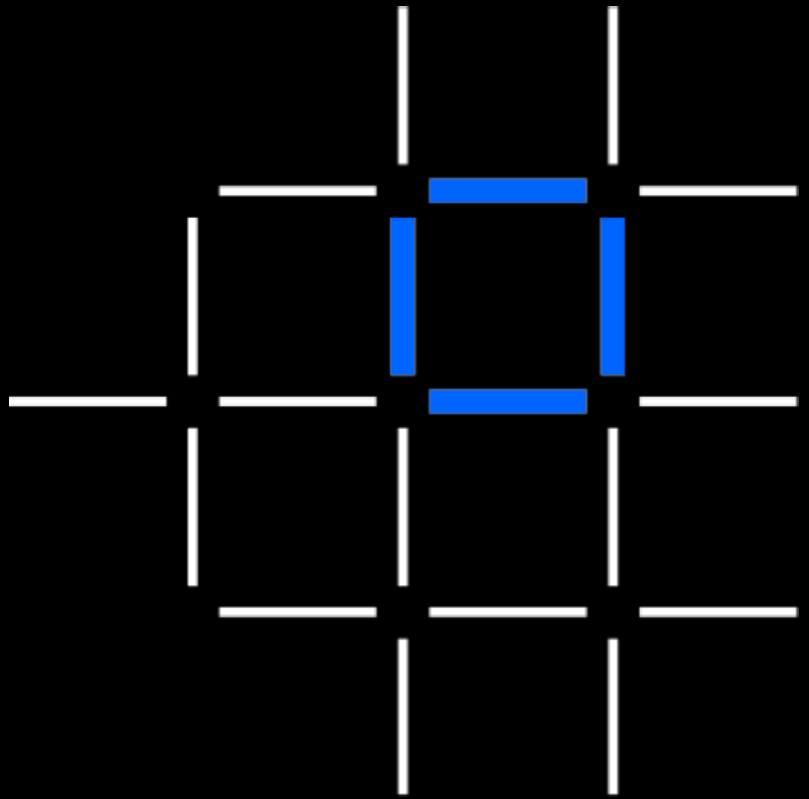
Blockchain Explained

An Introduction to Blockchain for Business



Austin Grice

January 2020

IBM **Blockchain**

IBM

What is Blockchain

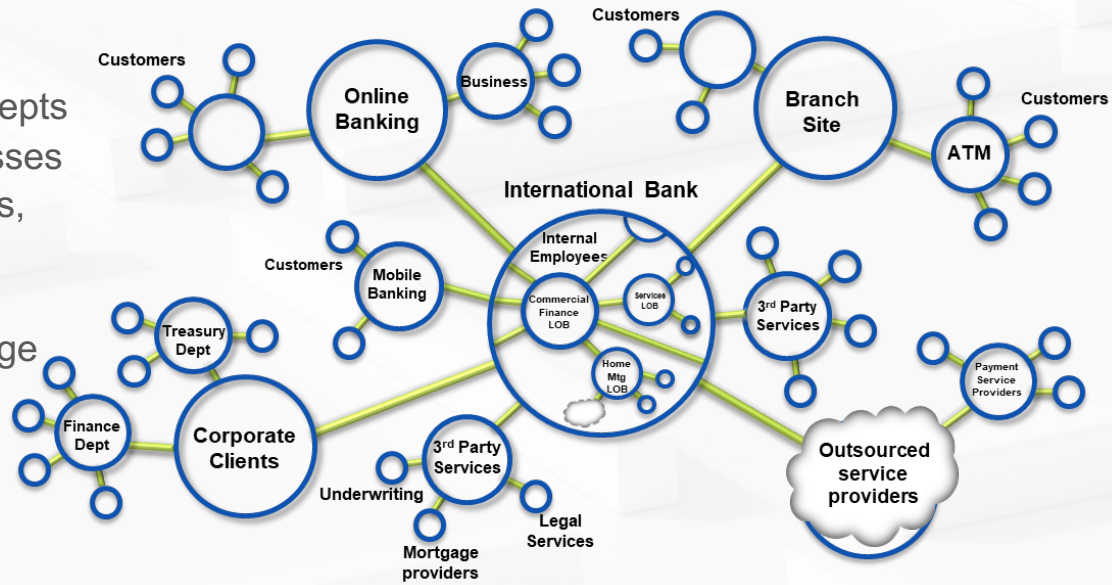
Example Networks

How IBM Can Help

What is **blockchain?**

- Blockchain lets you build a decentralized **business network**

- Blockchain builds on basic business concepts
  - **Business networks** connect businesses
  - **Participants** are customers, suppliers, banks, partners
  - **Assets** flow over business networks
  - **Transactions** describe asset exchange
  - **Contracts** underpin transactions
  - The **ledger** is a log of transactions



