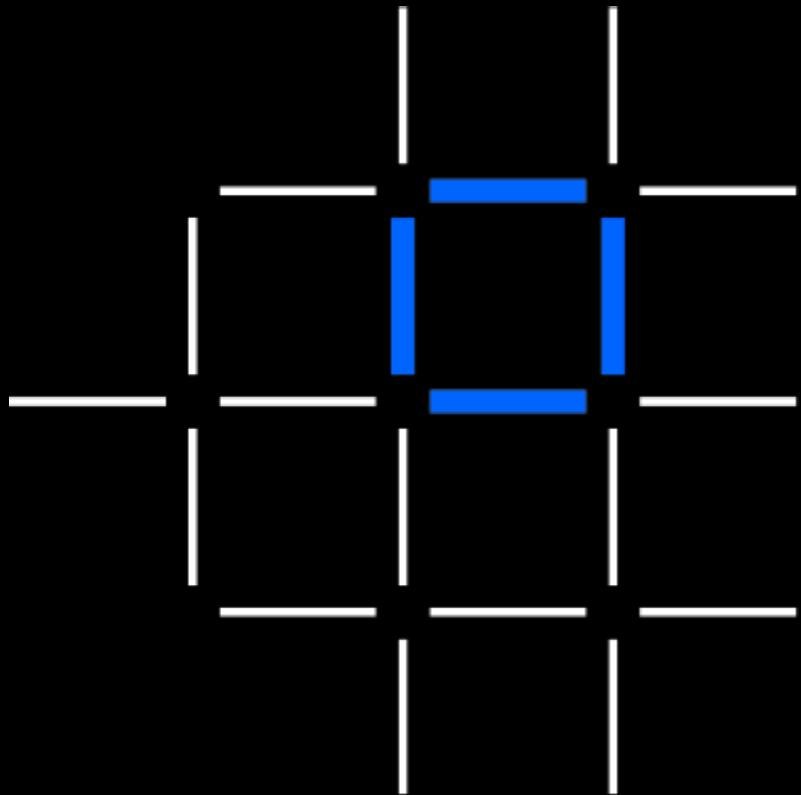
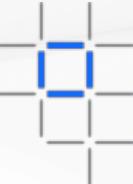


Blockchain Immersion Workshop

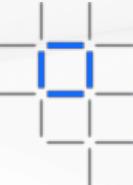
Puerto Rico – April 23/24





Day 1 Schedule

- **9am** – Intro
- **9:15am** - Blockchain Explained
- **10am** – Vehicle Lifecycle Demo
- **10:30am** – Use Case Discussion
- **11am** – Use Case Walkthrough
- **11:30am** – Basic Components
- **Noon** – Lunch/Informal Use Discussion
- **1pm** - Hyperledger Fabric Lab
- **2pm** – Transaction Flow and Consensus
- **3:15pm** – VSCode Lab pt. I
- **4pm** – Next Steps



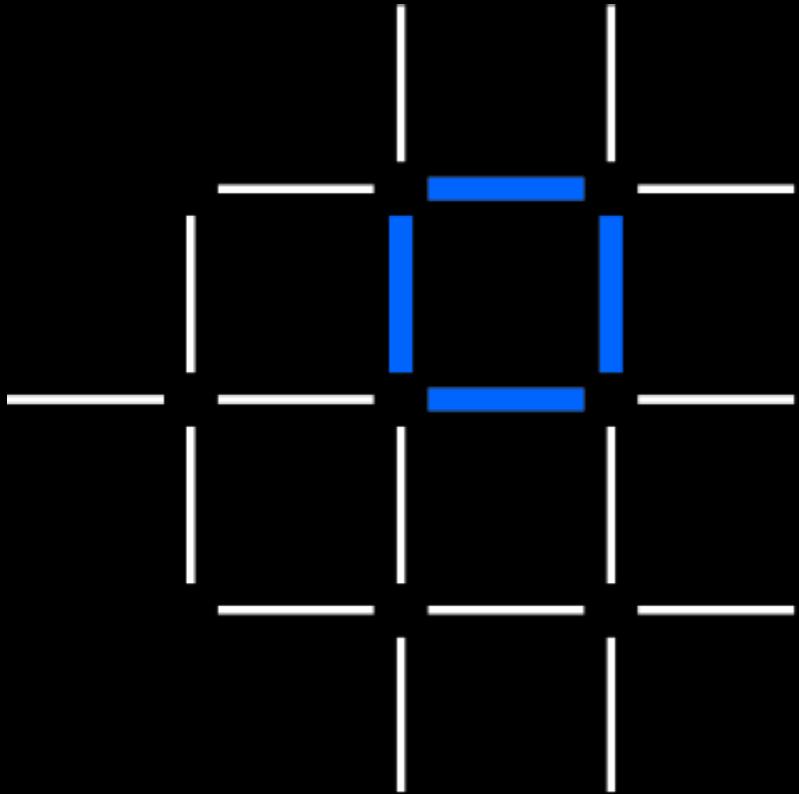
Day 2 Schedule

- **9am** – Blockchain Permission and Privacy
- **9:30am** – IBM Blockchain Platform Explained
- **11:30am** – VSCode Lab pt. II
- **Noon** - Lunch
- **1pm** – Introduction to IBM Cloud Private and Kubernetes
- **2pm** – IBM Blockchain Platform for IBM Cloud Private Lab

