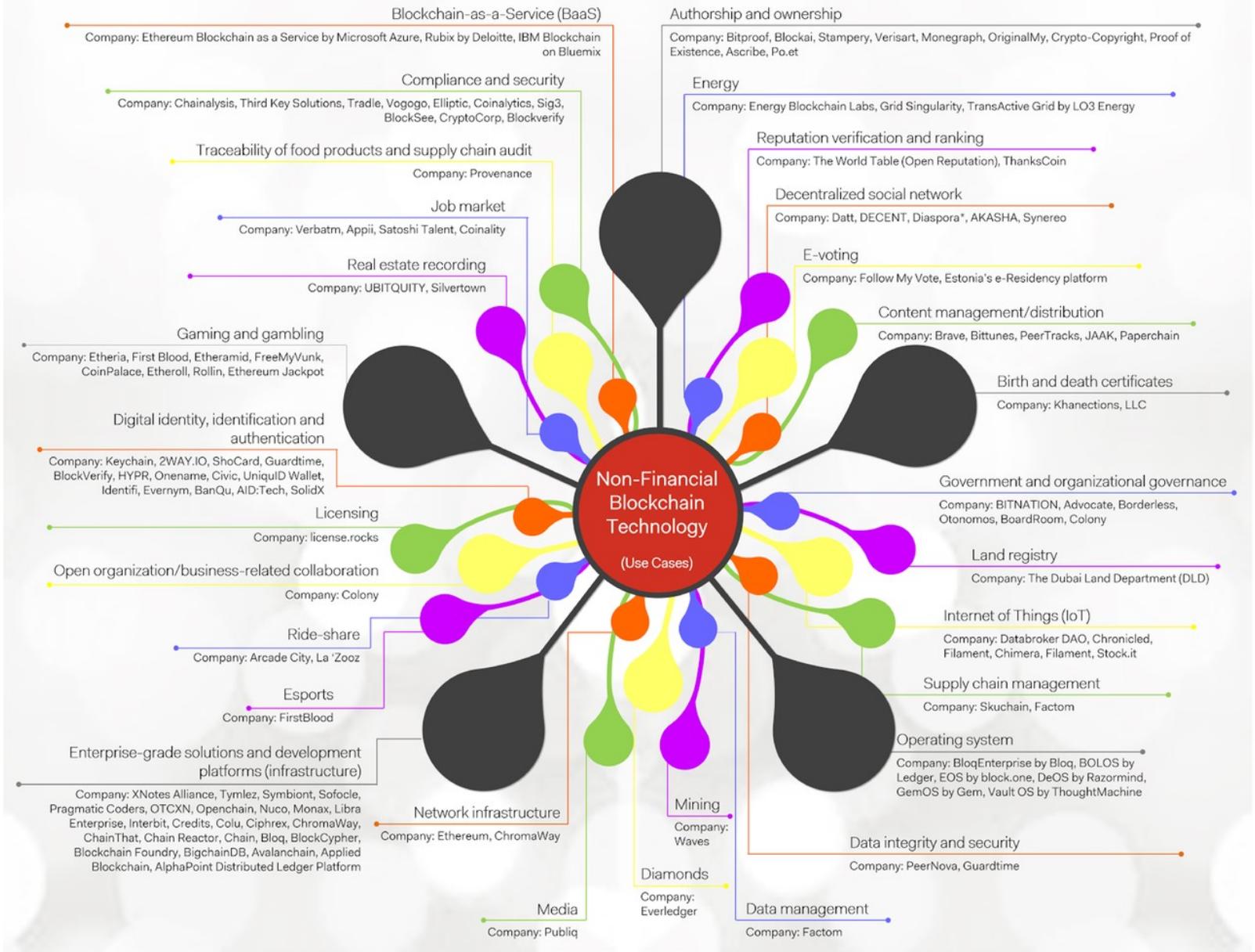
Thank you,
any questions?

