Blockchain Explained

An Introduction to Blockchain for Business

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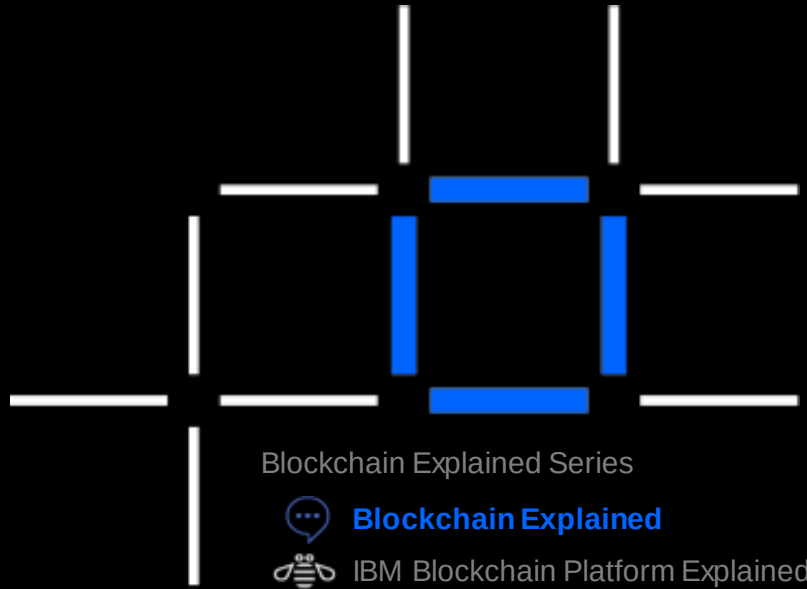

Blockchain Explained Series

- **Blockchain Explained**
- IBM Blockchain Platform Explained
- Solutions Explained
- Garage Explained
- What's New
- Next Steps

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IBM **Blockchain**

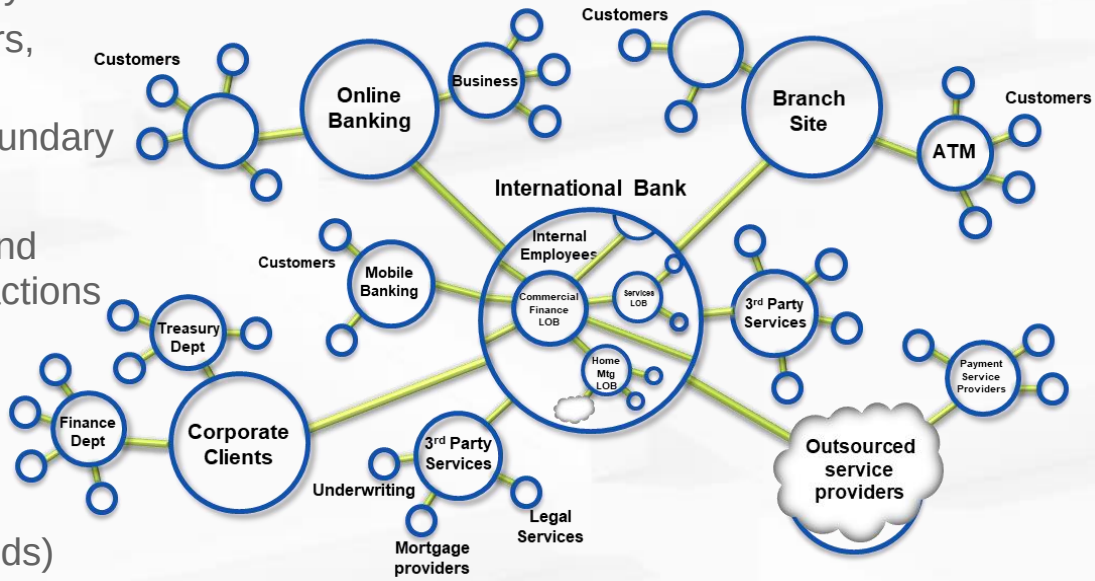
What is Blockchain?

Example networks

How can IBM help?

Business networks, wealth and markets

- Business Networks benefit from connectivity
  - Participants are customers, suppliers, banks, partners
  - Cross geography and regulatory boundary
- Wealth is generated by the flow of goods and 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)



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

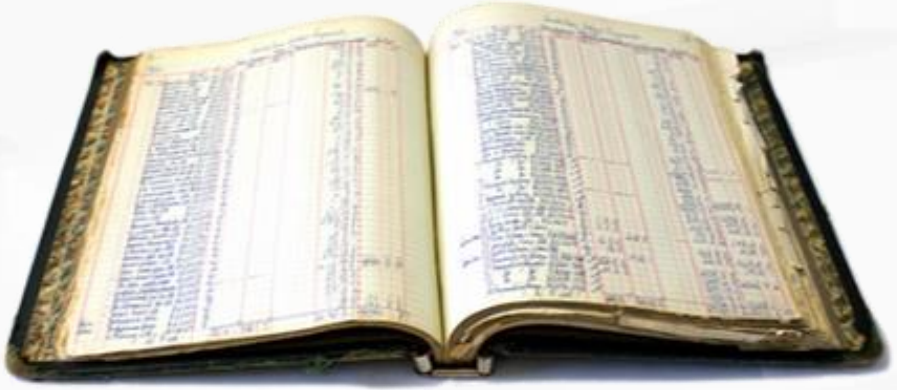
- Has property of anonymity

Ledgers are key

Ledgers are THE system of record for a business.

