

Introduction to Blockchain

Distributed Ledger Technology based on Cryptography

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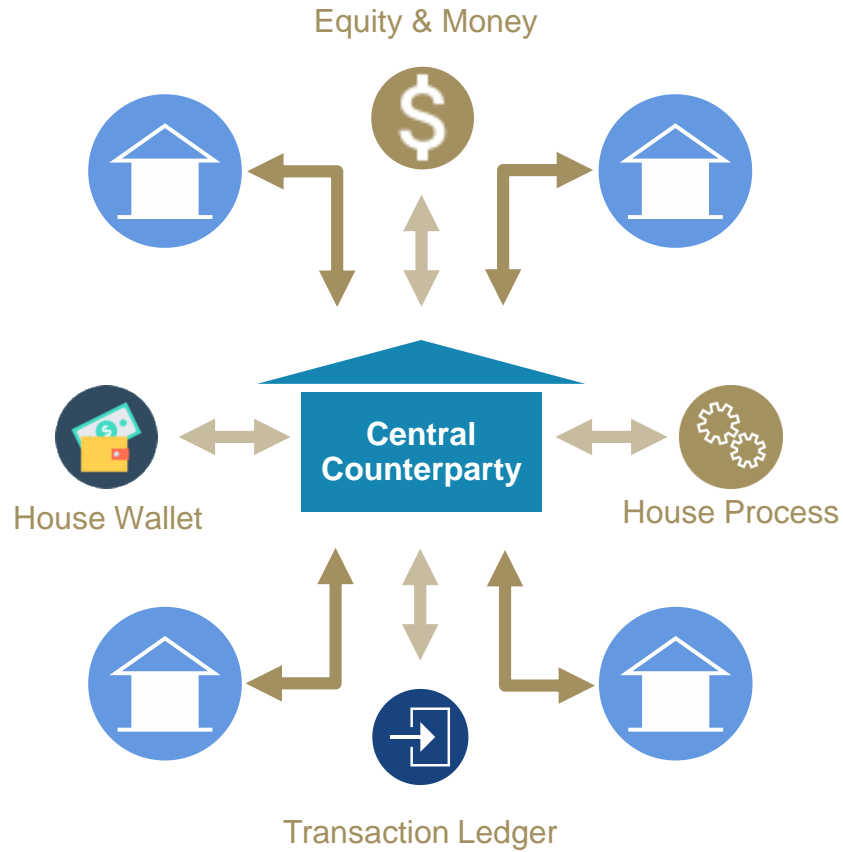
Boris Spremo is the Operations Director of Emerging Business & Architecture, and one of the blockchain leads at BNY Mellon. He is responsible for blockchain research, and for development of related business models, products and services.

Previously, Boris was an independent fintech consultant specialising in payments and integration, and prior to that, a consulting services team lead. He has helped establish national clearing and settlement networks in CEE region, and has led development of several state-of-the-art payments gateways for major global financial services organisations like Worldpay, Barclays, and more. In addition to his technology work, Boris has started several ventures, and has taught payments technology around Europe, and farther.

