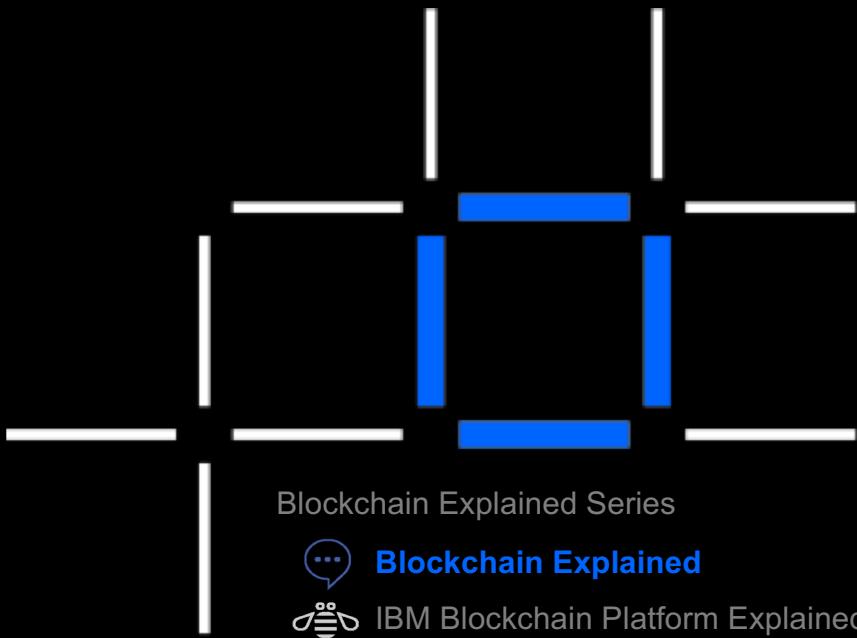


# Blockchain Explained

An Introduction to Blockchain for Business



Blockchain Explained Series

- [Blockchain Explained](#)
- IBM Blockchain Platform Explained
- Solutions Explained
- Garage Explained
- Next Steps

V5.12, 18 July 2018

IBM Blockchain

IBM



What is Blockchain?



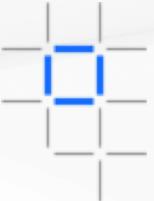
Example networks



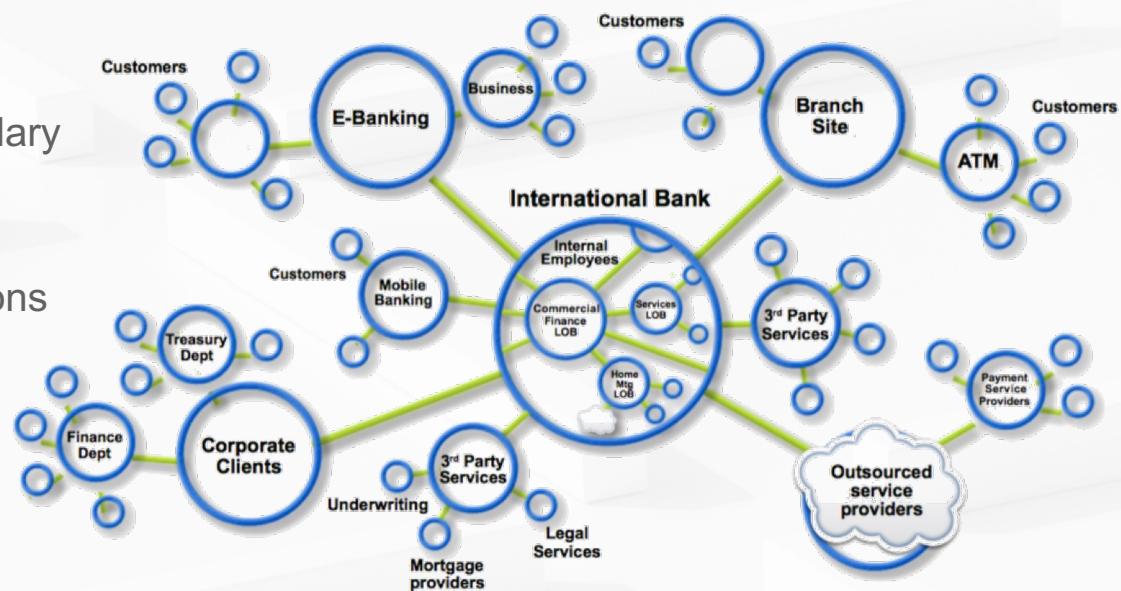
How can IBM help?



# Business networks, wealth and markets

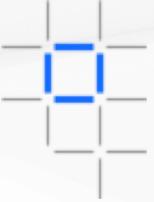


- **Business Networks** benefit from connectivity
  - Participants are customers, suppliers, banks, partners
  - Cross geography and regulatory boundary
- **Wealth** is generated by the flow of goods and services across business network in transactions and contracts
- **Markets** are central to this 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

