

Blockchain Explained

IBM Blockchain

Presenters:



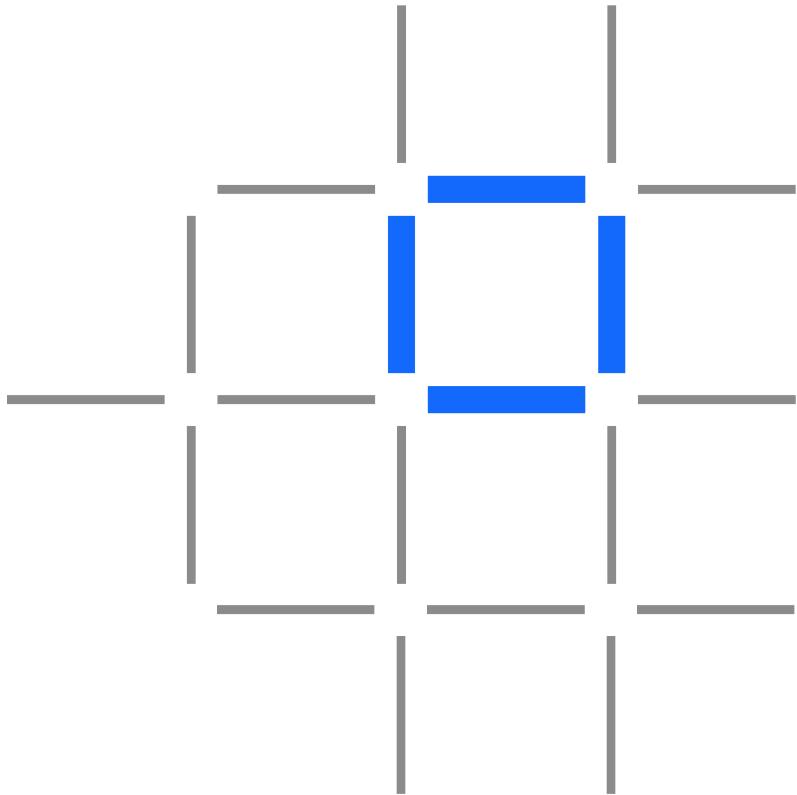
Jin VanStee



Austin Grice



Barry Silliman





What is Blockchain?