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. data

Cash is also an asset

- Property of anonymity
- Hard to prove and track

Ledgers, Transactions and Contracts

- Ledger: an important **log** of all transactions
  - Describes the inputs and outputs of the business
- Transaction: an **asset transfer** between participants
  - Matt gives a car to Dave (simple)
- Contract: the **conditions** for a transaction to occur
  - If Dave pays Matt money, then car passes from Matt to Dave (simple)
  - If car won't start, funds do not pass to Matt (as decided by third party arbitrator) (more complex)

- *How do I know that the transaction I see is the same as the transaction you see?*
- *How do I know that the contract - the business rules associated with the transaction - are interpreted and implemented consistently between us?*
- Significant costs of reconciliation, dispute resolution and legal processes

Blockchain aims to solve the problems of ledgers and contracts

by allowing transactions and business rules to be **shared** between participants of the network

Shared Ledger

Distributed system of record, shared across business network. Replicated and synchronized ledger with no central administrator

Privacy

Ensuring appropriate visibility; transactions are secure, authenticated & verifiable

Smart Contract

Provides the shared implementation of the business rules associated with each transaction

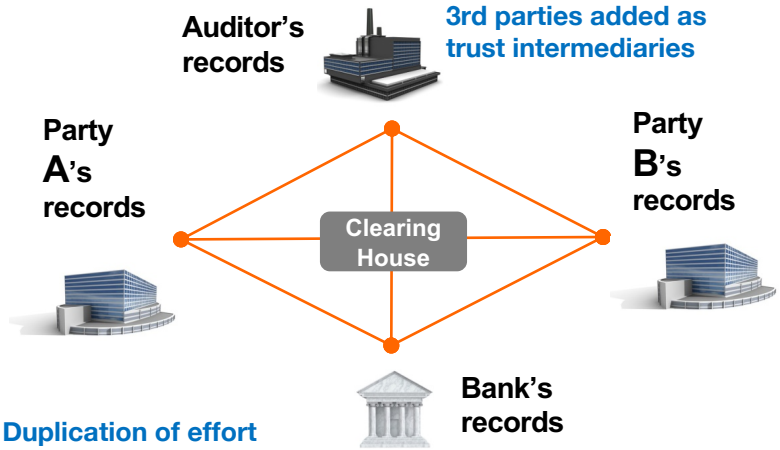
Consensus

Appropriate parties agree to valid transactions

This sharing is the foundation for innovative business solutions, including the ability to remove ambiguity and friction from trade

Broader participation, lower cost, increased efficiency

Traditional

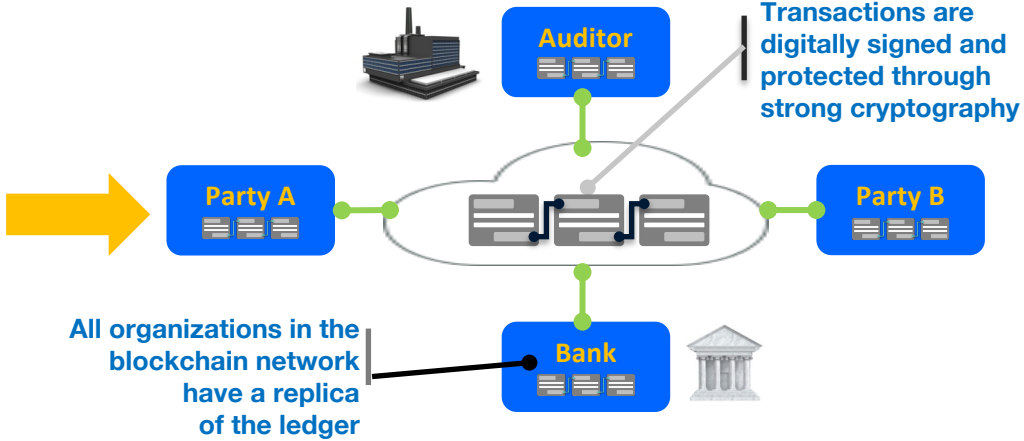


Transaction fees – Cost, Time
Data exposure - Security
Centralized entities - Risk
No central source of information - Truth

