

Making **Blockchain** Real for Business

Explained

Contents

What

.. are Blockchain technologies ?

Why

.. is it relevant for our business?

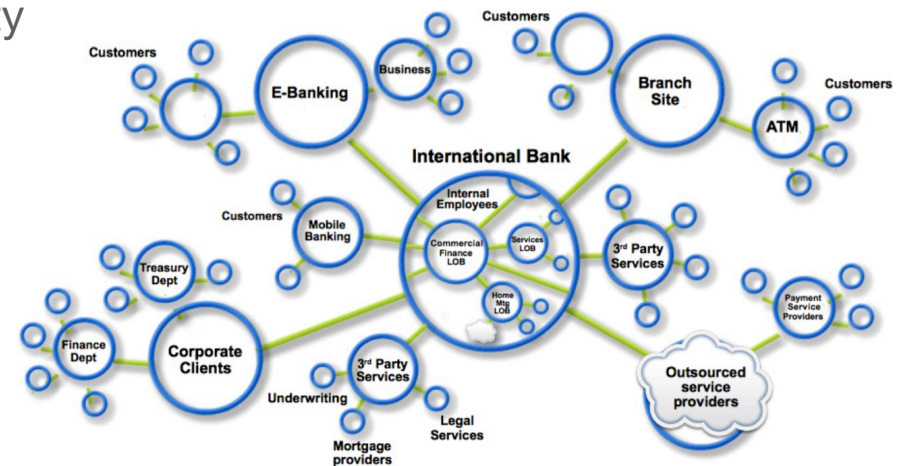
How

.. can IBM help us apply Blockchain?

Business Networks, Markets & Wealth

What?

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



Transferring **Assets**, building **Value**

What?

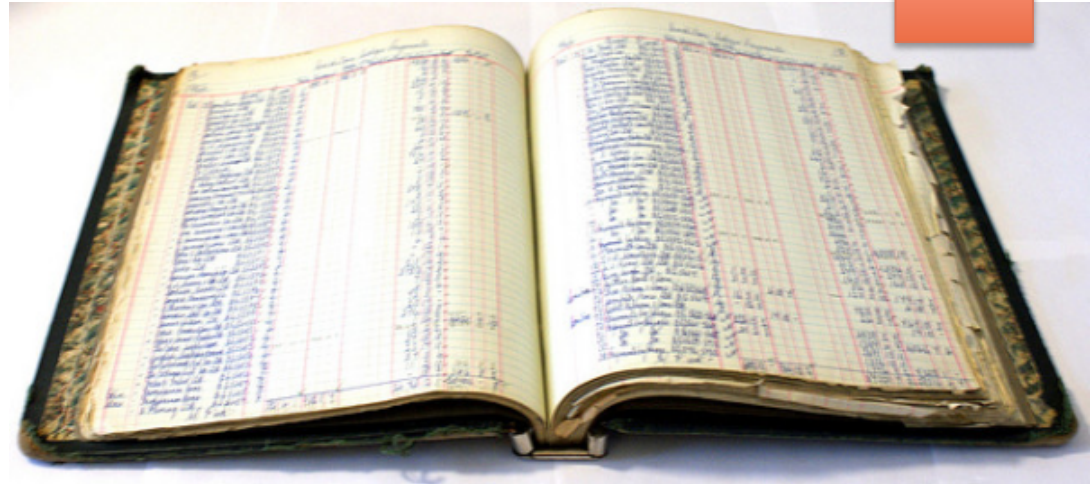
- Anything that is capable of being owned or controlled to produce **value**, is an **asset**
- Two fundamental types of asset
 - Tangible, e.g. a house
 - Intangible e.g. a mortgage
- Intangible assets subdivide
 - Financial, e.g. bond
 - Intellectual e.g. patents
 - Digital e.g. music
- Cash is also an asset
 - Has property of anonymity



Ledgers are Important

What?

- **Ledger** [1] is THE system of record for a business
 - records asset transfer between participants.
- Business will have multiple ledgers for multiple business networks in which they participate.



