



**BLOCKCHAIN**  
TRAINING ALLIANCE



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# BLOCKCHAIN *Use Cases*

[www.blockchaintrainingalliance.com](http://www.blockchaintrainingalliance.com)

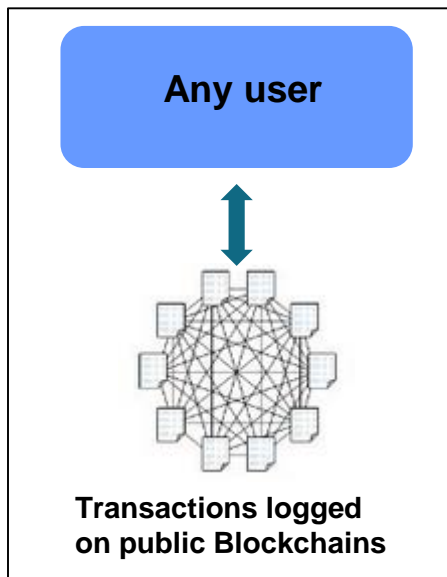


# Public and Private Blockchains

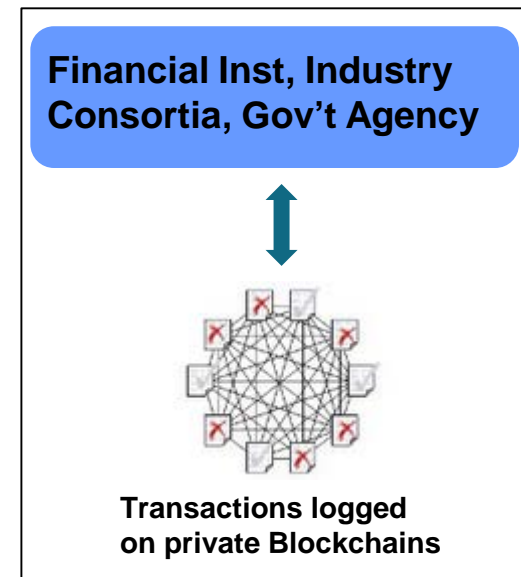


- **Public: open to anyone (“permissionless”)**
  - Identity unknown, individuals
    - Ex: Zcash zero-knowledge proofs
  - Open access
- **Private: approved users (“permissioned”)**
  - Identity known, enterprise
    - Approved credentials
  - Controlled access

**Examples:**  
**Bitcoin**  
**Ethereum**



**Examples:**  
**R3**  
**Hyperledger**



# Four Classes of Applications



## Finance

Trade and settle securities at a fraction of the time and cost.

**Money, Payments,  
Financial Clearing**



## Property

Permanently record and access real-time property rights.

**Smart Property  
Cryptographic  
Asset Registries**



## Contracts

Self-enforcing contracts based on predefined conditions.

**Smart Contracts  
IP Registration**



## Identity

Eliminate invasive identity practices via digital identities.

**Identity  
Confirmation**

# Store Documents on the Blockchain



- ① **Store Auto Title, Home deed on the blockchain**
  - ① **Storj (always-on, do not have login to Dropbox, Google Drive)**
- ① **Proof of Existence your Will**
  - ① **Proof of Existence**

## Submissions

Documents registered for certification

Document Digest	Timestamp
0d5851955572c890f2b60eac1e61cd69dc2583f3cd0a2cc57e8fd0245fc3cc46	2017-12-21 01:29:02
26d3c76d8e736cc02a7ccd5350f9b4e4d04cc2e461f59bb221bddb7b4faa7588	2017-12-20 22:48:22

## Certifications

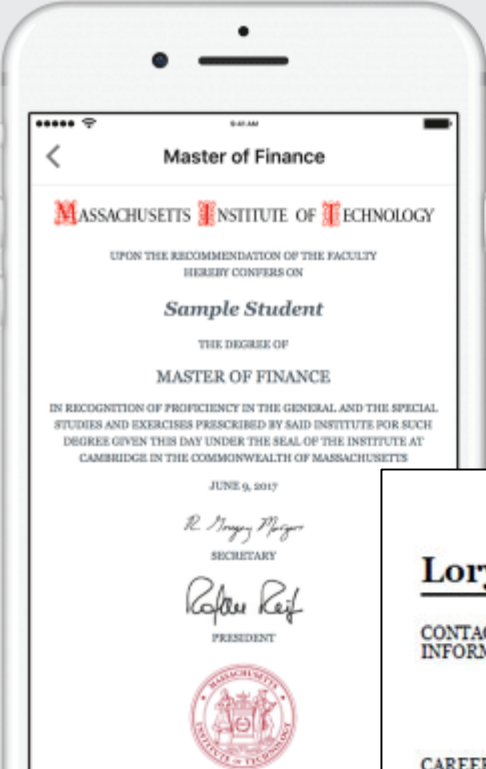
Documents confirmed in the blockchain

Document Digest	Timestamp
de38982cebfd60bc341ec4fbcbeb16cd5ed583338083643fe15949d76eed63de	2017-12-14 08:50:45
162e90df051c9d791886cdc98f976187ab495f66d2915af27ba3a6d86773a8ea	2017-12-11 15:57:11

# Background Checks



## MIT Digital Certificates (diplomas); Criminal Records



The smartphone screen shows a digital MIT diploma. At the top, it says 'Master of Finance'. Below that is the MIT logo and the text 'MASSACHUSETTS INSTITUTE OF TECHNOLOGY'. The diploma is dated 'JUNE 9, 2017' and is signed by 'R. Murray Meyer, SECRETARY' and 'Rafael Reif, PRESIDENT'. The diploma is for 'Sample Student' and is a 'MASTER OF FINANCE'.


**Step 1 of 5**  
Computing local hash [DONE]

**Step 2 of 5**  
Fetching remote hash [DONE]

**Step 3 of 5**  
Comparing local and remote hashes [DONE]

**Step 4 of 5**  
Checking Merkle root [DONE]

**Step 5 of 5**  
Checking receipt [DONE]



**Loryann M. Hoofnagle**

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**CAREER OVERVIEW**    I have 10 years of experience in web design with a range of clients including small private companies, medium-sized e-commerce shops, and large online magazines. My main focus is on design, usability and SEO optimization.



