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Understanding Blockchain Technologies through Visualization

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Research Areas

- Pattern discovery of human and algorithmic behaviours in real-time streaming data
- Visualizing abstract big data sets

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Agenda

1. ‘Distributed Ledger Technology’ explained - Bitcoin as a case study
2. What is the innovation and what does it facilitate?
3. Good & Bad use cases for DLT
4. Computational limitations of trustless DLT
5. Regulation and Governance on a blockchain
6. Questions

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1. Bitcoin Explained

A whole system consisting of three main components

1. Protocol
2. Peer-to-Peer Network
3. Blockchain database

No singular novel innovation

Above all it’s a transaction database, secured by cryptography and economic incentives, that’s distributed amongst trustless participants

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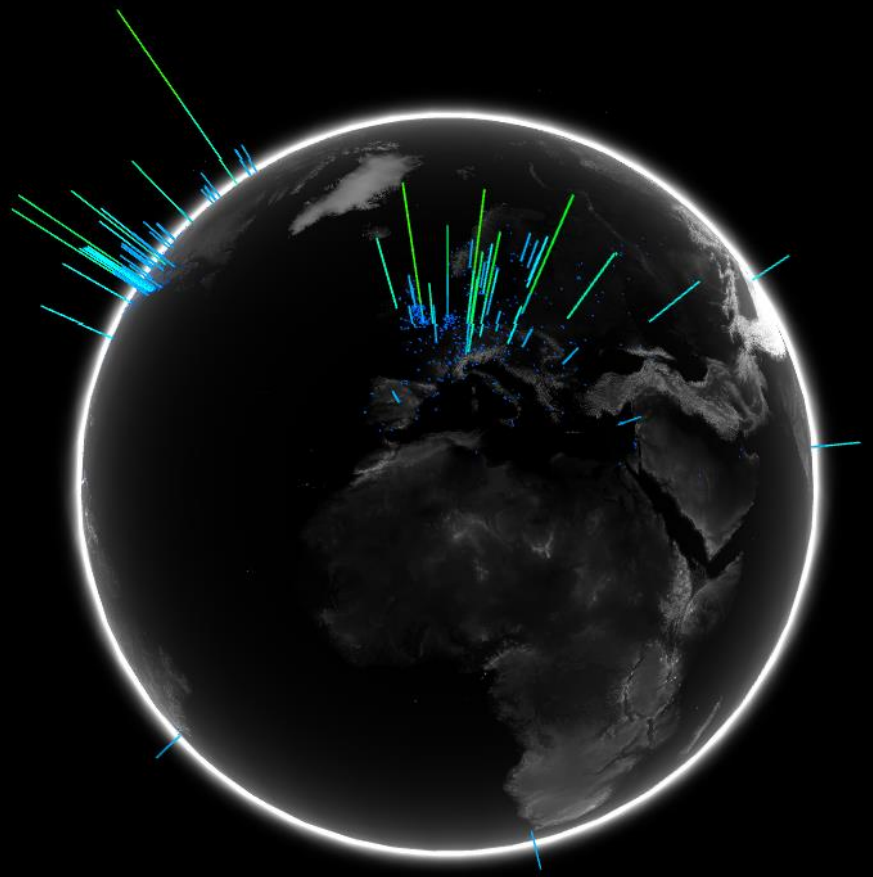
1. Bitcoin Explained

