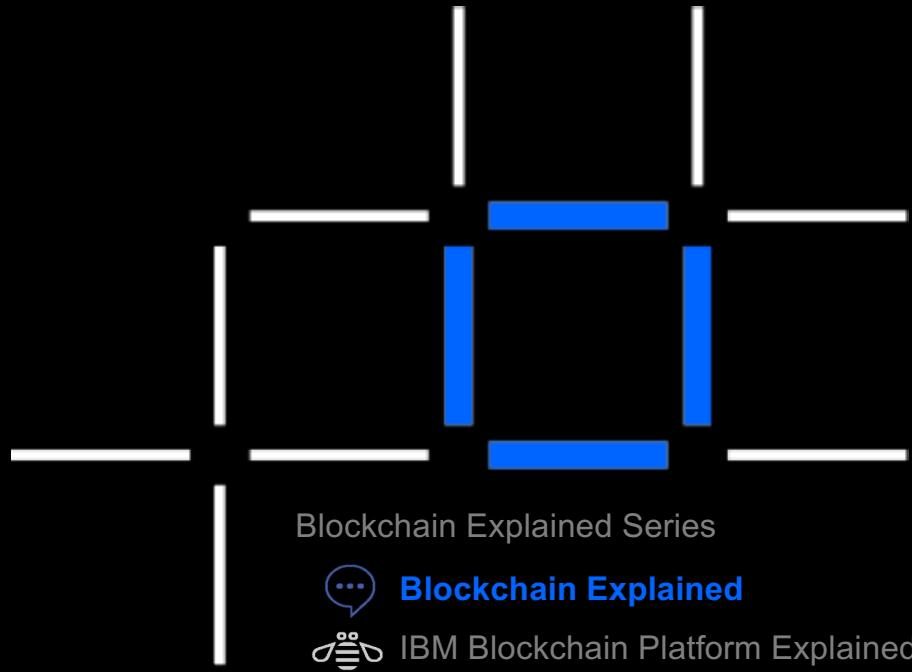


# Blockchain Explained

An Introduction to Blockchain for Business



Blockchain Explained Series



[Blockchain Explained](#)



[IBM Blockchain Platform Explained](#)



[Solutions Explained](#)



[Garage Explained](#)



[Next Steps](#)

V5.10, 8 June 2018

IBM **Blockchain**

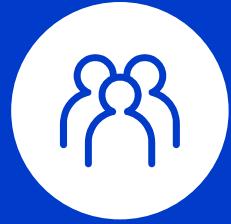
IBM



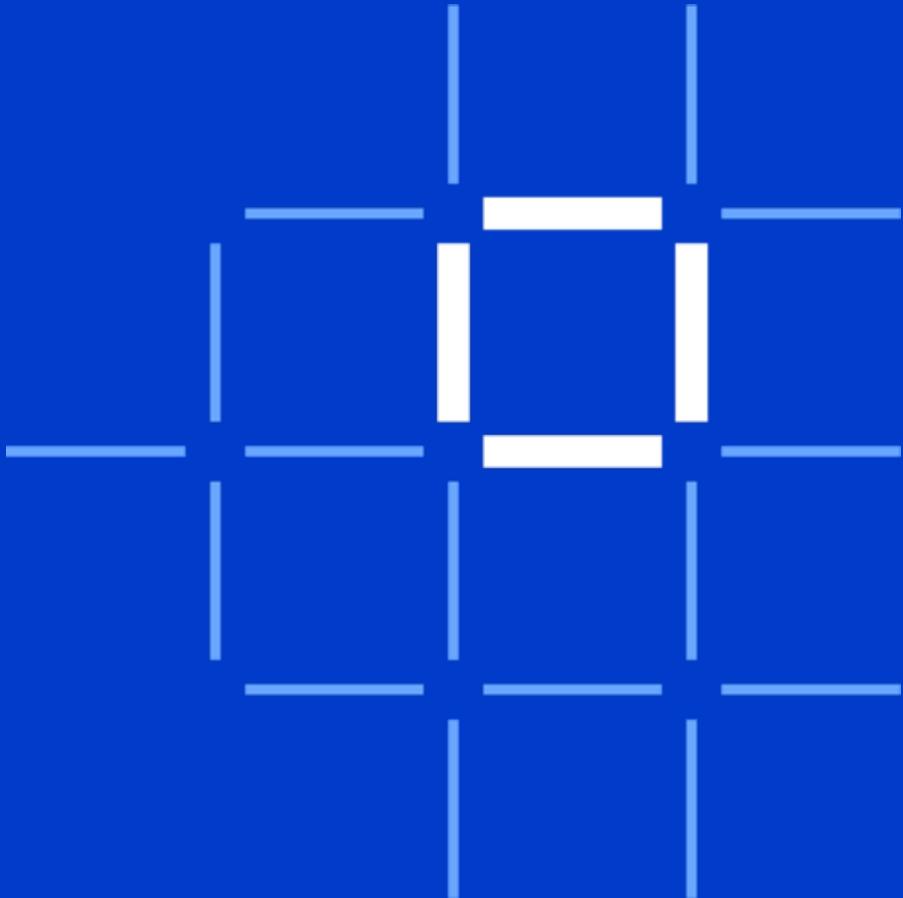
What is Blockchain?