…inefficient, expensive, vulnerable

With Blockchain

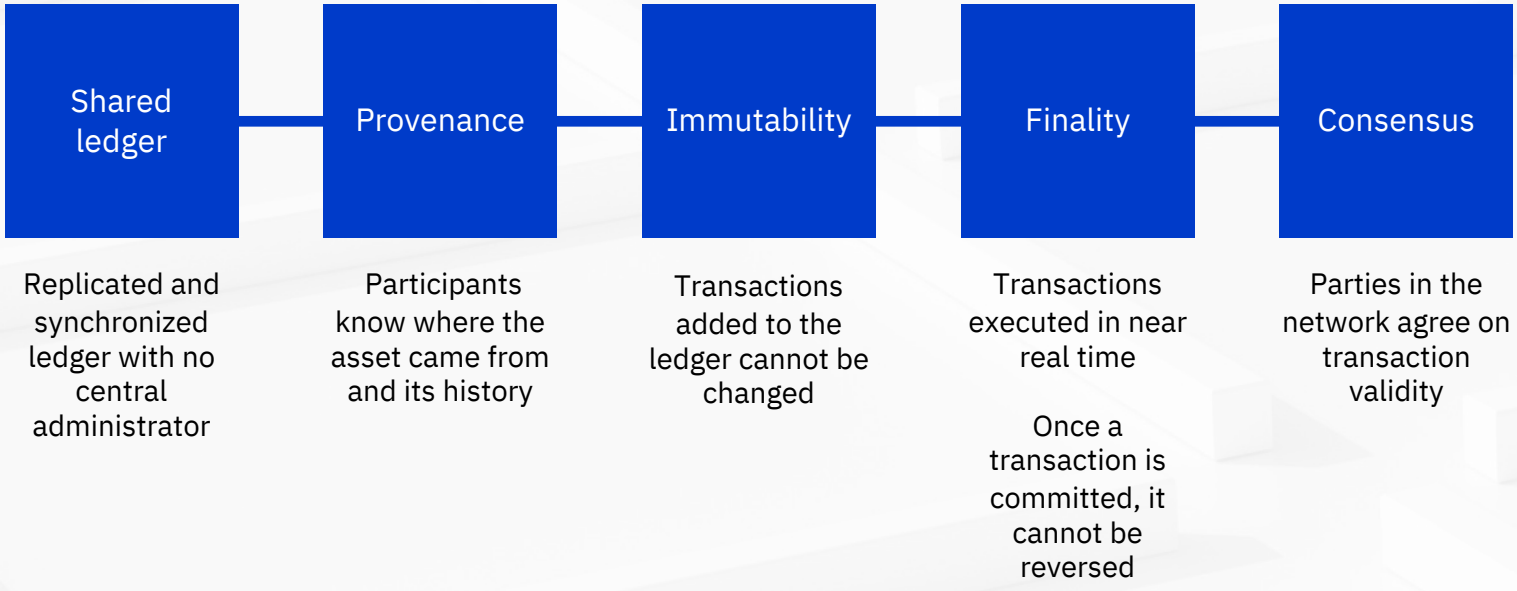
A shared, replicated, permissioned ledger



…provenance, immutability, finality

Blockchain is a shared, replicated, permissioned ledger

*Permissioned blockchains bring **trust** to business networks through consensus, provenance, immutability and finality*



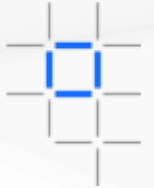
Different types of blockchain

bitcoin is an example of an unpermissioned, public ledger:

- The first blockchain application
- Peer to Peer electronic cash system
- Resource intensive

- Blockchains for business generally prioritize
  - **Assets** over cryptocurrency; **Identity** over anonymity; **Selective endorsement** over proof of work

Two Types of Blockchain



	Private/Permissioned	Public/Unpermissioned
Who?	Known invited parties	General public, unknown
Consensus	Selective Endorsement	Proof of Work/Stake
What is transferred?	Assets	Currency
Examples	Hyperledger Fabric	Bitcoin, Ethereum

Requirements of **blockchain for business**

ASSETS

Participants decide which assets to share

IDENTITY

Participants know who they are dealing with; information shared is need-to-know

ENDORSEMENT

Participants give provable endorsement

Example Networks

Only 1 in 4 consumers trust today's food ecosystem.

Food Safety

1 out of 10
people get sick each year, and **420,000** die from foodborne illness

Supply Chain Inefficiency

80%
of CPGs business are partially or entirely paper-based

Food Waste

1 / 3
of fresh food is thrown out because it is considered unacceptable

Food Fraud

1 in 5
seafood samples is mislabeled worldwide

(43% mislabeled in NYC)

The root of these issues, and many others, are the lack of trust and transparency