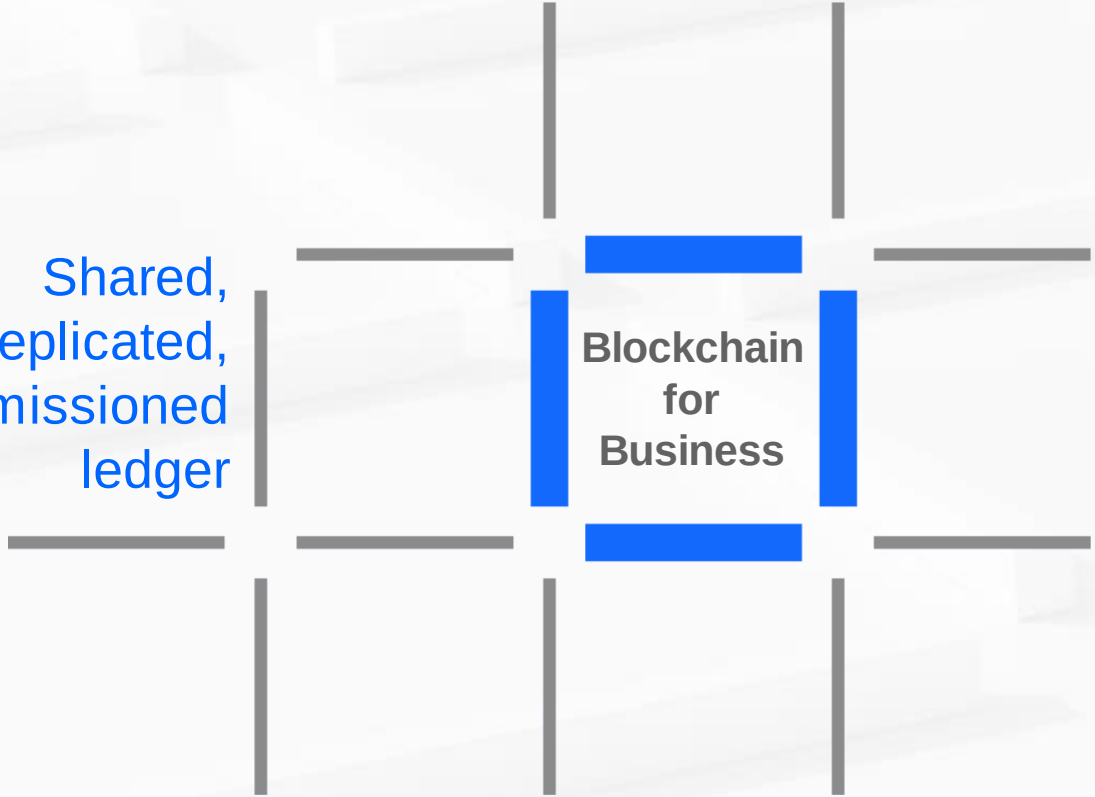
Businesses will have multiple ledgers for the multiple business networks in which they participate.

- Transaction: an asset transfer onto or off the ledger
  - John gives a car to Anthony (simple)
- Contract: the conditions for a 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)



