



# Making Blockchain Real for Business

## Explained



V3.4, 8 September 16

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# Contents



**What** is Blockchain?



**Why** is it relevant  
for our business?

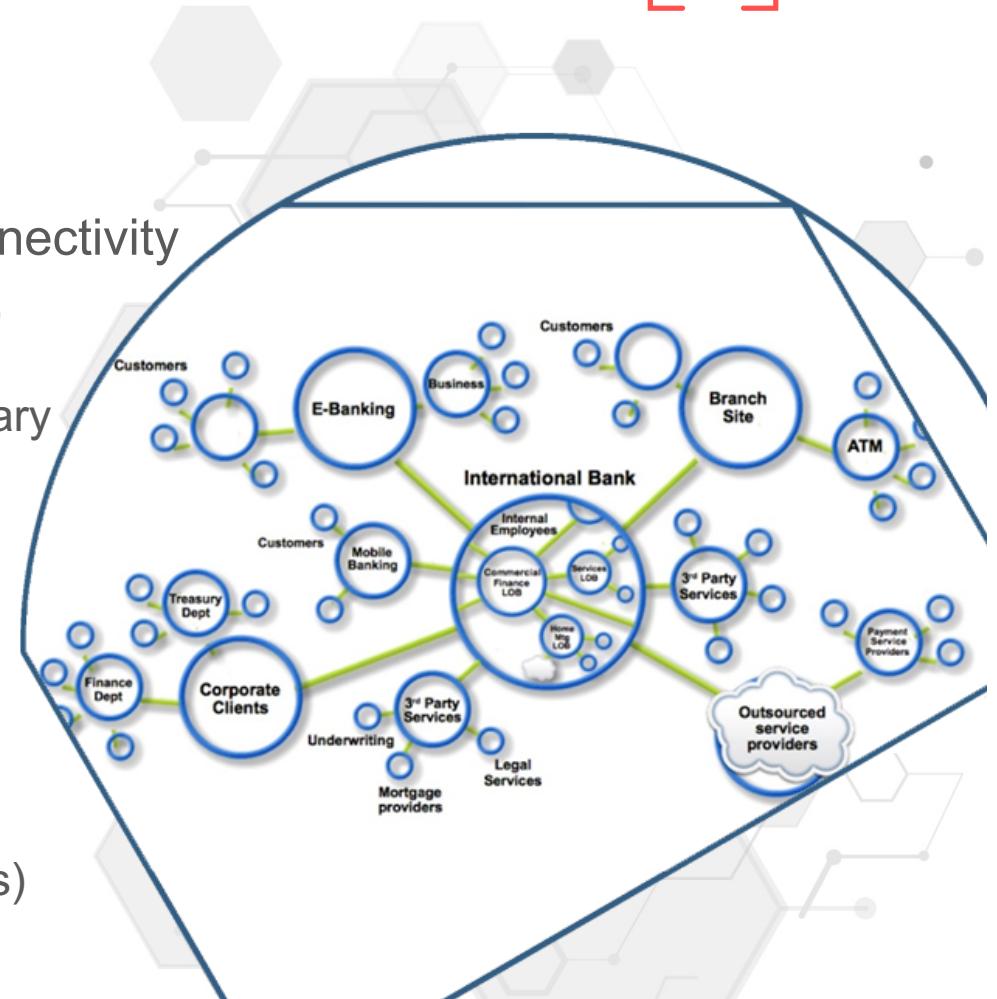


**How** can IBM help  
us apply Blockchain?

What

# Business networks, wealth & markets

- **Business Networks** benefit from connectivity
  - Participants are customers, suppliers, banks, partners
  - Cross geography & regulatory boundary
- **Wealth** is generated by the flow of goods & services across business network in transactions and contracts
- **Markets** are central to this process:
  - Public (fruit market, car auction), or
  - Private (supply chain financing, bonds)





What

# Transferring assets, building value

Anything that is capable of being owned or controlled to produce value, is an asset



## Two fundamental types of asset

- Tangible, e.g. a house
- Intangible, e.g. a mortgage



## Intangible assets subdivide

- Financial, e.g. bond
- Intellectual, e.g. patents
- Digital, e.g. music



## Cash is also an asset

- Has property of anonymity



What

## Ledgers are key ...

**Ledger** is THE system of record for a business.

Business will have multiple ledgers for multiple business networks in which they participate.