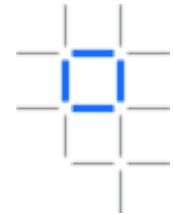
Why is it relevant for  
our business?



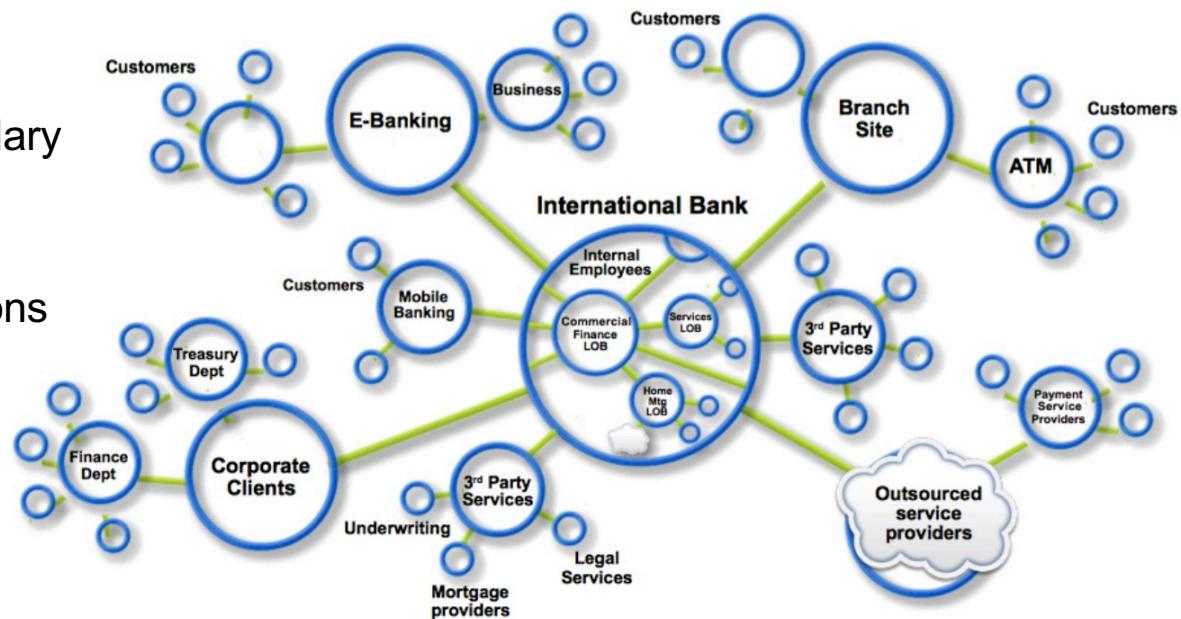
How can IBM help us  
apply blockchain?



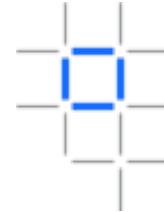
# Business networks, wealth and markets



- **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

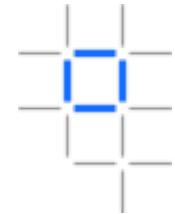
- Tangible, e.g. a house
- Intangible, e.g. a mortgage

## Intangible assets subdivide

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

## Cash is also an asset

- Has property of anonymity

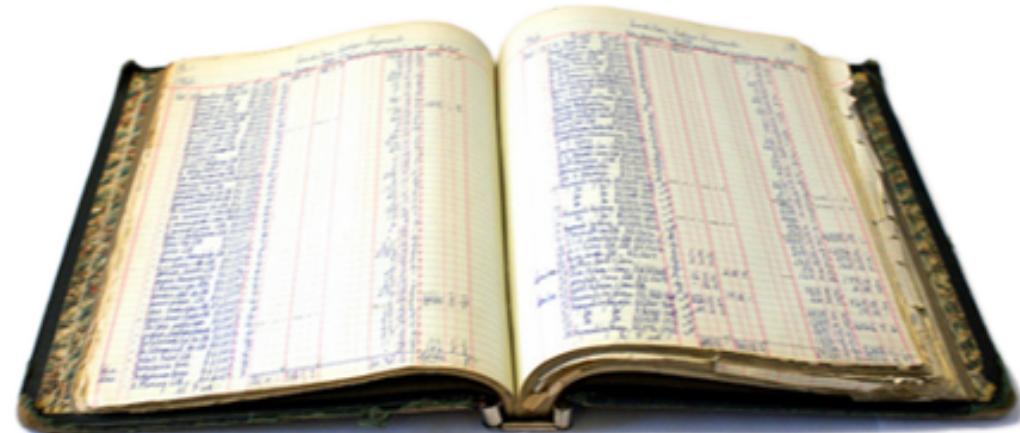


# Ledgers are key

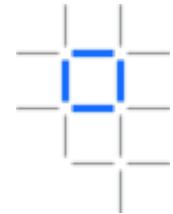
**Ledgers** are THE system of record for a business.