2. Peer-to-Peer Network



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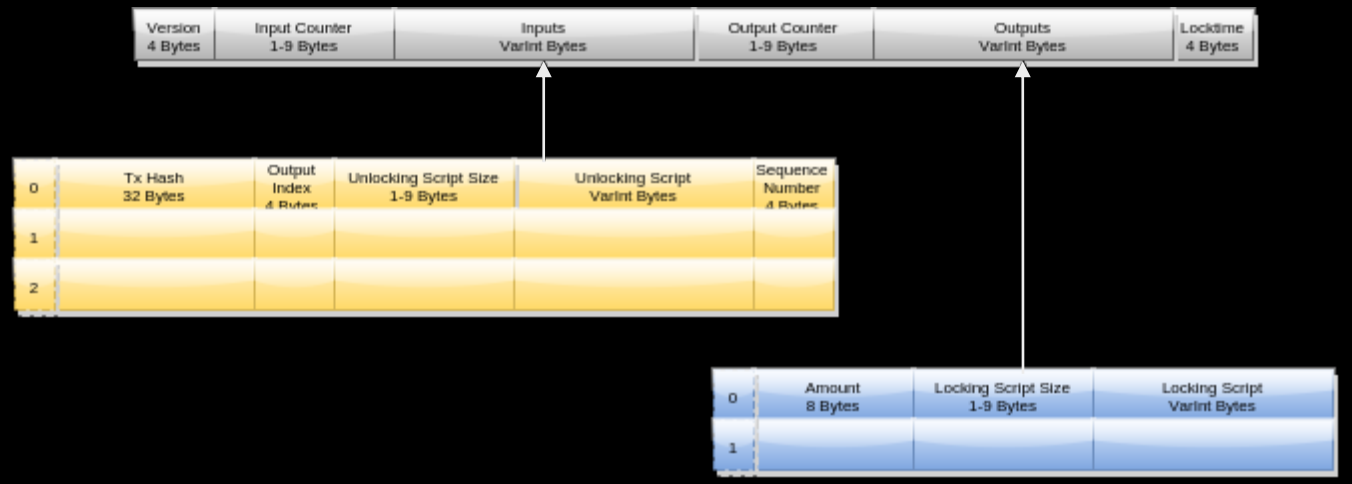
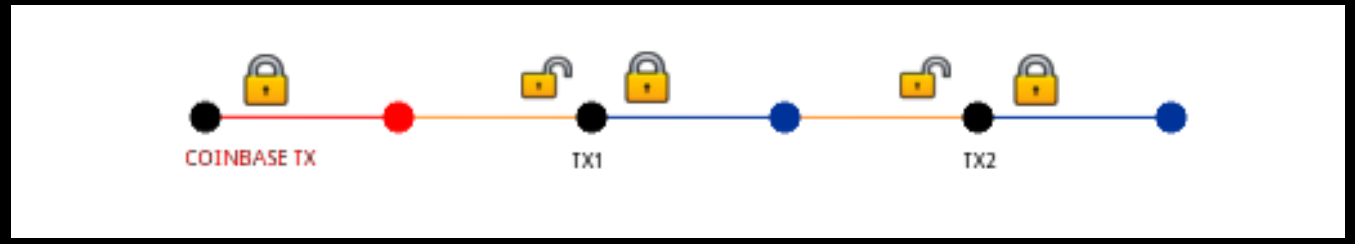
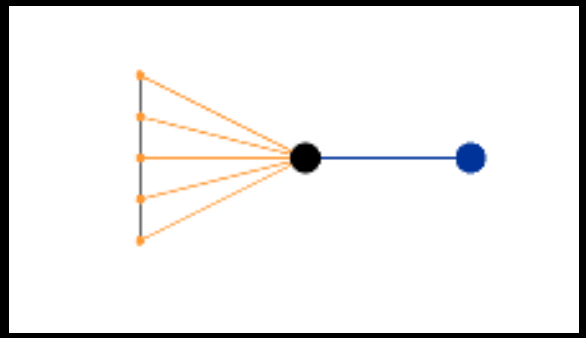
1. Bitcoin Explained