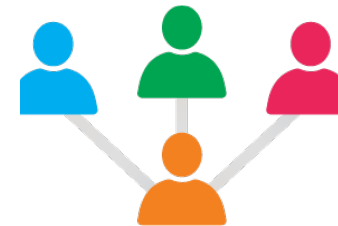
[1] The principal book (or computer file) for recording and totaling financial transactions by account type, with debits and credits in separate columns and a beginning monetary balance and ending monetary balance for each account.

ID	Date	Account	Description	Withdrawal Amt	Deposit Amt	Taxable
1	02/01/2005	Transportation	Trip to LA	\$5.00		
2	11/06/2005	Meals	Fancy Meal	17.00		
5	02/01/2005	Lodging	Hotel	\$25.00		
6	10/04/2005	Meals	Business Luncheon	\$20.00		
9	20/11/2004	Transportation	Air Fare to Atlanta	\$70.00		
18	20/11/2004	Meals	Dinner	\$20.00		
19	20/11/2004	Transportation	Cab	\$9.00		
22	01/06/2005	Meals	Client Luncheon	\$55.00		
23	01/06/2005	Miscellaneous	Newspapers, Magazines	\$5.00		
25	01/02/2005	Miscellaneous	Tip	\$5.00		
26	01/02/2005	Lodging	Hotel	\$60.00		
30	10/07/2005	Telephone Service	Telephone Bill	\$34.00		
41	01/01/2005	Mutual Fund	First Mutual Fund		\$250.00	
43	01/07/2004	Second Mutual Fund	Second Mutual Fund		\$1,000.00	
46	04/02/2005	Power Bill	Power Bill	\$200.00		
50	10/09/2004	Mutual Fund	First Mutual Fund		\$250.00	
52	19/10/2004	Lodging	Hotel	\$55.00		
53	01/06/2005	Miscellaneous	Newspapers, Magazines	\$5.00		
54	01/02/2005	Rental Income	Housing Property		\$1,000.00	
57	01/05/2005	Rental Income	Housing Property		\$2,000.00	
60	18/04/2004	Second Mutual Fund	Second Mutual Fund		\$20,000.00	
91	18/06/2004	Second Mutual Fund	Second Mutual Fund		\$50,000.00	
96	10/06/2005	Telephone Service	Telephone Bill	\$34.00		
Totals:				\$911.50	\$44,250.00	

Participants, Transactions & Contracts

What?

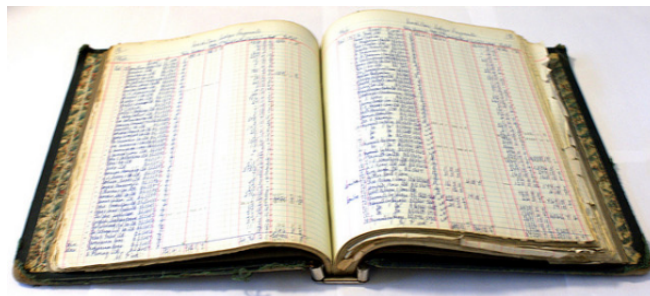
- **Participants** - members of a business network
 - Customer, Supplier, Government, Regulator
 - Usually resides in an organization
 - Has specific identities and roles
- **Transaction** - an asset transfer
 - John gives a car to Anthony (simple)
- **Contract** - conditions for transaction to occur
 - 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)