Blockchain Explained

An Introduction to Blockchain for Business

Austin Grice
austin.grice@ibm.com





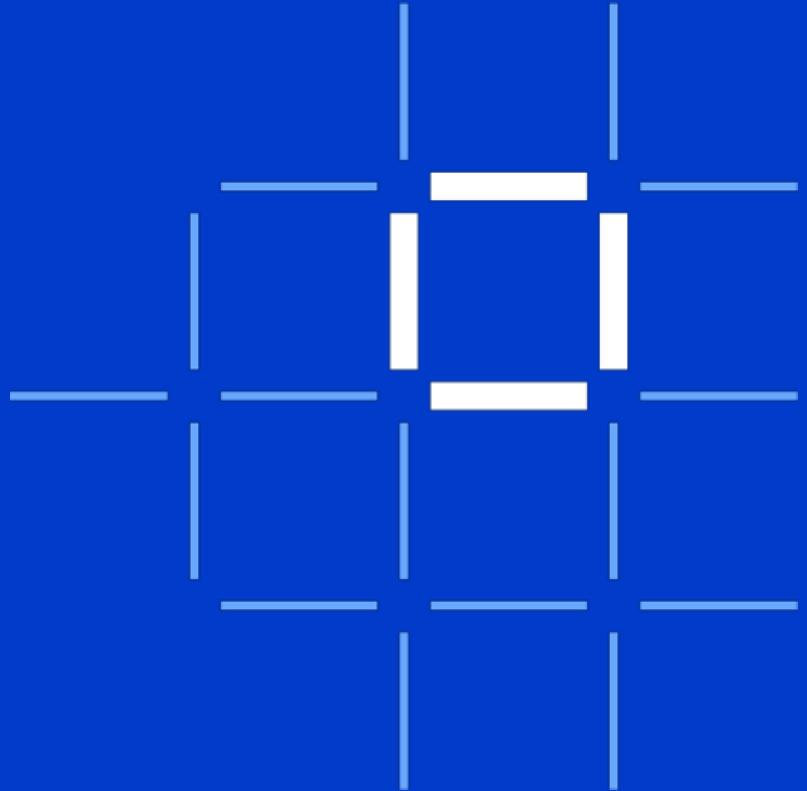
What is Blockchain?



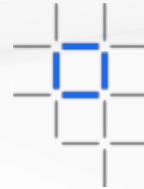
Example networks



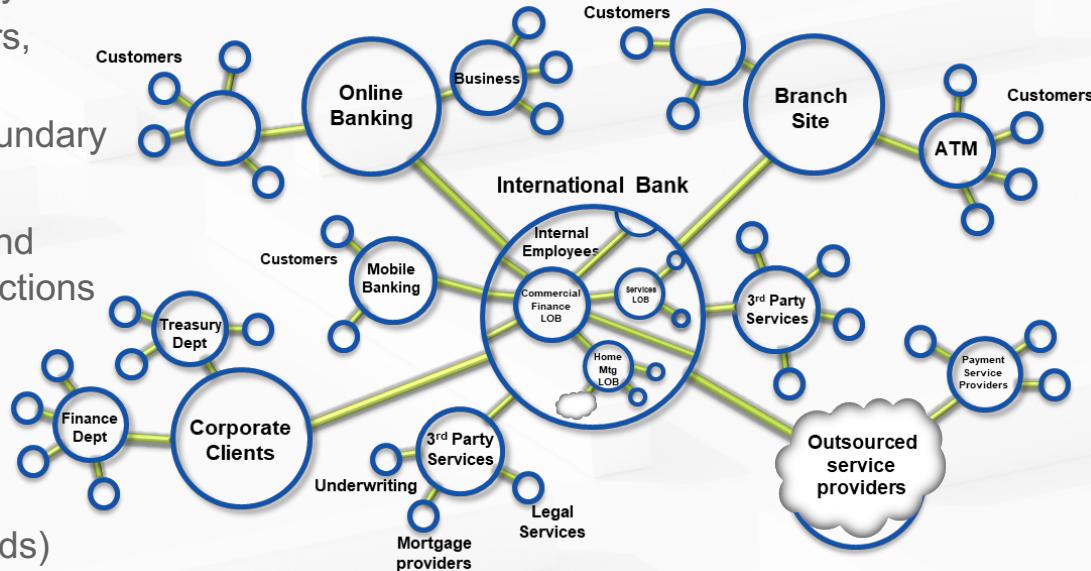
How can IBM help?