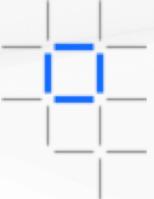
## Intangible assets subdivide

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

## Cash is also an asset

- Has property of anonymity

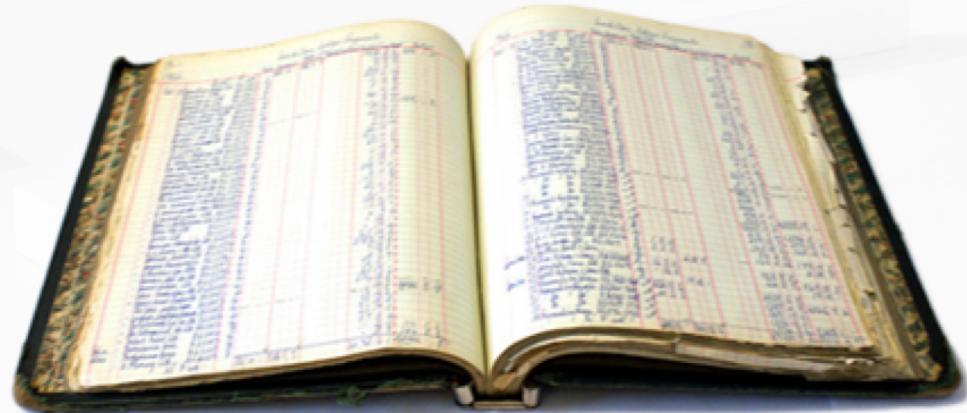
# Ledgers are key



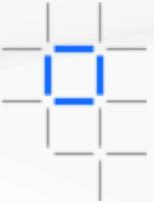
Ledgers are THE system of record for a business.

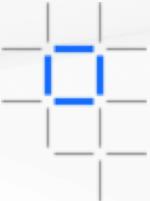
Businesses will have multiple ledgers for the multiple business networks in which they participate.

- **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)



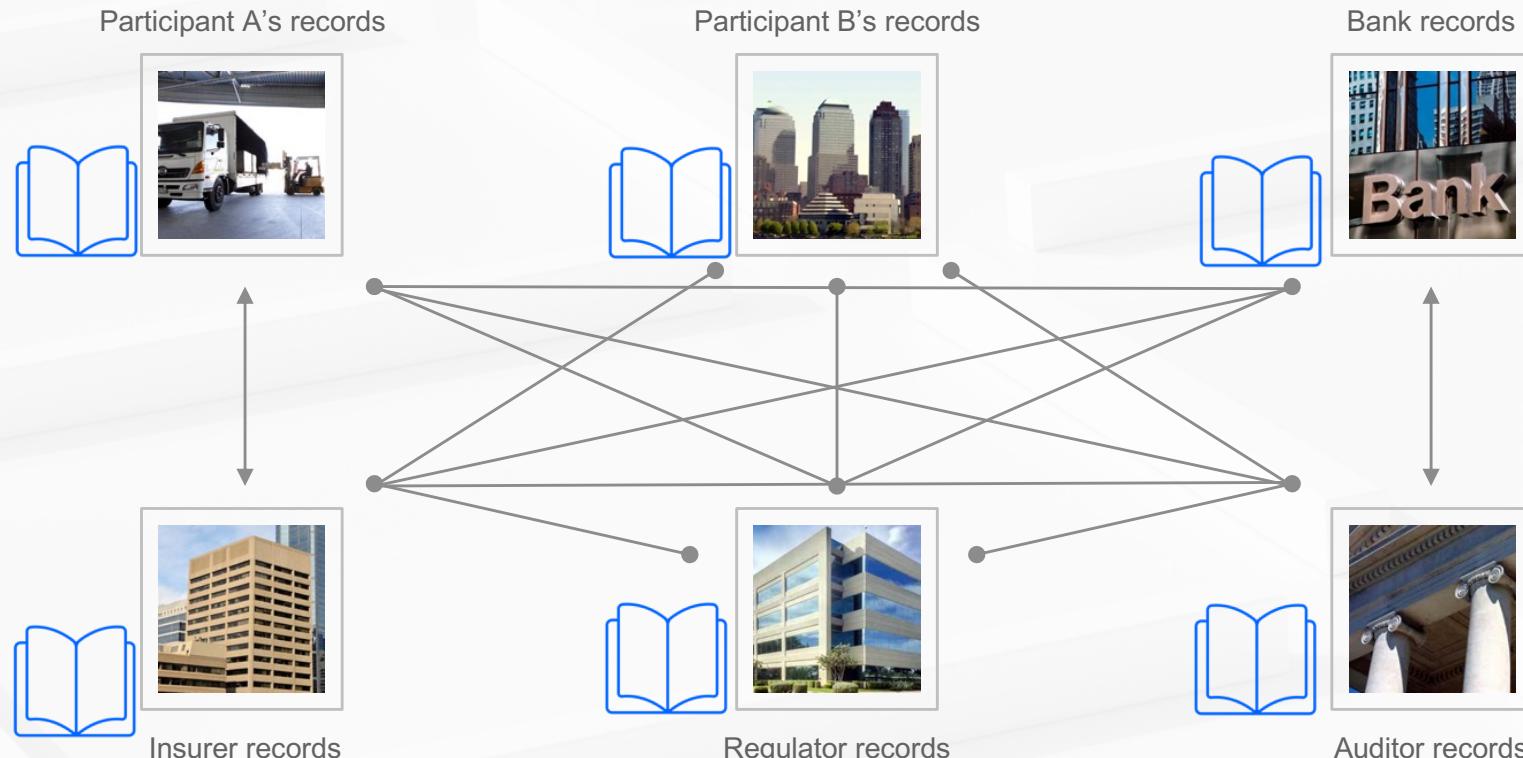
# Introducing Blockchain for Business...