# Birth Registry



The Illinois  
BLOCKCHAIN  
Initiative

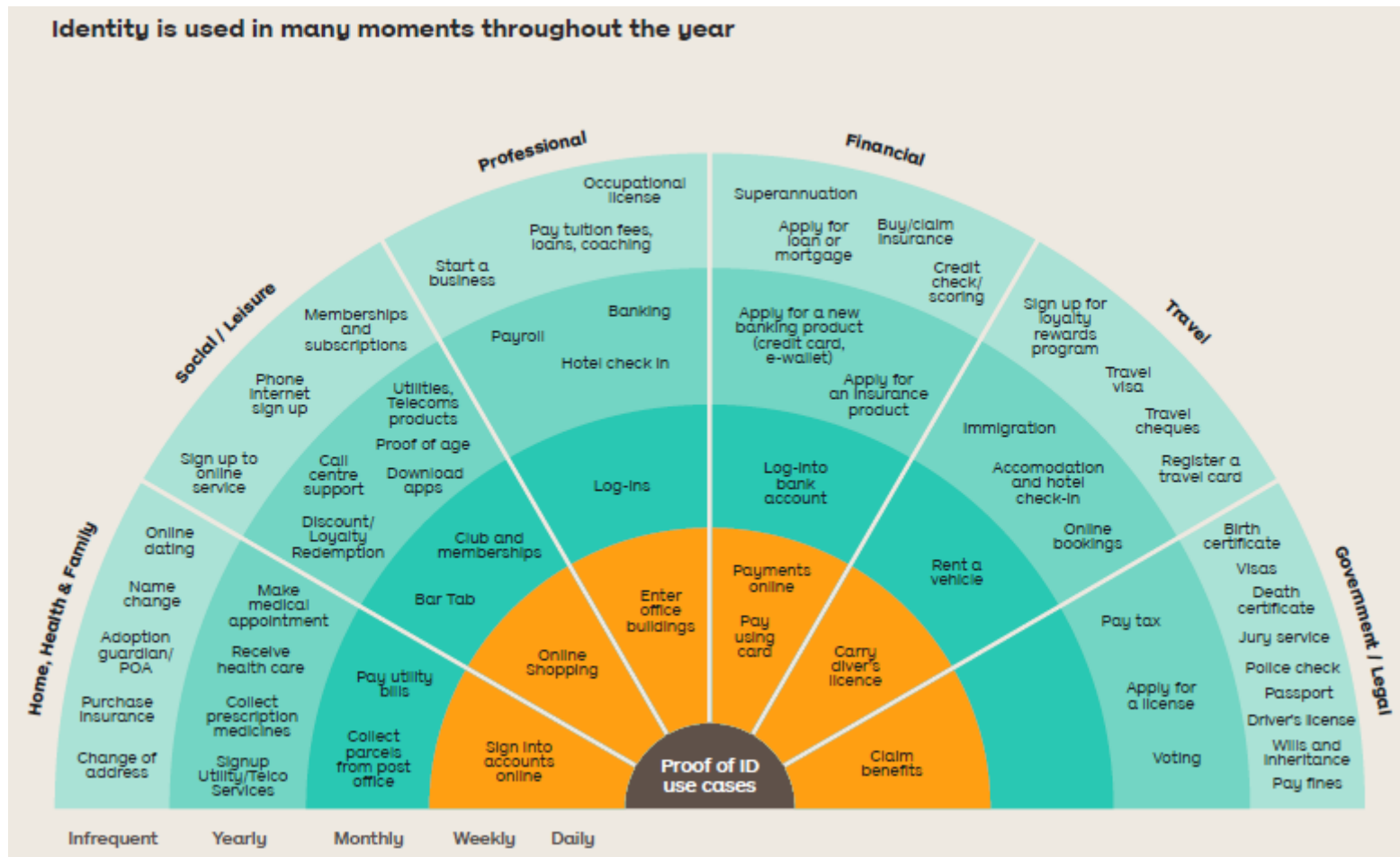
e:ernym

**CERTIFICATION OF VITAL RECORD**

**State of Illinois**  
CERTIFICATE OF BIRTH

▶ ETHNews

# Digital Identity Credentials

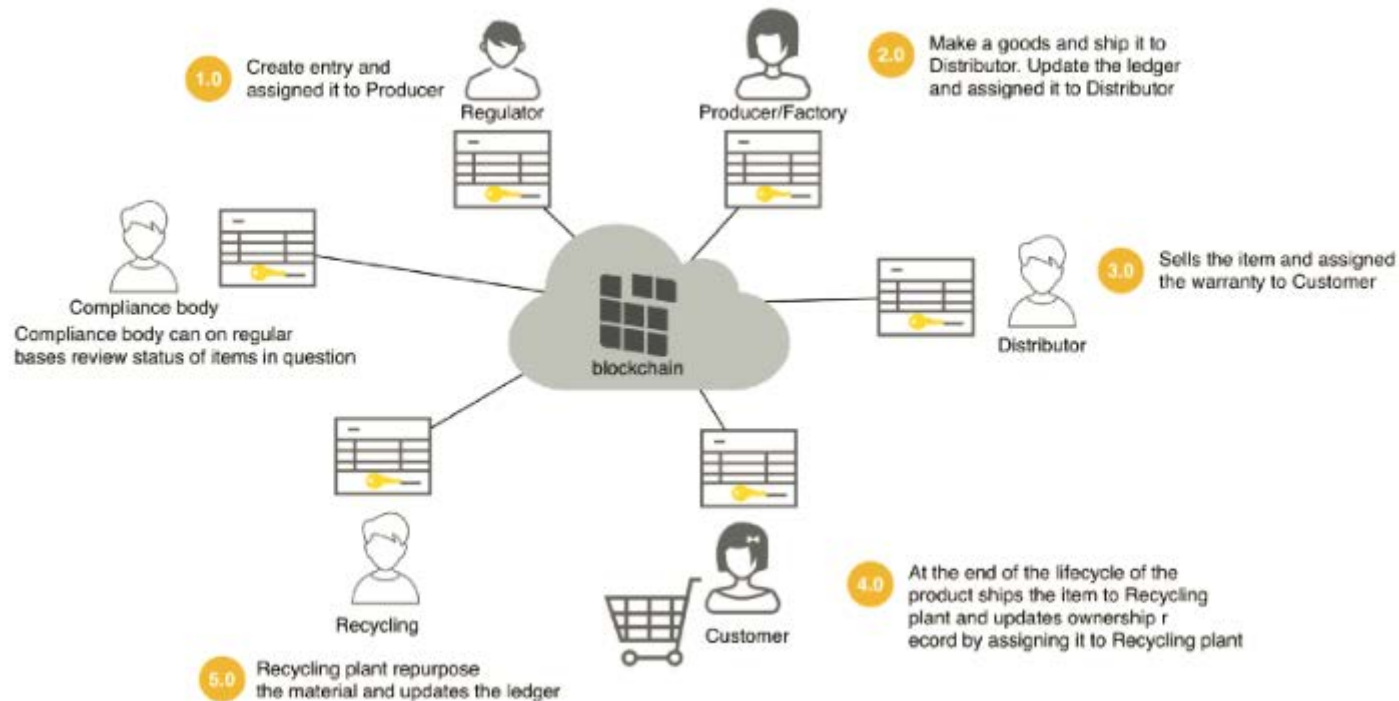




# Supply Chain Asset Tracking



- Controlled-use credentials issued to multiple parties in the value chain using single shared blockchain