Q & A

- What is the implementation and running cost of a blockchain project?
  - I believe the running cost of a blockchain project, and even the development cost will be similar to traditional software projects.org, dev, rollout, stakeholders, requirements, etc.)
- Isn't distributed data inherently less secure than centrally stored data?
  - Yes, data stored centrally has a smaller attack surface than distributed data
  - But the entity in charge of the central ledger has to be trusted
  - Possible to store only document fingerprints on blockchain (proof of existence)
  - Possible to use private channels in Hyperledger Fabric to reduce access to transaction participants
  - Permissioned blockchain gives the possibility to manage access permissions per document

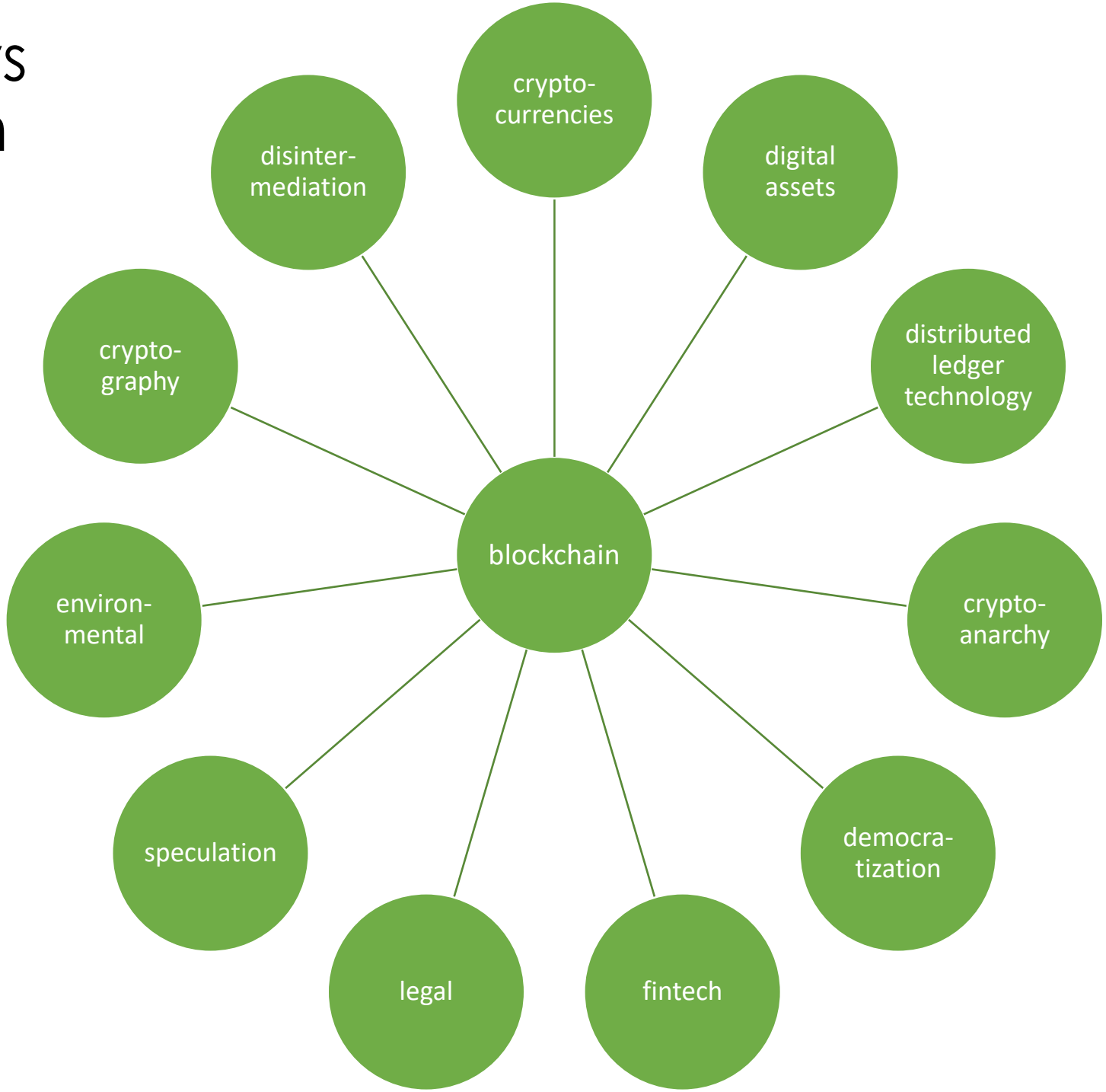
- - storage volume (store hashes = proof of existence; store off-chain i.e. IPFS)
- - consensus vs. truth. what if people agree on the wrong thing?
- - energy consumption, PoW
- - low tx throughput
- - consensus = whatever is agreed. when people disagree a blockchain split occurs.
- - consensus in the face of malicious attackers is the whole point
- - how do nodes get added in permissioned blockchain?