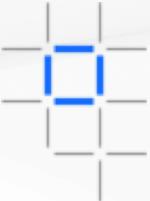
# Problem

## inefficient, expensive, vulnerable

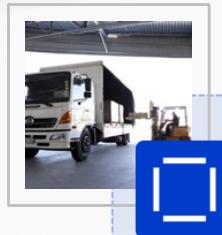


# Solution

A shared, replicated, permissioned ledger...  
...with consensus, provenance, immutability and finality



Participant A's records



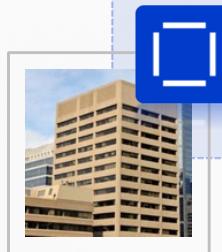
Participant B's records



Bank records



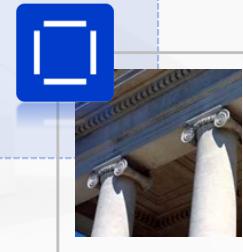
## Blockchain



Insurer records

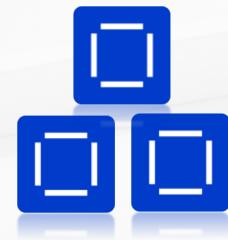
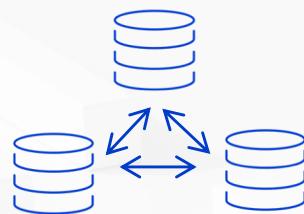
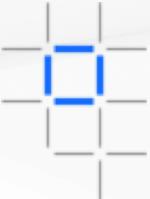


Regulator records



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:



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



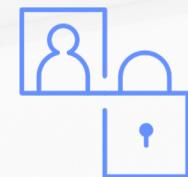
## IDENTITY

Participants know who they are dealing with



## ENDORSEMENT

Participants give provable endorsement



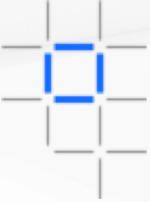
## CONFIDENTIALITY

Information shared is need-to-know

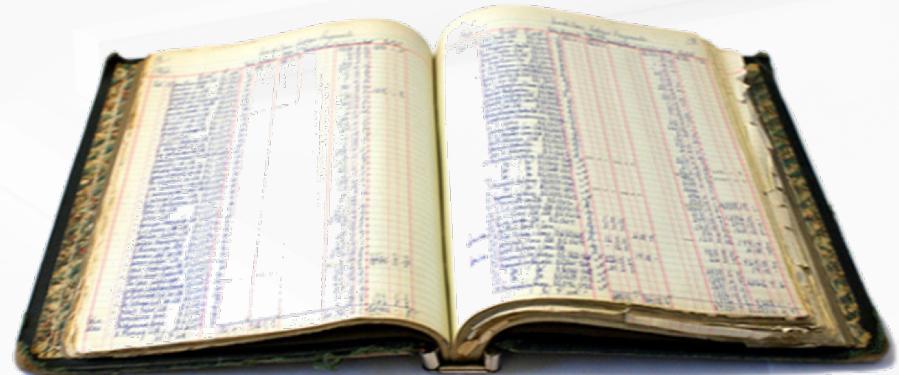


## Choosing what to share

*The business network decides what to share on the ledger*



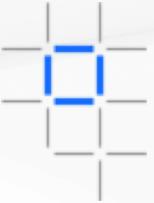
- **Assets** are anything of value
  - On the blockchain, these are represented digitally using a pre-agreed format
- **Transactions** change the state of an asset and are provably recorded on the blockchain
  - e.g. transfer ownership, change color
- Transactions are underpinned by **smart contracts**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





# Identity

*Knowing who you're dealing with*



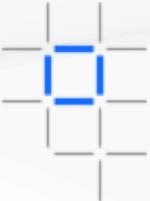
- Various regulations applied to businesses require them to know who they are dealing with
  - e.g. KYC, AML, CFT
- There are established methods for obtaining and asserting identity
  - Cryptography is central to these
- Identity allows transactions to be **signed** and **encrypted**