## Automotive Industry Recalls and Counterfeit Airbags

**Business case: 30% global airbags sold and installed are counterfeit**

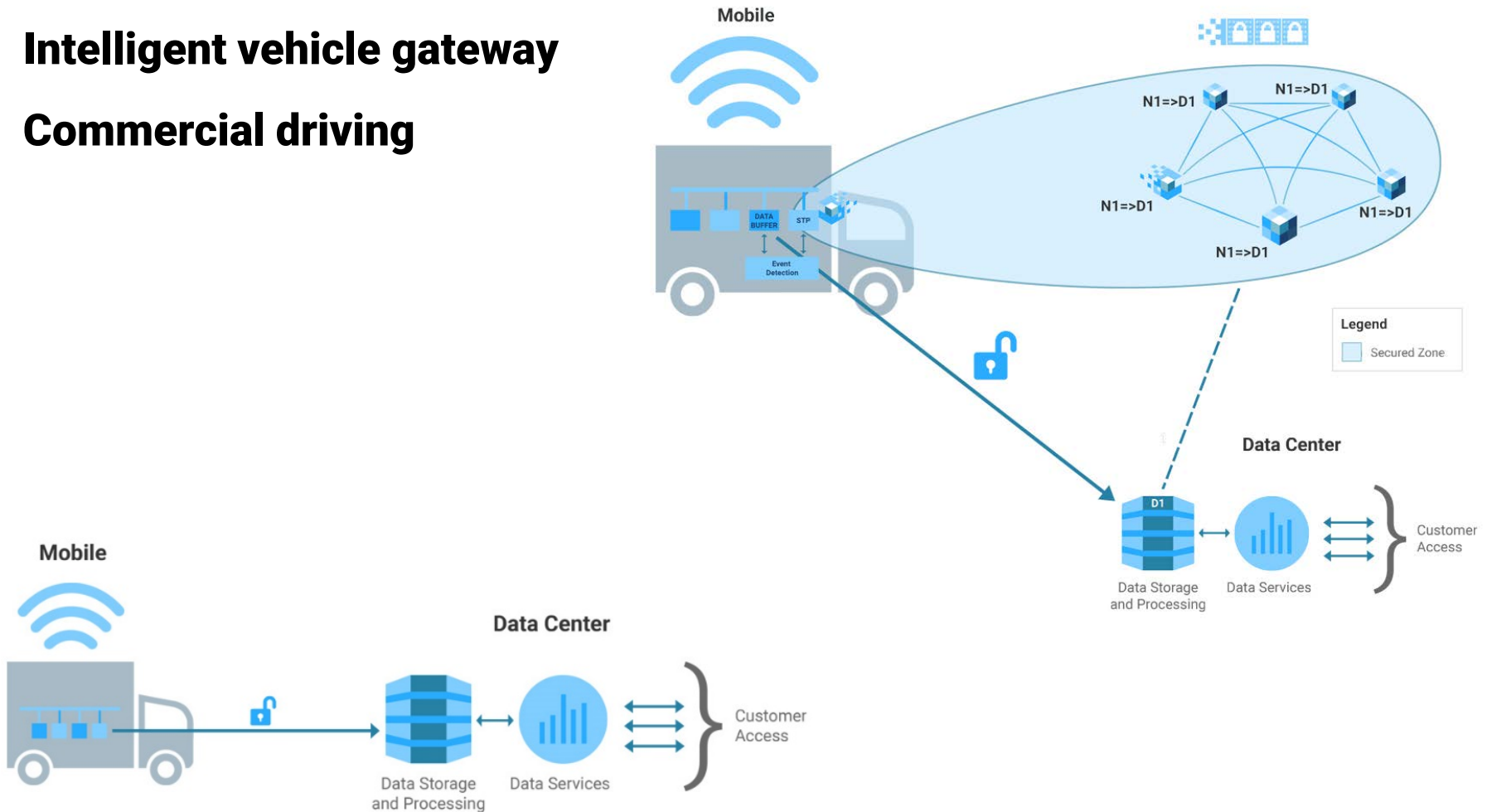
**Solution: Single shared process for airbag registration and lookup**



# Automotive Gateway



## Intelligent vehicle gateway Commercial driving

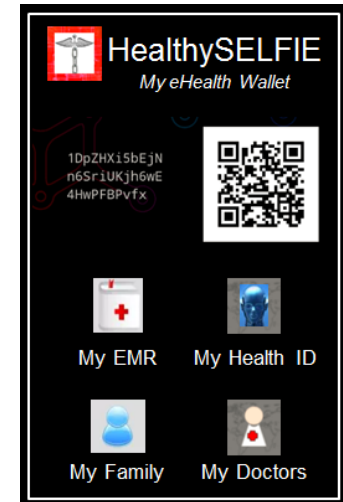




- **Consent**
  - **Smart Contracts in Managing E-Consent for Patient Privacy On and Off the Blockchain**
- **Clinical Trials**
  - **Patient “Life Ledger” Blockchain Platform for Clinical Trials**
- **Blockchain-based health data marketplaces**
  - **User-assembled, contributed, remunerated**
  - **Comprehensive data picture, data security and interoperability**
- **Regulation and Compliance**
  - HL7 and CMS Meaningful Use : Health Level Seven International
  - 21st Century Cures Act (2016)
  - Any US service provider to share on-request electronically with patient CMS: meaningful use Stage 2: Jan 2019



- **Electronic Medical Records (EMRs)**
  - **Digital health wallet**
    - Identity credentials + EMR + health insurance + payment information
- **Health insurance claims**
  - **Automated claims billing, validation, payment, and settlement**
  - **Multi-party value chain: patient, service provider, billing agent, insurance company, payor, government, collections**
- **Genomic research**
  - **Files too large (20-40 Gb) for centralized research repositories**
  - **Need secure validated access**