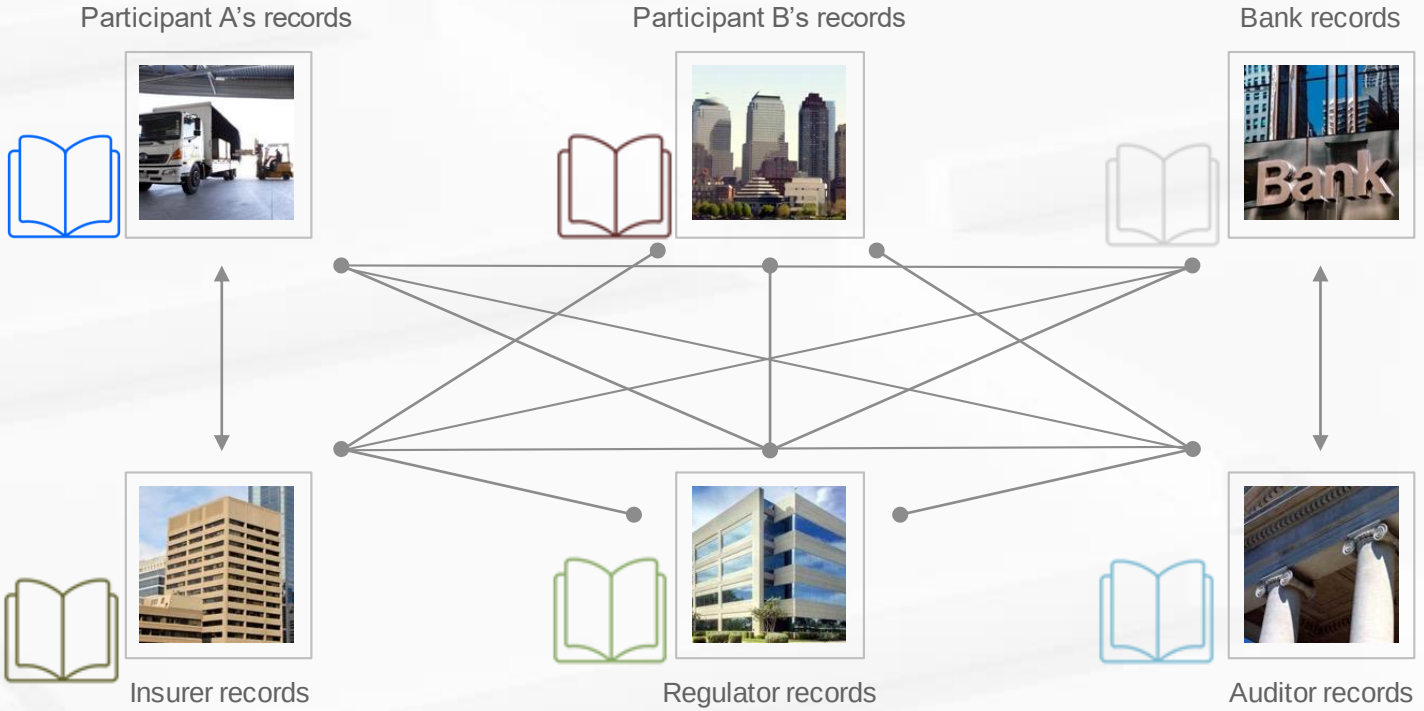
Introducing Blockchain for Business…

Shared, replicated, permissioned ledger



Problem

inefficient, expensive, vulnerable



Solution

A shared, replicated, permissioned ledger…

…with consensus, provenance, immutability and finality

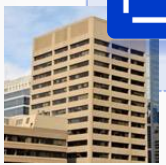
Participant A's records

Participant B's records

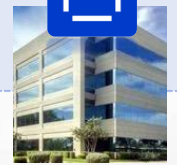
Bank records

Blockchain

Insurer records



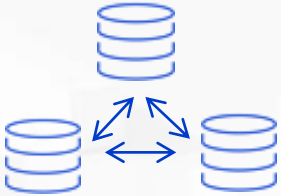
Regulator records



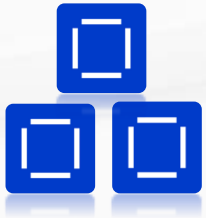
Auditor records

Traditional databases cannot be used in untrusted networks

- A traditional database is **centralized**
- Everyone needs to **trust** the administrator managing the database
- There's typically **no immutability or provenance**



- Distributed databases do not alleviate the **trust** issue
- There are now **more copies** to worry about and **more administrators**



- **Blockchain** allows the concept of a distributed database to be deployed across an **untrusted network**
- Something a traditional database cannot handle

Different types of blockchain

- All blockchains aim to provide irrefutable proof that a set of transactions occurred between participants

- Different types of blockchain exist:

  bitcoin is an example of an unpermissioned, public blockchain
  - The first blockchain application
  - Defines a shadow-currency and its ledger
  - Resource intensive

- Blockchains for business are generally permissioned and private, and prioritize
  - Identity over anonymity | Selective endorsement over proof of work | Assets over cryptocurrency

Requirements of blockchain for business

SHARED LEDGER

Participants decide which assets to share

IDENTITY

Participants know who they are dealing with

ENDORSEMENT

Participants give provable endorsement

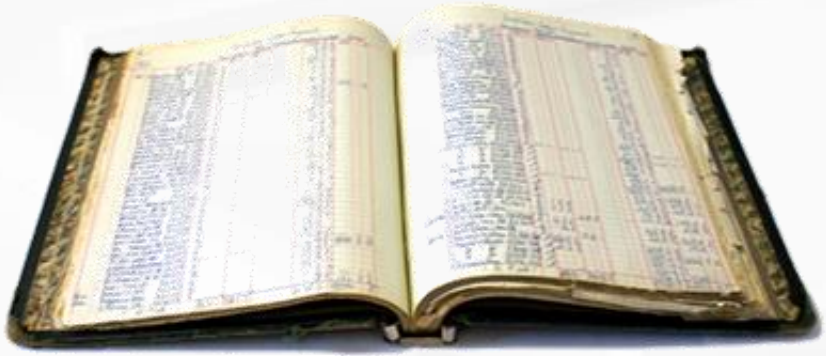
CONFIDENTIALITY

Information shared is need-to-know

Choosing what to share

The business network decides what to share on the ledger

- Assets are anything of value
  - On the blockchain, these are represented digitally using a pre-agreed format
- Transactions change the state of an asset and are provably recorded on the blockchain
  - e.g. transfer ownership, change color
- Transactions are underpinned by smart contracts
  - Verifiable business rules that cause the asset to change state