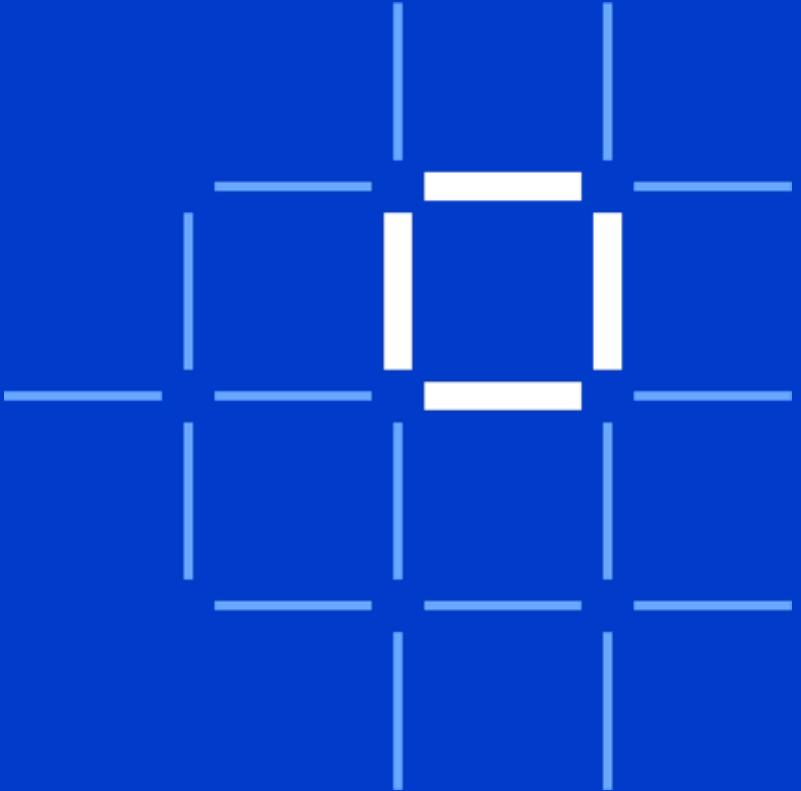
Why is it relevant for
business



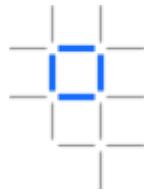
Demo application



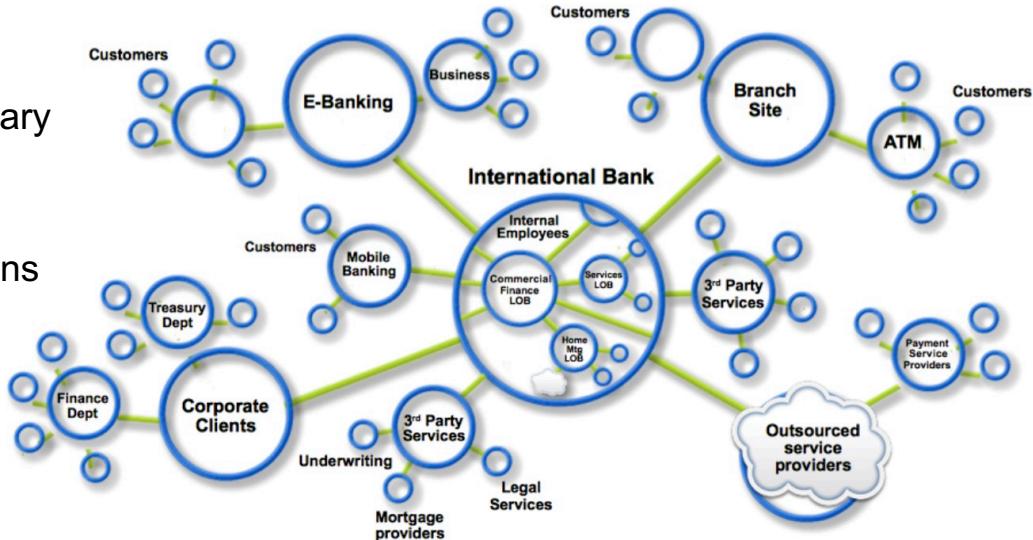
IBM Blockchain and
Offerings



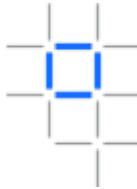
Business networks, wealth and markets



- **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

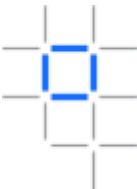
- Tangible, e.g. a house
- Intangible, e.g. a mortgage

Intangible assets subdivide

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

Cash is also an asset

- Has property of anonymity

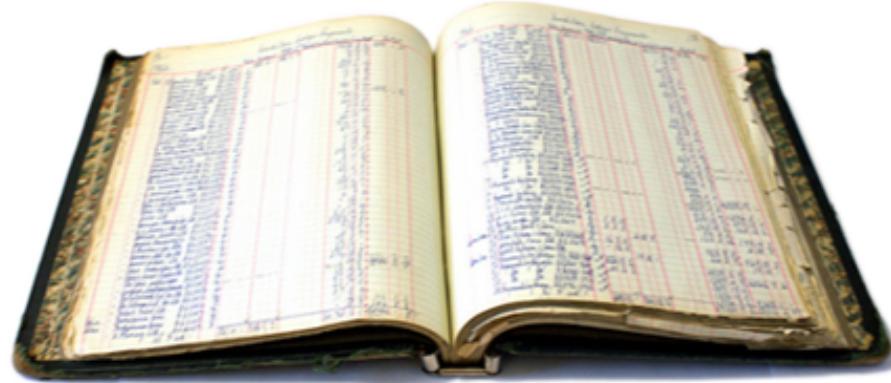


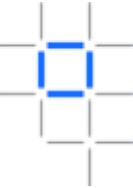
Ledgers are key

Ledgers are THE system of record for a business.

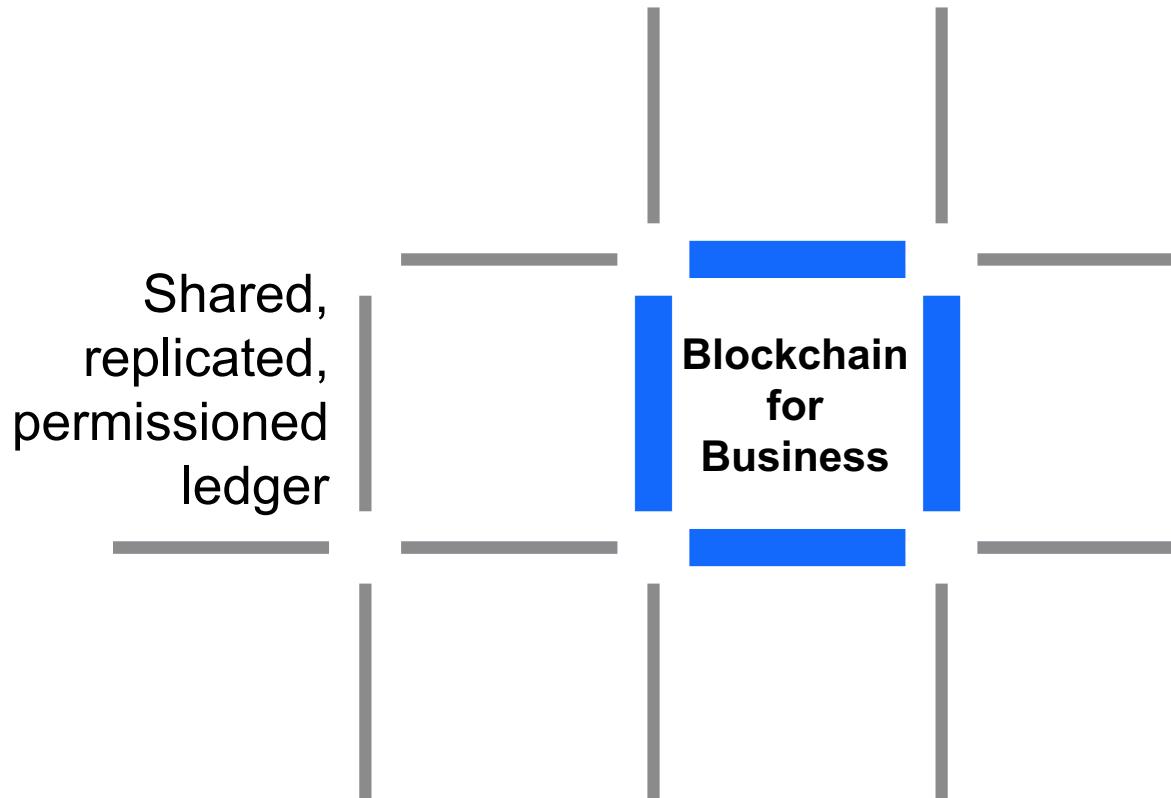
Businesses will have multiple ledgers for the multiple business networks in which they participate.