Digital health wallet

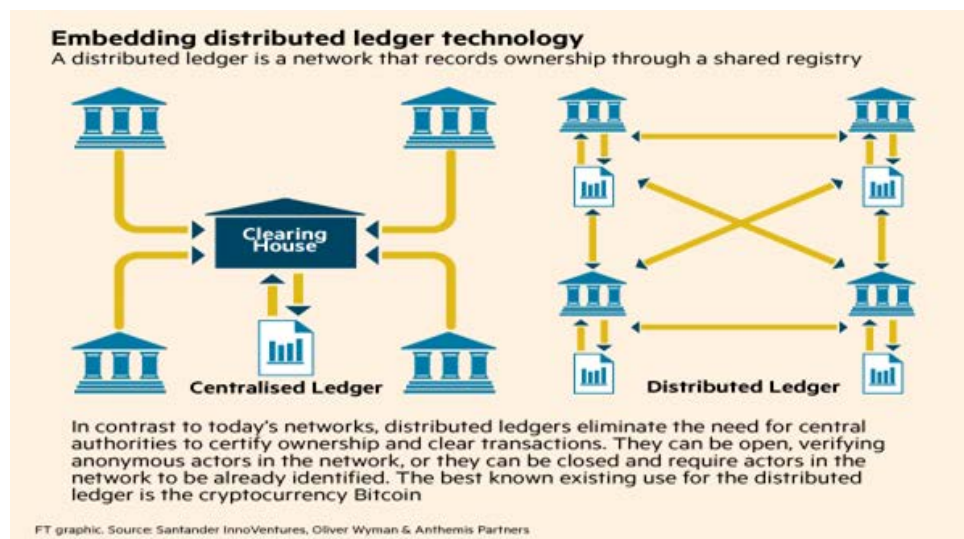




- ⦿ **R3 Corda**
- ⦿ **Ethereum Quorum**
- ⦿ **IBM Hyperledger Fabric**
- ⦿ **Ripple**
- ⦿ **Symbiont**



- **Clearing and Settlement**
- **Issuance, Ownership, and Transfer of Financial Instruments**
- **Servicing of Instruments**
- **Payments and Remittance**
- **KYC/AML Compliance**
- **Regulatory Reporting**
- **Audit and QA**
- **Back-office Reconciliation**

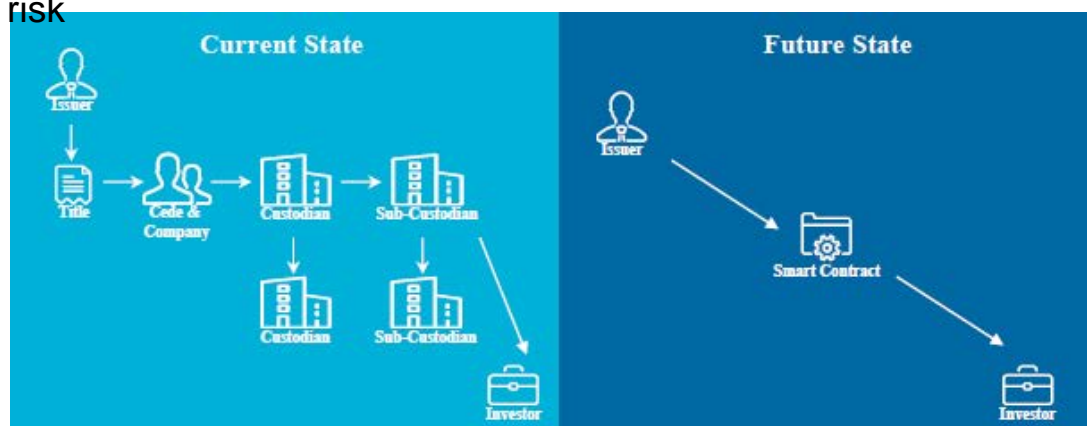


# Financial Services – Cap Table



## Smart Contracts for Securities

Simplification of capitalization table management for private companies can be enabled by smart contracts, while also reuniting record ownership with beneficial ownership of publicly traded securities, reducing cost, and counterparty risk