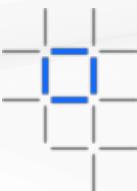


Business networks, wealth and markets



- **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

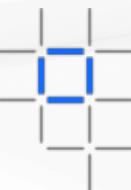
- Tangible, e.g. a house
- Intangible, e.g. a mortgage

Intangible assets subdivide

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

Cash is also an asset

- Has property of anonymity

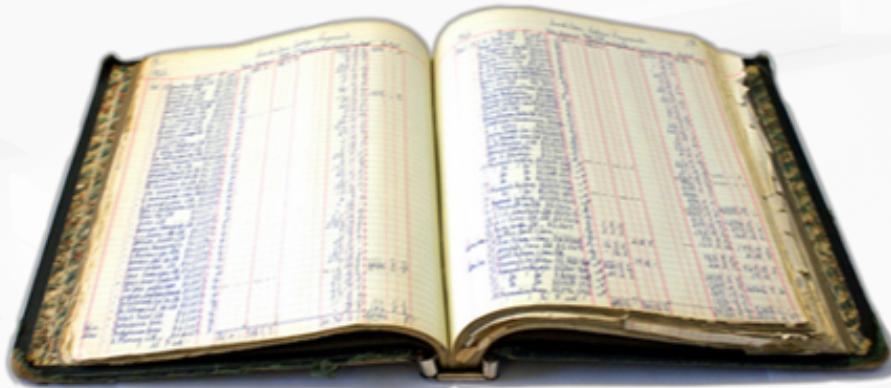


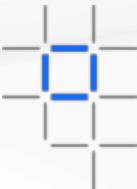
Ledgers are key

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)





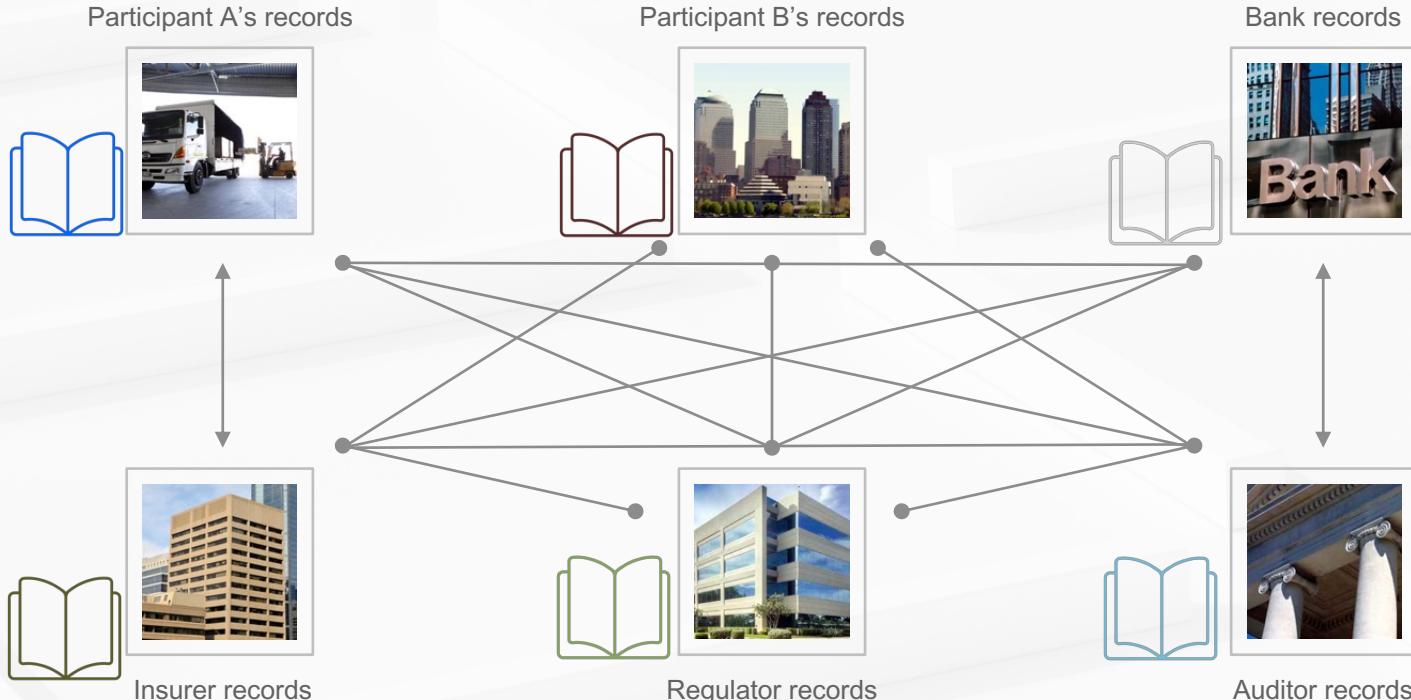
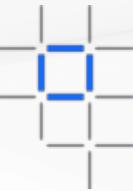
Shared,
replicated,
permissioned
ledger

Blockchain
for
Business

Shared
business
rules

Problem

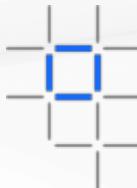
inefficient, expensive, vulnerable



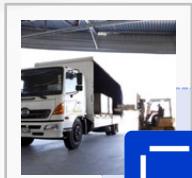
Solution

A shared, replicated, permissioned ledger...