- **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)

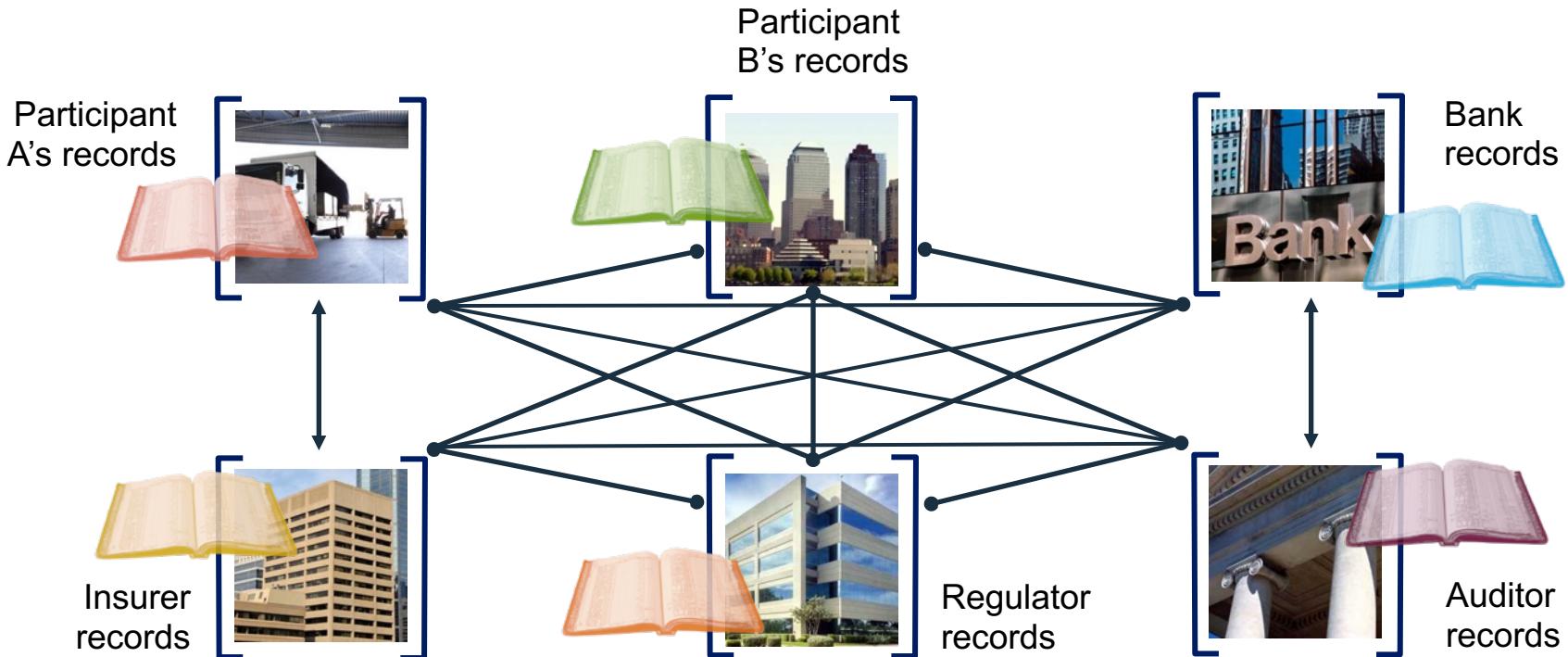
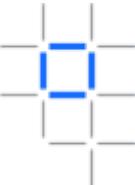




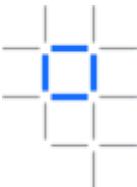
Introducing Blockchain for Business...