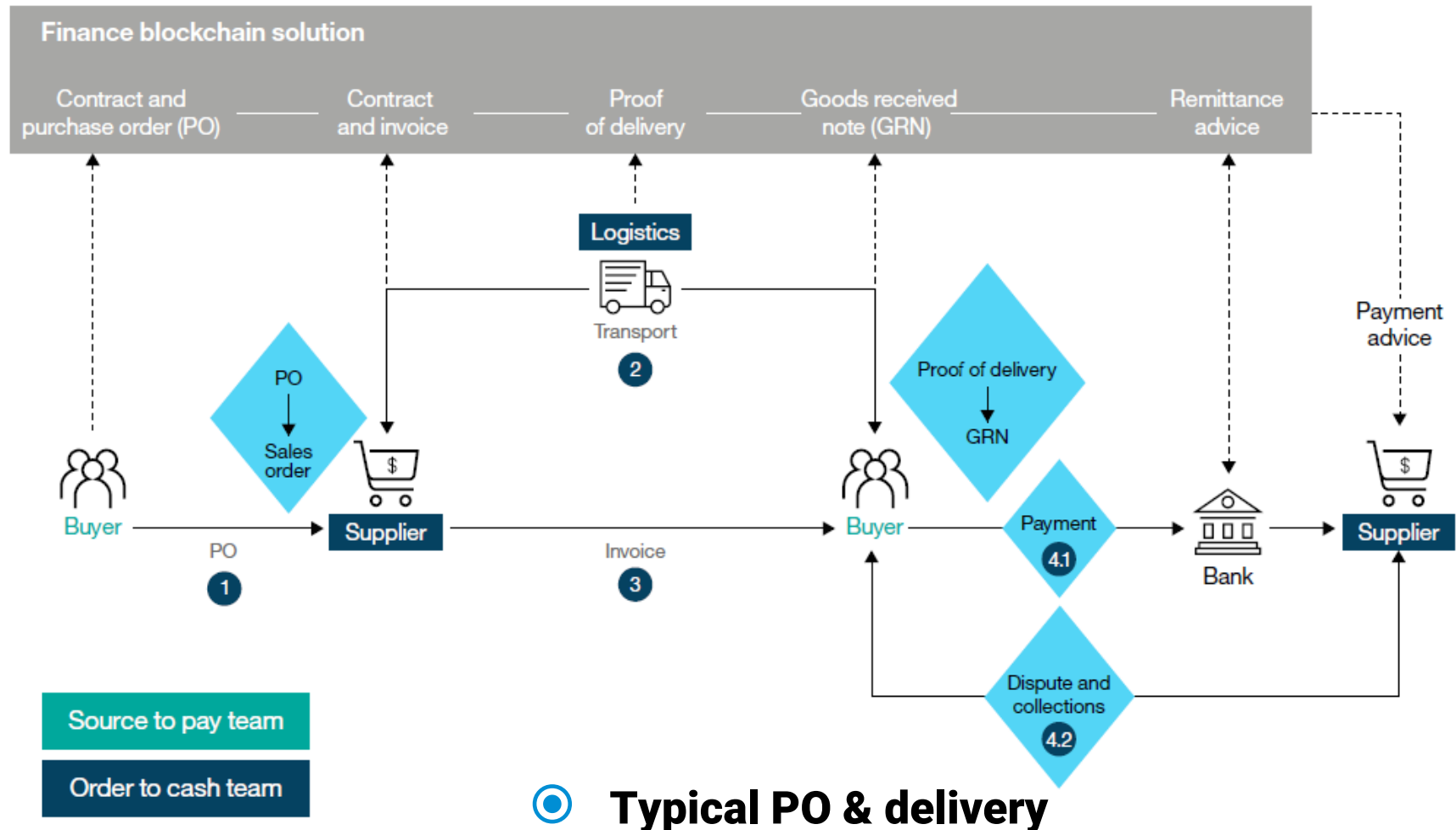
## Current Challenges

- Paper-based, manual corporate registration processes
- Companies that fail to keep their corporate registrations up-to-date require clean-up and certificate of good standing before issuing securities
- Intermediaries increase cost, counterparty risk and latency

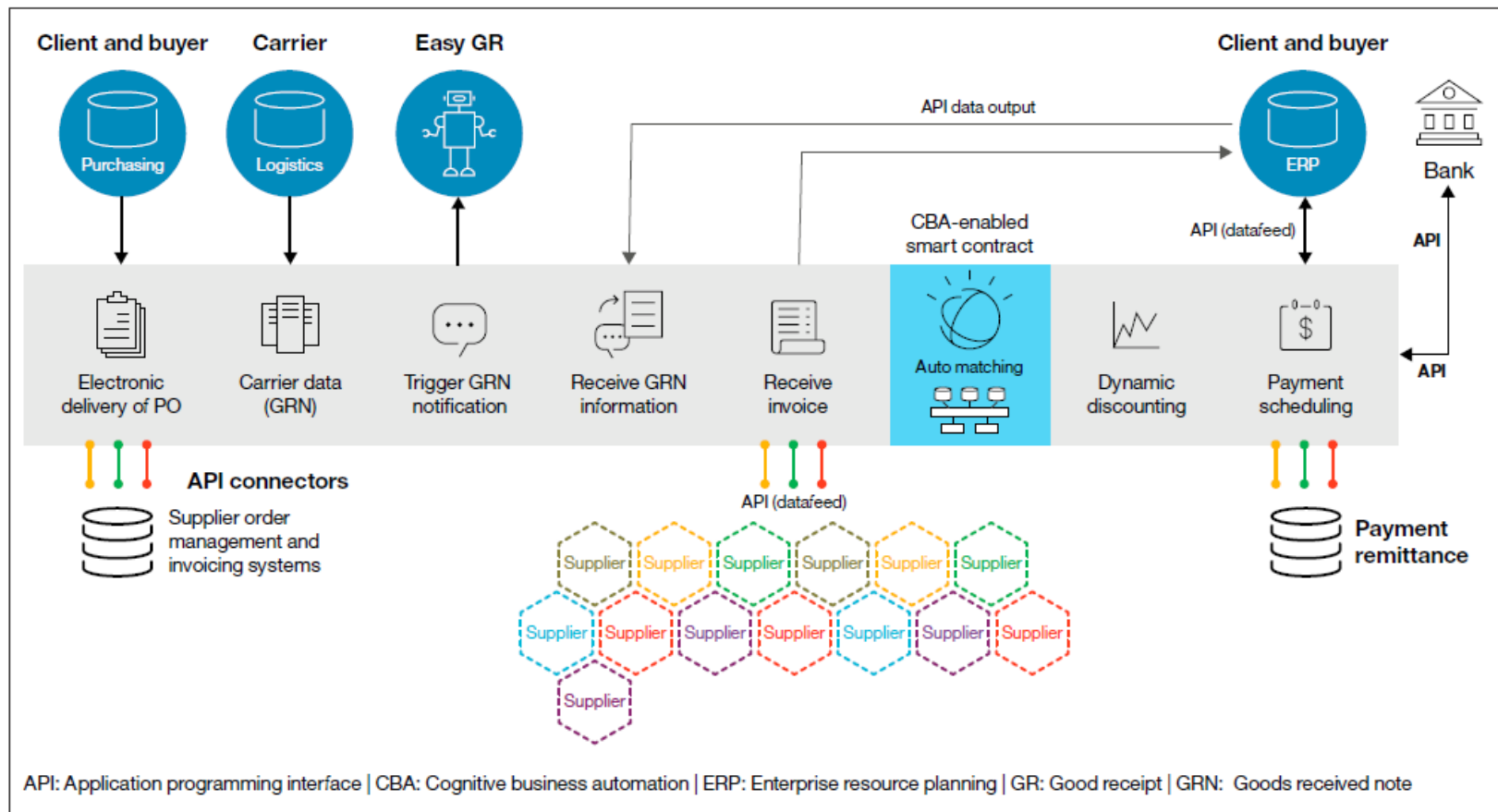
## Smart Contract Benefits

- Digitized end-to-end workflows due to securities existing on a distributed ledger
- Trade date plus zero days (T+0) securities settlement cycles
- Facilitates automatic payment of dividends and stock splits, while enabling more accurate proxy voting
- Removes counterparty and operational risks created by intermediaries