3. Blockchain Database

Transactions







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1. Bitcoin Explained

3. Blockchain Database

Mining

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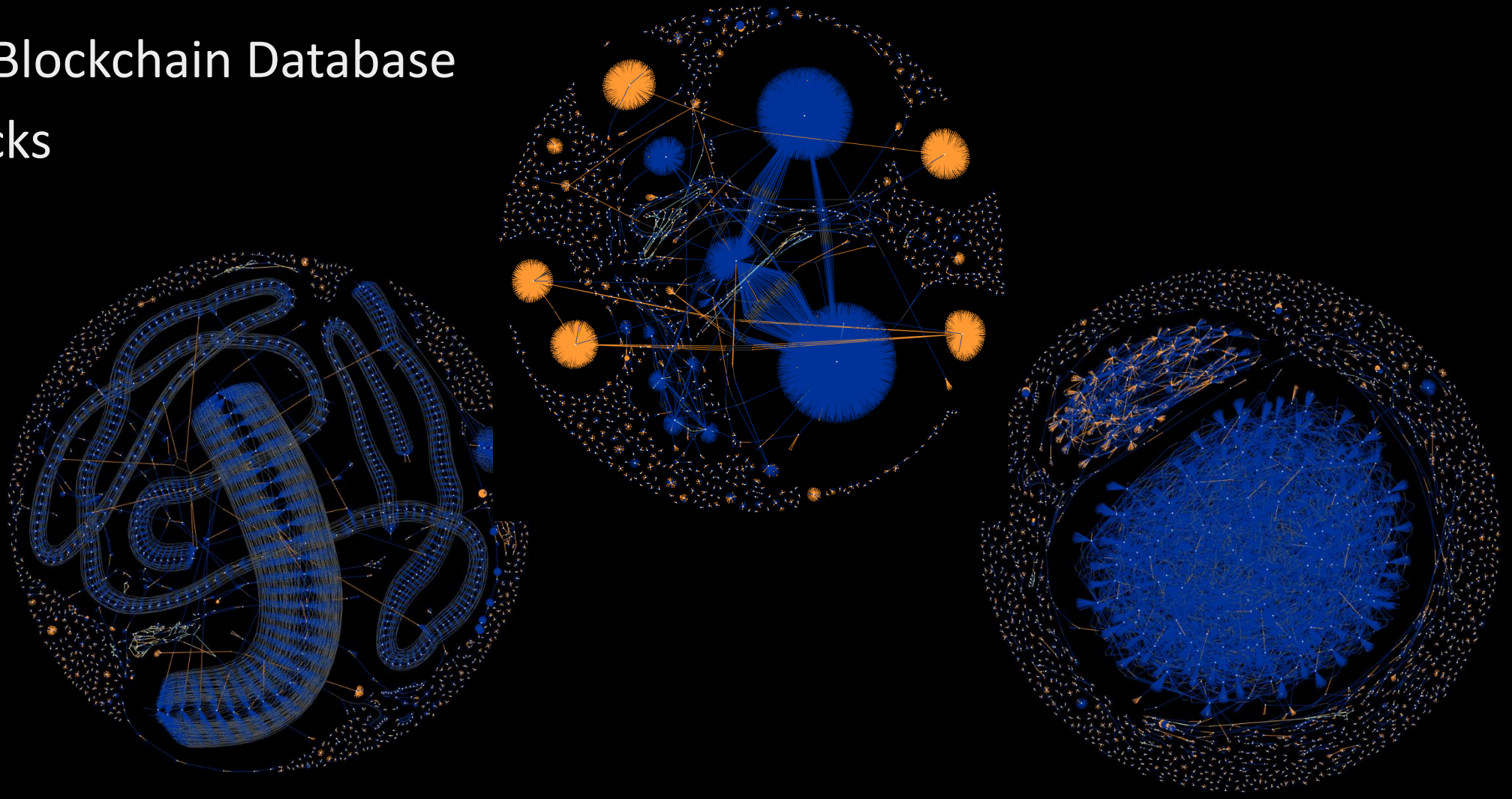
1. Bitcoin Explained

3. Blockchain Database

Blocks



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1. Bitcoin Explained

3. Blockchain Database

Not New!

Allows anyone to compute and verify the current system state according to the consensus of participants

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2. What is the Innovation?

- Not blockchain
- Not proof-of-work
- Cryptography + Economic Incentives →

A: Decentralized Digital Trust

Allows untrusting parties with common interests to co-create a permanent, unchangeable and transparent record of exchange without relying on a central authority.

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2. What is the Innovation?

- Old Old Trust Model – Show me your armies
- Old Trust Model – Show me your reputation and relationships
- Current Trust Model – Show me your license
- New Trust Model – Show me your code

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2. What is the Innovation?

Internet = Disruptive platform for information dissemination

Blockchain = Disruptive platform for the exchange of value

- Cheaper?
- Faster?
- Increased security?
- Increased anonymity?
- Censorship resistant