# 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?

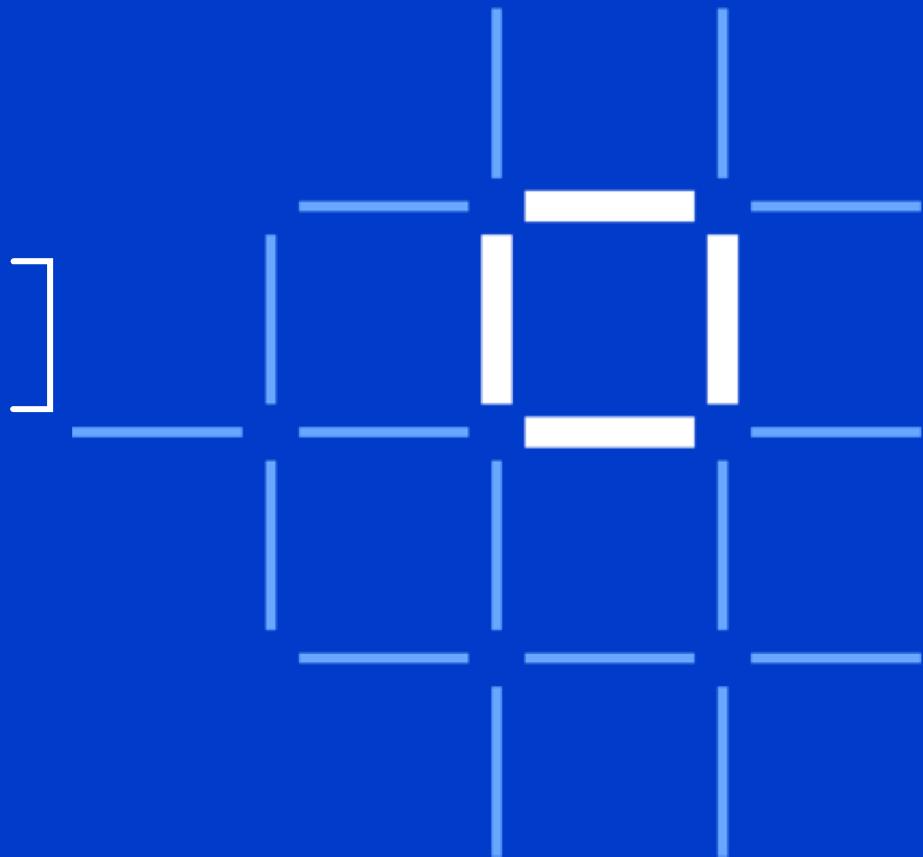


Example networks



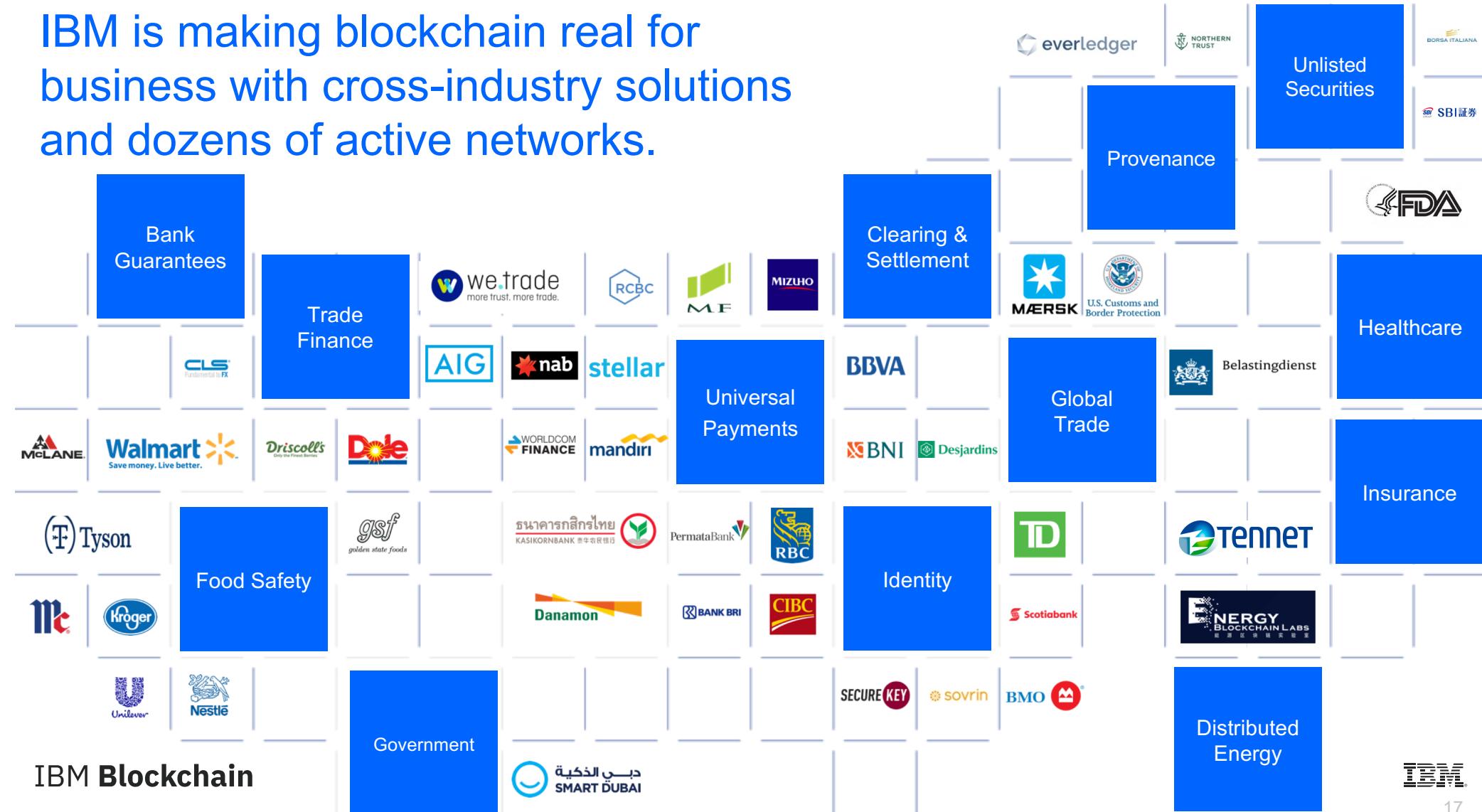
How can IBM help?