- **Transaction** – an asset transfer onto or off the ledger
  - John gives a car to Anthony (simple)
- **Contract** – conditions for transaction to occur
  - If Anthony pays John money, then car passes from John to Anthony (simple)
  - If car won't start, funds do not pass to John (as decided by third party arbitrator) (more complex)





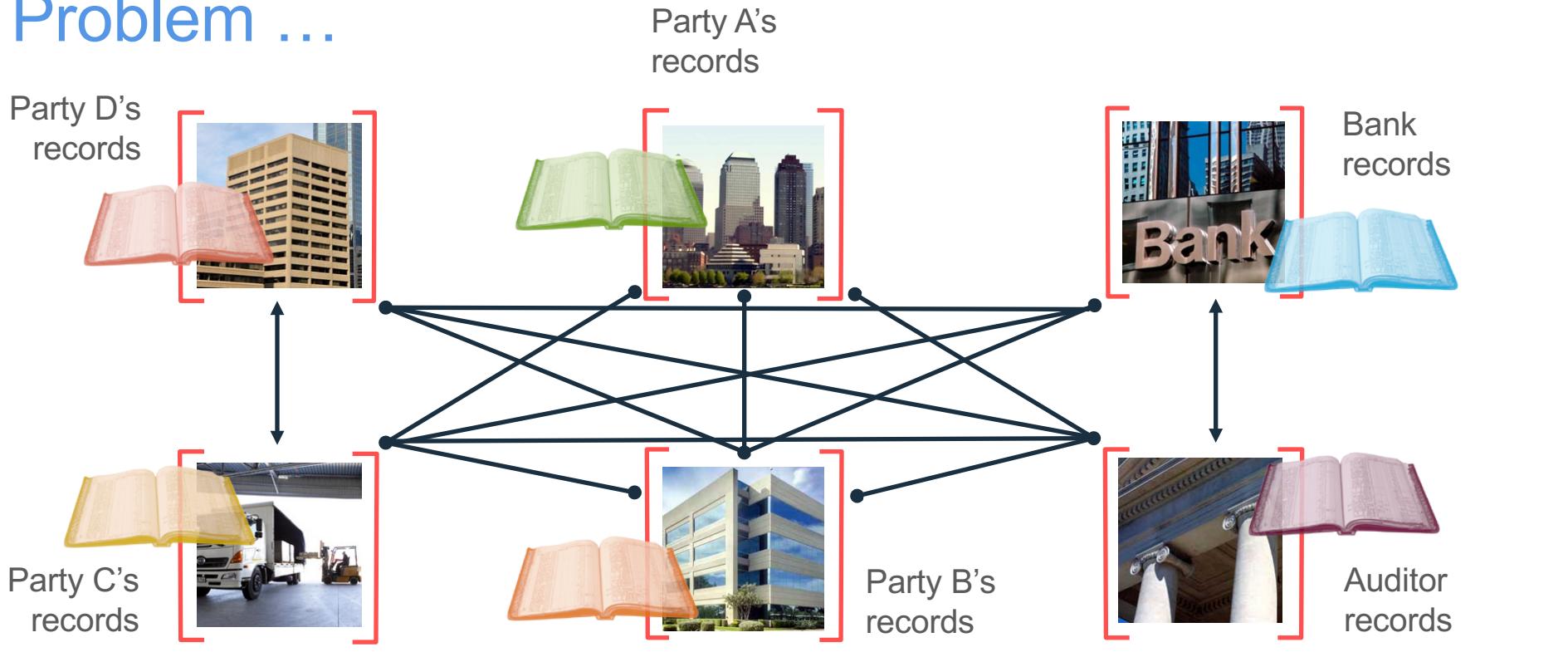
What

# Introducing Blockchain

A shared ledger technology allowing any participant in the business network to see THE system of record (ledger)