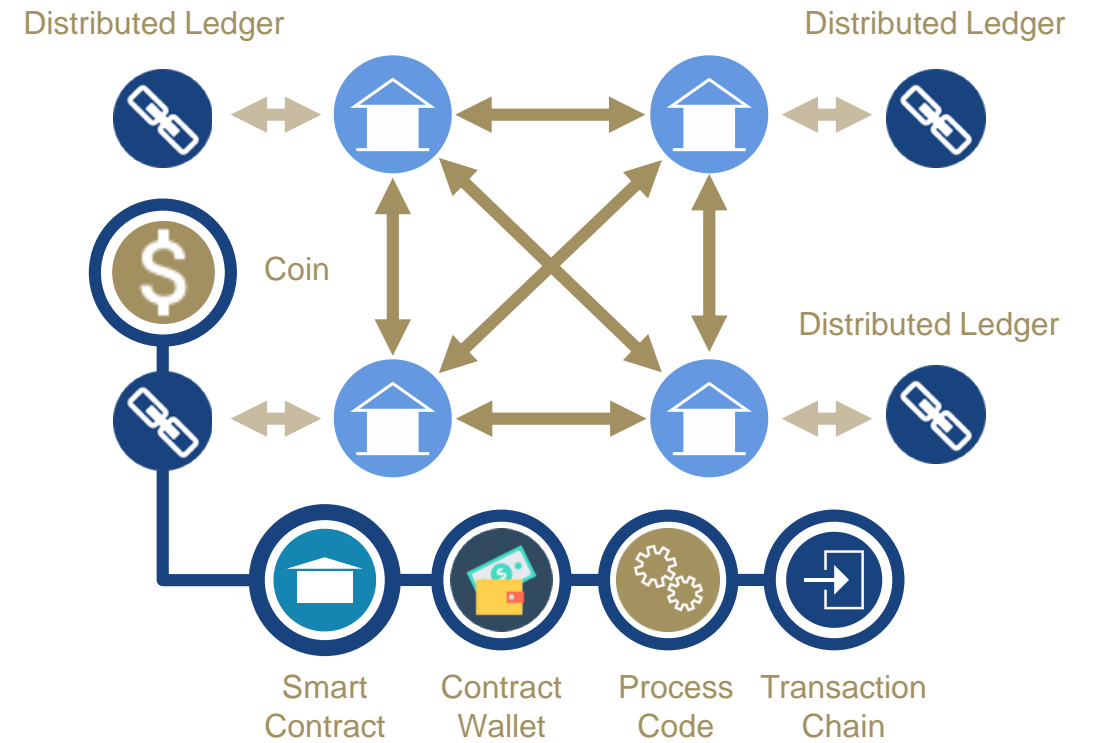
Boris has an MS in Electrical Engineering & ICT from University of Zagreb, an MBA from Cotrugli Business School, and fintech education from Massachusetts Institute of Technology.

Blockchain is a distributed ledger technology based on cryptography

A distributed ledger is an automated network that records ownership through a shared registry



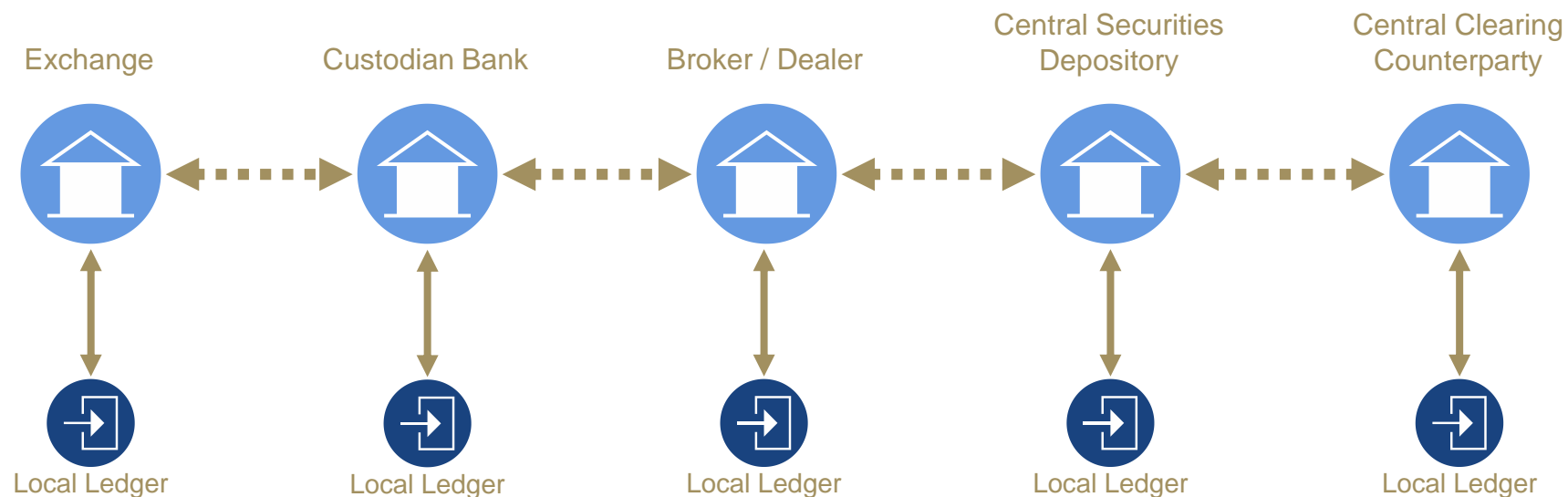
natural language agreements performed by a human



