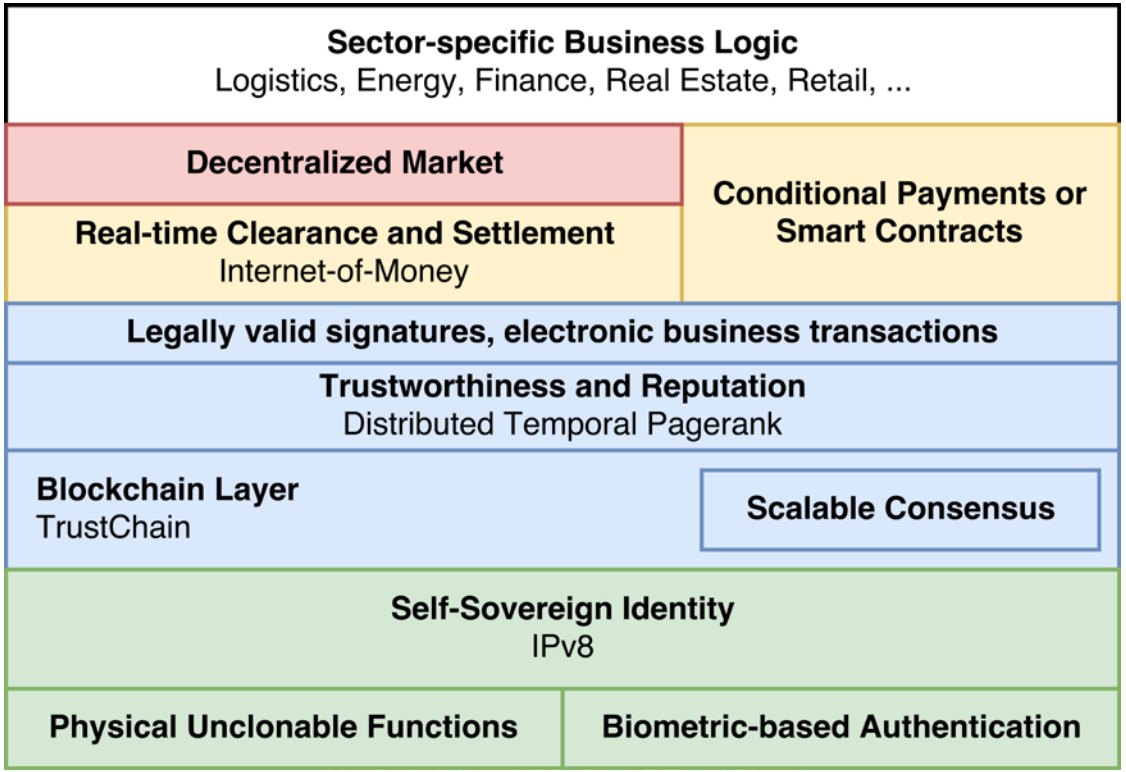
TrustChain

A scalable blockchain fabric to build trust

Martijn de Vos
Distributed Systems

TU Delft

Delft Technology Portfolio



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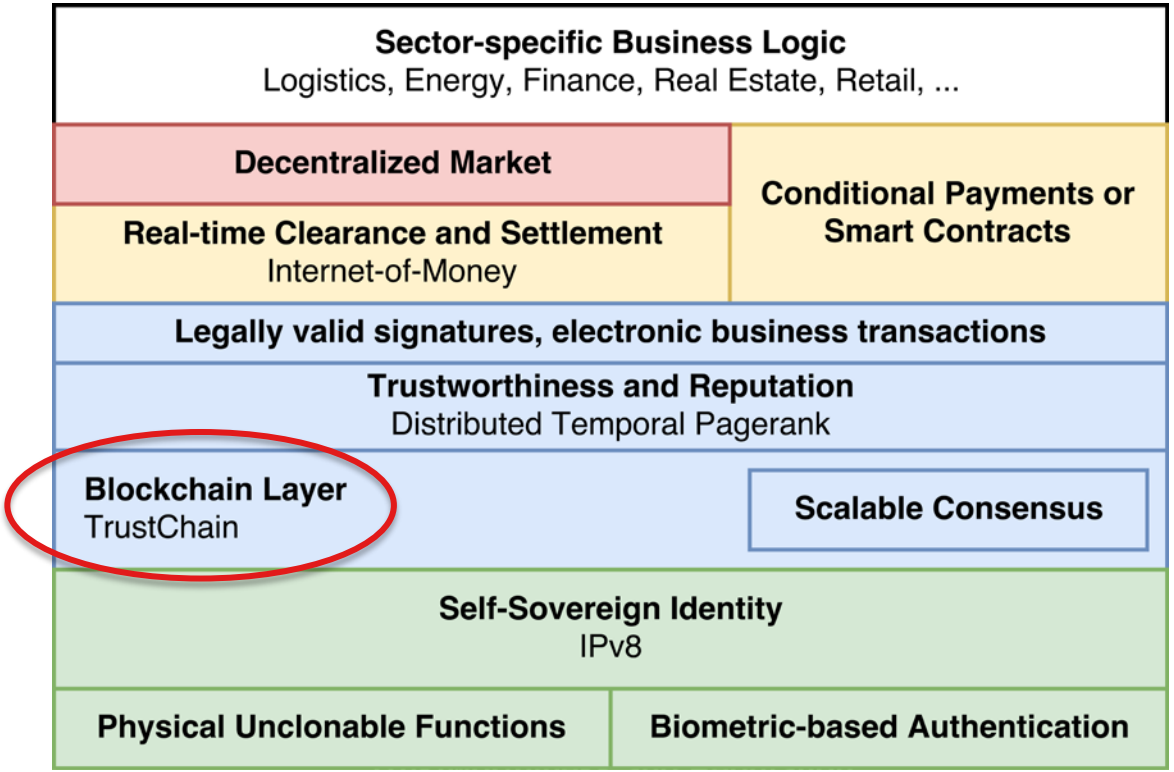
Pouwelse, Johan, et al. "Laws for Creating Trust in the Blockchain Age." *European Property Law Journal* 6.3 (2017): 321-356.

Delft Technology Portfolio



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Open problems of existing Blockchain solutions