Introducing Blockchain

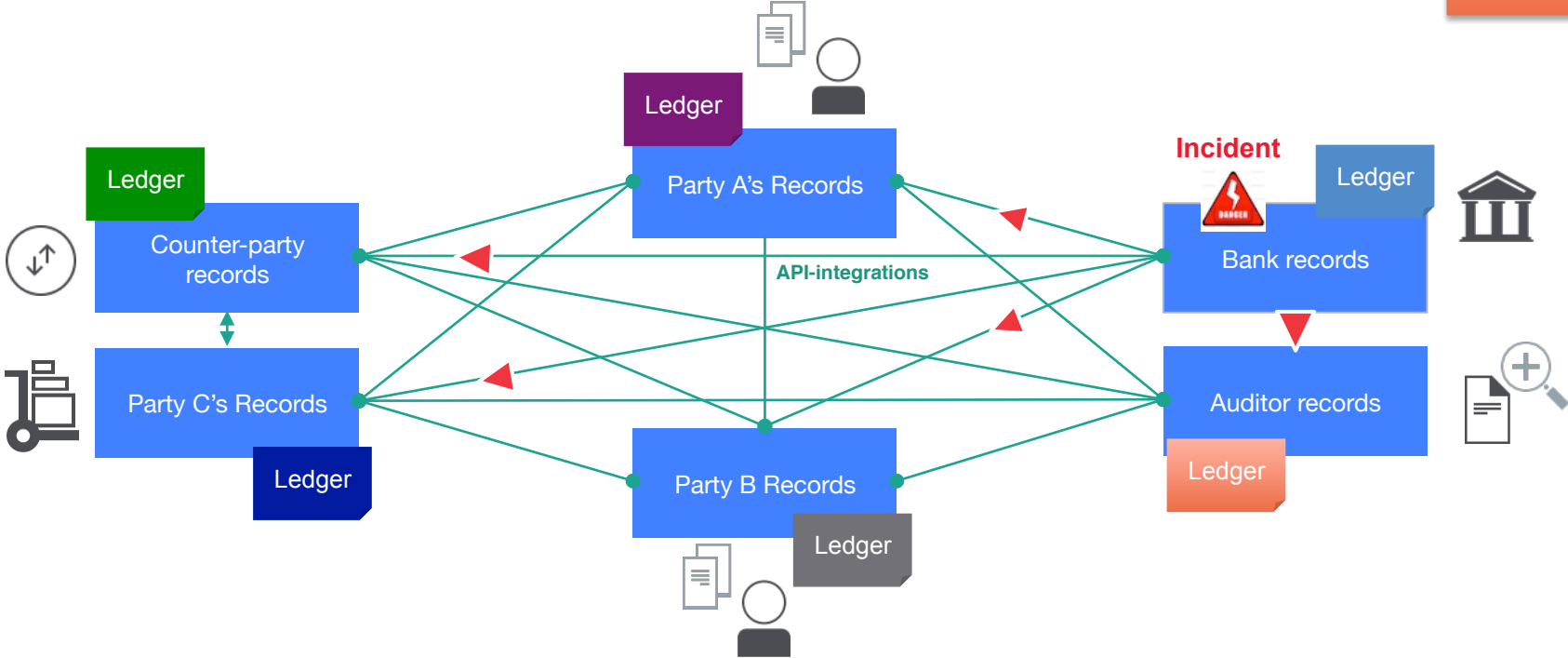
What?

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



Problem - Difficult to monitor asset ownership and transfers in a trusted business network