coded agreements performed by all machines

Current State

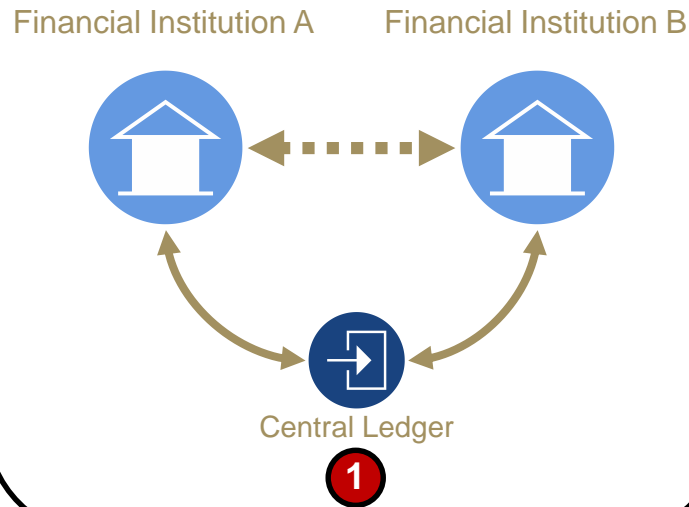
Each financial institution has its own ledger:



Reconciliation and other processes that involve multiple ledgers lead to long settlement times (e.g. T+3 for securities)

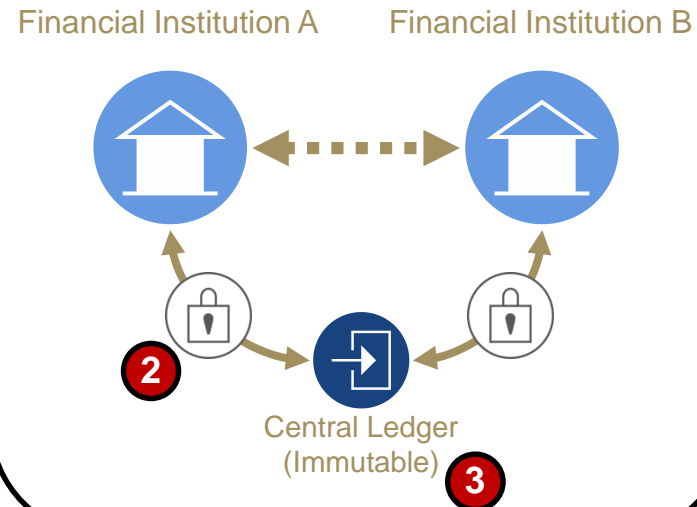
Improving the Current State

Step 1: "Golden Source"



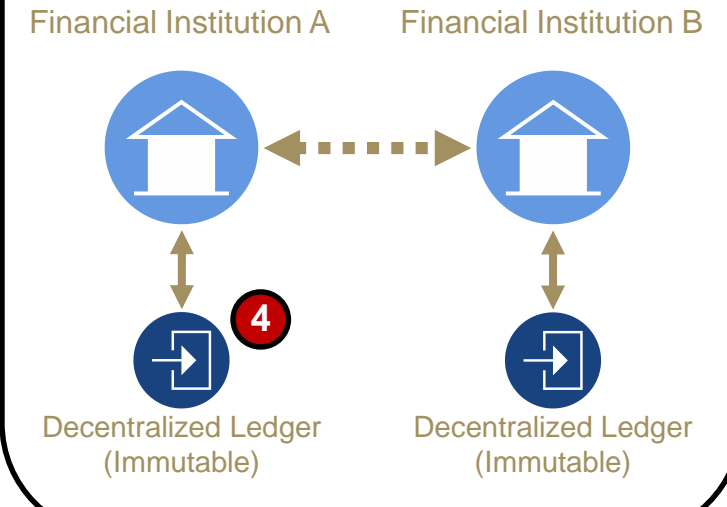
- Unify data across different sources and institutions

Step 2: Protect



- Make sure data can't be tampered with
- Provide privacy
- Identify parties in the transaction