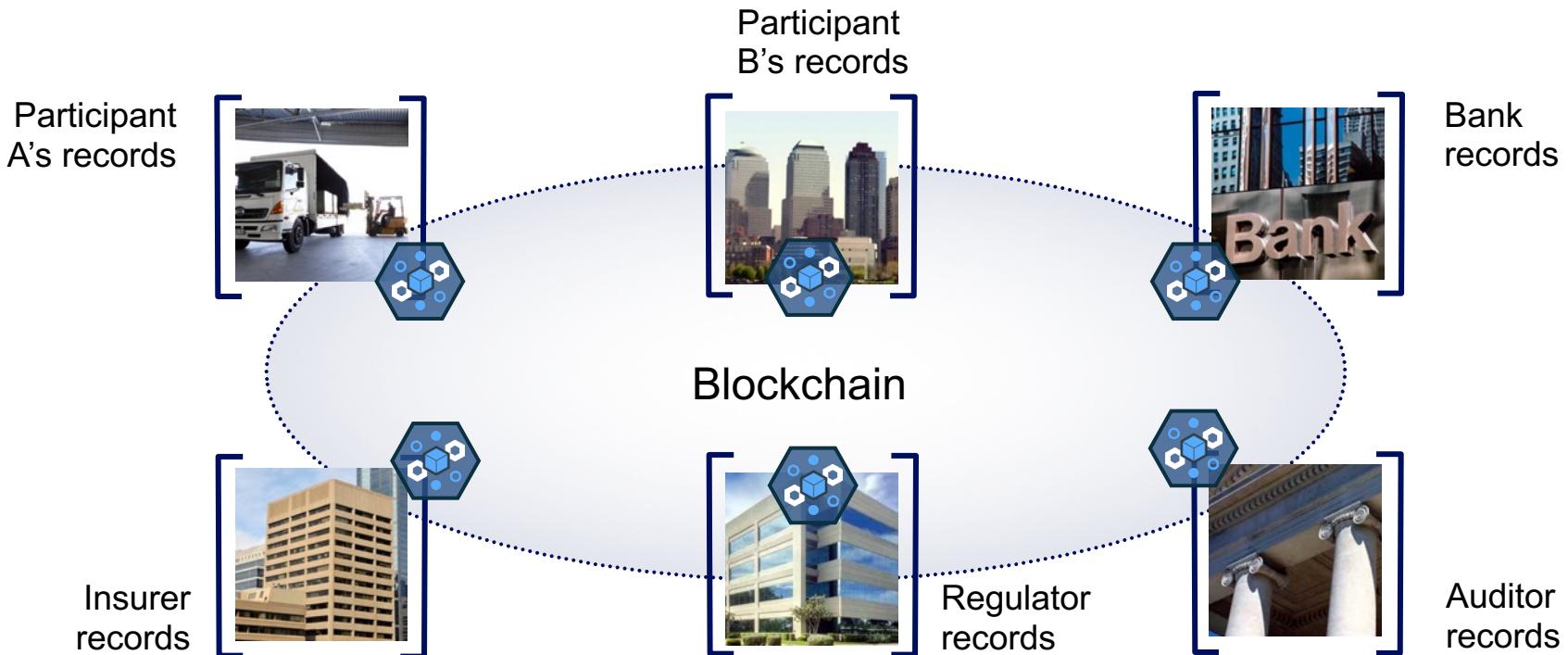
Problem...



... inefficient, expensive, vulnerable

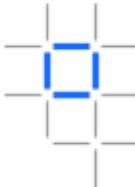


A shared, replicated, permissioned ledger ...



... with consensus, provenance, immutability and finality

Other types of blockchain exist

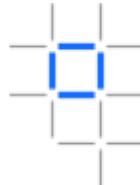


is an example of an unpermissioned, public ledger:

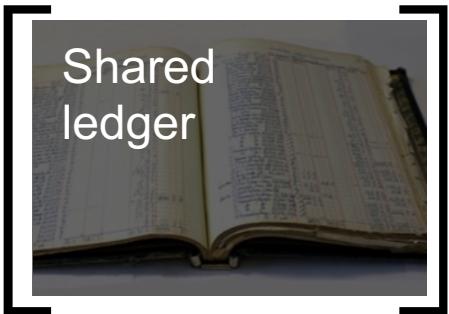
- The first blockchain application
 - Defines an unregulated shadow-currency
 - Resource intensive
-
- **Blockchains for business** are generally permissioned and private, and prioritize:
 - Identity over anonymity
 - Selective endorsement over proof of work
 - Assets over cryptocurrency



Blockchain for business engenders trust



Append-only
distributed system of
record shared across
business network



Smart
contract



Business
terms
executed with
transactions

Transactions
are secure with
appropriate
visibility



Privacy



Proof

Transactions are
provably endorsed
by relevant
participants



What is Blockchain?



Why is it relevant for
business



Demo application

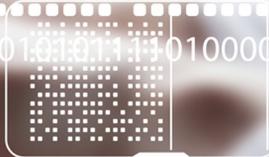


IBM Blockchain and
Offerings



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Example: Shared reference data

What

- Competitors/collaborators in a business network need to share reference data, e.g. bank routing codes, medical 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 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

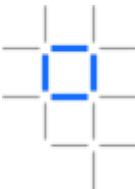
Example: Audit and compliance



- 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



Common KYC Data

What?

- View of customer identity to enable compliance with Know Your Customer (KYC)

How?

- A complete view of customers' documents across a distributed network

Benefits

- Creation of a single but cross-businesses KYC platform to inform all of the banks processes.
- Crédit Mutuel Arkéa could enable its customers to deliver proof of their identity to third-parties such as local utilities, retailers or regulated service providers.



Accelerating Global Payments

What?

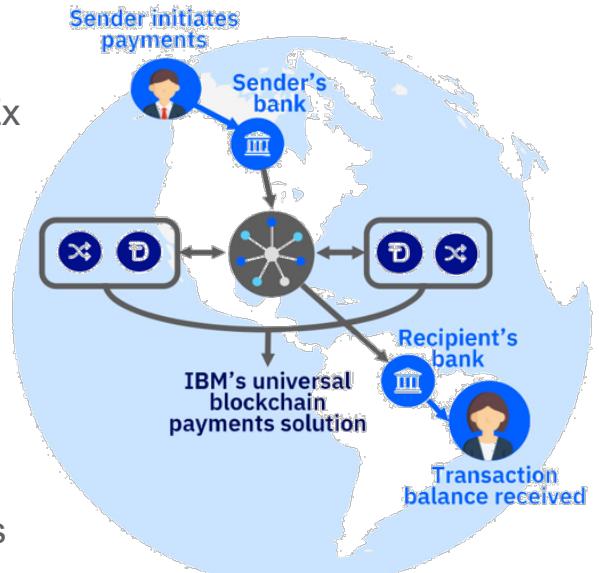
- A universal rail for real-time clearing and settlement on an integrated Blockchain network

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



Food Trust



What?