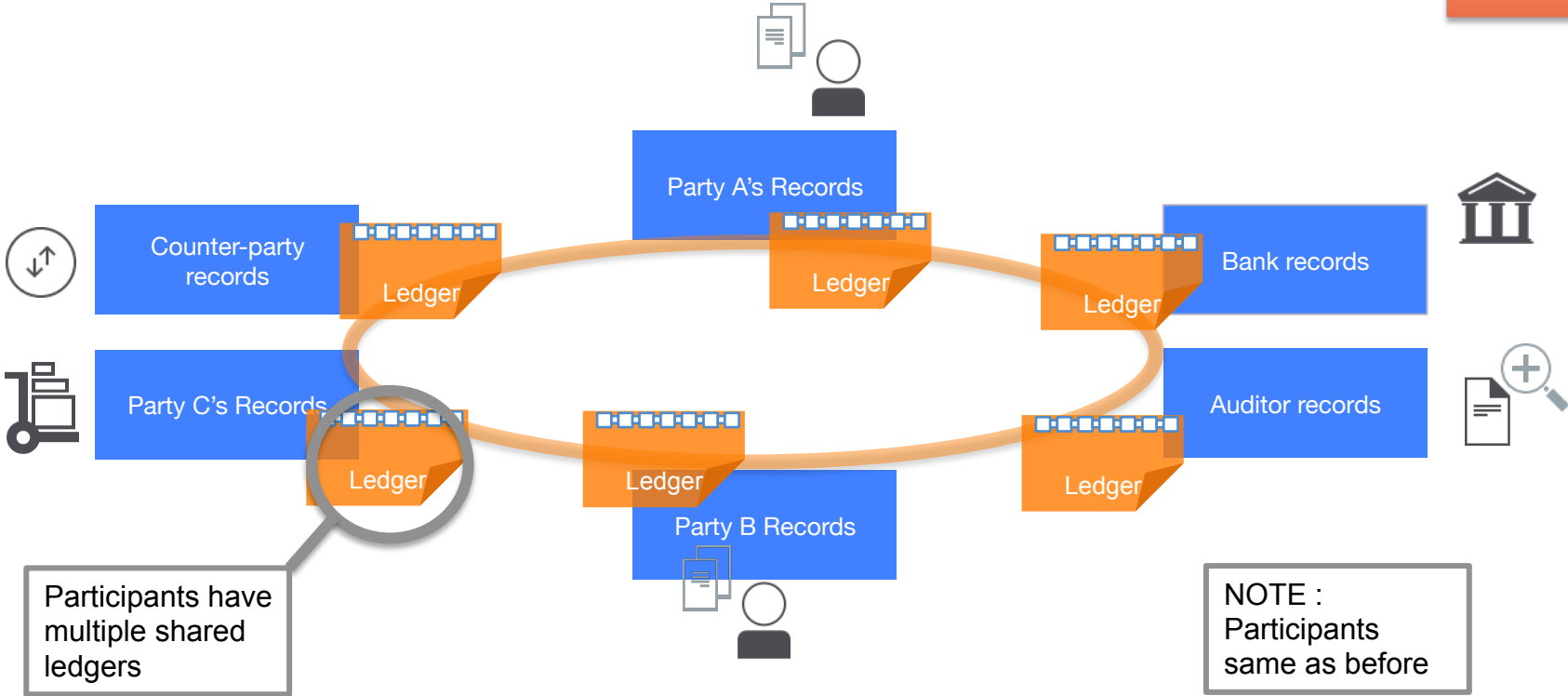
What?



Inefficient, expensive, vulnerable

Solution – a permissioned, replicated, shared ledger

What?

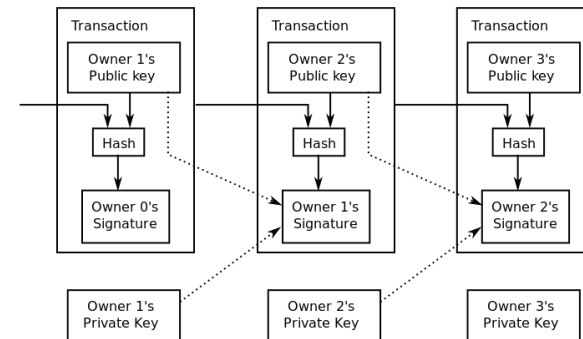


Consensus, provenance, immutability, finality

Blockchain underpins Bitcoin . . .

What?

1. **Bitcoin** is unregulated, censorship-resistant shadow currency
2. Blockchain ensures “cash like” coin passing
 - unique,
 - immutable,
 - final
3. **Bitcoin** the first Blockchain application
 - Blockchain is not **Bitcoin**
4. Digital currencies different from cyptocurrency



Blockchain for Business

What?

Append-only distributed
system of record shared
across business network

Shared
Ledger

Smart
Contract

Business terms embedded
in transaction database &
executed with transactions

Ensuring appropriate
visibility; transactions are
secure, authenticated &
verifiable