...with consensus, provenance, immutability and finality



Participant A's records



Participant B's records



Bank records



Blockchain



Insurer records

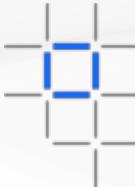


Regulator records



Auditor records

Different types of blockchain



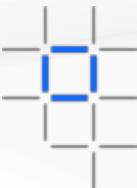
- All blockchains aim to provide **irrefutable proof** that a set of transactions occurred between participants
- Different types of blockchain exist:



is an example of an unpermissioned, public blockchain

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





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



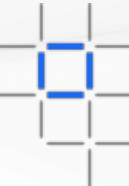
ENDORSEMENT

Participants give provable endorsement

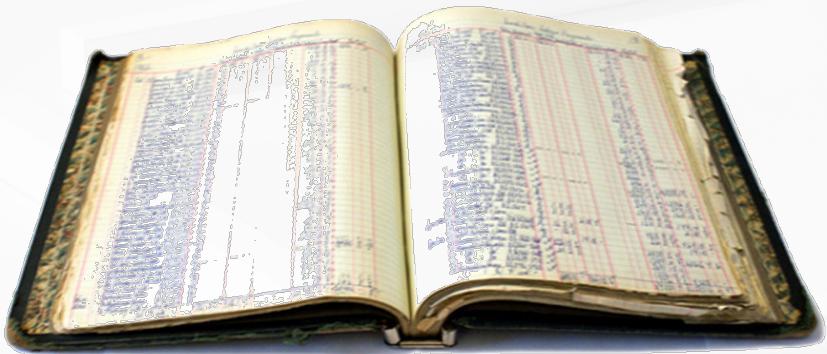


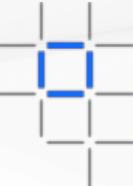
Assets

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

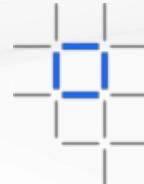
- Various regulations applied to businesses require them to know who they are dealing with
 - e.g. KYC, AML, CFT
- Identity is used to ensure business networks are kept **private** and individual transactions **confidential**
 - With transparency for the regulator
- There are established methods for obtaining and asserting identity
 - Cryptography is central to these
 - Identity allows transactions to be signed and encrypted





Transaction Endorsement

Provable verification 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





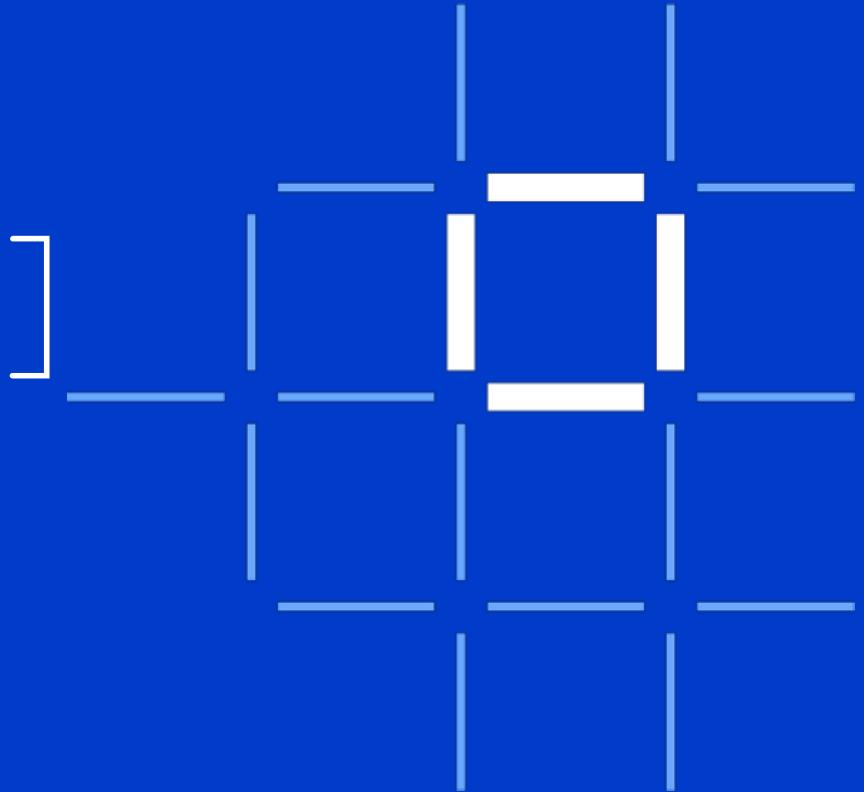
What is Blockchain?