- Scalability (often constant tx/s)
  - Bitcoin Core: ~7 tx/s
  - Ongoing efforts to increase scalability (Lightning network, sharding, off-chain)
- Storage requirements
  - Bitcoin: 149GB as of December 2017

Global Consensus

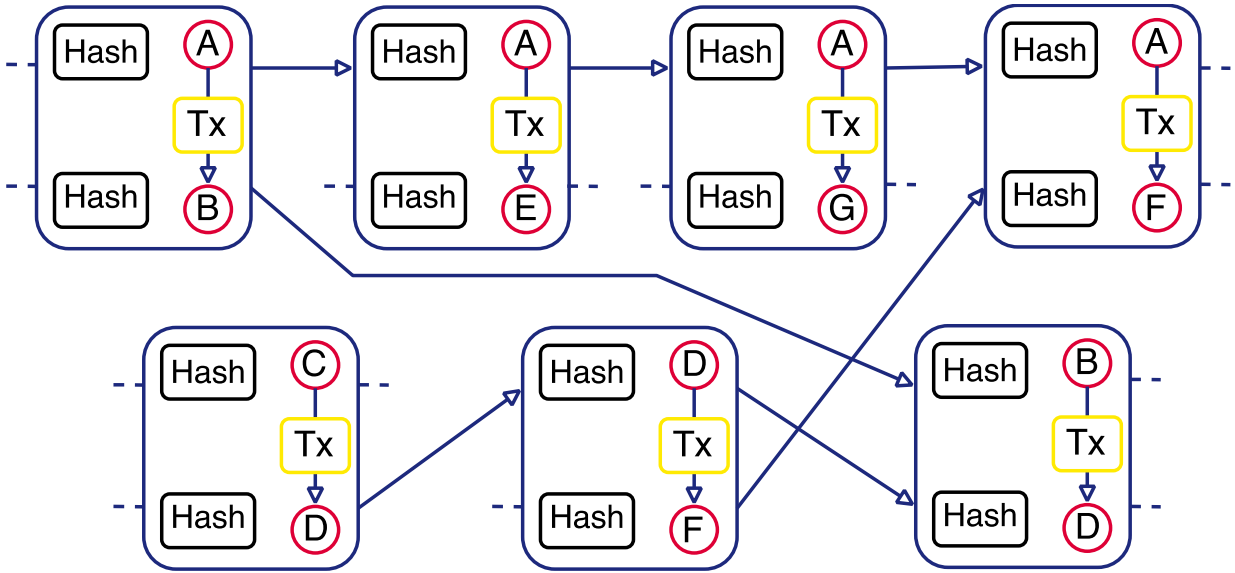
- Scalability is often limited by requirement for global consensus.
  - Proof-of-work, BFT
- Is global consensus necessary?
  - It is desired if you need scarcity
- What if we can guarantee eventual detection of fraud?
  - Like credit card companies