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)



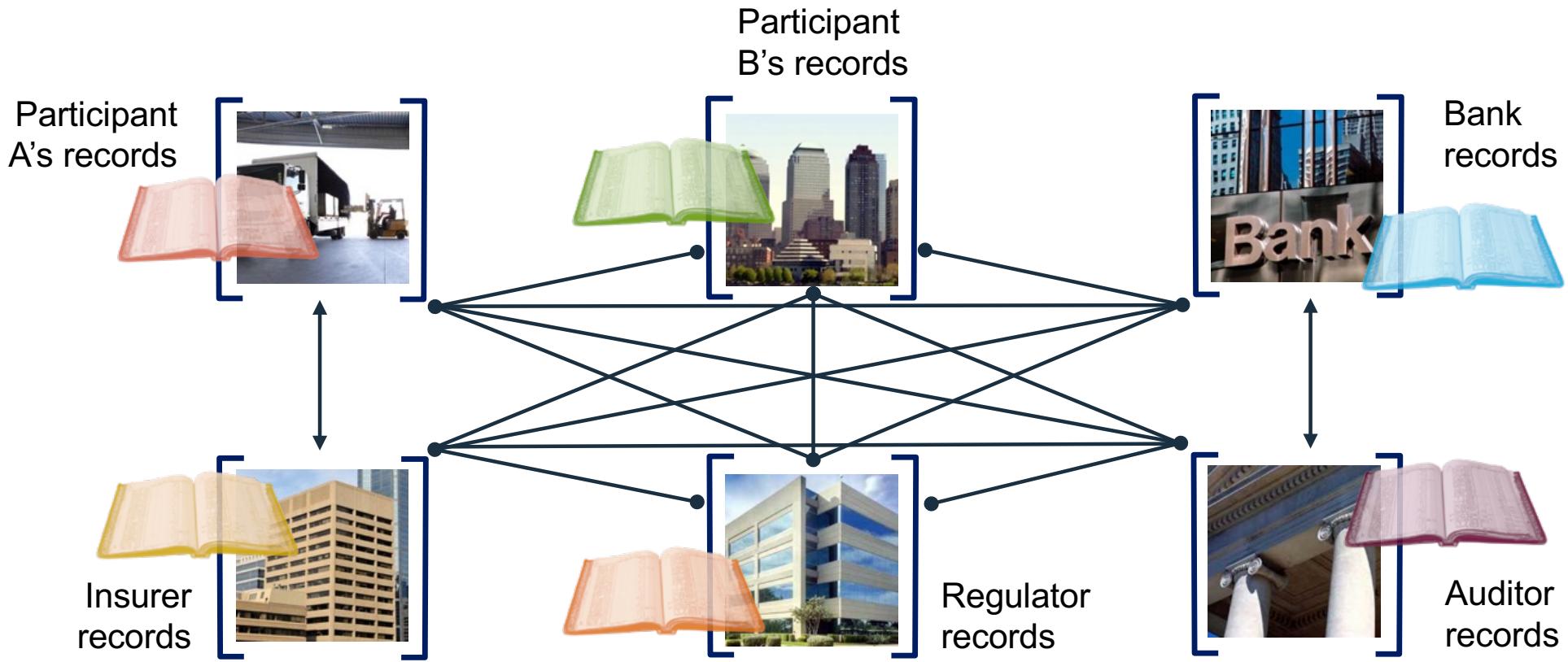
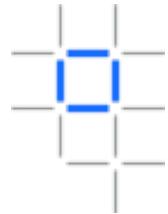
# Introducing Blockchain for Business...



Shared,  
replicated,  
permissioned  
ledger

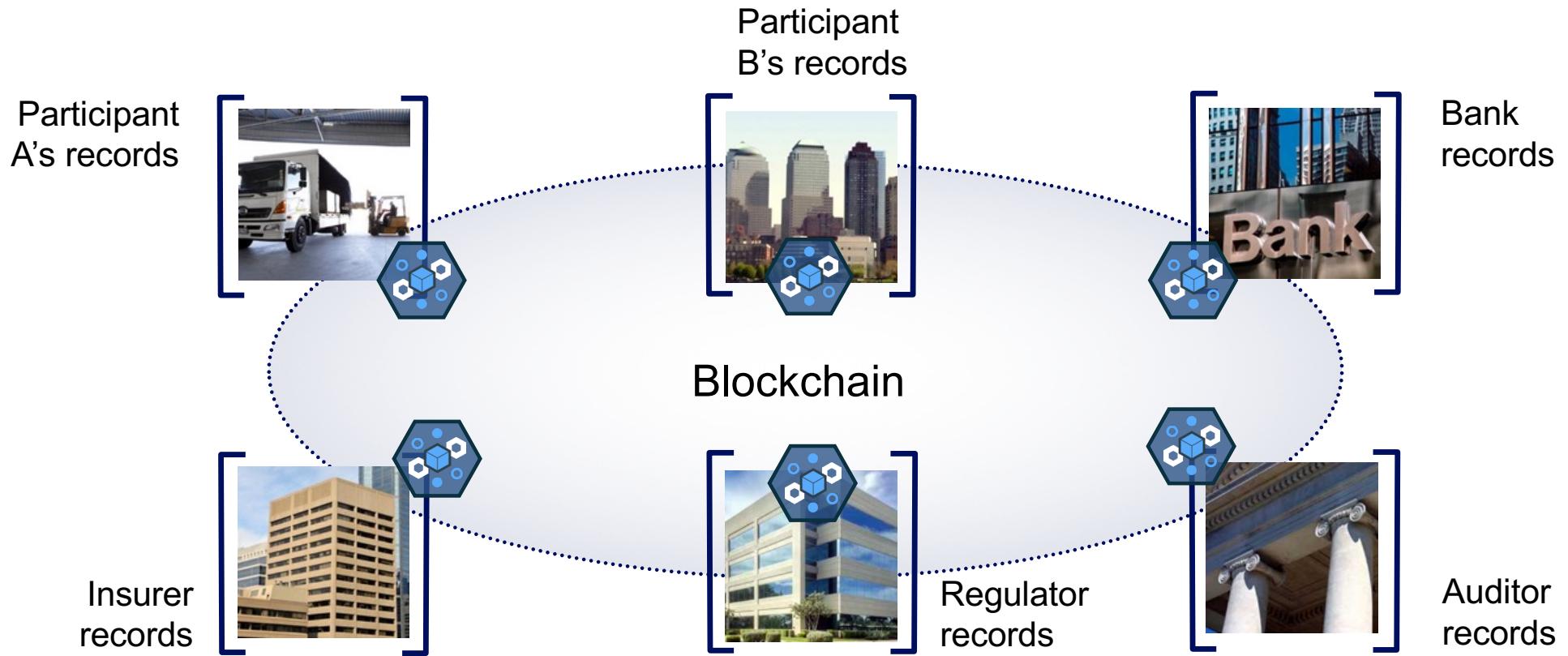
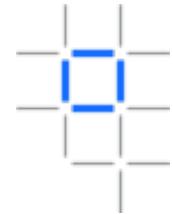
**Blockchain  
for  
Business**