Identity

Knowing who you're dealing with

- Various regulations applied to businesses require them to know who they are dealing with
  - e.g. KYC, AML, CFT
- There are established methods for obtaining and asserting identity
  - Cryptography is central to these
- Identity allows transactions to be signed and encrypted

Transaction Endorsement

Provable endorsement by relevant participants

- Endorsement is the process in which a transaction is verified as “good”
  - Ensures that participants are happy to accept the transaction and prevents (e.g.) double spending
- Endorsement can be expensive in public blockchains
  - Without identity, transactions are thrown to the whole network for endorsement
  - Proof of work is particularly CPU intensive
- In the real world, transactions are endorsed by a smaller number of participants
  - e.g. sender bank, receiver bank, payments provider
  - Must be completed in an appropriate timeframe

Privacy and Confidentiality

Transaction visibility is need-to-know

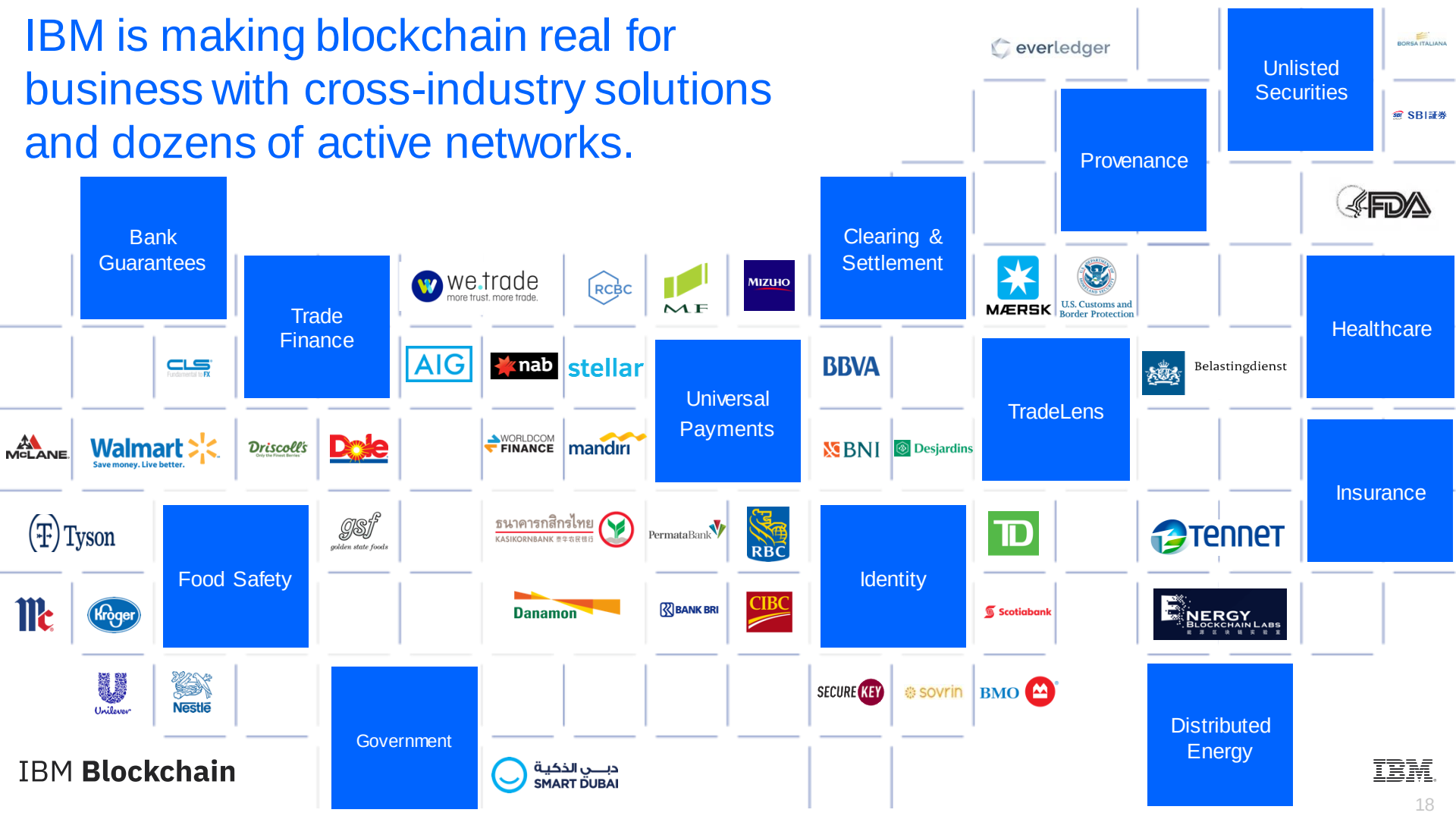
- Identity also gives us a mechanism to make the blockchain private and confidential
- Blockchain for business networks are generally private
  - And restricted to the scope of the business network
- Individual transactions are usually confidential
  - Transparency for regulator is critical
  - However visibility to some participants could give unfair advantage