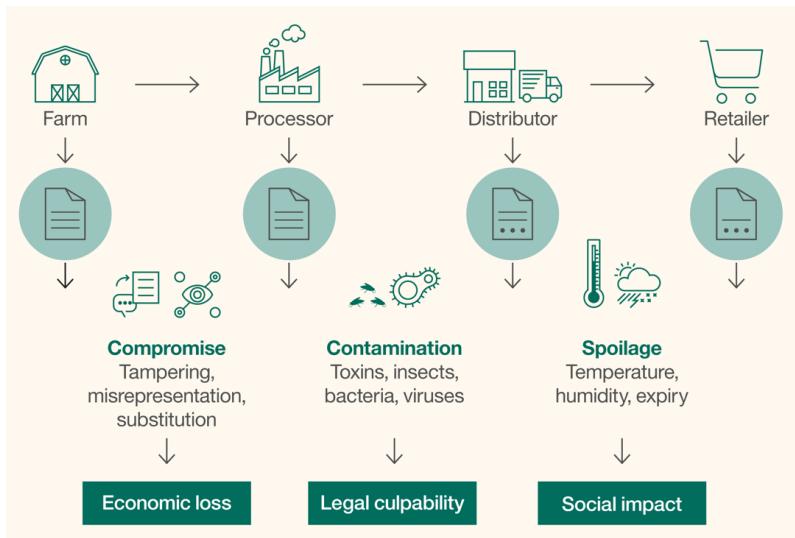
- Provide a trusted source of information and traceability to improve transparency and efficiency across the food network.

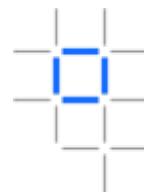
How?

- 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.





What?

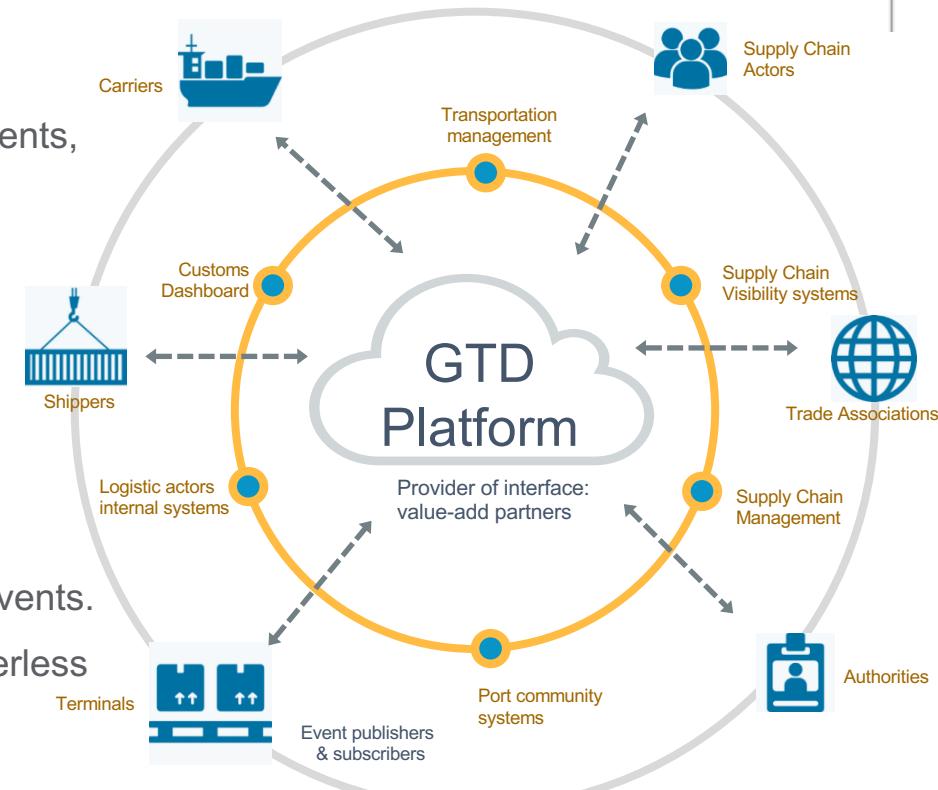
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

How?

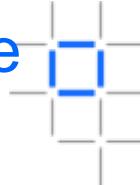
- Providing Shared Visibility and Shared State for Container Shipments

Benefits

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



Healthcare organizations tackle provider directories mandate



What?

- Five healthcare organizations including insurers UnitedHealthcare and Humana, Optum, Quest Diagnostics and MultiPlan are launching a blockchain pilot to help payers tackle mandated provider directories

How?

- The pilot will use blockchain technology for the five members of the alliance to share the curated information.
- “So when one payer does the curation work, it could be potentially shared with the other payers,” “This works for payers that have an overlapping provider population.”

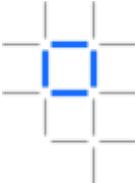
Optum, UnitedHealthcare, Humana, others launch blockchain pilot

The alliance is one of the first, if not the first, national blockchain alliances for healthcare, says Optum engineer.