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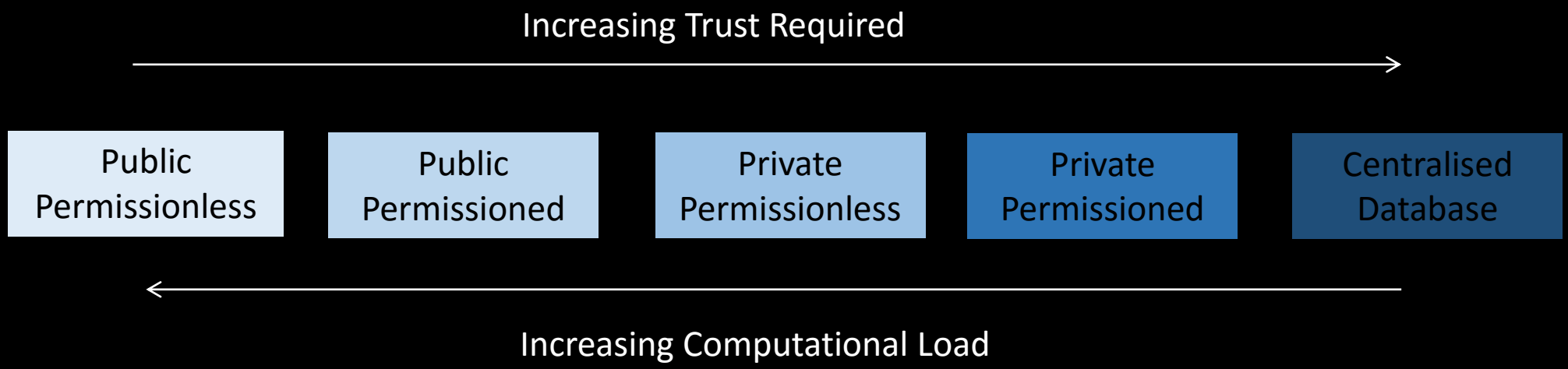
2. What is the Innovation?

Blockchain Spectrum of Trust



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3. DLT Use Cases

- Good for disintermediating central authorities
- Good where there exists mistrust amongst strangers
- Good for reducing reconciliation costs & counterparty risks
- Good where chronological transactions are highly interdependent
- Good for transparency & interoperability
- Bad where a central authority retains control
- Bad where known parties can be trusted through authentication
- Bad where data volumes are high

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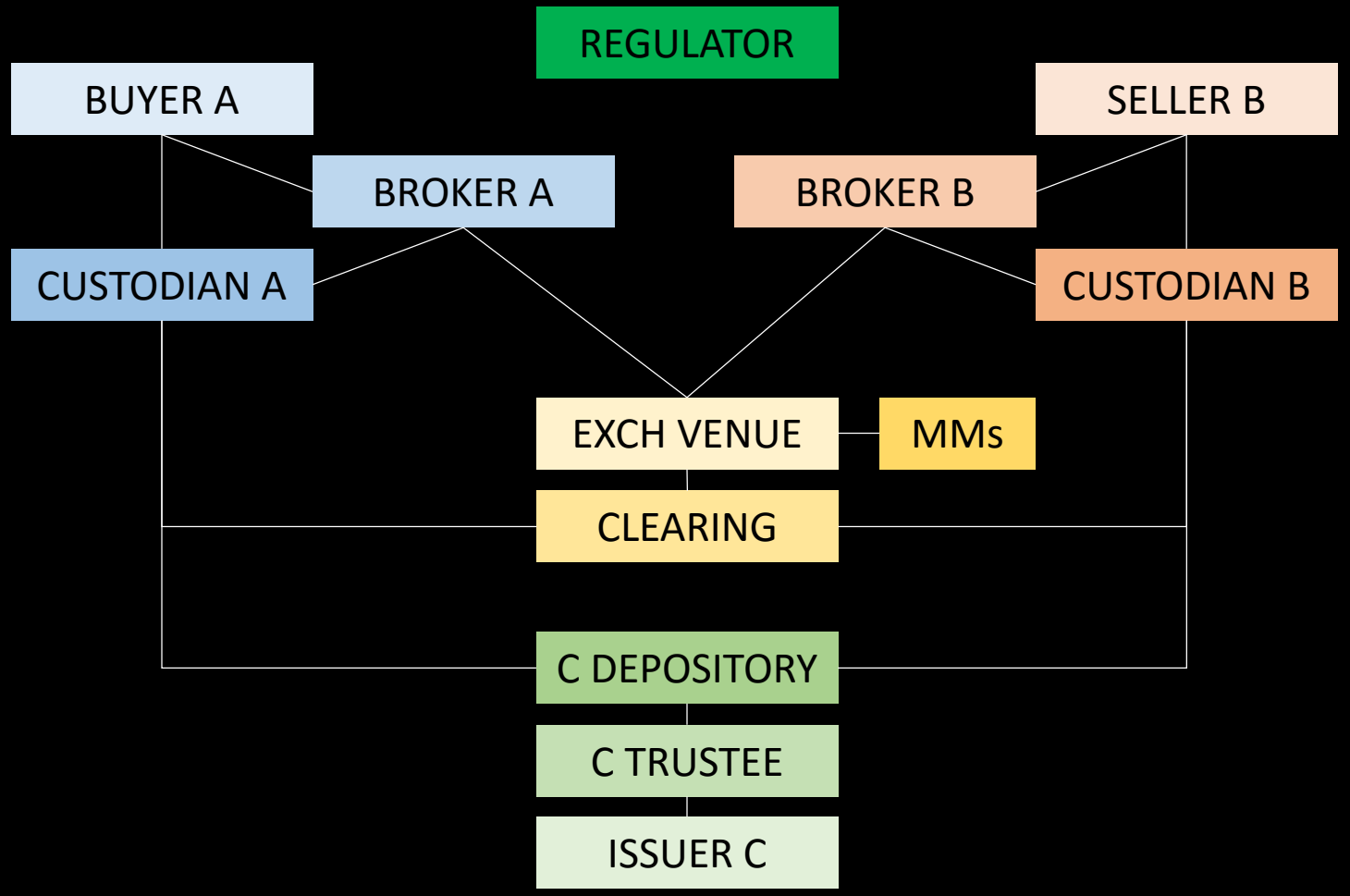
3. Use Cases