IBM Blockchain



IBM

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



IBM Blockchain

# Example: Food Trust

## What?

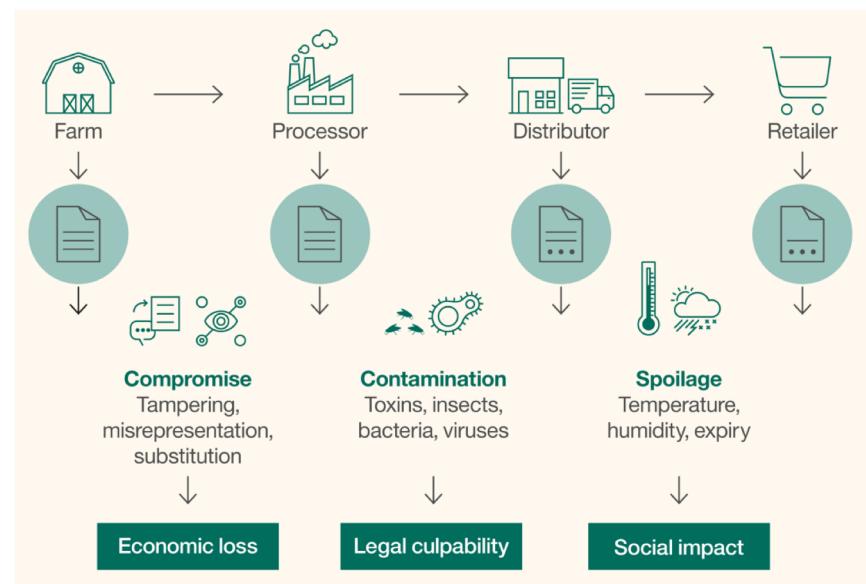
- Provide a trusted source of information and traceability to improve transparency and efficiency across the food network.

## How?

- Shared ledger for storing digital compliance documentation, test results and audit certificates network.

## 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.



IBM Blockchain

IBM

# Example: Global Digitized Trade

## What?

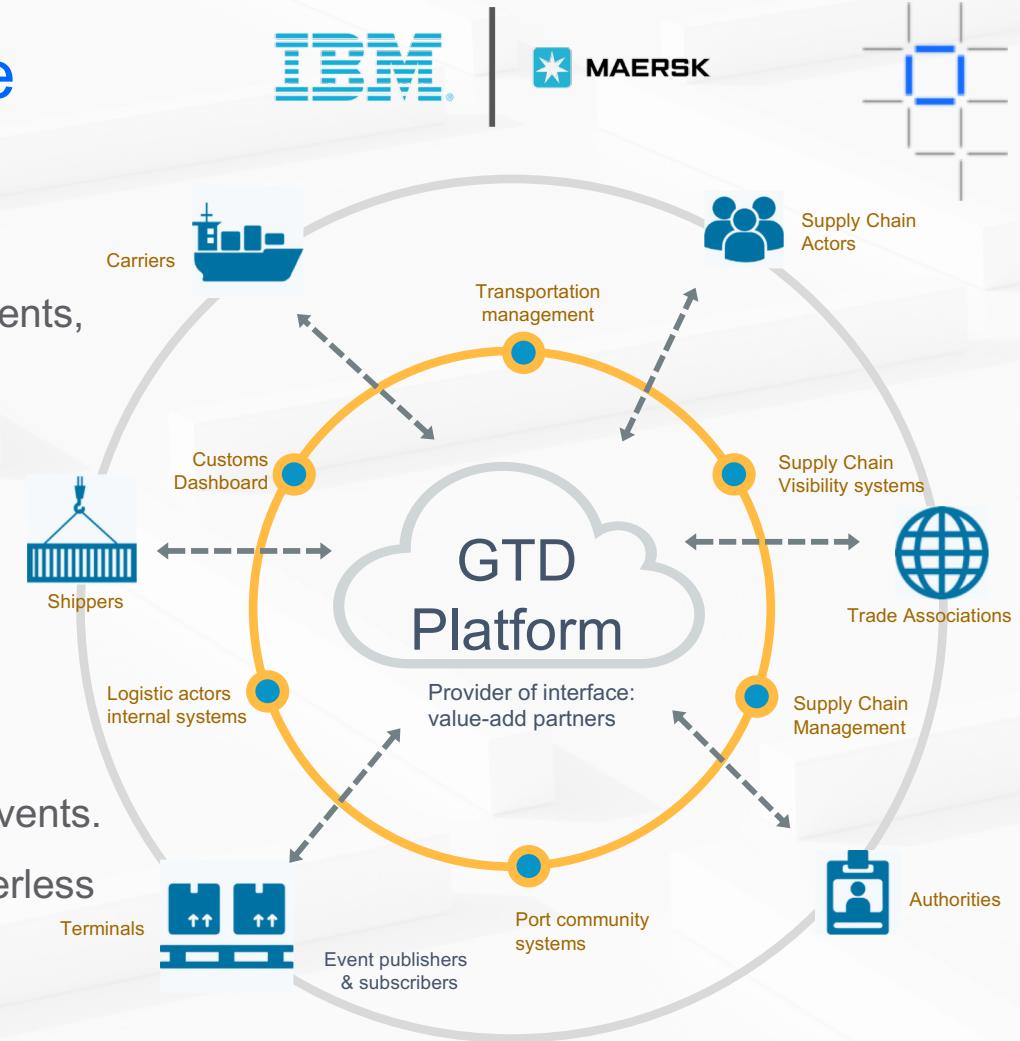
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

## How?

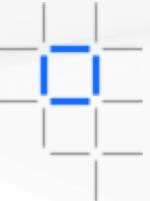
- Providing Shared Visibility and Shared State for Container Shipments

## 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?

- New experience for consumers to effortlessly sign-on to digital services, while remaining in control of their identity attributes.