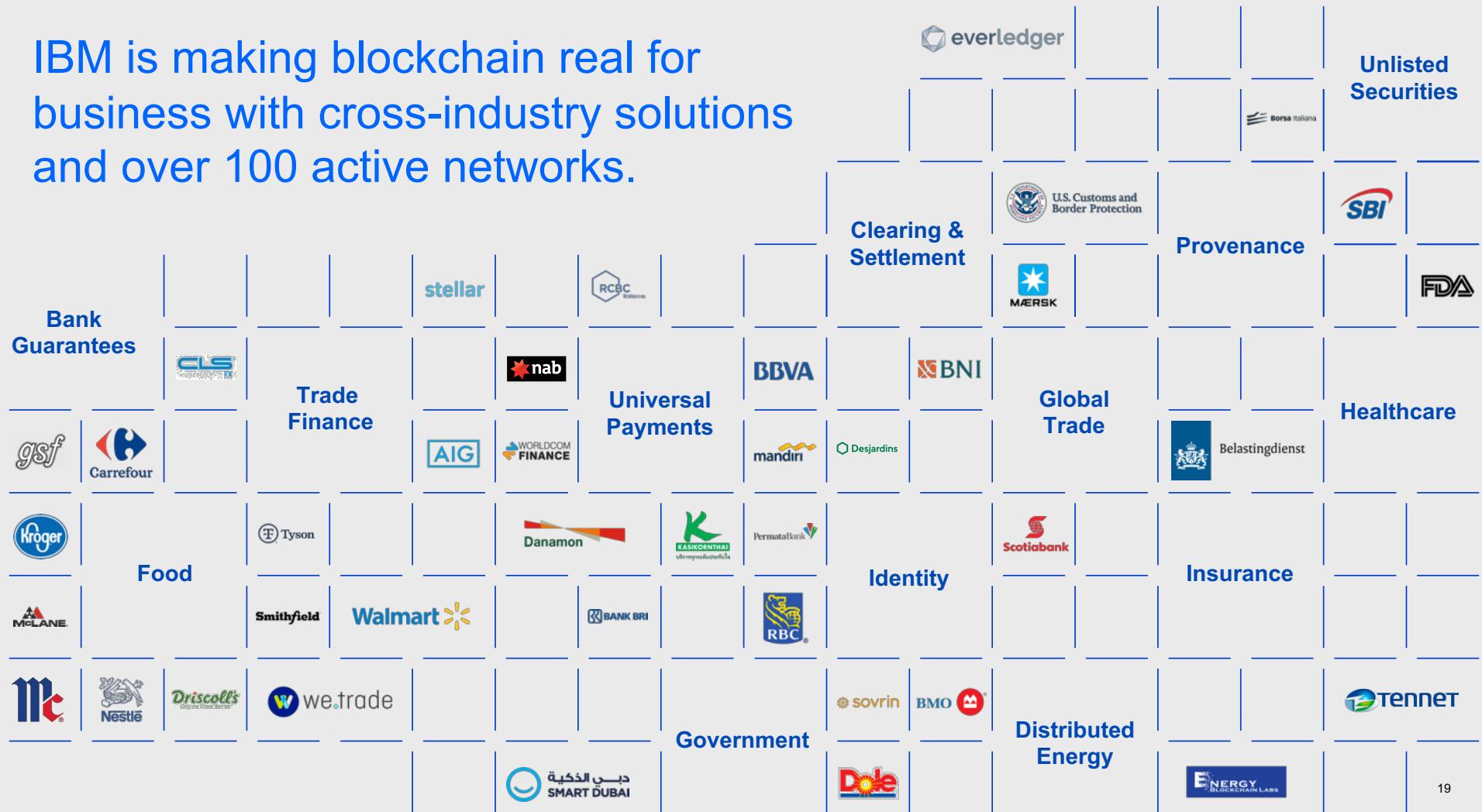
Example networks



How can IBM help?



IBM is making blockchain real for business with cross-industry solutions and over 100 active networks.





Example: TradeLens

What?

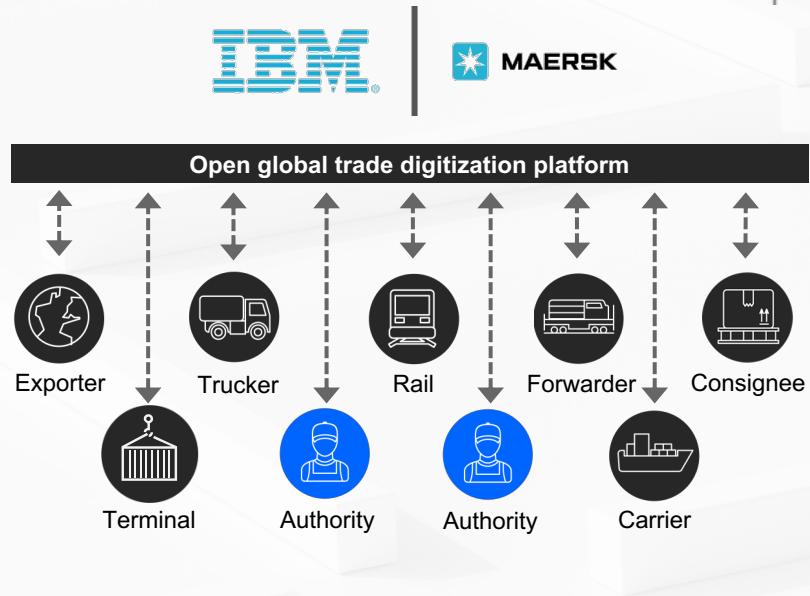
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

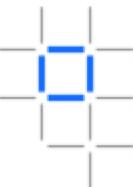
How?

- 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: Food Trust

What?