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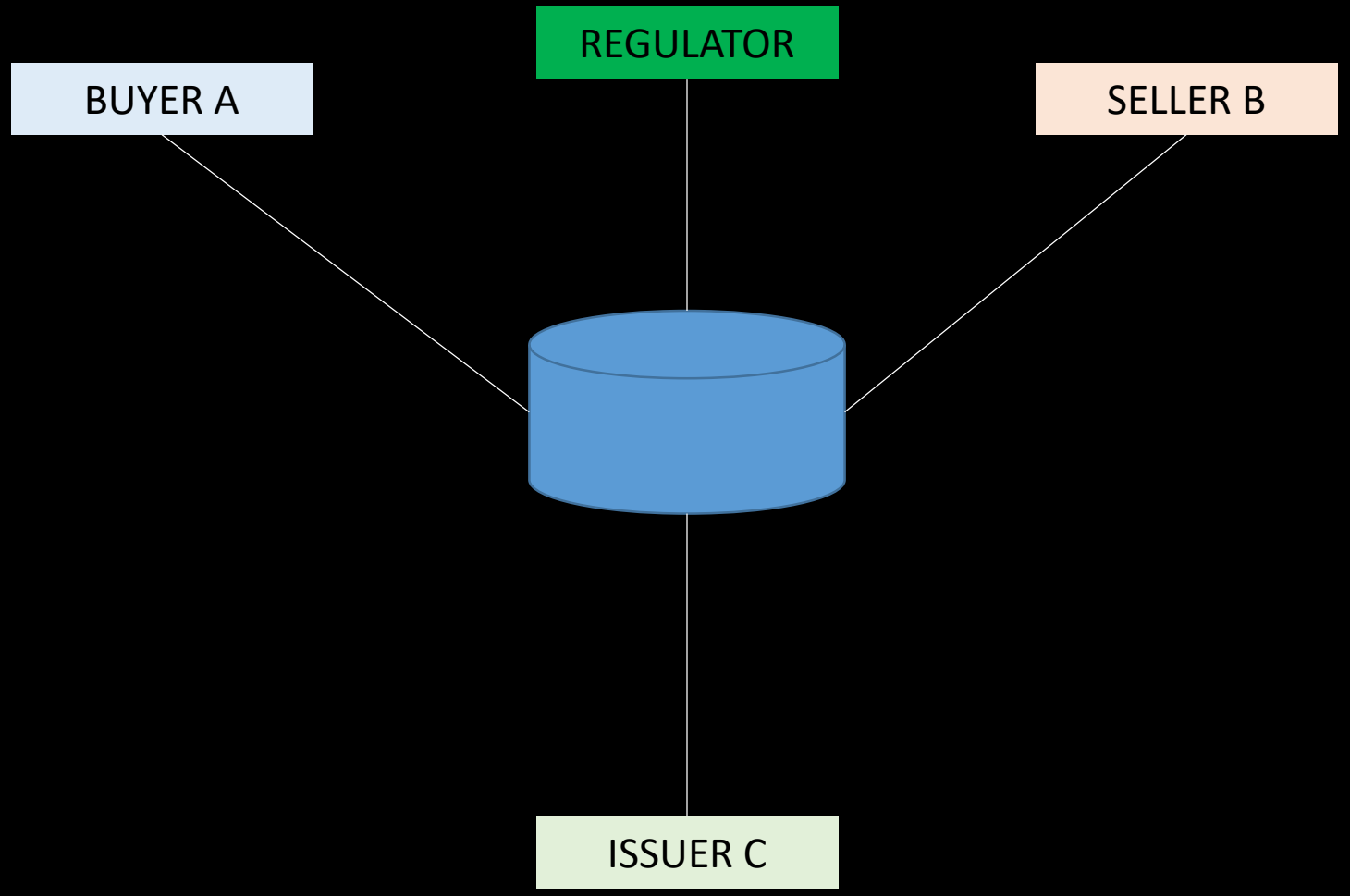
3. Use Cases