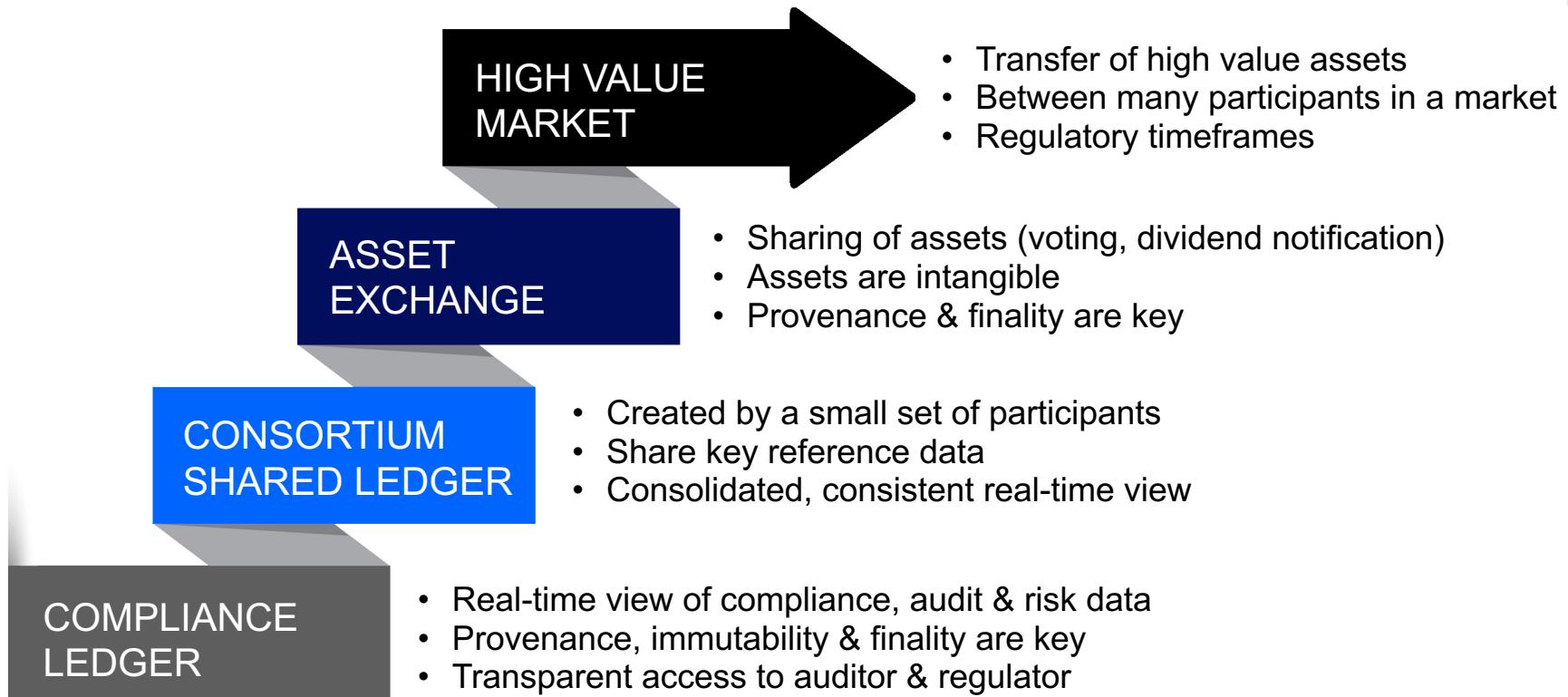
By [Susan Morse](#) | April 02, 2018 | 10:28 AM



*Source: <http://www.healthcareitnews.com/news/optum-unitedhealthcare-humana-others-launch-blockchain-pilot>



Patterns for customer adoption



Blockchain Workload Indicators

Positive Indicators

- ✓ Managing contractual relationships
- ✓ Complex business logic
- ✓ Identity is important
- ✓ Transactions need to be private
- ✓ More than two parties
- ✓ Looking to reduce costs
- ✓ Want to improve discoverability

Negative Indicators

- ✗ Small organization (no business network)
- ✗ Looking for a database replacement
- ✗ Looking for a messaging solution
- ✗ Looking for transaction processing replacement
- ✗ Very high assets volumes (millions)
- ✗ Need high performance (millisecond tx)



What is Blockchain?



Why is it relevant for
business

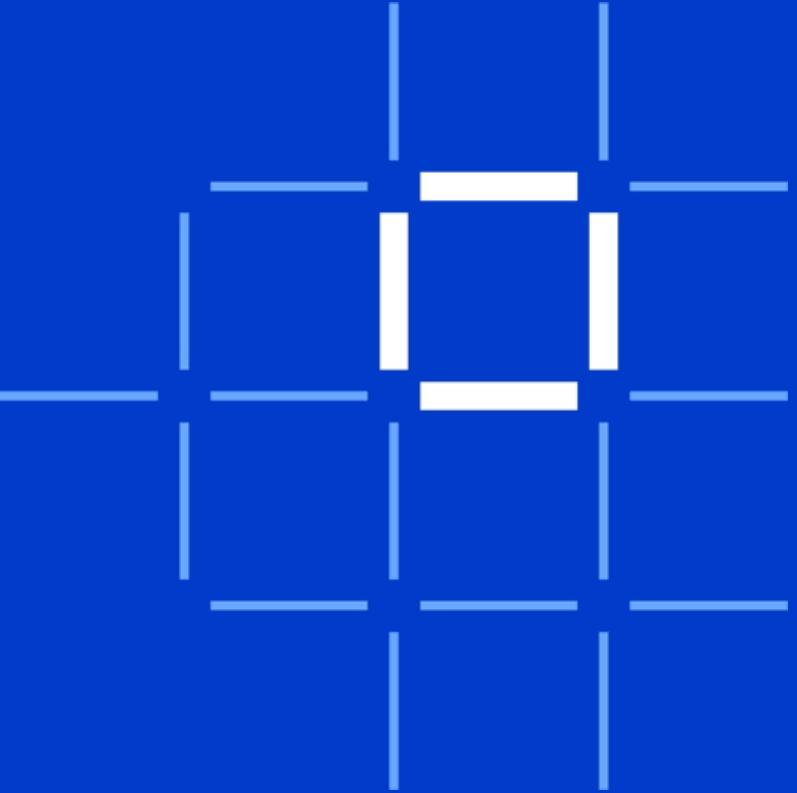


Demo application



IBM Blockchain and
Offerings

]