Transaction Ledgers

- Observation: many blockchain systems are transaction fabrics.
  - Money transfers (Bitcoin, Litecoin)
  - Contract invocations (Ethereum)
  - Attestations (Our ongoing research)

TrustChain

- A scalable blockchain fabric to build trust



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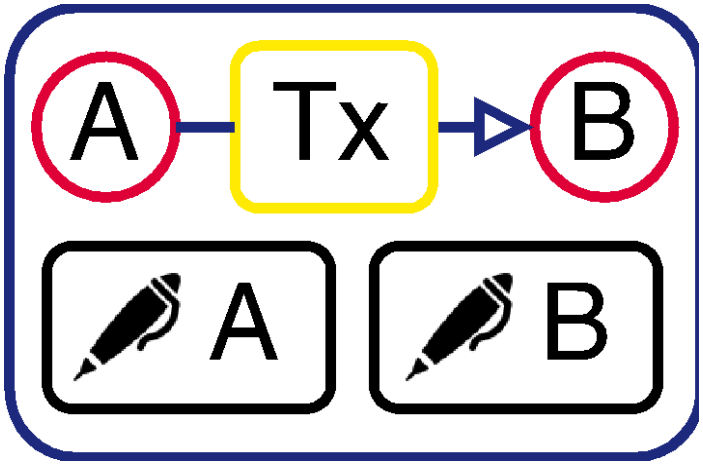
Otte, Pim, Martijn de Vos, and Johan Pouwelse. "TrustChain: A Sybil-resistant scalable blockchain." *Future Generation Computer Systems* (2017).

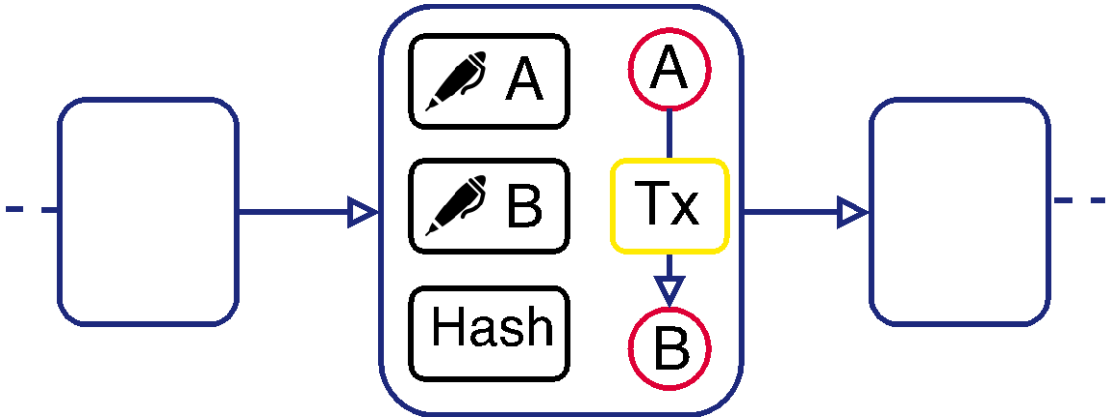
Transaction

- Consider a transaction between two users
- Both users sign the transaction
  - Using any secure signing algorithm



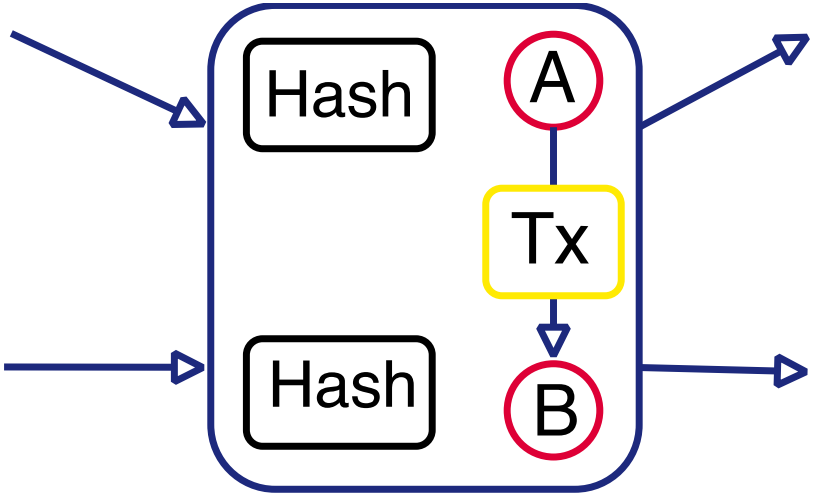
Transaction Chaining

- We can chain these transactions together
- Each users keeps track of his own transaction history