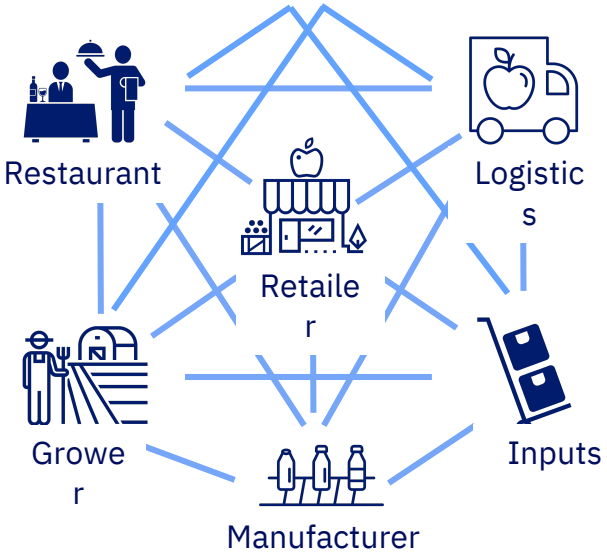
Sources: World Health Organization, Gravitas Study, FAO of UN, Oceana

Today, traditional system constructs limit transparency

The Problem:

- **Data is siloed** within each company and accessing it requires a request and time
- Exchange of information takes place between a pair of partners; to get information from a distant partner may require **intermediaries** time, resources
- Most transactions are still **paper-based**, creating inefficiencies and opportunities for fraud
- Because everyone maintains their own record of transactions, **differences** take time and resources to reconcile

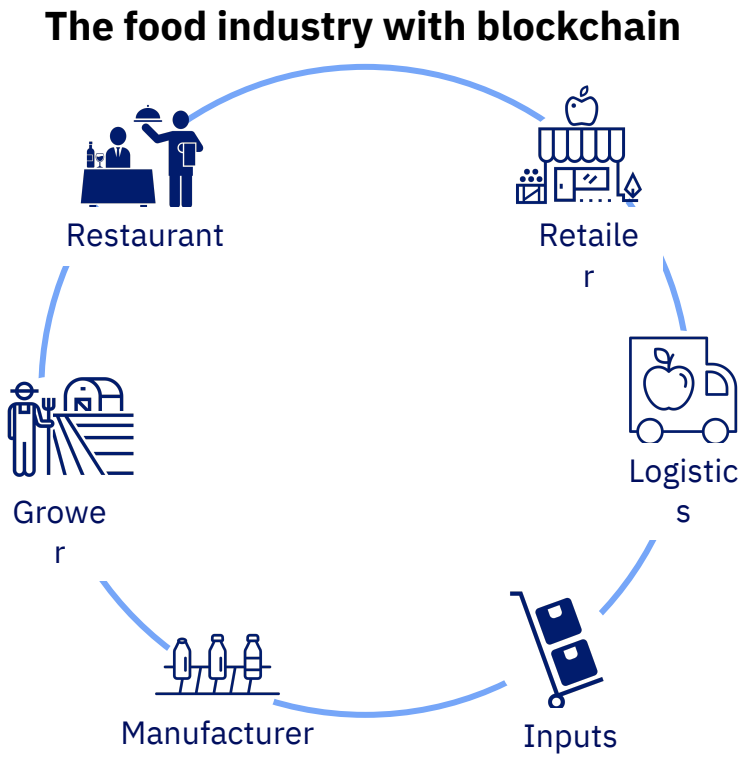
The food industry today



Blockchain transforms systems with trust and transparency

The Solution:

- Blockchain provides an **independent data-sharing platform**
- Once data is shared in a single data-sharing platform, everyone has **instant transparency** into the transactions they are authorized to view; no intermediation required
- **Data immutability** creates an auditable record of all transactions, disincentivizing fraudulent behavior
- **Dispute resolution** from the shared ledger can be automated saving time and resources



Built on a blockchain platform, IBM Food Trust offers industry-specific functionality targeted at key pain points

Trace

– Trace the location and status of food products upstream and downstream across the supply chain

Certifications

Enable reliability and accountability with instant access to digitized records and documents

Fresh Insights

Access real-time and aggregate supply chain data to extend product freshness and shelf life

Third-party

Partner to expand functionalities and deliver new value across the food system through our APIs

Capabilities

APIs can be used to retrieve platform data to create new applications for internal and consumer facing applications