# Problem...



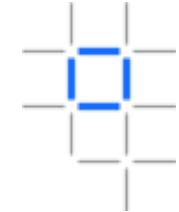
... inefficient, expensive, vulnerable

# A shared, replicated, permissioned ledger ...



... with consensus, provenance, immutability and finality

# Different types of blockchain



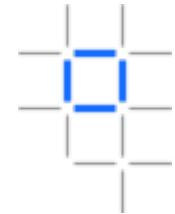
- All blockchains aim to provide **irrefutable proof** that a set of transactions occurred between participants
- Different types of blockchain exist:



is an example of an unpermissioned, public blockchain

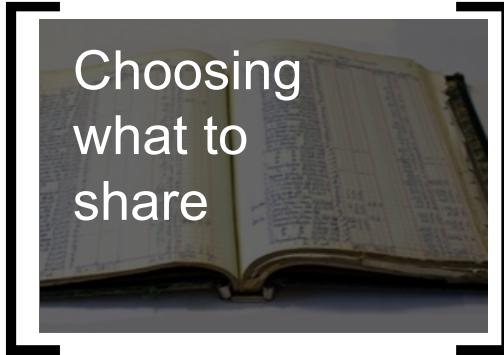
- The first blockchain application
  - Defines a shadow-currency and its ledger
  - Resource intensive
- 
- Blockchains for business are generally permissioned and private, and prioritize
    - Identity over anonymity | Selective endorsement over proof of work | Assets over cryptocurrency