# Problem ...

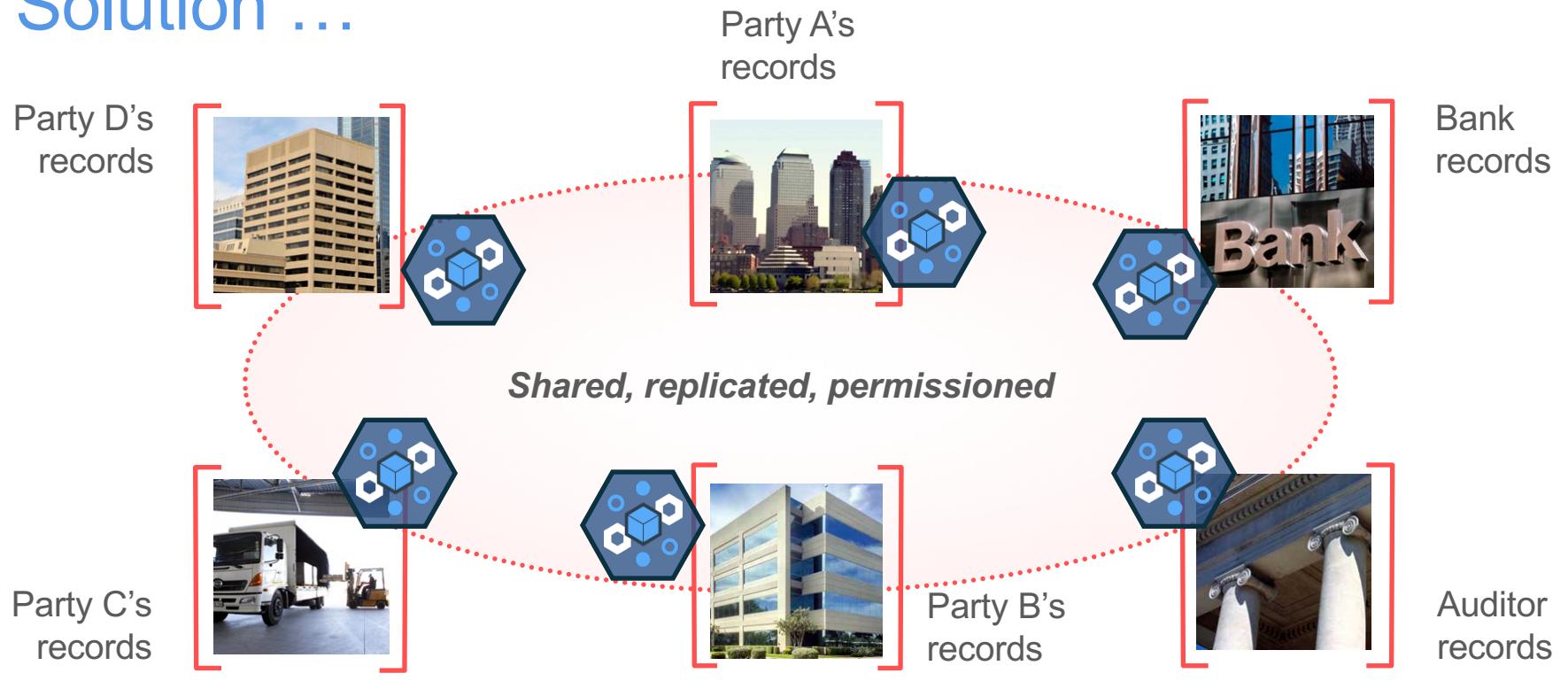


... Inefficient, expensive, vulnerable



What

## Solution ...

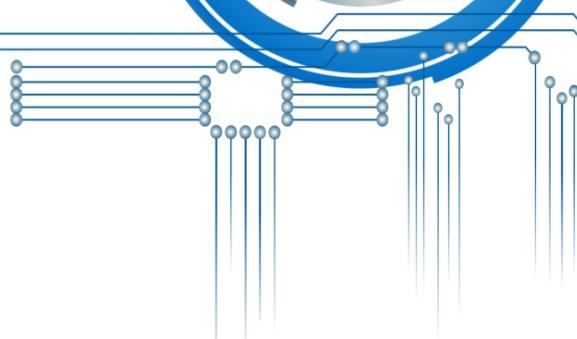


... Consensus, provenance, immutability, finality

## Blockchain underpins Bitcoin ...

- Unregulated, censorship-resistant shadow currency
- First Blockchain application
  - Pioneer of Blockchain technology

 **bitcoin**



BUT  
**BLOCKCHAIN**  
is not *bitcoin*

... Digital currencies different from cryptocurrency



**What**

## Blockchain for business ...

Append-only distributed system of record shared across business network



**Shared ledger**



**Smart contract**

Ensuring appropriate visibility; transactions are secure, authenticated & verifiable



**Privacy**



**Consensus**

Business terms embedded in transaction database & executed with transactions

All parties agree to network verified transaction

... Broader participation, lower cost, increased efficiency

## Shared ledger



Records all transactions across business network

- Shared between participants
- Participants have own copy through replication
- Permissioned, so participants see only appropriate transactions
- THE shared system of record

# Smart contract



Business rules implied by the contract ... embedded in the Blockchain  
and executed with the transaction