- Good

eg DvP



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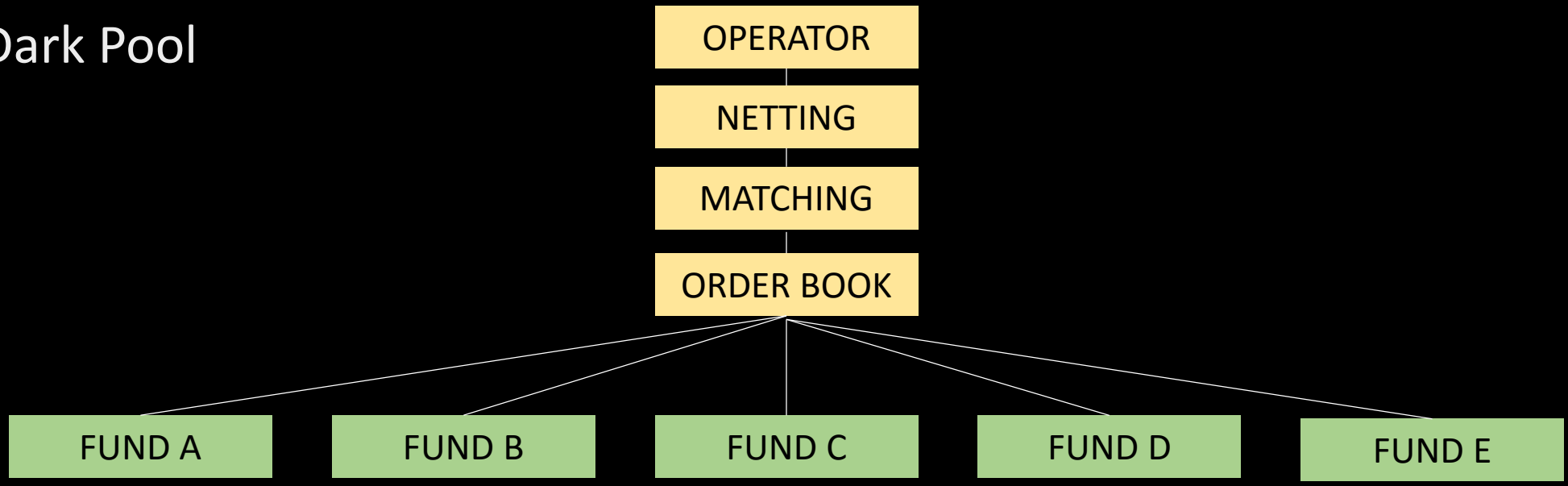
3. Use Cases

- Bad

eg Dark Pool



- In MOST cases, a properly authenticated and replicated traditional database will be a more appropriate solution

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4. Computational Limitations

- Mass replication of data for truly trustless operation
- Every node must verify every transaction, no matter how small
- Latency between transaction broadcast and consensus acceptance
- Proof of work expensive and computationally useless
- Proof of stake untested
- Costs can be reduced by increasing trust amongst participants
- Compliance functions can be achieved through smart contracts

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5. Regulation & Governance

- Bitcoin IS regulated: by strict rules adopted by user consensus
- Tendency to centralisation: both validating miners and developers
- KYC & AML can be satisfied with new e-government tools
- Privacy can be augmented with zero-knowledge proofs
- Will capital relief be available for the risks DLTs can reduce?

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Summary

- DLT's facilitate the creation of an agreed shared database to establish an agreed truth state amongst trustless strangers
- Still very nascent technology and will take time to mature and gain adoption, probably in niche areas
- Interoperability levels will determine success
- Costs and benefits over existing technologies remain an open question
- DLT's are less useful for centralised applications where a traditional database will be more appropriate in most cases

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Thank You!

Questions?