# Requirements of blockchain for business

Participants decide which assets to share



Transaction Endorsement



Participants give *provable* endorsement

Participants know who they are dealing with



Privacy and Confidentiality

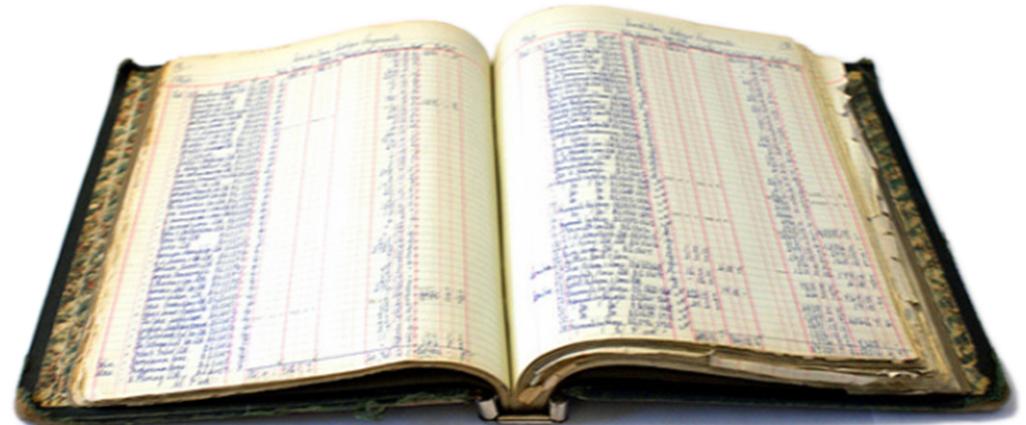


Information shared via need-to-know

# Choosing what to share

- **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

*Business network decides what is shared on the ledger*



# 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

- 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

*Transactions provably endorsed by relevant participants*



# Privacy and Confidentiality

- 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

*Transaction visibility is need-to-know*

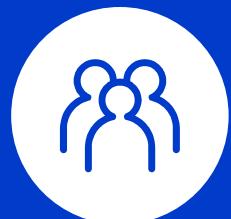




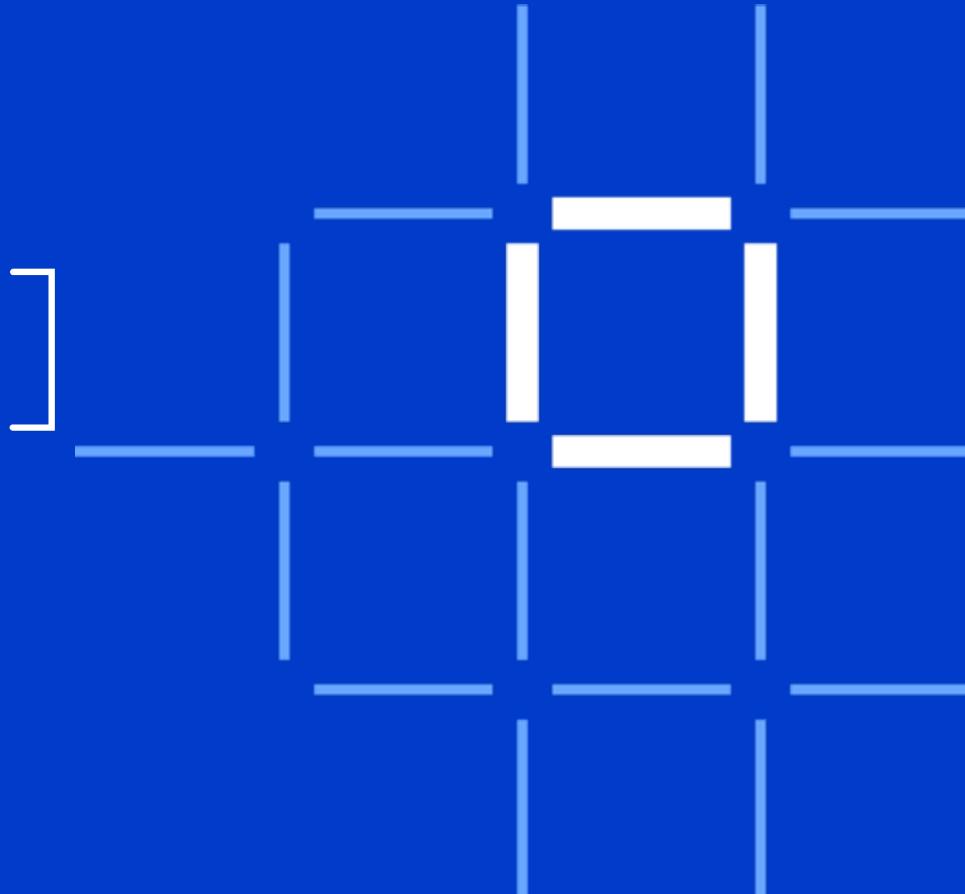
What is Blockchain?



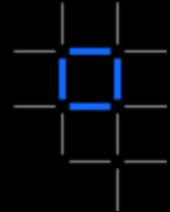
Why is it relevant for  
our business?



How can IBM help us  
apply blockchain?



# Blockchain is creating extraordinary opportunities for businesses to come together in new ways



## Create New Value

Exploit new business models and eliminate inefficiencies

## Optimize Ecosystems

Streamline business processes and the exchange of value along your ecosystem

## Reduce Risk

Replace uncertainty with transparency and a trusted decentralized ledger



## Example: Shared reference data



- 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 access to reference data
3. Naturally supports code editing and routing code transfers between participants

# Example: Supply chain



- 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

# Example: Audit and compliance



- 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

# Example: Letter of credit

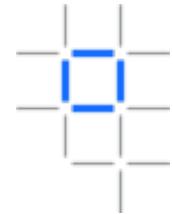


- What
- Bank handling letters of credit (LOC) wants to offer them to a wider range of clients including startups
  - Currently constrained by costs & the time to execute

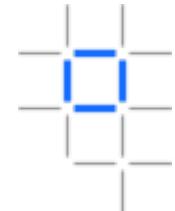
- How
- Blockchain provides common ledger for letters of credit
  - Allows all counter-parties to have the same validated record of transaction and fulfillment