Privacy

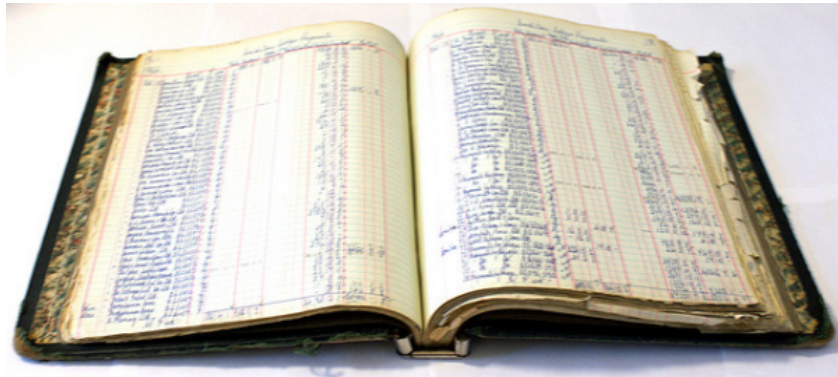
Validation

All parties agree to
network verified
transaction

Broader participation, lower cost, increased efficiency

Shared Ledger

What?

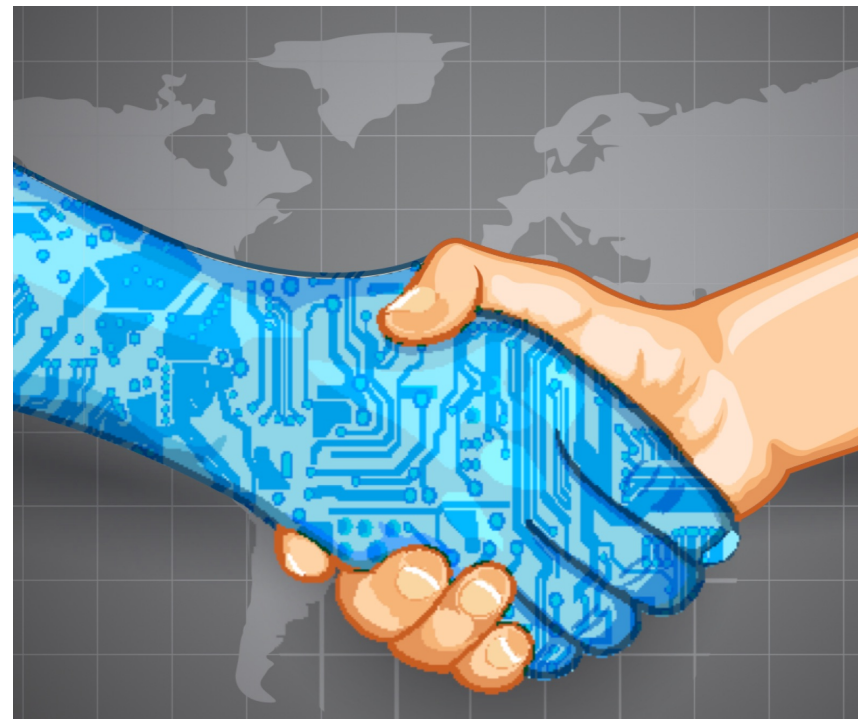


- Records all transactions across business network
- Shared between participants
- Participants have own copy through replication
- Permissioned, so participants see only appropriate transactions
- THE shared system of record

Smart Contract

What?

- Business rules implied by the contract . .
- . . embedded in the Blockchain &
- executed with the transaction
- Verifiable, signed
- Encoded in programming language
- Example:
 - Defines contractual conditions under which corporate Bond transfer occurs



Privacy


What?



- 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

Validation

What?

- Transaction verification & commitment
- When participants are anonymous
 - Commitment is expensive
 -  **bitcoin** *cryptographic mining* provides verification for anonymous participants but at significant compute cost (proof of work)
- When participants are known & trusted
 - Commitment possible at low cost
- Multiple alternatives
 - **proof of stake** where fraudulent transactions cost validators (e.g. transaction bond)
 - **multi-signature** (e.g. 3 out of 5 participants agree)
- **Industrial Blockchain needs “pluggable” consensus**



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.. can IBM help us apply Blockchain?

Industrial Blockchain Benefits

Why?

Reduce costs and complexity



Trusted recordkeeping



Improve discoverability



Shared trusted processes



Blockchain – not for all . . .

Why?