Step 3: Decentralize



- Provide easy access to the data
- Ensure resiliency and availability

- Bounty of over \$100Bn

Private Vs. Public Blockchains



ethereum



HYPERLEDGER

Public Blockchain

- Permission-less
- Low throughput
- Resource intensive
- Trustless

Private Blockchain

- Permissioned
- High throughput
- Easier to tailor
- Great for the stock price*

Source: Chanticleer Holdings – CNN, February 2018

Token Smart Contract

```
contract MyToken {
    /* This creates an array with all balances */
    mapping (address => uint256) public balanceOf;

    /* Initializes contract with initial supply tokens to the creator of the contract */
    function MyToken(uint256 initialSupply) {
        balanceOf[msg.sender] = initialSupply;          // Give the creator all initial tokens
    }

    /* Send coins */
    function transfer(address _to, uint256 _value) {
        if (balanceOf[msg.sender] < _value) throw;      // Check if the sender has enough
        if (balanceOf[_to] + _value < balanceOf[_to]) throw; // Check for overflows
        balanceOf[msg.sender] -= _value;                // Subtract from the sender
        balanceOf[_to] += _value;                        // Add the same to the recipient
    }
}
```

Blockchain's Key Value Drivers for Market Participants

Potential to drive simplicity and efficiency through new financial services infrastructure and processes

Operational simplification

Blockchain reduces / eliminates manual efforts required to perform reconciliation and resolve disputes

Regulatory efficiency improvement

Blockchain enables real-time monitoring of financial activity between regulators and regulated entities

Counterparty risk reduction

Blockchain challenges the need to trust counterparties to fulfil obligations as agreements are codified and executed in a shared, immutable environment

Clearing and settlement time reduction

Blockchain disintermediates third parties that support transaction verification / validation and accelerates settlement

Liquidity and capital improvement

Blockchain reduces locked-in capital and provides transparency into sourcing liquidity for assets

Fraud minimization

Blockchain enables asset provenance and full transaction history to be established within a single source of truth

Resiliency improvement

Blockchain improves systemic resiliency whilst reducing individual's barriers to entry.