- 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

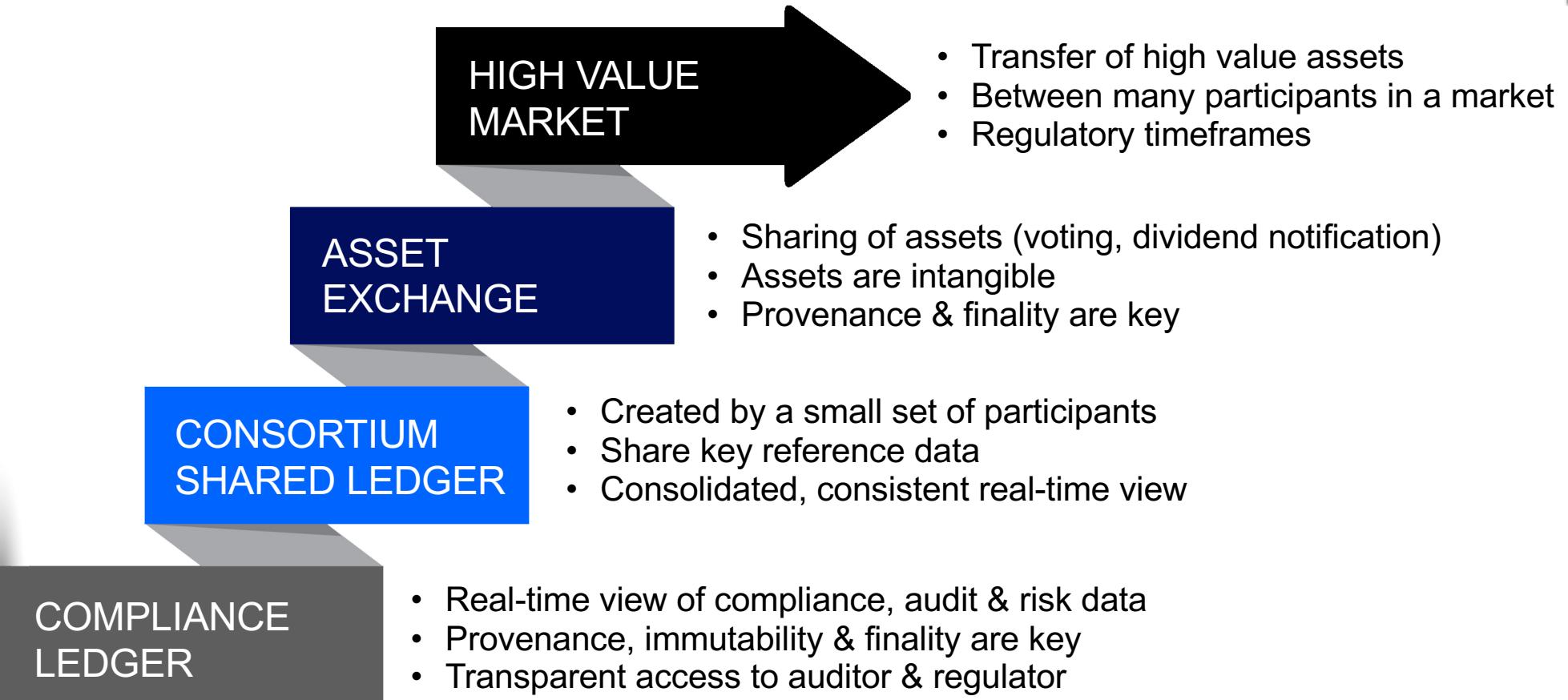
# Further examples by (selected) industry



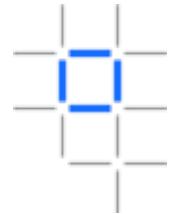
Financial	Public Sector	Retail	Insurance	Manufacturing
<ul style="list-style-type: none"><li>• Trade Finance</li><li>• Cross currency payments</li><li>• Mortgages</li></ul>	<ul style="list-style-type: none"><li>• Asset Registration</li><li>• Citizen Identity</li><li>• Medical records</li><li>• Medicine 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>



# Patterns for customer adoption



# 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

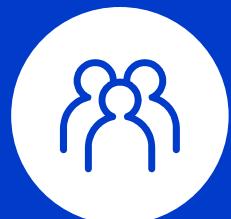
- In financial markets, takes buy-side and sell-side to provide liquidity
- More generally, the organization who innovates
  - Creates a new good or service, and business process (likely)
  - Creates a new business process for an existing good or service



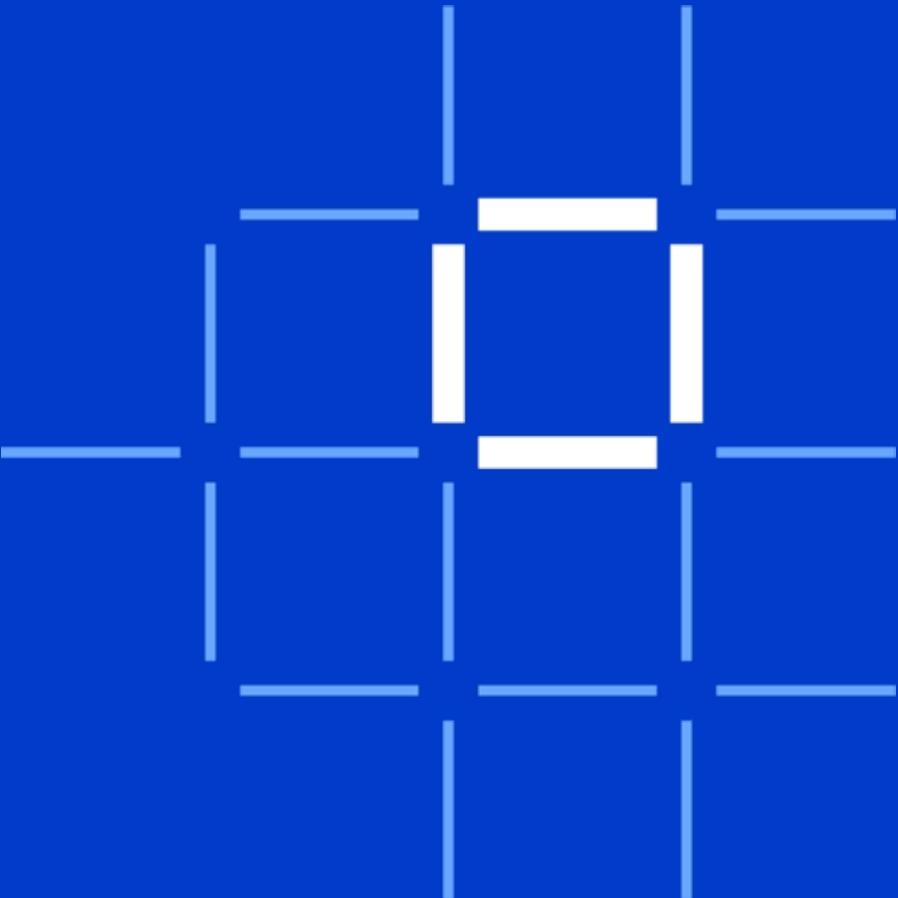
What is Blockchain?