- Verifiable, signed
- Encoded in programming language
- Example:
  - Defines contractual conditions under which corporate Bond transfer occurs



## Privacy

Ledger is shared, but participants require privacy

- Participants need:
  - Transactions to be private
  - Identity not linked to a transaction
- Transactions need to be authenticated
- Cryptography central to these processes

# Consensus



[] **What**

... the process by which transactions are verified

- Anonymous participants
  - Bitcoin *cryptographic mining* provides randomized selection among anonymous participants
  - Significant compute cost (proof of work)
- Known & trusted participants
  - Commitment possible at low cost
  - Byzantine fault tolerance (BFT)
- Multiple alternatives
  - Proof of stake, where influence is determined by risk of validators
  - Multi-signatures, validation needs consent from 3 out of 5 validators
- Industrial Blockchain needs “pluggable” consensus

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**How** can IBM help  
us apply Blockchain?

[?] Why

## Blockchain benefits



### Saves time

Transaction time from days to near instantaneous



### Removes cost

Overheads and cost intermediaries



### Reduces risk

Tampering, fraud & cyber crime



### Increases trust

Through shared processes and recordkeeping



# Consensus use case – Shared routing codes

## What

- Competitors/collaborators in a business network need to share reference data, e.g. bank routing codes
- Each member maintains their own codes, and forwards changes to a central authority for collection and distribution
- An information subset can be owned by organizations

## How

- Each participant maintains their own codes within a Blockchain network
- Blockchain creates single view of entire dataset

## Benefits

1. Consolidated, consistent dataset reduces errors
2. Near-real-time of reference data
3. Naturally supports code editing and routing code transfers between participants



## Provenance use case – Vehicle maintenance

**What**

- Provenance of each component part in complex system hard to track
- Manufacturer, production date, batch and even the manufacturing machine program

**How**

- Blockchain holds complete provenance details of each component part
- Accessible by each manufacturer in the production process, the aircraft owners, maintainers and government regulators

**Benefits**

1. Trust increased, no authority "owns" provenance
2. Improvement in system utilization
3. Recalls "specific" rather than cross fleet



## Immutability use case – Financial ledger

### What

- Financial data in a large organization dispersed throughout many divisions and geographies
- Audit and Compliance needs indelible record of all key transactions over reporting period

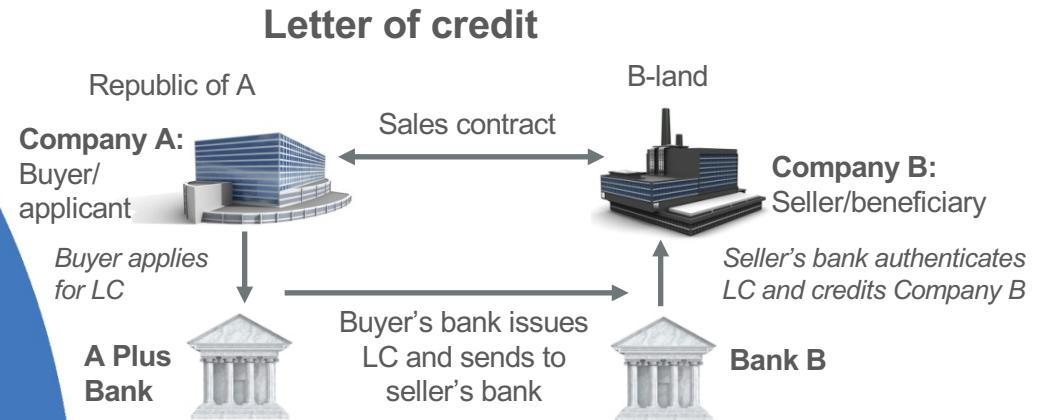
### How

- Blockchain collects transaction records from diverse set of financial systems
- Append-only and tamperproof qualities create high confidence financial audit trail
- Privacy features to ensure authorized user access

### Benefits

1. Lowers cost of audit and regulatory compliance
2. Provides “seek and find” access to auditors and regulators
3. Changes nature of compliance from passive to active

# Finality use case – Letter of credit



## What

- Bank handling letters of credit (LOC) wants to offer them to a wider range of clients including startups
- Currently constrained by costs & the time to execute

## How

- Blockchain provides common ledger for letters of credit
- Allows all counter-parties to have the same validated record of transaction and fulfillment

## Benefits

1. Increase speed of execution (less than 1 day)
2. Vastly reduced cost
3. Reduced risk, e.g. currency fluctuations
4. Value added services, e.g. incremental payment