What is Blockchain?

Example networks

How can IBM help?

IBM is making blockchain real for business with cross-industry solutions and dozens of active networks.



IBM **Blockchain**

Example: Food Trust

What?

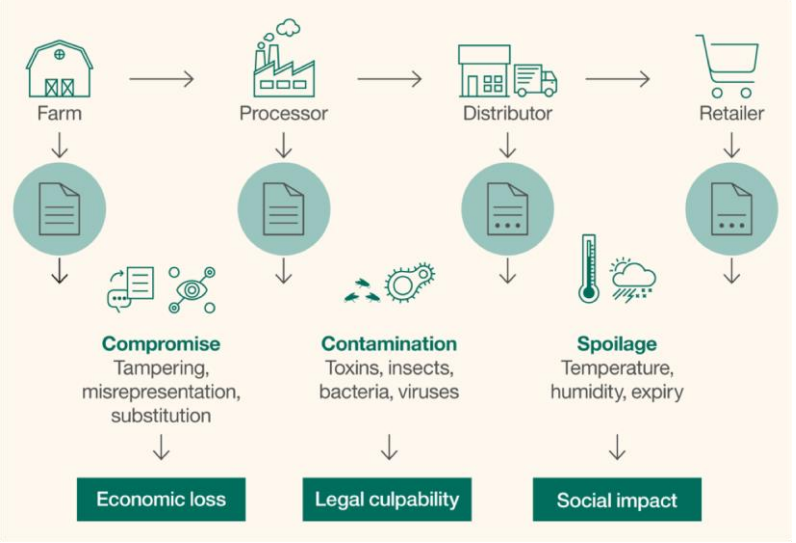
- IBM Food Trust is a set of modules providing traceability to improve food transparency and efficiency

How?

- Blockchain is used to create a trusted connection with shared value for all ecosystem participants, including end consumers.

Benefits

- Reduce impact of food recalls through instant access to end-to-end traceability data to verify history in the food network and supply chain.
- Help to address the 1 in 10 people sickened and 400,000 fatalities WW which occur every year from food-born illnesses.



Example: TradeLens

What?

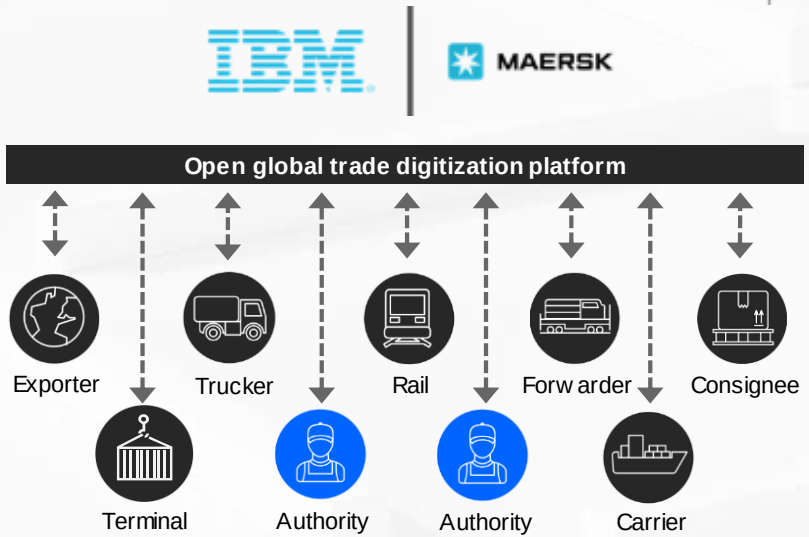
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

How?

- Providing Shared Visibility and Shared State for Container Shipments

Benefits

- Increase speed and transparency for cross border transactions through real time access to container events.
- Reduced cost and increased efficiency through paperless trade



Example: Trusted Identity

What?