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How can IBM help us  
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# IBM Blockchain Strategy

Drive the development of **applications** for specific business use-cases, to be deployed to active **blockchain networks**



## 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



### Platform

Develop, govern and operate enterprise blockchain networks with speed and security



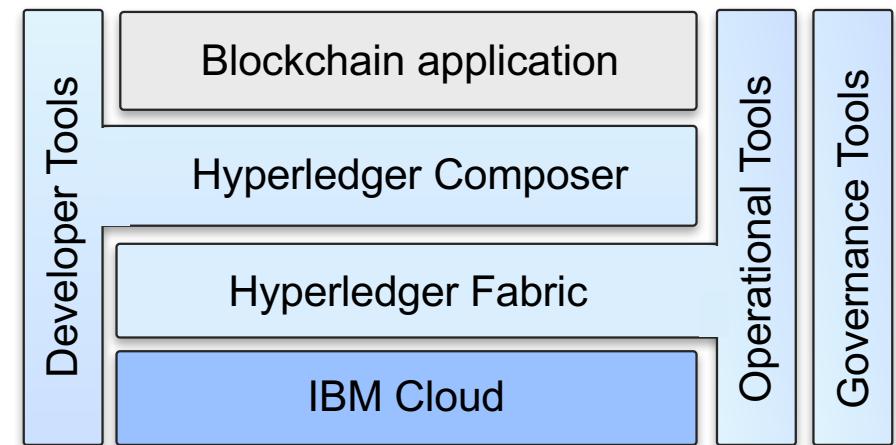
### HYPERLEDGER

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

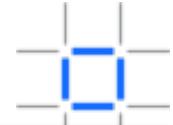
# Introducing the IBM Blockchain Platform

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



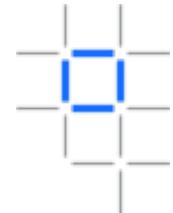
# IBM Blockchain

Source: <https://www.hyperledger.org/members>  
Updated: April 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 Fabric logo and a large banner with a blue background and a network graph. Buttons for "GET THE CODE" and "BUILD YOUR FIRST NETWORK" are visible. Below the banner, text indicates it's a DLT, Smart Contract Engine, and part of the Hyperledger project. A video thumbnail for "Hyperledger Fabric Explainer" is shown at the bottom right.

- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.1 released March 2018
  - Includes significant performance, security, migration and smart contract improvements
- IBM is one of the many contributing organizations