30 Non-Financial Use Cases of Blockchain Technology

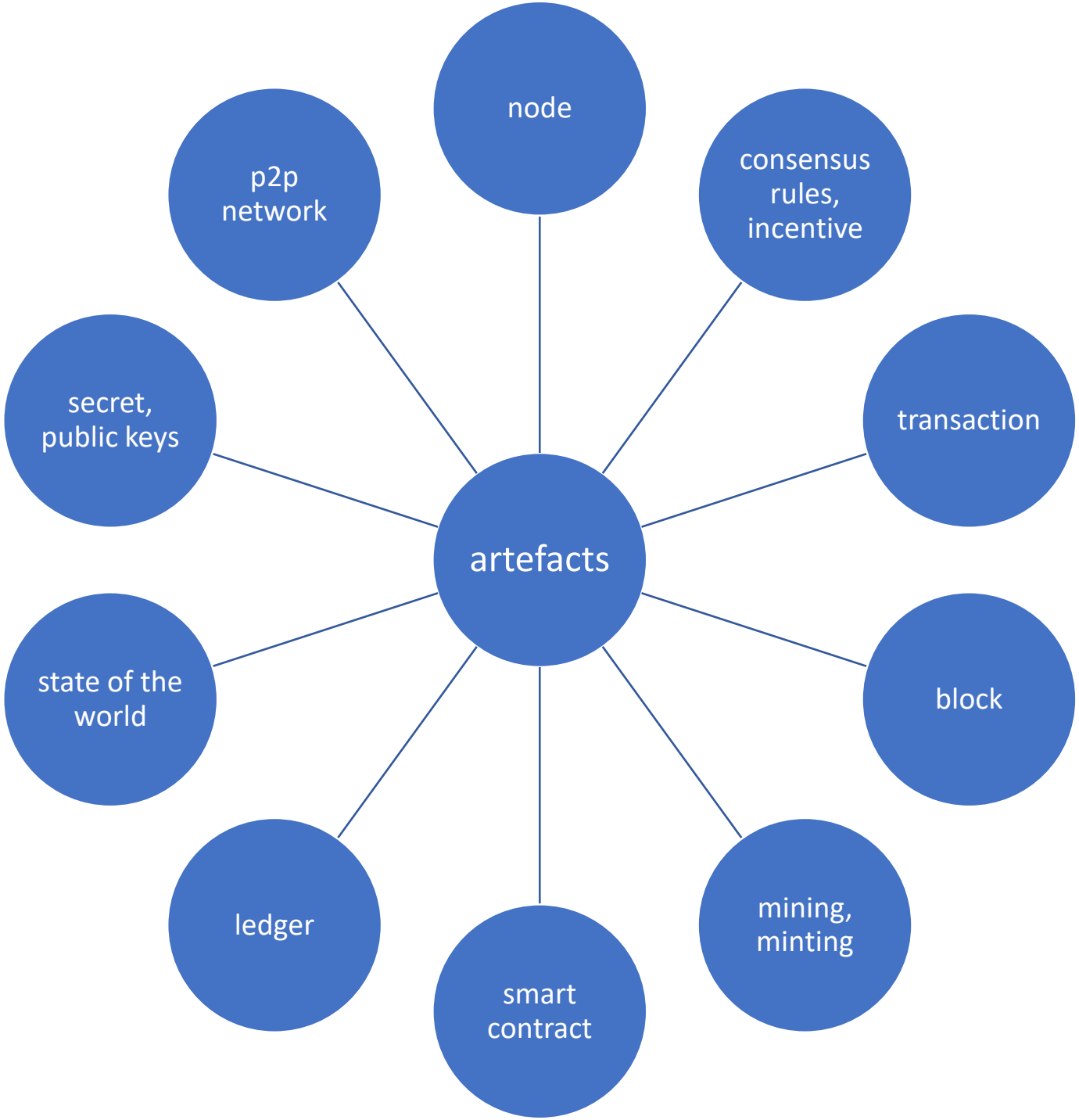
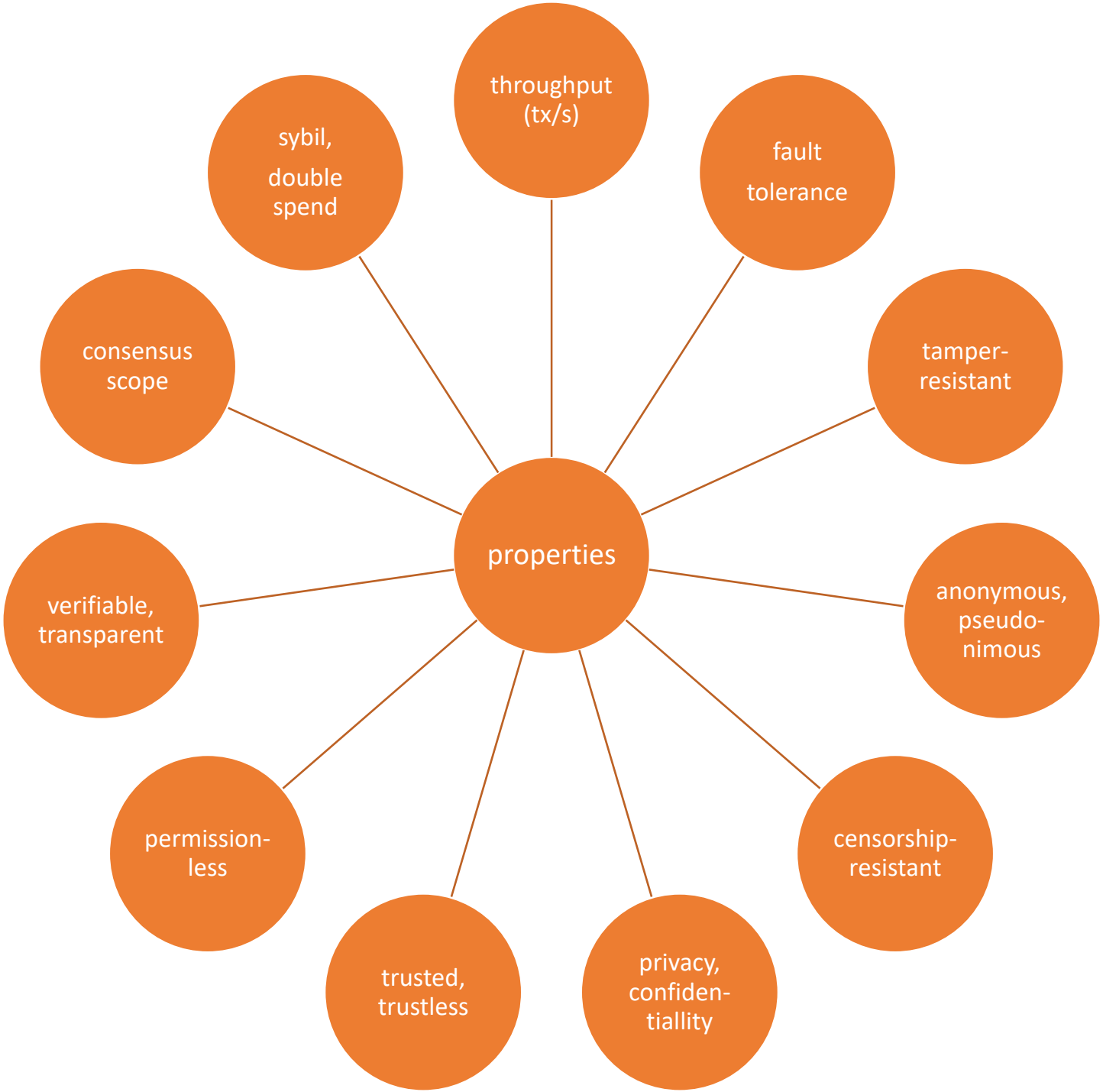


https://gomedici.com/30-non-financial-use-cases-of-blockchain-technology-infographic/

Different Views on Blockchain



Blockchain Artefacts



Blockchain Properties