## How?

- No central database or identity honeypots
- No central point of failure
- “Triple Blind” data sharing – PRIVACY

## Benefits

- Institutions that participate in an ecosystem benefit with increased customer satisfaction, reduced risk in identity theft, and new revenue sources to institutions



# Example: Global Payments

## What?

- IBM World Wire is a universal rail for real-time clearing and settlement on an integrated Blockchain network

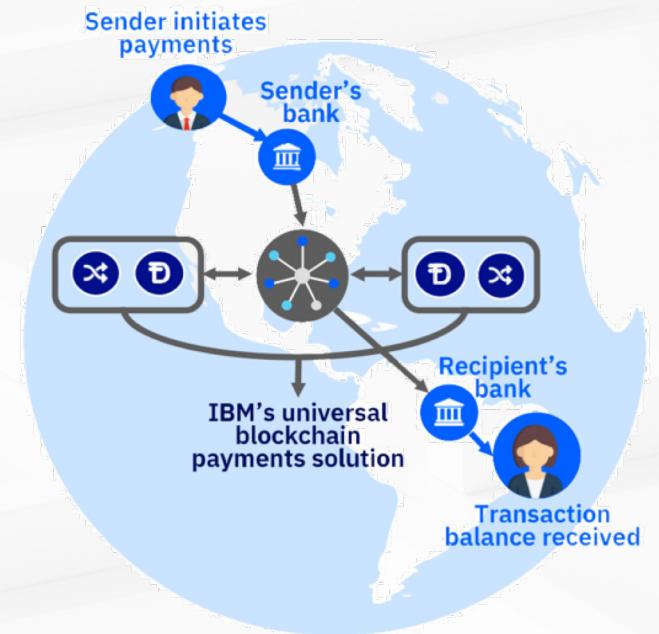
## How?

- Collaboration between IBM and technology partners Stellar.org and KlickEx Group
- Initial participants include over 13 financial institutions

## Benefits

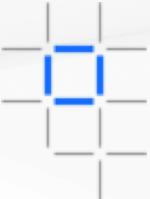
- Create secure, high volume, low-cost cross-border payments services without sacrificing margins
- Access new markets and currencies with limited risk
- Generate new sources of revenue with value-added products and services
- Aim: near real-time international payments

## IBM Blockchain



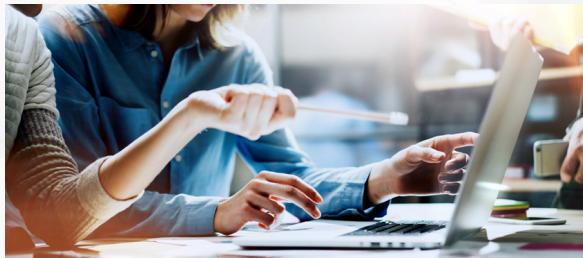
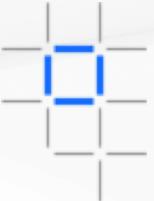
IBM

# Further examples by (selected) industry



Financial	Public Sector	Retail	Insurance	Manufacturing
<ul style="list-style-type: none"><li>• Trade Finance</li><li>• Cross currency payments</li><li>• Mortgages</li><li>• Letters of Credit</li></ul>	<ul style="list-style-type: none"><li>• Asset Registration</li><li>• Citizen Identity</li><li>• Medical records</li><li>• Medicine supply chain</li></ul>	<ul style="list-style-type: none"><li>• Supply chain</li><li>• Loyalty programs</li><li>• Information sharing (supplier – retailer)</li></ul>	<ul style="list-style-type: none"><li>• Claims processing</li><li>• Risk provenance</li><li>• Asset usage history</li><li>• Claims file</li></ul>	<ul style="list-style-type: none"><li>• Supply chain</li><li>• Product parts</li><li>• Maintenance tracking</li></ul>

# 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



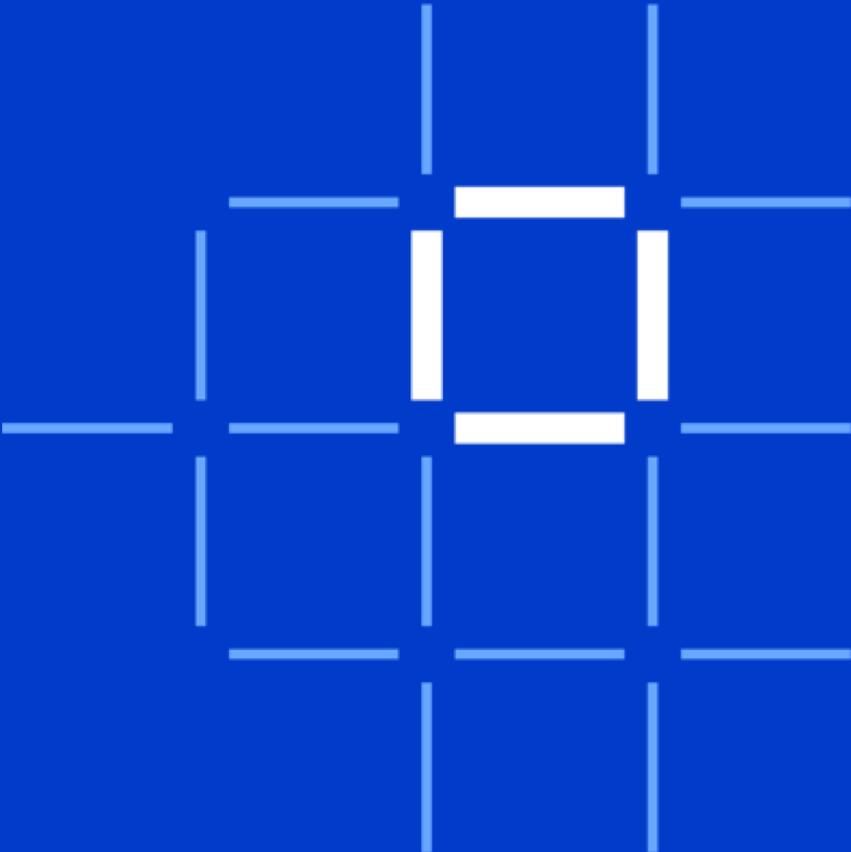
What is Blockchain?