- Sovrin pushes identity to the edge of the network
- Cryptographic, point to point exchange of identity
- Based on Hyperledger Indy technology

Benefits

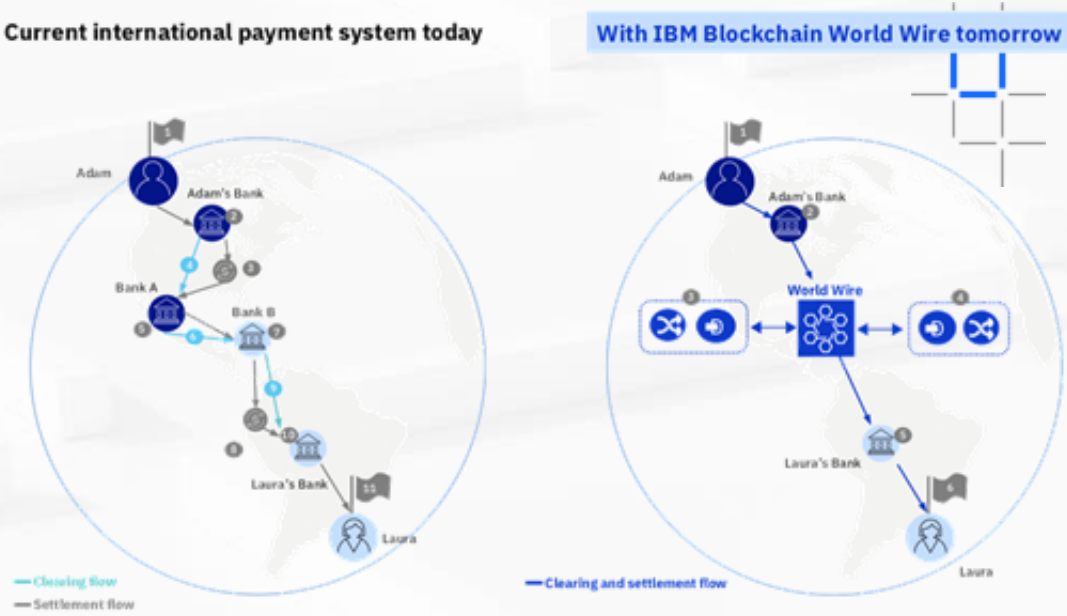
- A decentralized approach that establishes trust and puts the end user in control
- Every person, organization, and thing has a digital wallet to control the flow of their identity
- No PII is stored on the public ledger!

sovrin
identity for all

Example: World Wire

What?

- IBM Blockchain World Wire is an integrated network for real-time clearing and settlement.
- Allows banks and financial institutions to send and settle payments around the globe with finality in a matter of seconds
- Eliminates enduring challenges that have long hampered the cross-border payments industry.



Benefits

- Payment support regardless of size, origination, destination or asset type
- Higher visibility for streamlined transactions with reduced disputes and reconciliation needs
- Enhanced regulatory compliance through improved transparency
- Secure network with interaction and eligibility criteria as well as robust access controls

Further examples by (selected) industry

Financial	Public Sector	Retail	Insurance	Manufacturing
• Trade Finance • Cross currency payments • Mortgages • Letters of Credit	• Asset Registration • Citizen Identity • Medical records • Medicine supply chain	• Supply chain • Loyalty programs • Information sharing (supplier – retailer)	• Claims processing • Risk provenance • Asset usage history • Claims file	• Supply chain • Product parts • Maintenance tracking

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 product and business process, or a new business process for an existing product

What is Blockchain?

Example networks

How can IBM help?

The certainty to solve business challenges together.

Security at Scale

Enterprise-grade security and control on a platform where businesses and industries are reinventing themselves