Blockchain Technology

Food Supply Ecosystem

Information-sharing Platform

IBM Blockchain Platform

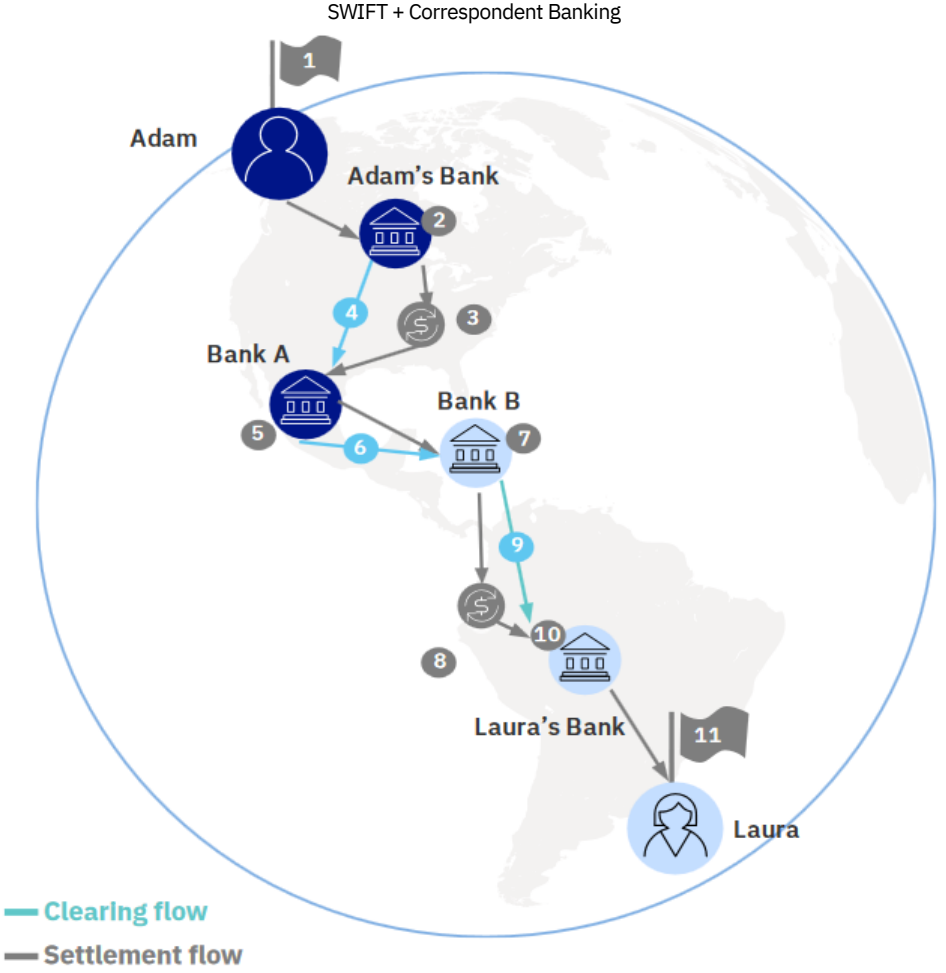
Hyperledger Fabric

Cross-border payments today remain costly, complex and slow

Limited end-to-end transparency, fee opacity & delivery uncertainty

The Challenges

- Slow: Current international payments systems rely heavily on **coordination between several counterparties** exchanging both information and value, taking **days** or **even weeks to complete** transactions.
- Costly: **Reconciliation**, regulatory **compliance**, foreign exchange and the cost of trapped **liquidity** in correspondent banking accounts are a few factors that continue to **inflate** the true cost of cross-border payments.
- Limited Transparency: The involvement of multiple intermediaries creates a **complex** web of procedures and **hinders the end-to-end visibility** of cross-border payments – often resulting in **error-prone** and faulty transactions that must be reconciled later. Parties are also rarely aware of where exactly fees are deducted along the way.
- Complicated: Privacy and security concerns have given rise to new, often **competing regulatory requirements**, creating a **barrier** for payment processing in certain regions, **cutting off** high-potential emerging markets from participating in the global economy.



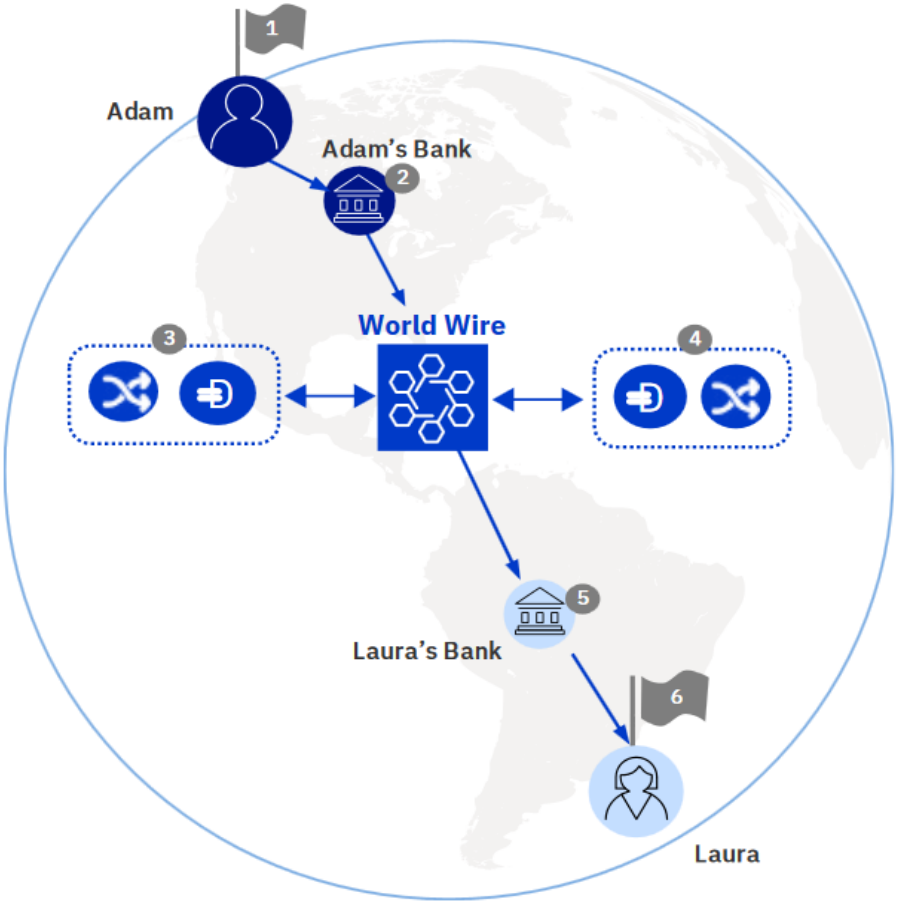
World Wire simplifies clearing & settlement to streamline cross-border payments