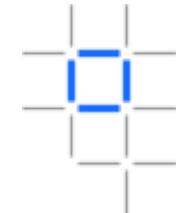


IBM Blockchain

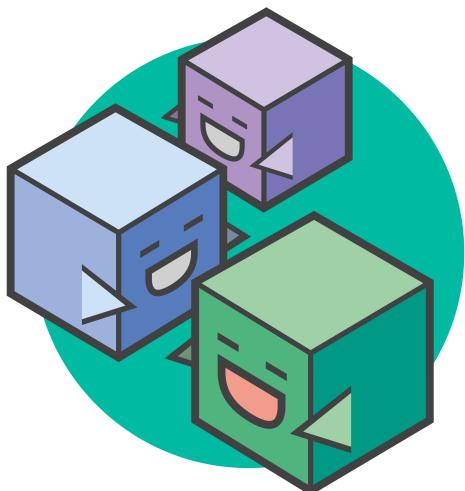




## Accelerated development



- 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

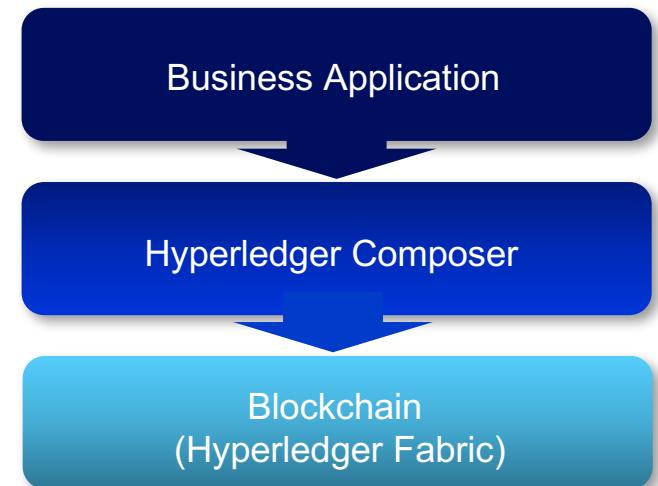


### Features

- 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/>

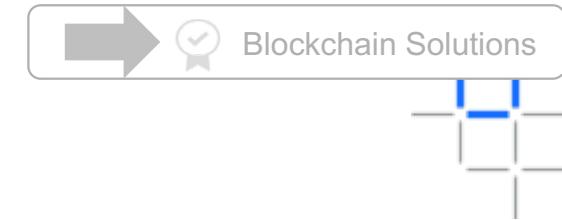
IBM Blockchain



Composer Explored

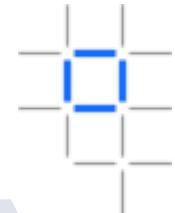
IBM

# Making blockchain real for business...



Trade Finance	Pre and Post Trade	Complex Risk Coverage
 <b>we.trade</b> more trust. more trade.   	   	  
Identity/ Know your customer (KYC)	Unlisted Securities/ Private Equity Funds	Incentive Program
  	 	  
Medicated Health Data Exchange	Government	Distributed Energy/ Carbon Credit
		 
Supply Chain	Food Trust	Provenance/ Traceability
  <b>IBM Blockchain</b>	        	 

# IBM 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

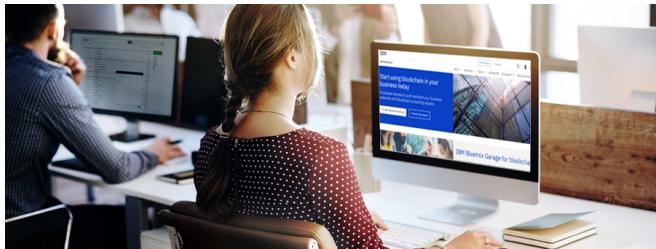
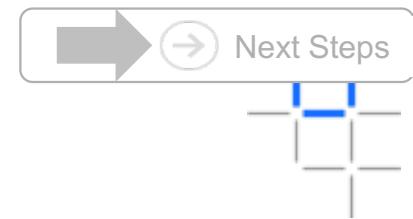
Remote

Digital

Face to face

Face to face

# Getting started on your blockchain journey



[Learn More About  
IBM Blockchain](#)



[Schedule an IBM  
Blockchain Workshop](#)

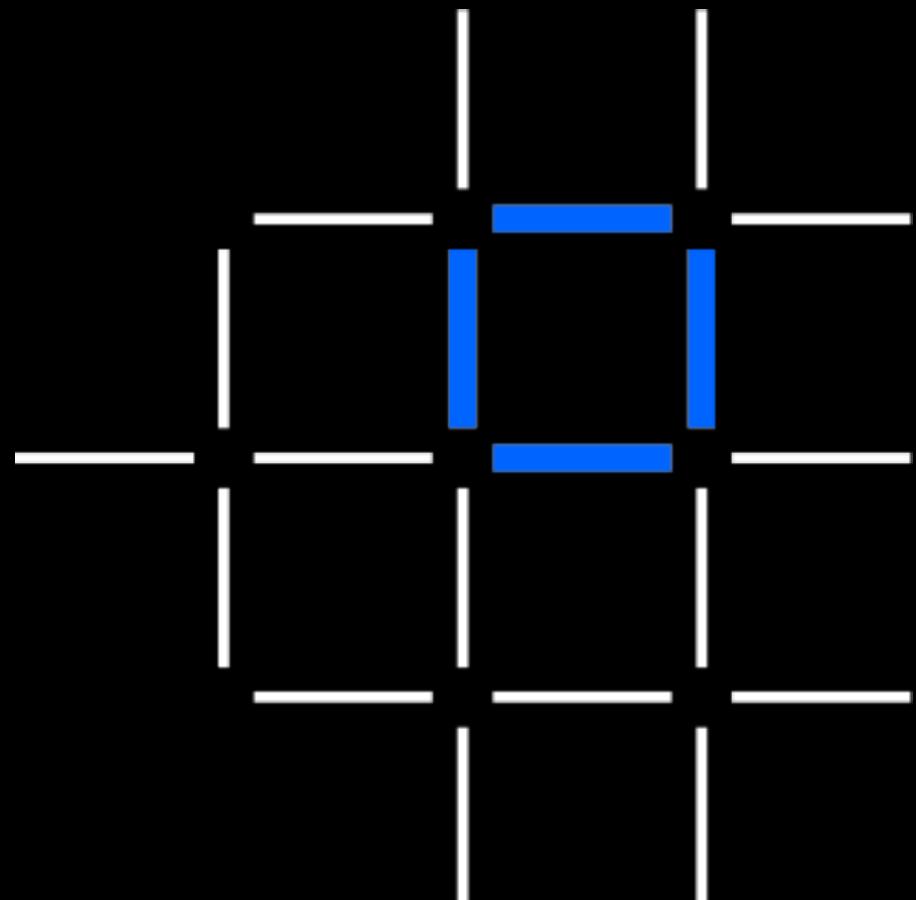


[Develop a Blockchain  
Application](#)



[Activate and Grow your  
Blockchain Network](#)

# Thank you



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

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