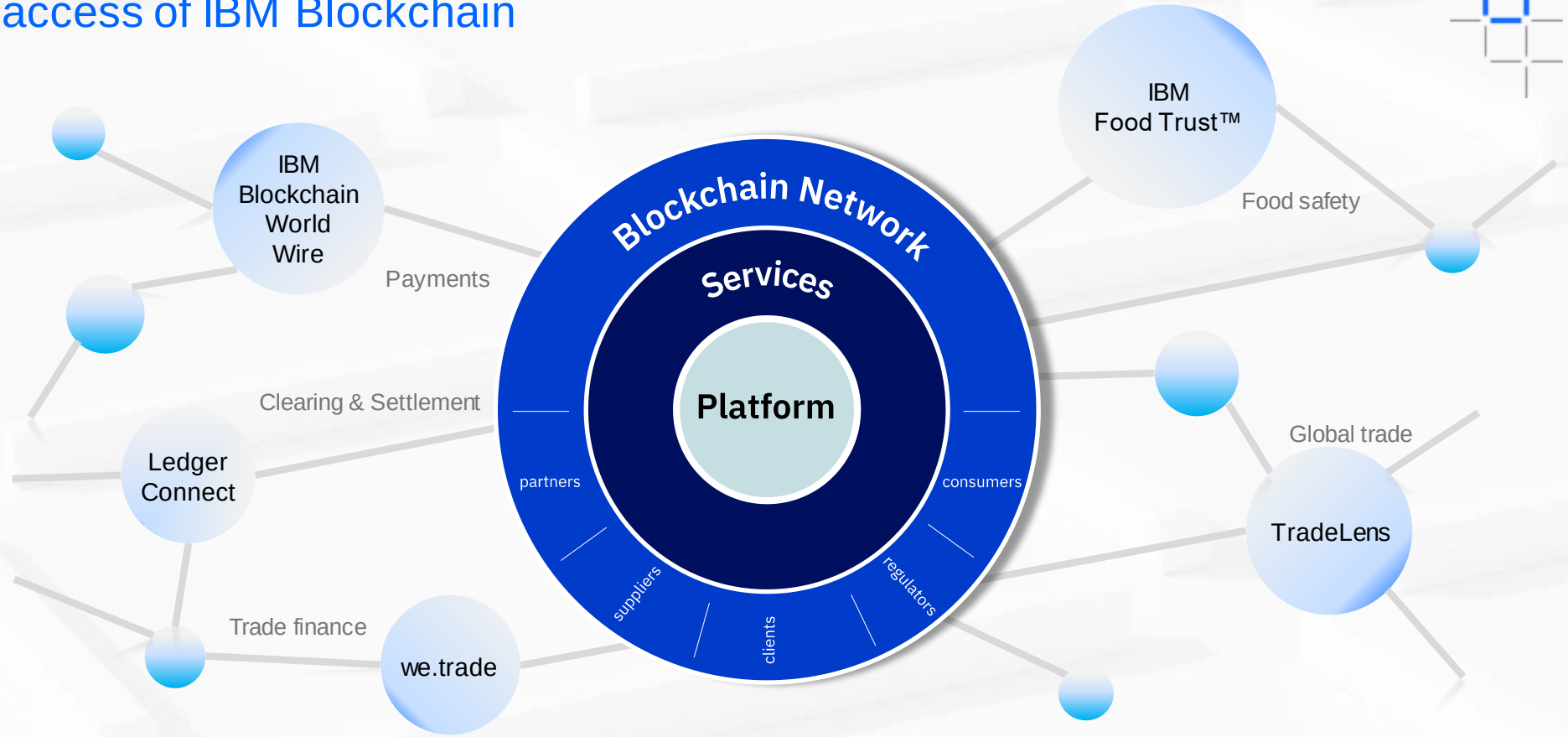
Trusted Expertise

Reinventing business processes through unrivaled industry and technical knowledge as you start, accelerate and innovate your blockchain network.

Network Convening Power

Bringing together an expansive partner network of innovators, regulators and suppliers to establish, join or run your blockchain network.

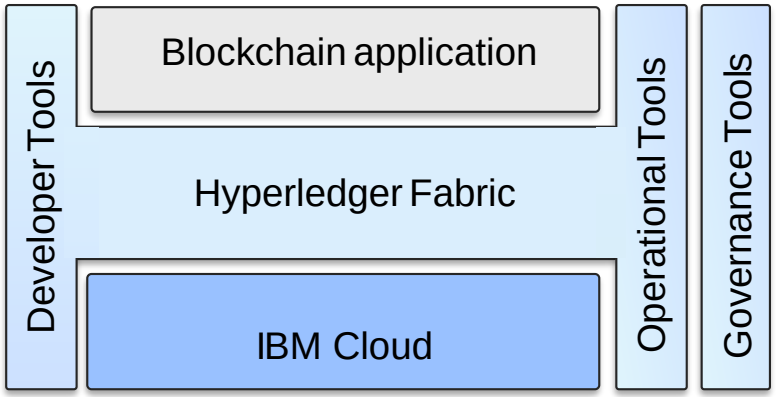
Leverage the unrivaled technology, expertise and access of IBM Blockchain



Introducing the IBM Blockchain Platform

IBM Blockchain Platform is a fully integrated enterprise-ready blockchain platform designed to accelerate the development, governance, and operation of a multi-institution business network

- Developer tools that will make use of Hyperledger Fabric SDK, to quickly build your blockchain application
- Hyperledger Fabric also provides the ledger, which is managed through a set of intuitive operational tools
- Governance tools for democratic management of the business network
- Flexible deployment options, including a highly secure and performant IBM Cloud environment



IBM Blockchain Platform Explained

Hyperledger: A Linux Foundation project

- IBM Blockchain Platform is underpinned by technology from the Hyperledger project
- Hyperledger is a collaborative effort created to advance cross-industry blockchain technologies for business
- Founded February 2016; now more than **270 member organizations**
- Open source
  Open standards
  Open governance model