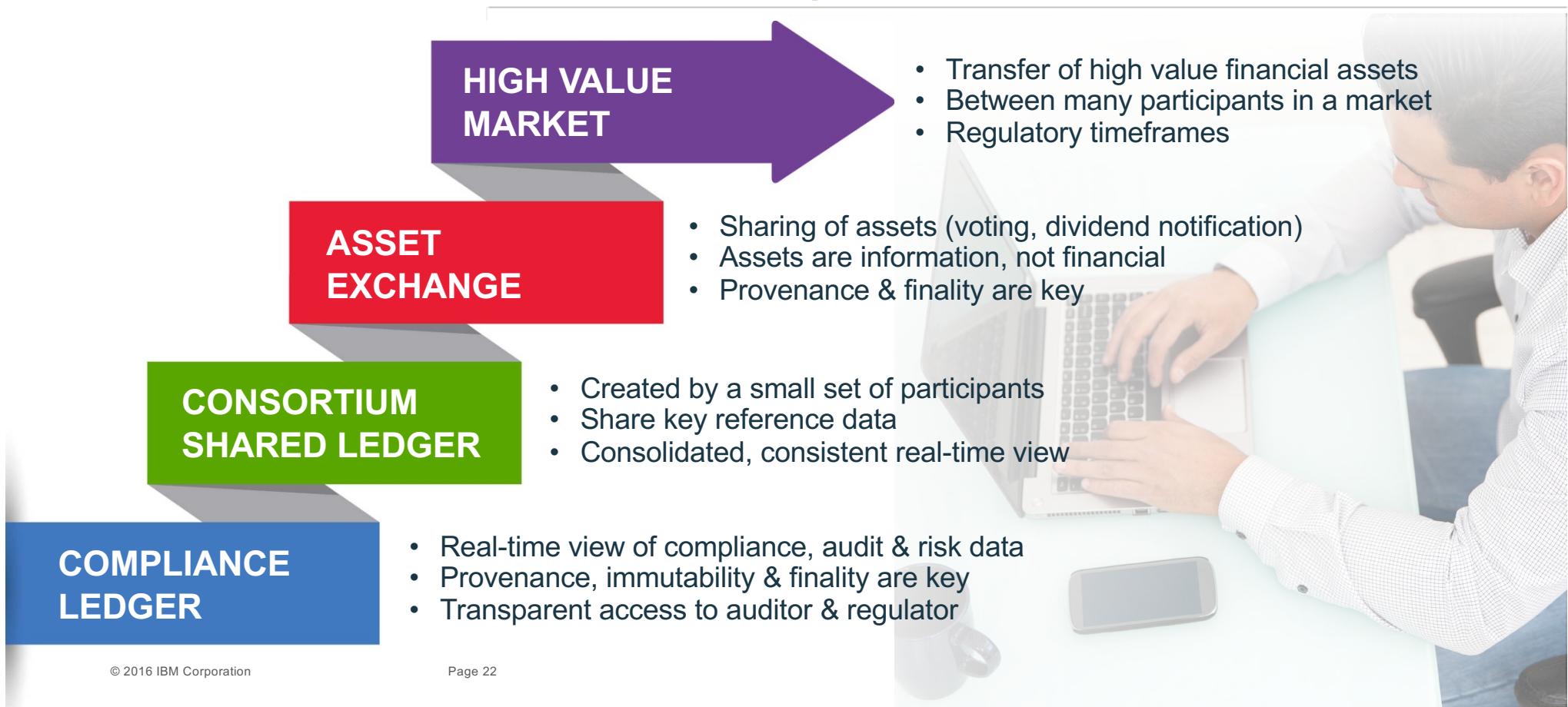
# Other potential use cases



- **Securities**
  - Post-trade settlement
  - Derivative contracts
- **Trade Finance**
  - Bill of Lading
  - Cross-currency payment
- **Syndicated Loans**
- **Supply Chain**
- **Retail Banking**
  - Cross border remittances
  - Mortgage verification & contracts
- **Public Records**
  - Real estate records
  - Vehicle registrations
  - Citizen Identity
- **Digital Property Management**

[?] Why

## Patterns for customer adoption



[?] Why

## Key players for Blockchain adoption



### Regulator

- An organization who enforces the rules of play
- Regulators are keen to support Blockchain based innovations
- Concern is systemic risk – new technology, distributed data, security



### Industry Group

- Often funded by members of a business network
- Provide technical advice on industry trends
- Encourages best practice by making recommendations to members