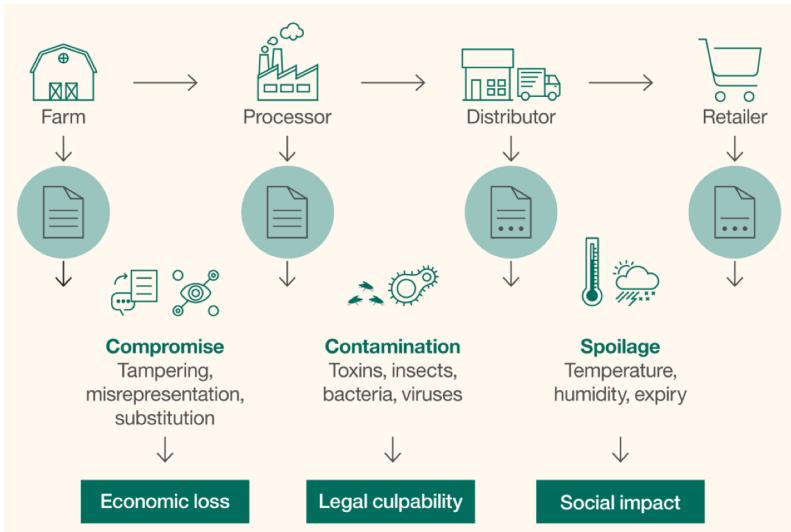
- IBM Food Trust is a set of modules providing traceability to improve food transparency and efficiency

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.



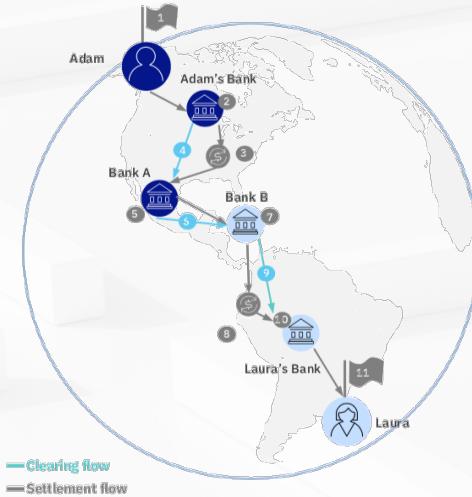
<https://www.ibm.com/blockchain/solutions/food-trust>

Example: World Wire

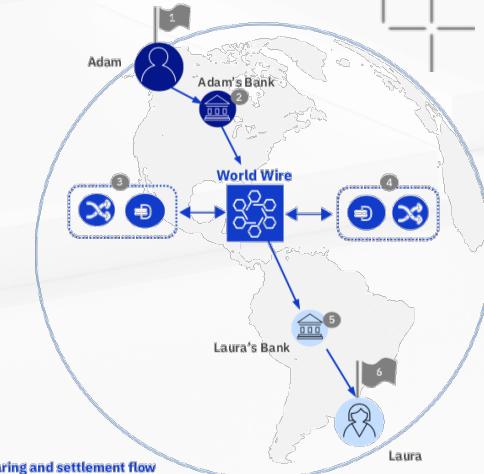
What?

- 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.

Current international payment system today



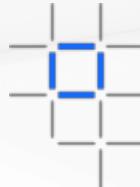
With IBM Blockchain World Wire tomorrow



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



What is Blockchain?