# Financial Services - PO



# Financial Services – A/P



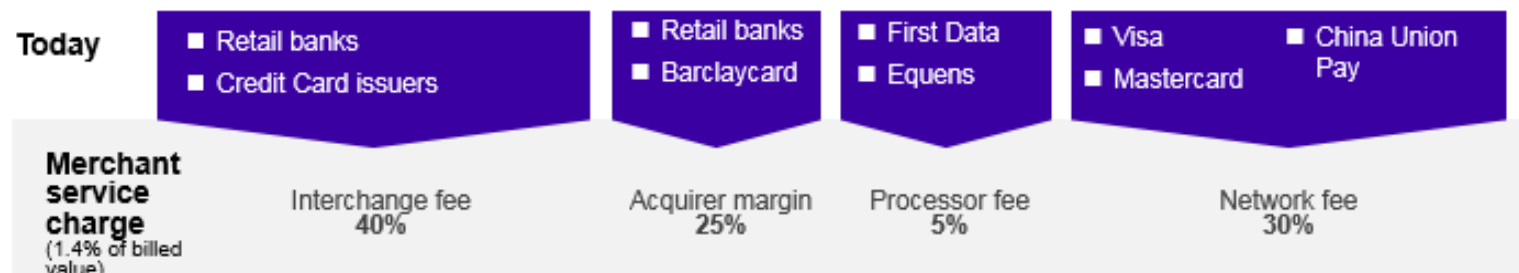
## Blockchain-enabled A/P process



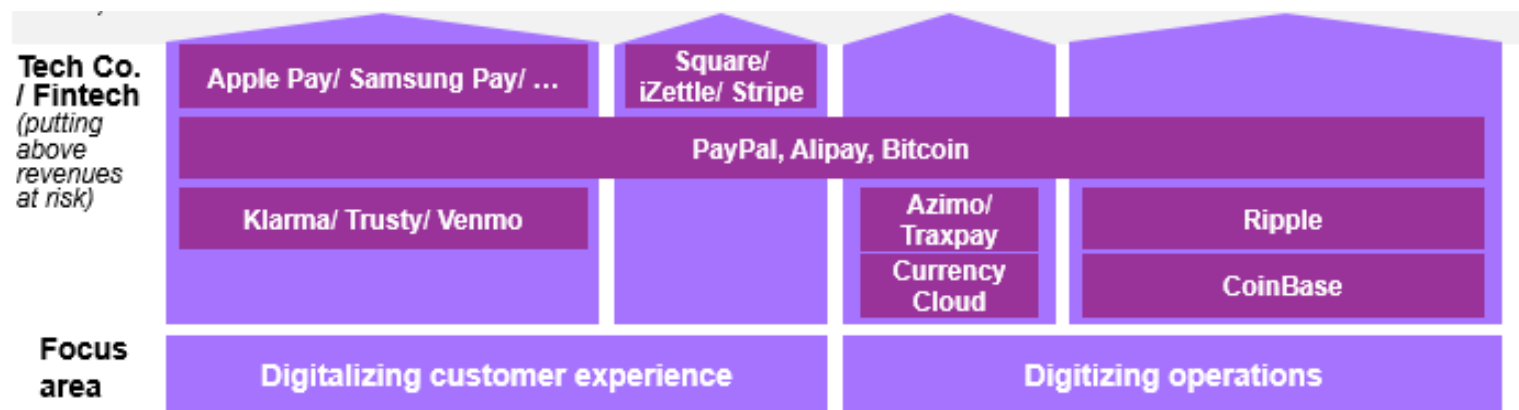
# Financial Services – Corporate Payments



## Traditional method

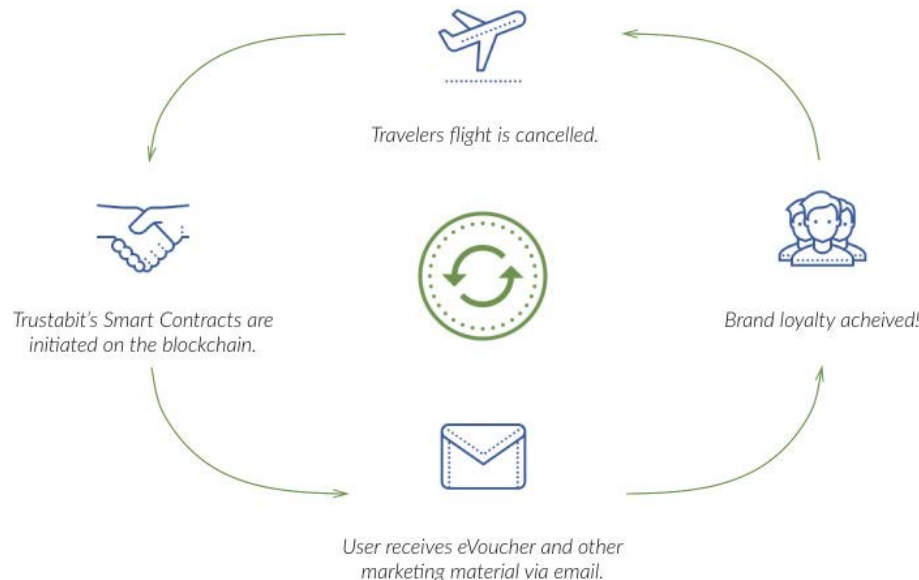


## Blockchain-enabled





- **Registration System (like SABRE)**
  - **S7 (Russia's largest domestic airline)**
- **Cross-airline flight re-booking**
- **Loyalty programs**
- **Flight cancellation smart contract vouchers**