Long tail innovation

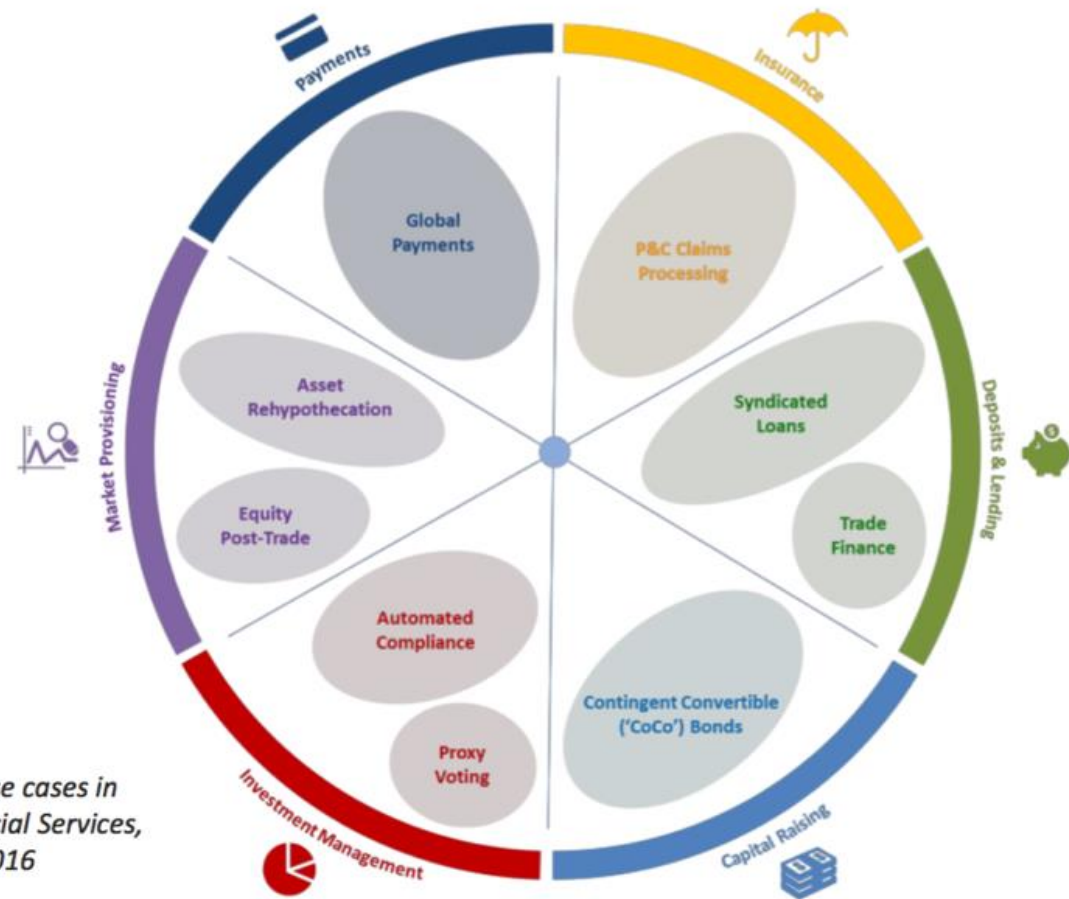
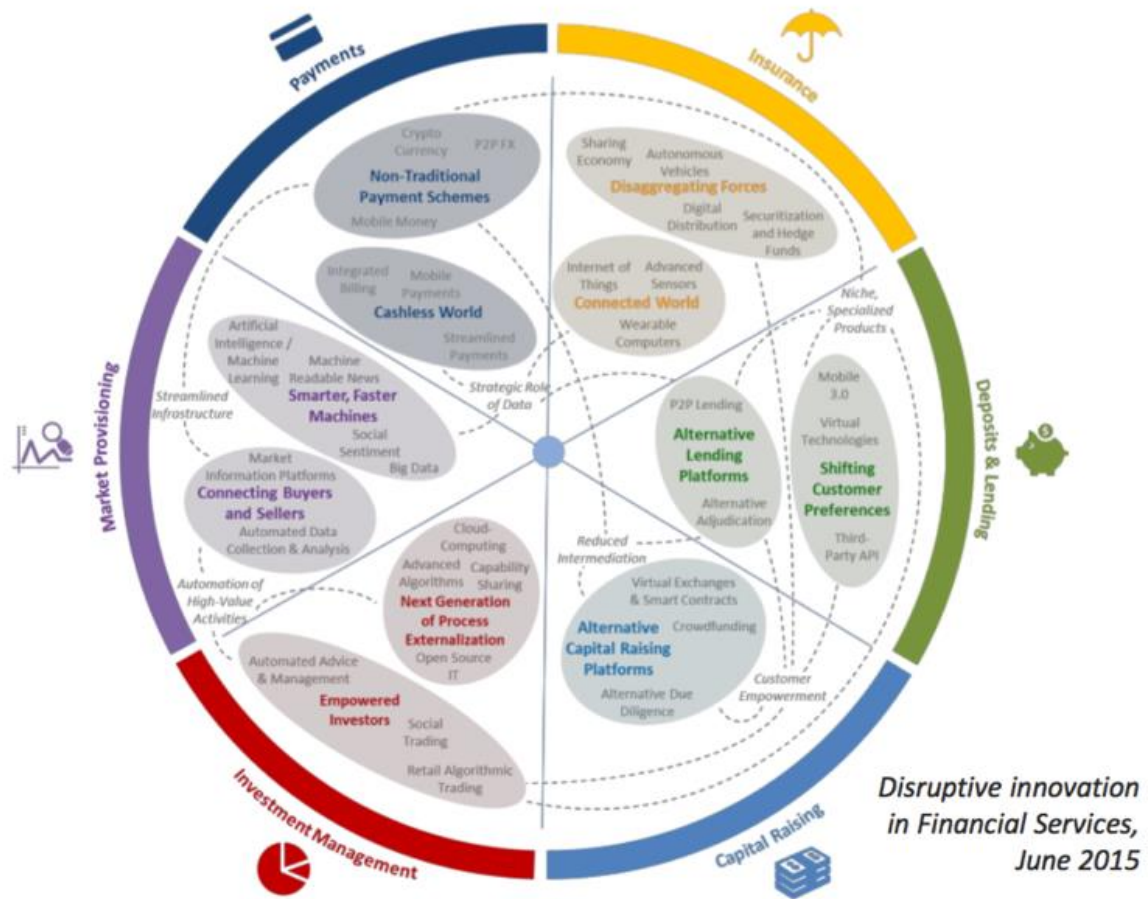
Blockchain enables innovation in the long tail of trust based services.

Supply chain automation

It opens up financial services supply chain for future automated applications.