Premier

Associate

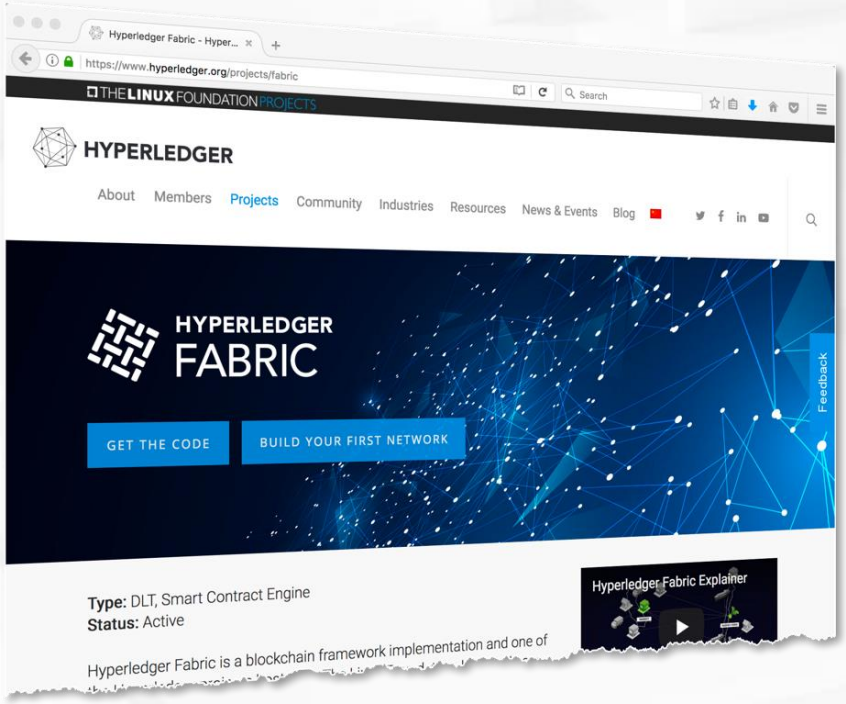
General

Academia Associate

Source: https://www.hyperledger.org/members
Updated: 4 October 2018

IBM **Blockchain**

Distributed ledger



- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.2 released July 2018
  - Includes significant confidentiality and service discovery improvements
- IBM is one of the many contributing organizations

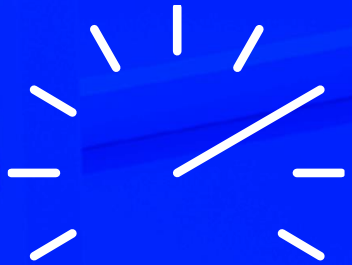
Fabric Explored

Get started on your blockchain journey

Start

Create or Join a network
Prioritize the best use cases and networks for your business, and rapid development of a minimum viable network in 12 weeks or less.

Accelerate



Commercialize your network
Apply proven frameworks & expertise to address complex legal/ governance & operational challenges, & deliver a production network.

Innovate

Extend a network
Build business models & new applications through the integration with established networks & advanced technologies.

Thank you

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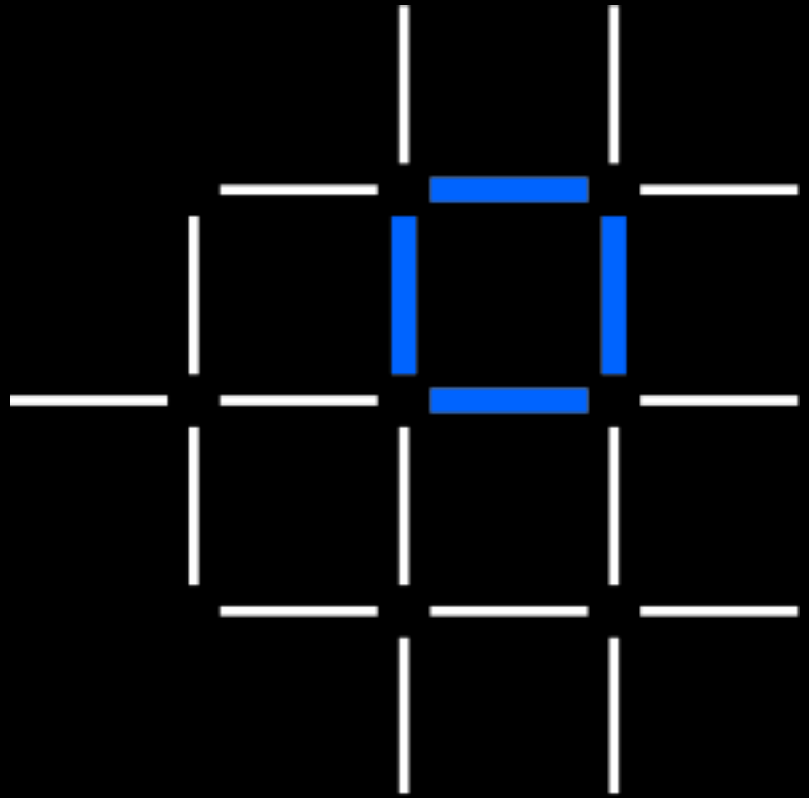

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