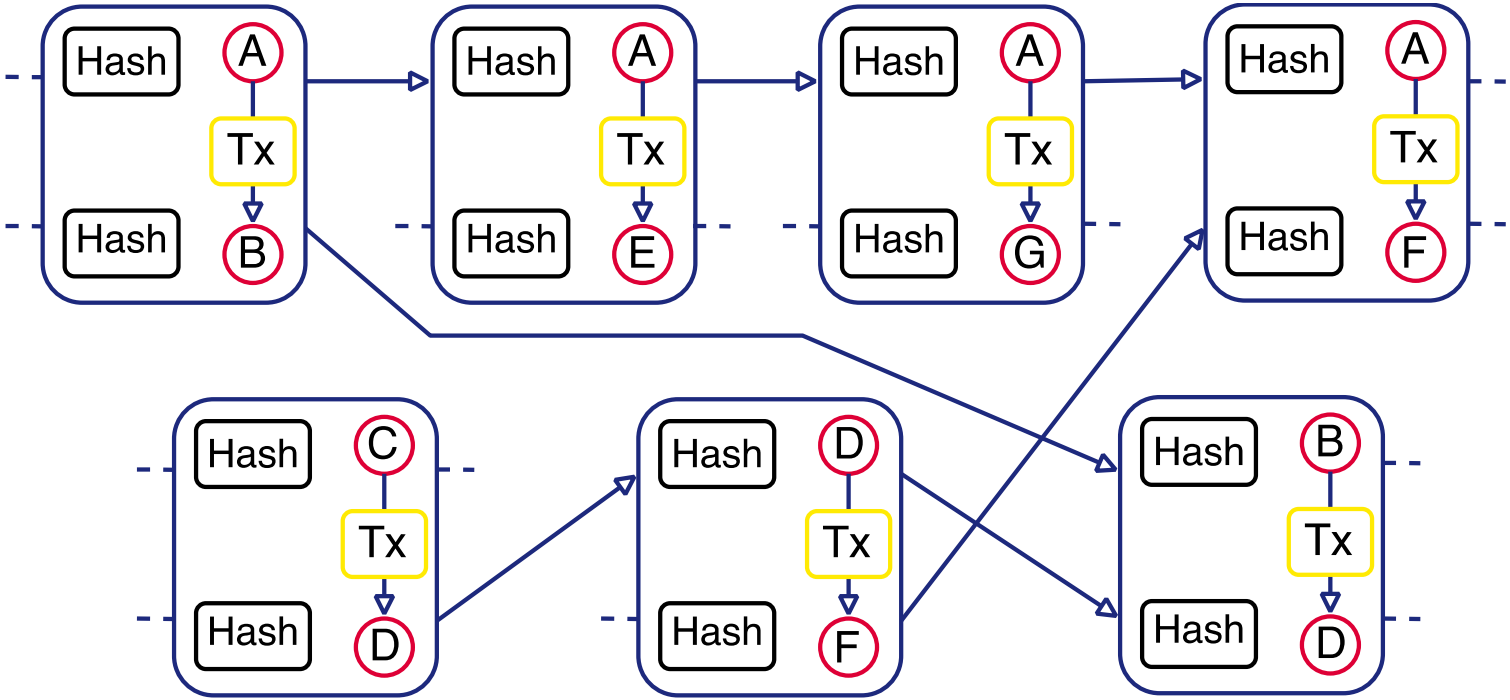


Improving Security

- We add an additional pointer to each block
  - Points towards the previous block in the chain of the transaction counterparty



Entangled Chains



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Properties of TrustChain

- Entanglement
  - Makes our chain tamperproof
- Eventual detection of a double-spend
  - By gossiping blocks through the network

Advantages

- Higher transaction throughput
  - No (hard) requirement for global consensus
  - However, global consensus improves security
- Less storage required
  - At a minimum, every participant only needs to store their transactions

Research Goals

- Determine how TrustChain can help to accurately store transactions.
  - Bandwidth accounting
  - Attestations
  - Generic asset trading
- **Build trust between interacting strangers.**

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