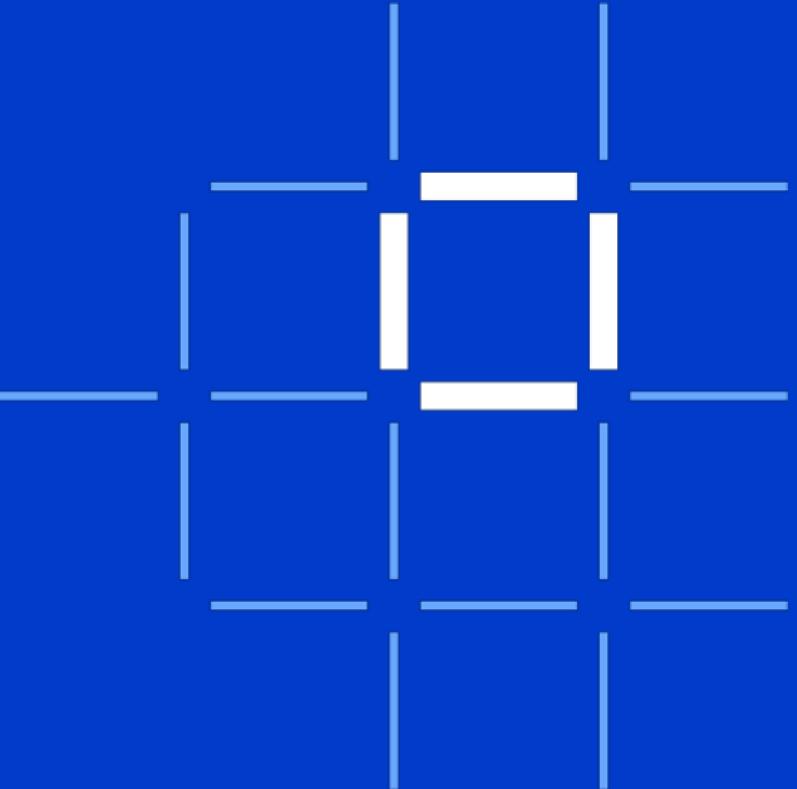


Example networks



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

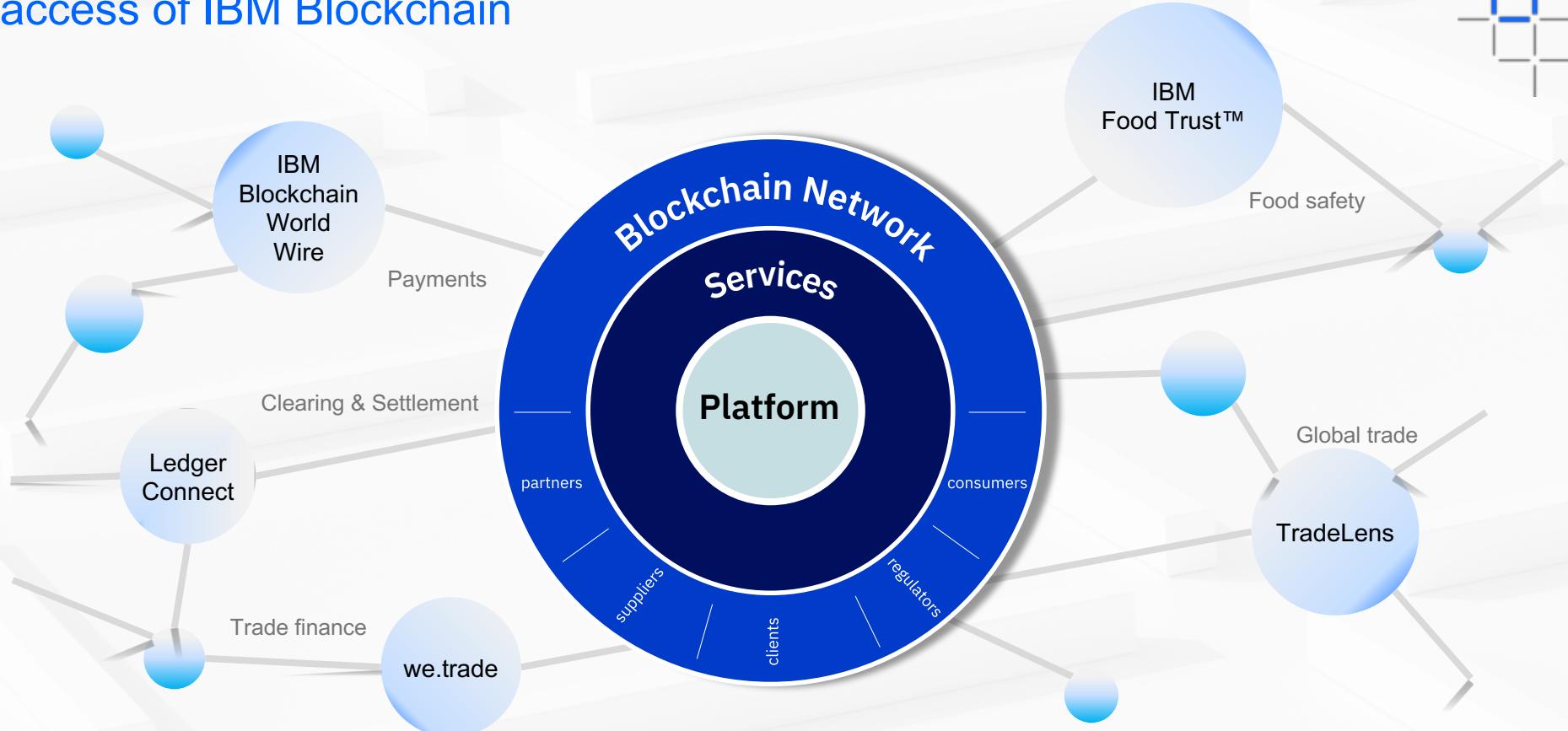
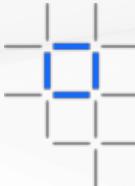
Reinventing business processes through unrivaled industry and technical knowledge as you start, accelerate and innovate your blockchain network.



Network Convening Power

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

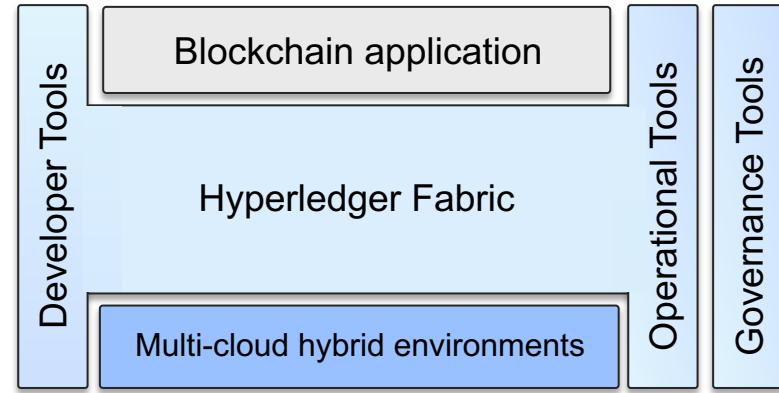
Leverage the unrivaled technology, expertise and access of IBM Blockchain