Faster, Cheaper & More efficient

World Wire targets industry pain points

- Clear & Settle Faster: Near **real-time clearing and settlement** reduces a process that traditionally takes 2-10 days, to mere **seconds**.
- Reduce Costs: Costs per transaction are reduced – this includes the removal and reduction of correspondent banking fees, capital requirements, regulatory costs, and reconciliation costs – allowing for **improved capital efficiency**.
- Increase Transparency: Financial institutions receive unprecedented **end-to-end transparency** of a payment from initiation through receipt by the receiving financial institution – **reducing the occurrence of disputes** and need for reconciliation.
- Build Trust: The use of distributed ledger technology creates the irrevocable and irrefutable audit trail of transactions, **enhancing regulatory reporting** capabilities and easing compliance concerns, while also **removing barriers of entry** for Financial Institutions entering **new markets**.

International Payments with World Wire

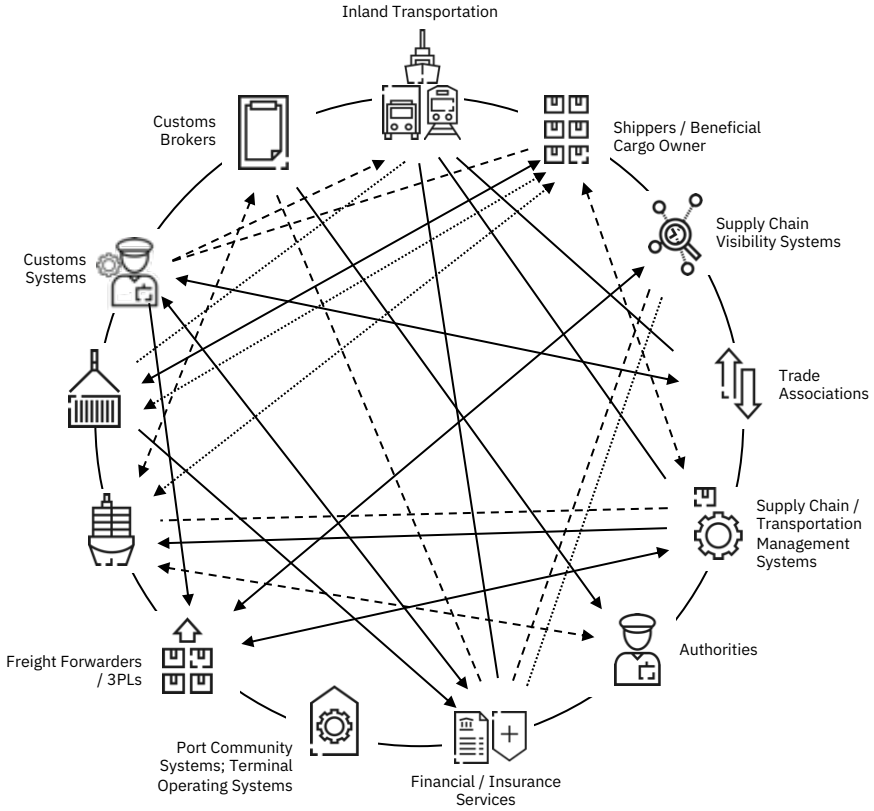


Clearing and settlement flow

TradeLens improves global trade efficiency

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

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



Decentralized trusted identity

Personally manage your digital IDs online with the Sovrin Network – an open source project creating a global public utility for self-sovereign identity