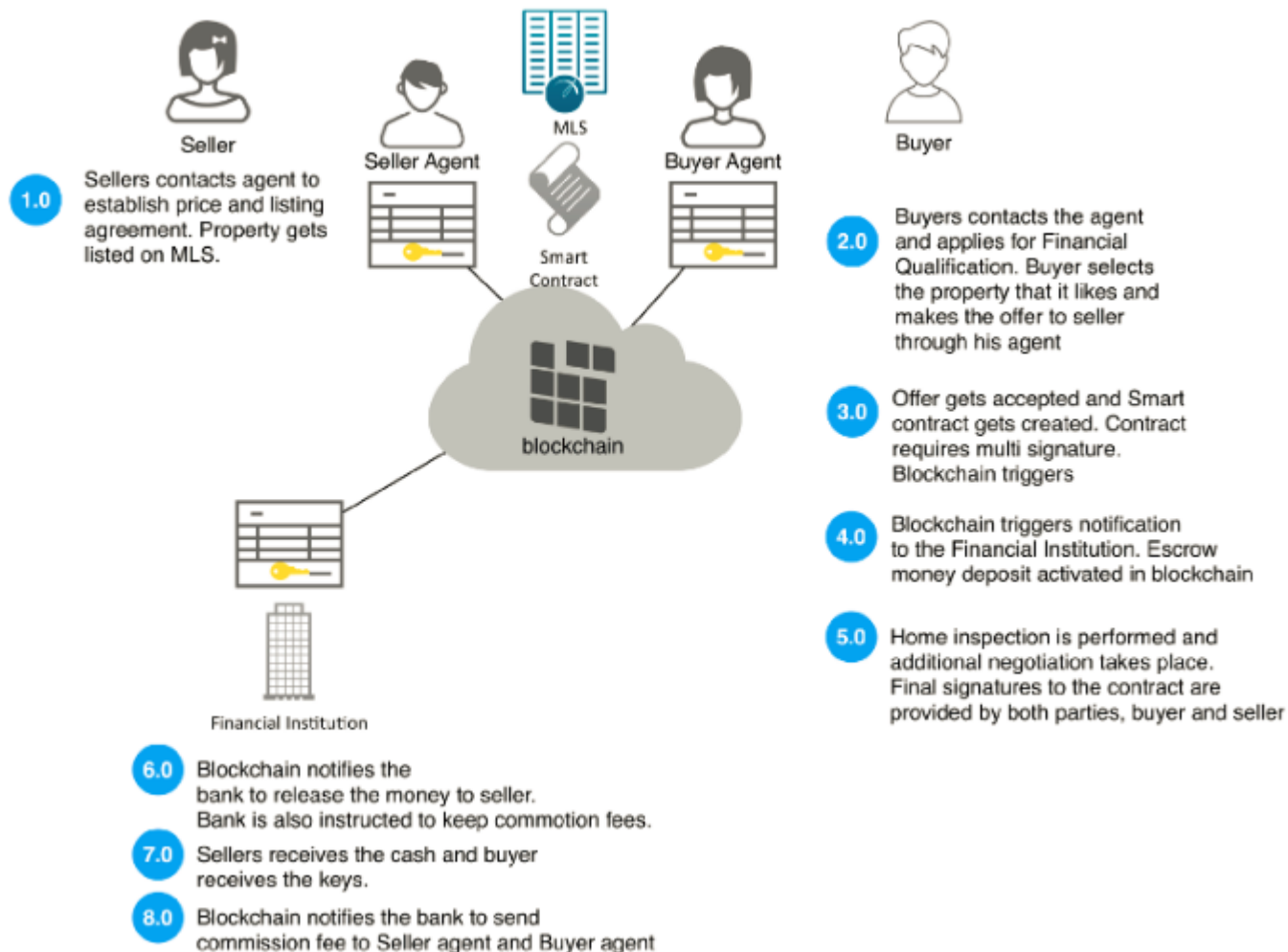
**Smart contracts automatically issue vouchers to customers when flights are delayed or cancelled**



## Blockchain and Home Purchases

- ⦿ Save by eliminating transaction fees for buyer/seller agent, banks and any other intermediaries
- ⦿ Minimize turnaround time
- ⦿ Eliminate escrow as Blockchain is only a source of trust
- ⦿ Eliminate manual process for requesting mortgages

# Real Estate Services

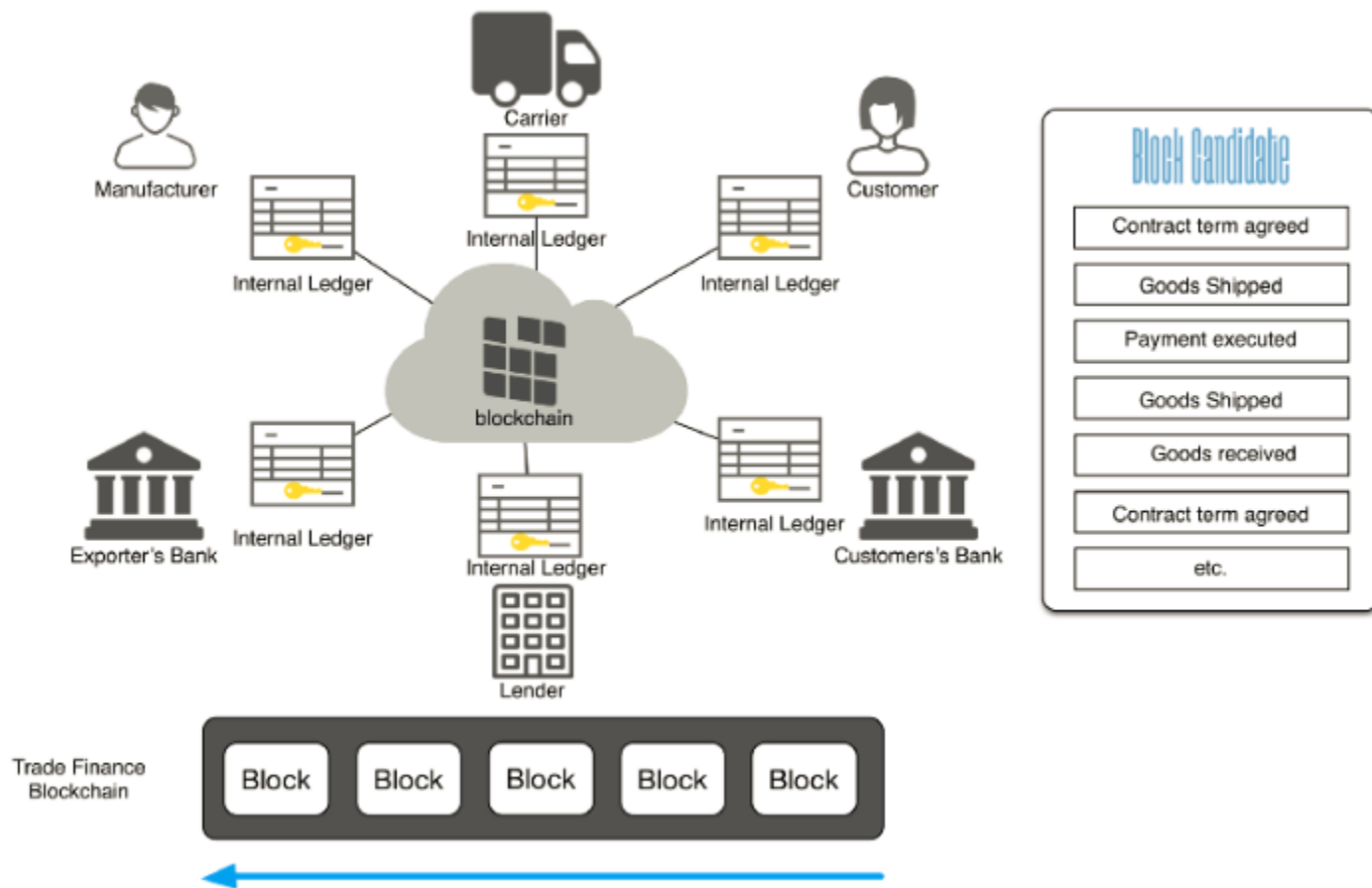




- ① **IBM Hyperledger Fabric**
- ① **Ethereum Private Network**
- ① **SKUChain**
- ① **Provenance**
- ① **Sweetbridge**



# Trade Finance





- ① Transparency—improve credit rating, credit history and risk assessment procedure
- ① Immutability—No one can change the block (ledger entry) without consensus of participating parties
- ① Auditability—all history is maintain in the Blockchain
- ① Safety—as both buyer and seller are on the same infrastructure prevents fraudulent invoices and duplication of invoices.