NEGATIVE Indicators

1. Need high performance (millisecond) transactions
2. Small organization (no business network)
3. Looking for a database replacement
4. Looking for a messaging solution
5. Looking for transaction processing replacement

Patterns for Customer Adoption

How?

(1) INTERNAL LEDGER

- Ledger for internal reporting, audit and compliance,
- Consistent view of key business assets,
- Provenance, immutability & finality more important than consensus.
- Access to auditor and regulator

(2) CONSORTIUM SHARED LEDGER

- Created by a small set of participants
- share reference data between themselves and consumers.
- Consistent real-time view of key information

(3) INFORMATION HUB

- A ledger set up in a single organization
- Sharing of information between participants (e.g. voting, dividend notification)
- Assets have *information*, not financial value,
- Require provenance, immutability & finality.

(4) HIGH VALUE MARKET

- Ledger for the transfer of high financial value assets
- between many participants in a market.
- Requires all enterprise features of Blockchain

Use Case – Letter of Credit

Why?

What?

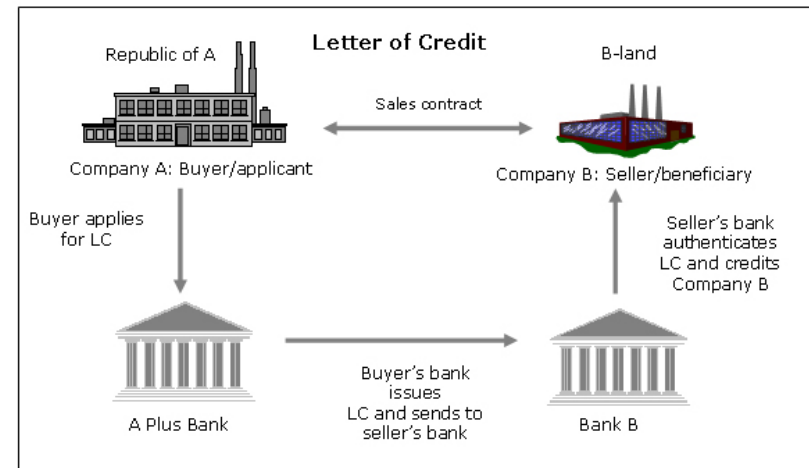
- Bank handling letters of credit (LOC) wants to offer them to a wider range of clients including startups
- Currently constrained by costs & the time to execute

How?

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

Benefits

- Increased trust
- Increase speed of execution (less than 1 day)
- Vastly reduced cost



Use Case – Corporate Debt (or Bond)

Why?



What?

- Bank holding a corporate debt would like to
 - pay vendors quickly for transactions validated by the client
 - allow the corporate client to see the payment is made
 - provide government with oversight of the process

How?

- Blockchain provides a common ledger for recording the corporate debt / bond,
- available to bank, corporate client, vendors & government.

Benefits

- Speeds up vendor payments bigger net discounts
- Eliminates risk and accelerates decision making
- Owning bank can spread the cost across each market.

Use Case – Business to Business Contracts

Why?



What?

- Buyer wants efficient way of converting a purchase order into validated, self executing contract updated to reflect the status of the supply.
- Agreement must be visible to the buyer, the seller, banks, logistics partners and other stakeholders.

How?

- Blockchain provides a shared record of the contract status which is updated as the contract progresses.
- Available to all parties to the agreement, their banks and partners.

Benefits

1. increased efficiency and transparency across the supply chain.
2. risk management improved through the near real time update of all contracts.

Use Case – Smart Refrigerator

What?

- Value of connected smart devices limited by ability to interact with business systems

How?

- Blockchain to manage automated interactions with the external world
- ordering and paying for food to arranging for its own software upgrades and tracking its warranty.

Benefits

1. business value from connected technology
2. efficiencies in network and supply chains.
3. status transparent to all network members

Why?



Use Case – Open, Trusted Supply Chain

Why?



What?

- Consumers demanding transparency on where and how their products are made.
- EU requires more information about corporate supply chains, with penalties for non-compliance.

How?

- Blockchain enable safe digital transfer of property across the end to end supply chain.