- Pushes identifies to the edge of the network frictionless, secure identity verification of self-sovereign identity. It's time to evolve the current system of siloed identities, endless passwords, and insecure databases.
- The Sovrin Network is the new standard for digital identity – designed to bring the trust, personal control, and ease-of-use of analog IDs – like driver's licenses and ID cards – to the Internet.
- Cryptographic, point to point exchange of identity - Every person, organization, and thing has a digital wallet to control the flow of their identity
- Based on Hyperledger Indy technology

sovrin
identity for all

HYPERLEDGER
INDY

Further examples by (selected) industry

Financial

- Trade Finance
- Cross currency payments
- Mortgages
- Letters of Credit

Public Sector

- Asset Registration
- Citizen Identity
- Medical records
- Medicine supply chain

Retail

- Supply chain
- **Loyalty programs**
- Information sharing (supplier – retailer)

Insurance

- Claims processing
- Risk provenance
- Asset usage history
- Claims file

Manufacturing

- Supply chain
- Product parts
- Maintenance tracking

How IBM Can Help

How **IBM can 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

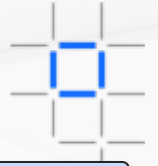
Trusted Expertise

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.

IBM's end-to-end **Blockchain Strategy**



Services

Collaborate with services teams from ideation all the way to production

Ecosystem

Tap into our diverse ecosystem to develop strategic partnerships and create your competitive advantage

Solutions

Solve critical industry challenges by building and joining new business networks and applications

IBM **Blockchain Platform**

Build, operate and grow blockchain networks in heterogeneous environments

HYPERLEDGER

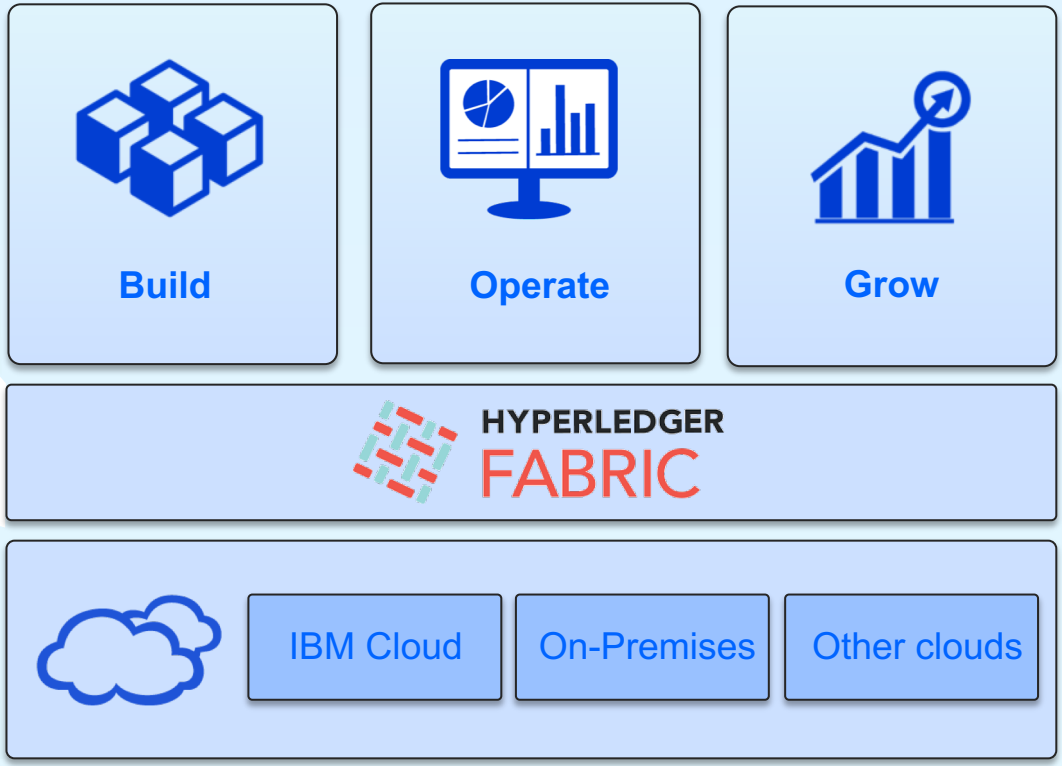
A founding, premier member of Hyperledger, IBM is committed to open source, standards & governance

IBM **Blockchain Platform**

Advanced tooling
allows you to quickly build, operate and grow blockchain networks

Open technology
uses the popular Hyperledger Fabric distributed ledger

Deploy anywhere
fully managed, or flexible deployment on-premises or on other cloud vendors



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 **280 member organizations**
- Open source
  Open standards
  Open governance model