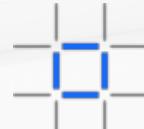
Introducing the IBM Blockchain Platform

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
- **Deploy anywhere** - including AWS, on-premises and a highly secure and performant IBM Cloud environment



Hyperledger: A Linux Foundation Project

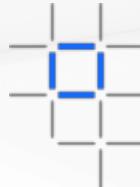


- IBM Blockchain Platform is underpinned by technology from the Hyperledger project
 - Hyperledger is a collaborative effort created to advance cross-industry blockchain technologies for business
 - Founded February 2016; now more than **260 member organizations**
 - Open source
Open standards
Open governance model

Source: <https://www.hyperledger.org/members>
Updated: 8 January 2019



Hyperledger: A Linux Foundation Project

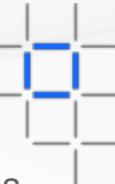


- Hyperledger is a Linux Foundation-hosted collaborative effort announced in December 2015 and officially formed in February 2016
- Hyperledger has multiple distributed ledger, or blockchain, implementations, known as frameworks
 - Fabric, Sawtooth, Iroha, Indy, Burrow, Grid
- Hyperledger also has multiple tools that support or complement one or more frameworks
 - Composer, Caliper, Cello, Explorer, Quilt, Ursa
- IBM Blockchain solutions and services are usually built on Hyperledger Fabric



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 title "HYPERLEDGER FABRIC". It includes two prominent buttons: "GET THE CODE" and "BUILD YOUR FIRST NETWORK". Below these buttons is a large blue background image showing a network of interconnected nodes. At the bottom left, there is descriptive text: "Type: DLT, Smart Contract Engine" and "Status: Active". A small video player at the bottom right shows a thumbnail for "Hyperledger Fabric Explainer".

- 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 released January 2019
 - Long Term Service release with emphasis on production operational and serviceability enhancements
 - New programming model abstractions for ease of development
- V2.0-alpha released April 2019
- IBM is one of the many contributing organizations



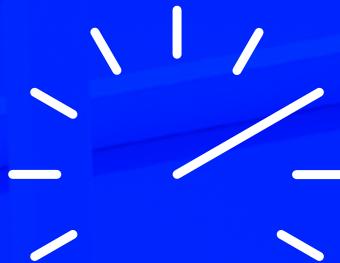
Get started on your blockchain journey

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

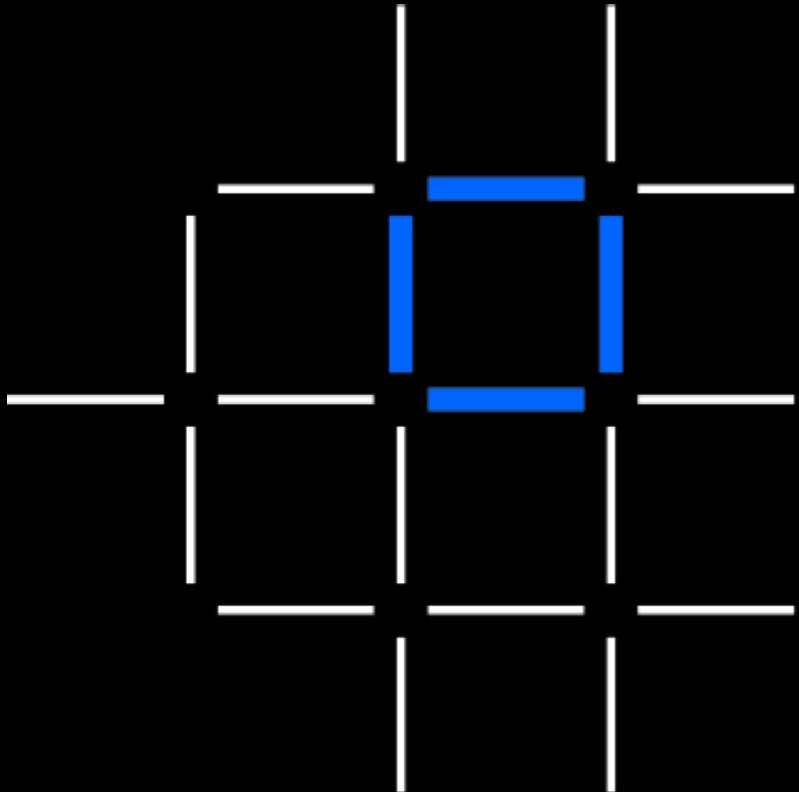
Austin Grice
austin.grice@ibm.com

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

 @IBMBlockchain

 IBM Blockchain

 IBM Blockchain





© Copyright IBM Corporation 2018. All rights reserved. The information contained in these materials is provided for informational purposes only, and is provided AS IS without warranty of any kind, express or implied. Any statement of direction represents IBM's current intent, is subject to change or withdrawal, and represents only goals and objectives. IBM, the IBM logo, and other IBM products and services are trademarks of the International Business Machines Corporation, in the United States, other countries or both. Other company, product, or service names may be trademarks or service marks of others.