Benefits

1. verifiable, preventing any party from altering
2. efficiencies through greater transparency
3. consumers can make informed purchases
4. governments get reliable information

Use Case – Aircraft Maintenance

Why?

What?

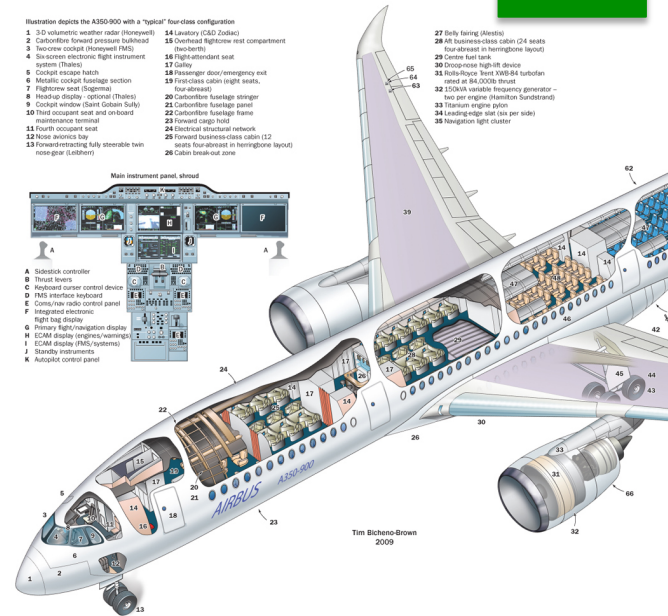
- Provenance of each component part in complex system hard to track
- Manufacturer, production date, batch and even the manufacturing machine program.

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



Use Case – On Line Gaming

Why?



What?

- Game player wants to trade “gold” earned in current game for the currency or assets of another game
- Use experience with the current game to put me ahead and not have to start cold in the new game

How?

- Blockchain holds tokens of value shared across on line gaming platform

Benefits

- Transparency to game player, game owners & infrastructure providers
- Efficiencies through elimination of intermediaries
- Increased trust for all involved parties.

Other Potential Use Cases include . .

Why?

- **Securities**
 - Post-trade settlement
 - Derivative contracts
 - Securities issuance
 - Collateral management
- **Trade Finance**
 - Bill of Lading
 - Cross-currency payment
- **Syndicated Loans**
- **Intra-bank settlement**
- **Retail Banking**
 - Cross border remittances
 - Mortgage verification
 - Mortgage contracts (smart contract)
- **Public Records**
 - Real estate records
 - Vehicle registrations
 - Business license and ownership records



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Hyperledger Project

How?

- Linux Foundation - announced 17th December 2015
- New open ledger project to transform the way business transactions are conducted around the world
- Project members understand that an open source, collaborative development strategy supporting multiple players in multiple industries is required

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

Hyperledger Project Members [1]



How?