Source: https://www.hyperledger.org/members
Updated: 11 September 2019

Premier

Associate

General

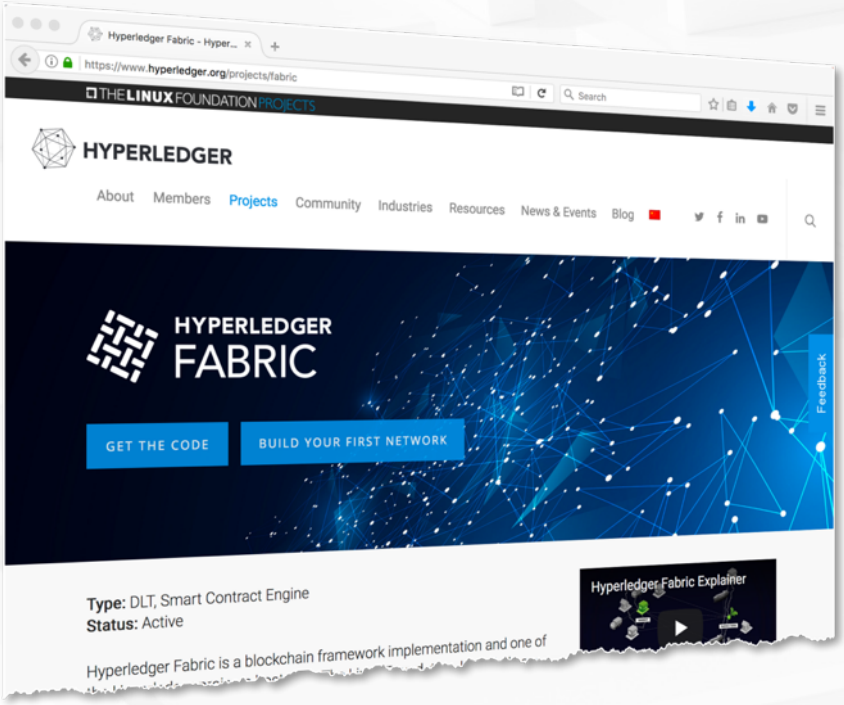
Academia Associate

General

IBM **Blockchain**

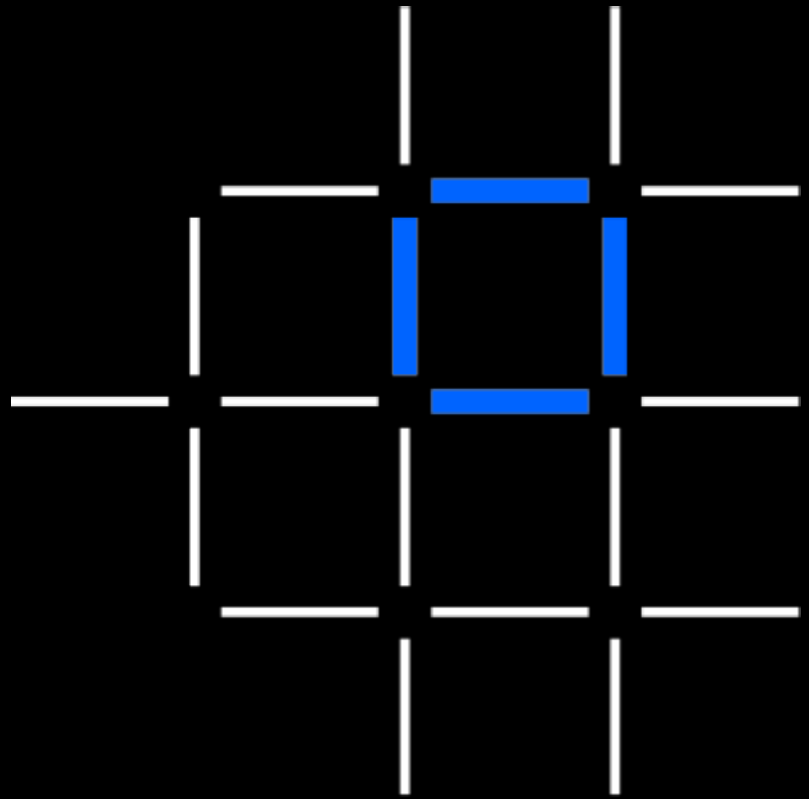
HYPERLEDGER FABRIC

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.
- V1.4.4 released in November 2019
  - V1.4 Long Term Service release with emphasis on production operational and serviceability enhancements; new programming model abstractions for ease of development
  - V2.0 beta is out now
- IBM is one of the many contributing organizations

Thank you



Questions? Tweet us or go to ibm.com/blockchain

@IBMBlockchain

IBM Blockchain

IBM Blockchain