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

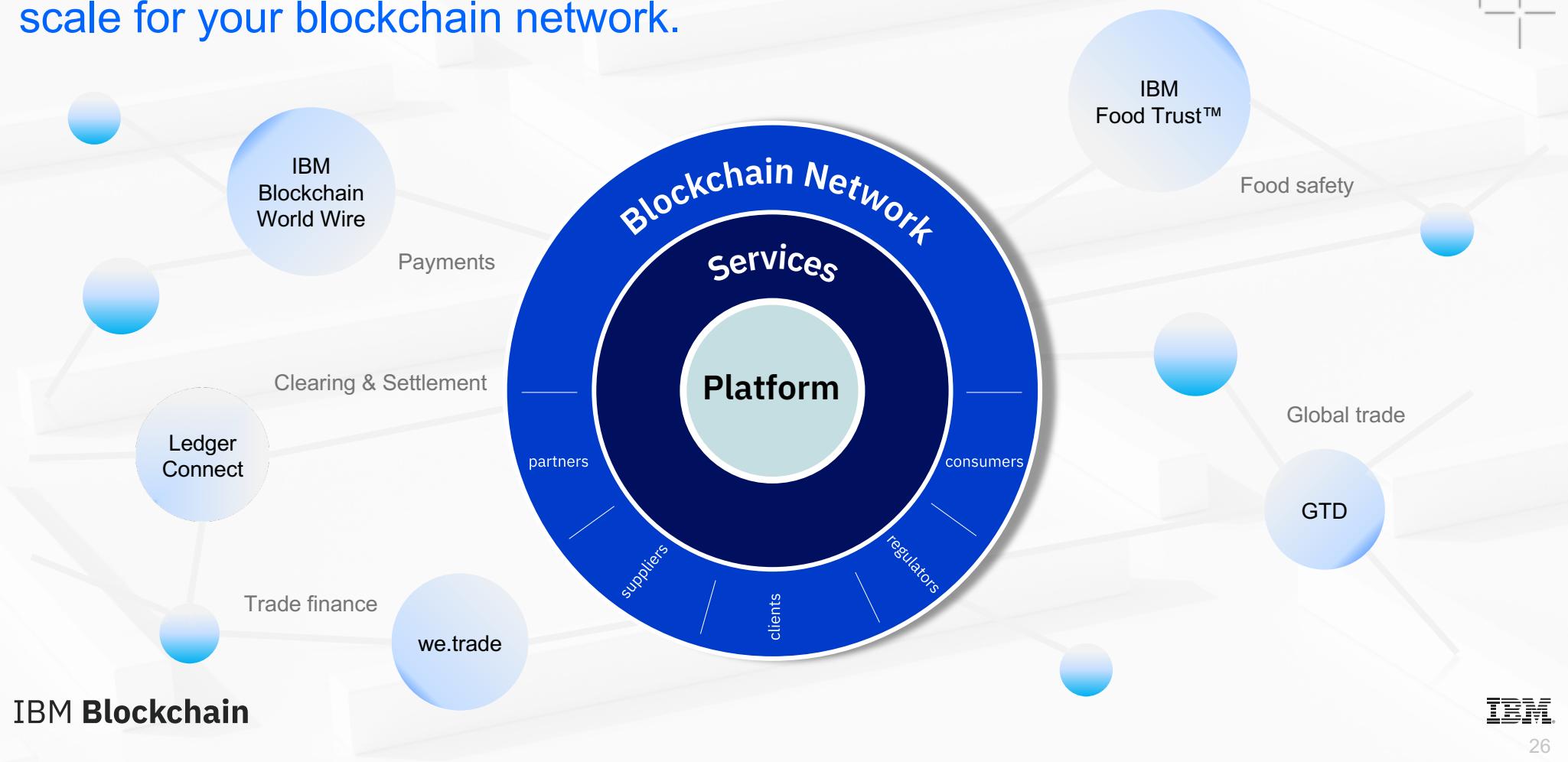
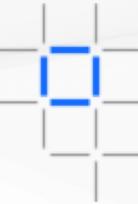
Reinventing business processes through unrivaled industry and technical knowledge as you start, accelerate and innovate your blockchain network.



## Network Convening Power

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

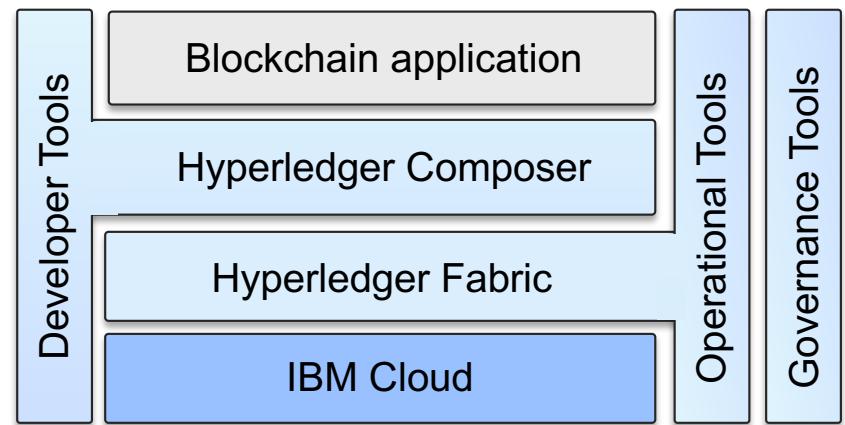
Leverage the unrivaled technology, expertise and access of IBM Blockchain to create impact at scale for your blockchain network.