# Coworking 1 Token = 1 Seat



## What is a Primalbase token (PBT)?

PBT is a Primalbase digital token built on the Waves platform that can be bought, sold or rented out. It is not just membership eligibility but a business in and of itself. One PBT provides full access to the co-working or shared workspaces at any Primalbase location for one person. The possession of 4 tokens permits access to a separate office. The number of tokens that can be purchased by open person is unlimited.

[How to buy](#)   [How to profit](#)

Current price

**8024.41 USD**

# CryptoKitties – Digital Collectibles



Cats breed, creating offspring with unique DNA preserved on Ethereum's blockchain

250,000 CryptoKitties players – launch Nov 2017

500,000 CryptoKitties sold; over \$40m Business Model: m

Business model: creator AxiomZen 3.75% tx fee; crypto-web-mobile roll-out

## Most Expensive for Sale



#3565  
ETH 1.2214  
Price \$716.95  
Ends in 2 days



#3620  
ETH 0.4805  
Price \$282.04  
Ends in 6 days



#1290  
ETH 0.4758  
Price \$279.27  
Ends in 6 days



#4883  
ETH 0.3936  
Price \$231.02  
Ends in 8 hours



#4910  
ETH 0.2679  
Price \$157.27  
Ends in 21 hours

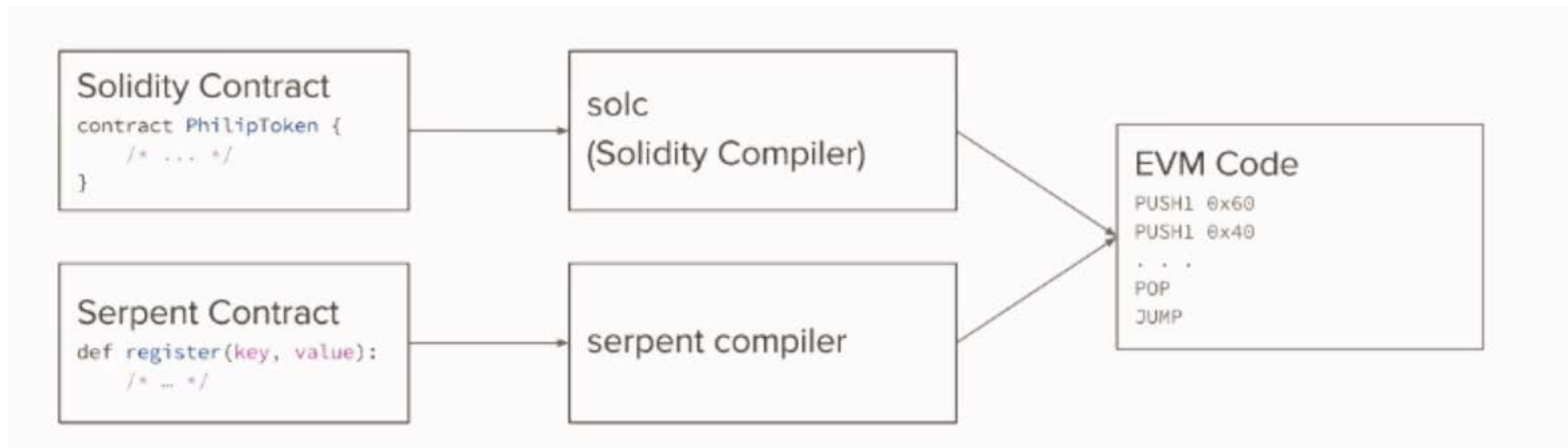
# Enterprise Platform Comparison



Characteristic	Ethereum	Hyperledger Fabric	R3 Corda
Description of platform	– Generic blockchain platform	– Modular blockchain platform	– Specialized distributed ledger platform for financial industry
Governance	– Ethereum developers	– Linux Foundation	– R3
Mode of operation	– Permissionless, public or private <sup>4</sup>	– Permissioned, private	– Permissioned, private
Consensus	<ul style="list-style-type: none"> <li>– Mining based on proof-of-work (PoW)</li> <li>– Ledger level</li> </ul>	<ul style="list-style-type: none"> <li>– Broad understanding of consensus that allows multiple approaches</li> <li>– Transaction level</li> </ul>	<ul style="list-style-type: none"> <li>– Specific understanding of consensus (i.e., notary nodes)</li> <li>– Transaction level</li> </ul>
Smart contracts	– Smart contract code (e.g., Solidity)	– Smart contract code (e.g., Go, Java)	<ul style="list-style-type: none"> <li>– Smart contract code (e.g., Kotlin, Java)</li> <li>– Smart legal contract (legal prose)</li> </ul>
Currency	<ul style="list-style-type: none"> <li>– Ether</li> <li>– Tokens via smart contract</li> </ul>	<ul style="list-style-type: none"> <li>– None</li> <li>– Currency and tokens via chaincode</li> </ul>	– None



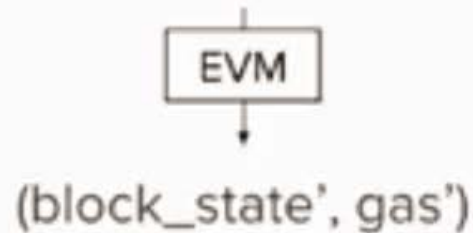
# Ethereum Smart Contracts





EVM as a state transition mechanism:

(block\_state, gas, memory, transaction, message, code, stack, pc)



- where *block\_state* is the global state containing all accounts
  - includes balances and long-term storage

# Blockchain and Political Systems



- **Elections and Voting**
- **Liquid Democracy / Delegative Democracy**
  - **Voters can transitively delegate their votes**
- **Futarchy and Voting Prediction Markets**
  - **2-tier voting for project area and approach**
- **Participatory Budgeting**
  - **Residents collectively decide how to spend their local government's budget**
- **Self-directed Public Finance**
  - **\$500/\$1000 personal bond offerings (Neighbor.ly)**
- **Virtual Democracy**
  - **Instant elections among machine learning models of real voters to address the challenge of ethical decision making**

*Questions?*  
THANK YOU  
...