### Market Maker

- In financial markets, takes buy-side and sell-side to provide liquidity
- More generally, the organization who innovates
  - Creates a new good or service, and business process (likely)
  - Creates a new business process for an existing good or service

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# Blockchain for Business – Our Point of View



## Community + Code

Linux Hyperledger Project

Open Source Code: Blockchain for business;

**Consensus | Provenance  
Immutability | Finality**

Open Governance – 100 member cross industry board



## Cloud

IBM Blockchain

Blockchain managed service on IBM Cloud and z Systems;

**Identity | Consensus | System Integration |  
Hardware-assist for Performance & Security**

IBM Blockchain on Bluemix



## Clients

Blockchain Solutions  
Blockchain Garage

Making Blockchain real for business

Blockchain Garage;

**New York | London | Singapore | Tokyo**

Blockchain Services Practice



# Linux Foundation's Hyperledger Project

- Linux Foundation project announced December 17, 2015 with **17** founders, now nearly **100** members
- The Hyperledger Project is a collaborative effort to advance Blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers that can transform the way business transactions are conducted globally
- Open source and open standards-based

Enable adoption of shared ledger technology at a pace and depth not achievable by any one company or industry

QUICK FACTS	
Chairman	Blythe Masters/DAH
Executive Director	Brian Behlendorf
Technical Chair	Chris Ferris/IBM
Contribution	44,000 lines of code in February 2016
Sprint to one codebase with unified thinking	Staged releases

[www.Hyperledger.org](http://www.Hyperledger.org)

## PREMIER

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CME Group

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R

## GENERAL

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Milligan Partners

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## ASSOCIATE

NTT DATA

onchain

橙色魔方  
Orange Magic Cube

redhat

Rabbit

SAMSUNG SDS

As of 07 September 2016



# Engagement model overview



1. Discuss Blockchain technology
2. Explore customer business model
3. Show Blockchain Application demo



1. Understand Blockchain concepts & elements
2. Hands on with Blockchain on Bluemix
3. Standard demo customization



1. Design Thinking workshop to define business challenge
2. Agile iterations incrementally build project functionality
3. Enterprise integration



1. Scale up pilot or Scale out to new projects
2. Business Process Re-engineering
3. Systems Integration

Remote or face to face	Remote or face to face	Face to face	Face to face
<b>Free of charge</b>	<b>Free of charge</b>	<b>For fee</b>	<b>For fee</b>



## IBM and Hyperledger in Action

HSBC, Bank of America, IDA      Trade Finance - Letter of Credit

ABN AMRO      Financial Restructuring & Recovery

Crédit Mutuel Arkéa      Consortium Shared Ledger

Japan Exchange Group (JPX)      Post Trade

Kouvola Innovation      Supply Chain Logistics

London Stock Exchange      Market Innovation

Mizuho      Digital Currency

IBM Global Finance      Shadow Chain for Dispute Resolution

# Summary



## Blockchain ...

- is a shared, replicated, permissioned ledger technology
- can open up business networks by taking out cost, improving efficiencies and increase accessibility
- addresses an exciting and topical set of business challenges, which cross every industry

## IBM ...

- supports the Linux Foundation Hyperledger open standard, open source, open governance Blockchain
- has an easy to access, proven and incremental engagement model giving customers the confidence to get started NOW

IBM®

# Thank you!



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# Further Information – Use case Links

**HSBC, Bank of America, IDA:**

<http://www.coindesk.com/hsbc-bank-america-blockchain-supply-chain/>

**ABN AMRO:**

<https://www.abnamro.com/en/newsroom/blogs/arjan-van-os/2016/walking-the-walk-exploring-the-power-of-blockchain.html>

**Crédit Mutuel Arkéa:**

<http://www.coindesk.com/ibm-completes-blockchain-trial-french-bank-credit-mutuel/>

**JPX:**

<http://www.ibm.com/press/us/en/pressrelease/49088.wss>

**Kouvola Innovation:**

<http://www.ibm.com/press/us/en/pressrelease/49029.wss>

**London Stock Exchange:**

<http://www.ibtimes.co.uk/linux-foundation-blockchain-consortium-digital-asset-ibm-credits-london-stock-exchange-board-1533798>

**Mizuho:**

<http://www.coindesk.com/mizuho-digital-currency-powered-blockchain-settlement/>

**IBM Global Finance:**

<http://www.coindesk.com/ibm-building-blockchain-dispute-resolution-system/>