# 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 make use of Hyperledger Composer to quickly build your blockchain application
- Hyperledger Fabric 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



# 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 **240 member organizations**
  - Open source  
Open standards  
*Open governance model*



# IBM Blockchain

Source: <https://www.hyperledger.org/members> Updated: 21 June 2018



## Distributed ledger

A screenshot of a web browser displaying the Hyperledger Fabric project page. The URL is https://www.hyperledger.org/projects/fabric. The page features the Hyperledger logo and the text "HYPERLEDGER FABRIC". It includes buttons for "GET THE CODE" and "BUILD YOUR FIRST NETWORK". A large blue background image shows a network of nodes connected by lines. Below the image, it says "Type: DLT, Smart Contract Engine" and "Status: Active". A video thumbnail for "Hyperledger Fabric Explainer" is also visible.

IBM Blockchain

- 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

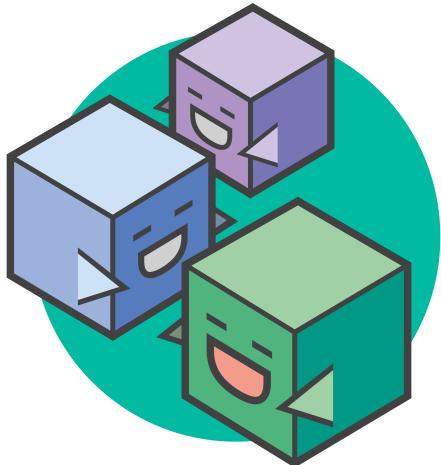


IBM



# Accelerated development

- A suite of high level application abstractions for business networks
- Emphasis on **business-centric vocabulary** for quick solution creation
- Reduce risk, and increase understanding and flexibility



IBM Blockchain

## Features

- Model your business networks, test and expose via APIs
- Applications invoke transactions to interact with business network
- Integrate existing systems of record

Try it in your web browser now:

<http://composer-playground.mybluemix.net/>

Business Application

Hyperledger Composer

Blockchain  
(Hyperledger Fabric)



Composer Explored

IBM

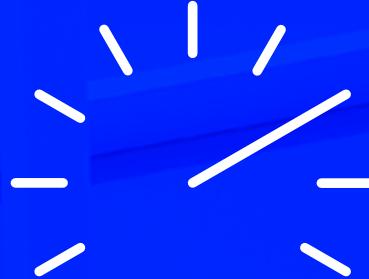
# Get started on your blockchain journey

## 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



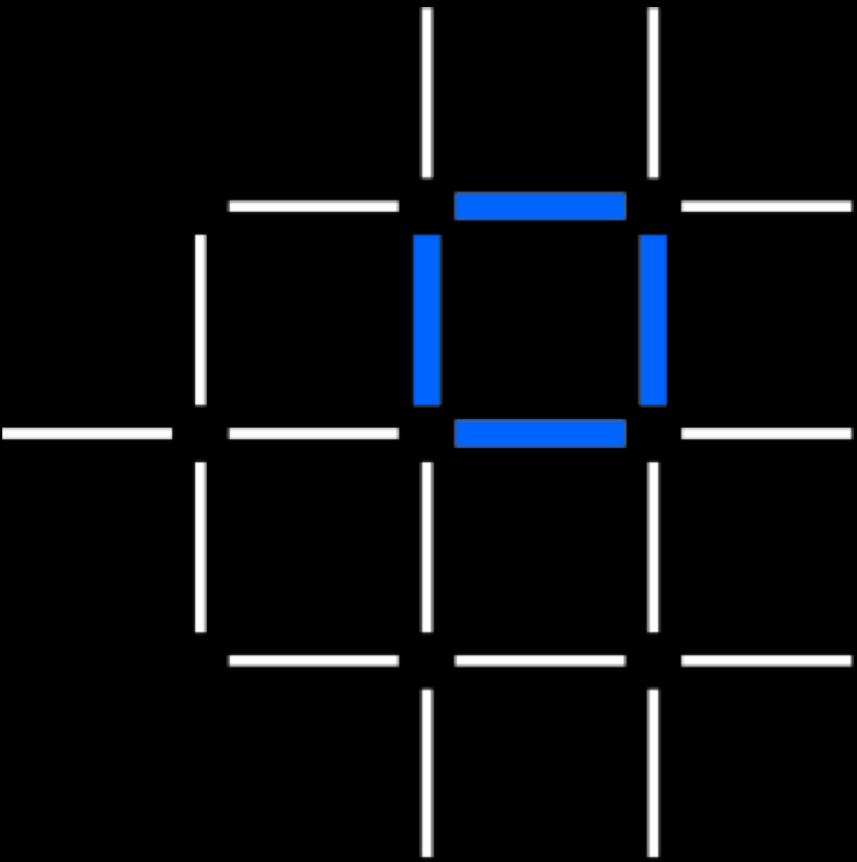
Commercialize your network  
Apply proven frameworks & expertise to address complex legal/ governance & operational challenges, & deliver a production network.

## Innovate



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

# Thank you



*Questions? Tweet us or  
go to [ibm.com/blockchain](http://ibm.com/blockchain)*

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