Use Cases

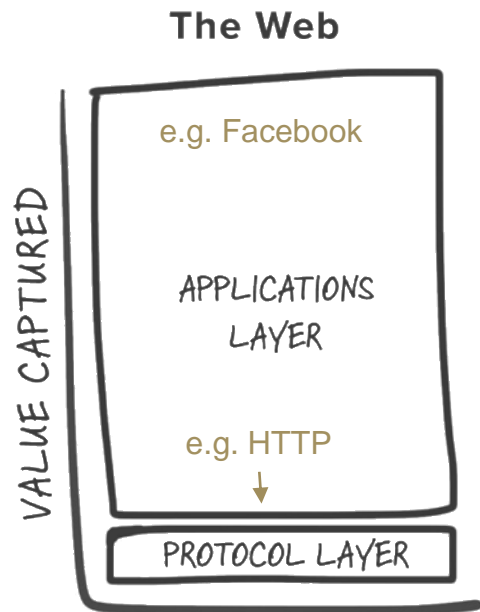
A few examples: Asset Hypothecation, Repo, and Collateral Management, Equity Post Trade, Global Payments, Syndicated Loans, Trade Finance, Proxy Voting



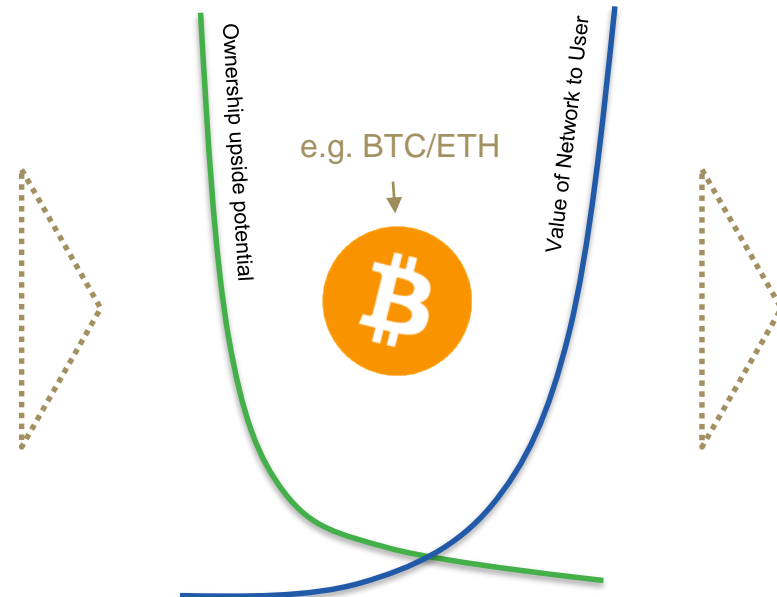
Source: WEF - The Future of Financial Infrastructure, August 2016

Decentralized business models

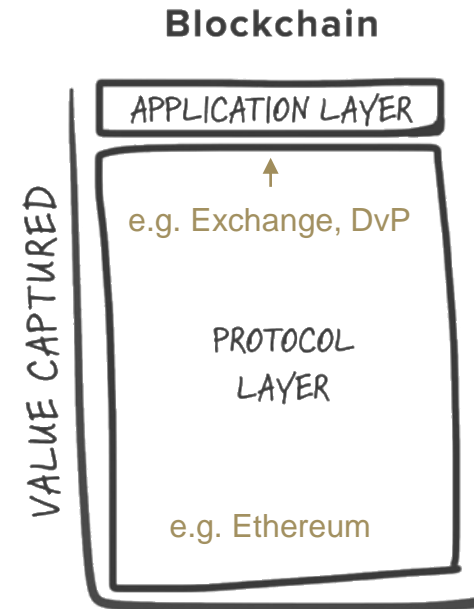
Coins incentivize value transfer from application to protocol and create new investment asset class



Value concentrates at the application layer and only a fraction is redistributed along the shared protocol layer



Coins monetize historically low-incentive creation of new protocols for network-effect businesses



Coins incentivize value transfer from application to protocol and spawn new service-free investment assets

Sources:

Joel Monegro - *Fat Protocols*, USV, August 2016

Fred Ersham - *Blockchain Tokens and the dawn of the Decentralised Business Model*, Coinbase, August 2016

William Mougayar - *How Blockchain Startups are revolutionising Venture Capital*, Coindesk, October 2016

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