London
Stock Exchange Group



Digital Asset
Holdings

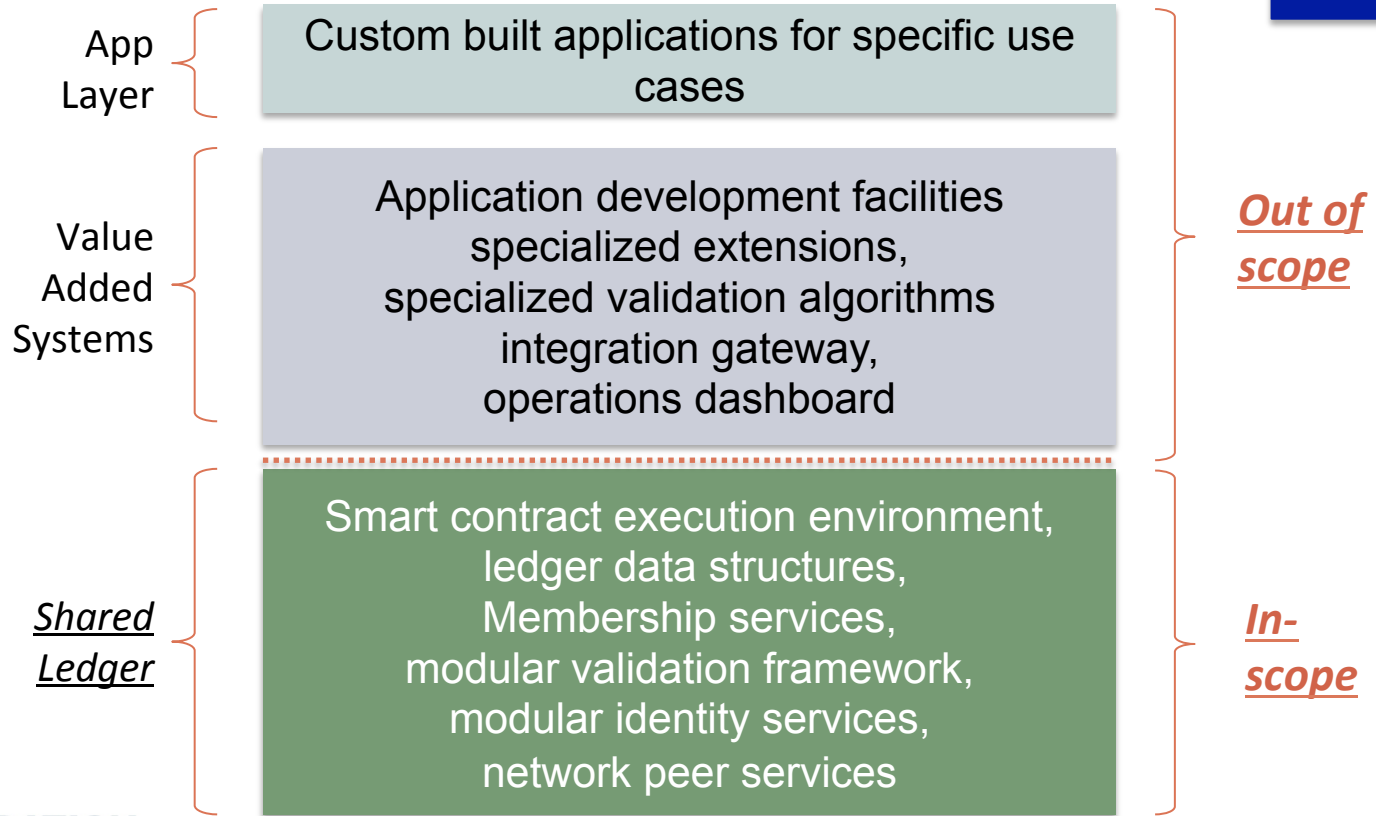


[1] At 17th December 2015



Hyperledger Project – Draft Scope

How?



Engagement Model overview

How?



<ol style="list-style-type: none"> 1. Discuss Blockchain technology 2. Explore customer business model 3. Show Blockchain Application demo 	<ol style="list-style-type: none"> 1. Understand Blockchain concepts & elements 2. Hands on with Blockchain technology 3. Standard demo customization 	<ol style="list-style-type: none"> 1. Design Thinking workshop to define business challenge 2. Agile iterations incrementally build project functionality 3. Enterprise integration
<i>Remote or face to face</i>	<i>Remote or face to face</i>	<i>Face to face</i>
<i>Free of charge</i>	<i>Free of charge</i>	<i>For fee</i>

Enterprise Integration

How?

What?

- Customer realizes full benefit of Blockchain solution by scale up, scale out and enterprise integration

How?

- Full range of consulting, system integration & project skills
- Extension of Agile from Proof of Concept
- Integration into customers existing systems and business processes
- Metrication to prove Return on Investment

Commercial?

- For fee



Summary

1. Blockchain is a shared, replicated ledger technology
2. IBM supports an open standards, open source, open governance Blockchain
3. Blockchain can open up business networks by taking out cost, improving efficiencies and increase accessibility
4. Blockchain addresses an exciting and topical set of business challenges, which cross every industry
5. Linux Foundation Hyperledger project developing open source, open standards shared ledger technology
6. IBM has an easy to access, proven and incremental engagement model giving customers the confidence to get started NOW



Thank You!