Alex
Agency for Vehicle
Standards



Paul
Buyer/Owner



Debbie
DMV
Regulations
Administrator



Tommen
Insurer



Mike
Arium Logistics
Employee



Vada
Police

BLOCKCHAIN

A central graphic featuring the word "BLOCKCHAIN" in a sans-serif font. The letters are contained within four separate orange-outlined boxes, which are connected by thin lines to form a rectangular shape. The entire graphic is set against a dark, semi-transparent hexagonal background.



Alex
Agency for Vehicle
Standards



Paul
Buyer/Owner



Debbie
DMV
Regulations
Administrator



Tommen
Insurer



Mike
Arium Logistics
Employee



Vada
Police

A central graphic features the word "BLOCKCHAIN" in a sans-serif font, enclosed within four orange-outlined rectangular boxes. These boxes are arranged horizontally and connected by thin vertical lines, resembling a blockchain structure. The entire graphic is set against a dark teal circular background.



What is Blockchain?



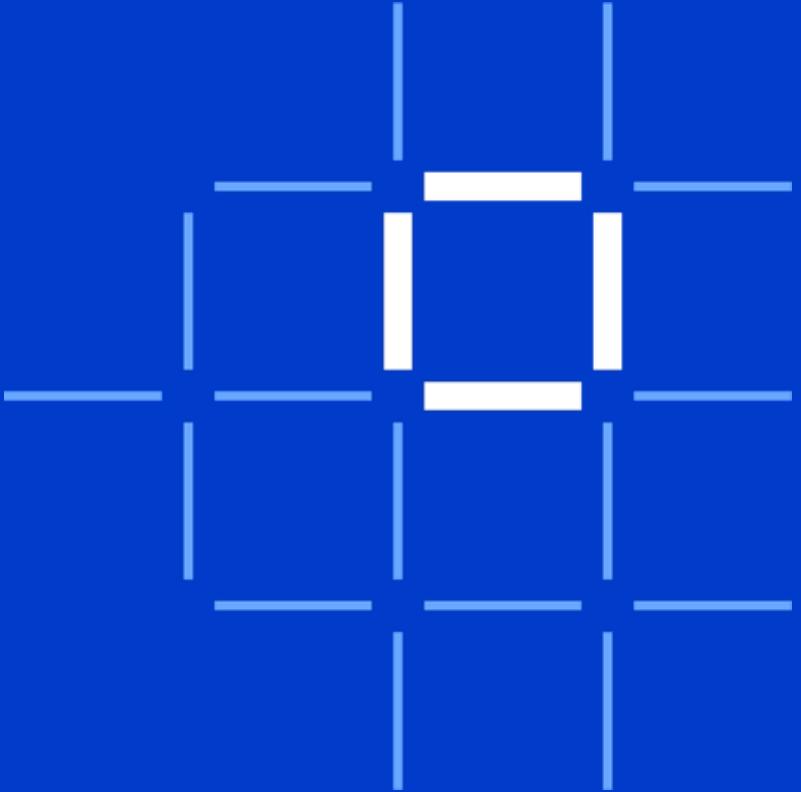
Why is it relevant for
business



Demo application



IBM Blockchain and
Offerings



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

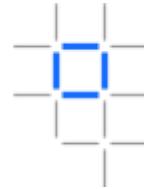
Develop, govern and operate enterprise blockchain networks with speed and security



HYPERLEDGER

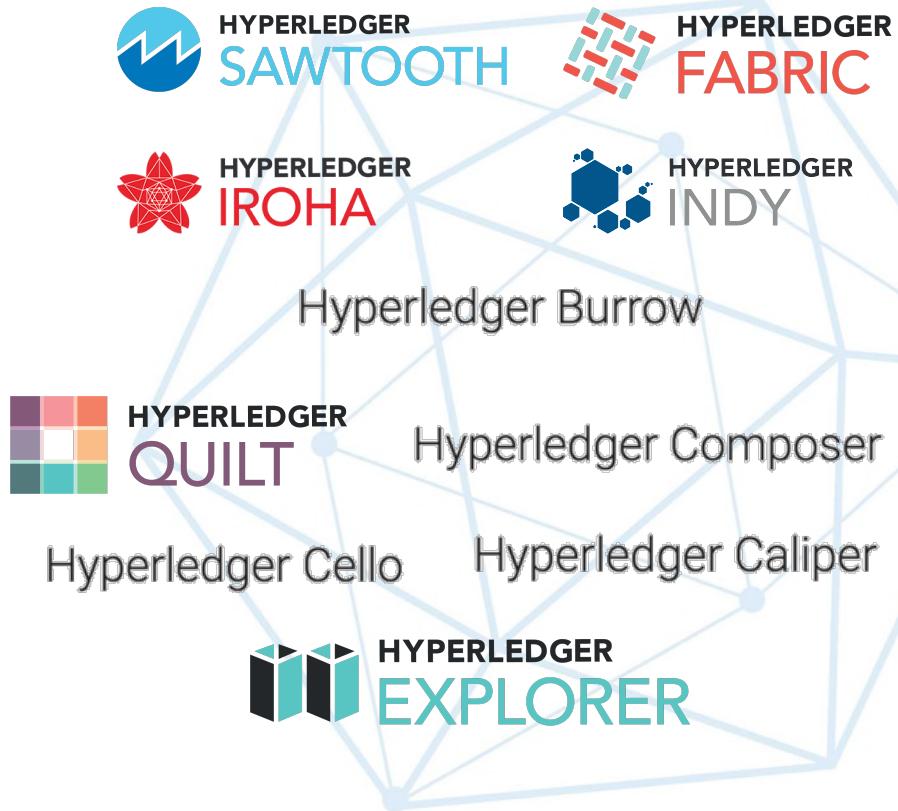
A founding, premier member of Hyperledger, IBM is committed to open source, standards & governance

Hyperledger: A Linux Foundation project



- 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
- Five frameworks and five tools projects
- IBM is a premier member of Hyperledger

www.hyperledger.org



Hyperledger Members

Premier



Associate



Source: <https://www.hyperledger.org/members>
 Updated: 3 April 2018

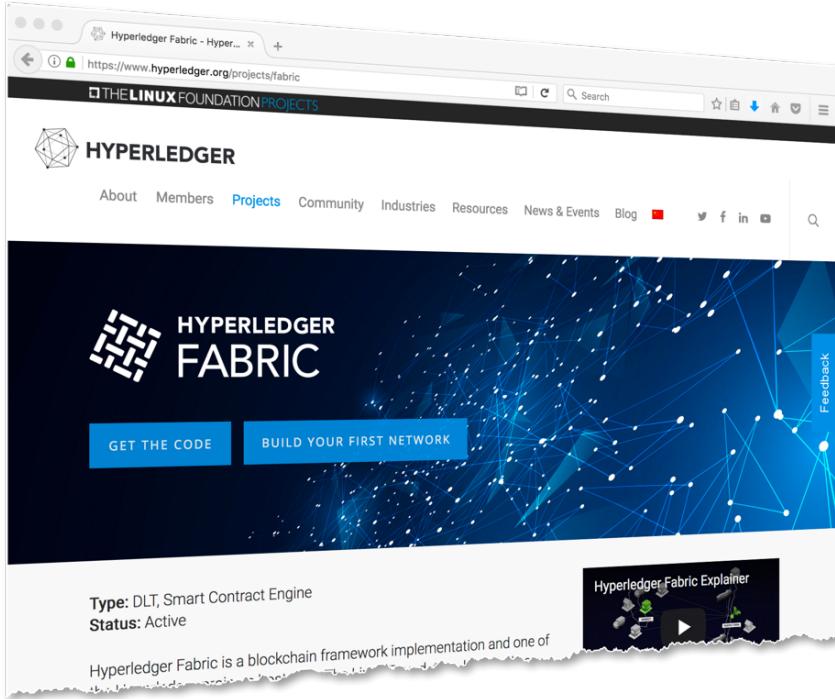
General



Associate (Academia)

IBM.

Distributed ledger platform

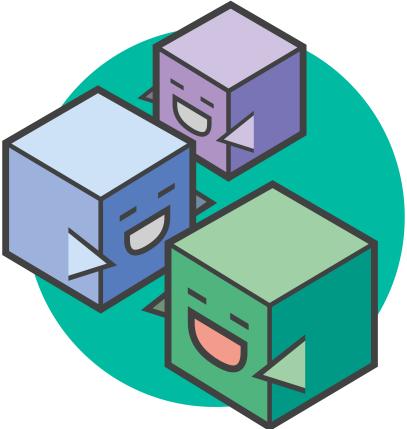
The screenshot shows the Hyperledger Fabric project page on the Linux Foundation website. The page features the Hyperledger Fabric logo and title. Below the title are two prominent blue buttons: "GET THE CODE" and "BUILD YOUR FIRST NETWORK". The background of the main section is a dark blue with a network of glowing white nodes. At the bottom left, there's a summary of the project's type ("Type: DLT, Smart Contract Engine") and status ("Status: Active"). On the bottom right, there's a thumbnail for a video titled "Hyperledger Fabric Explainer" with a play button.

- 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

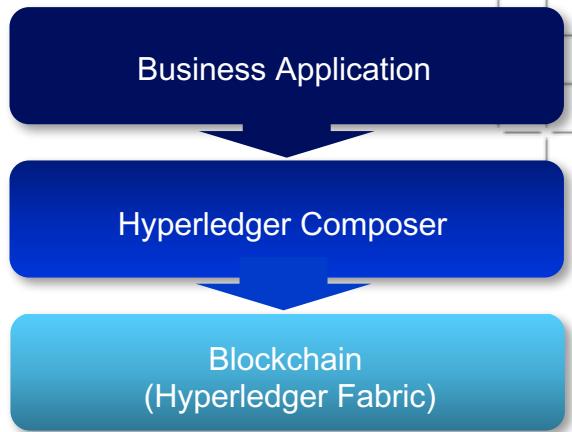
<http://hyperledger-fabric.readthedocs.io/>

Hyperledger Composer: Accelerating Time to Value

- 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
- Fully open and part of Linux Foundation Hyperledger
- Try it in your web browser now:
<http://composer-playground.mybluemix.net/>

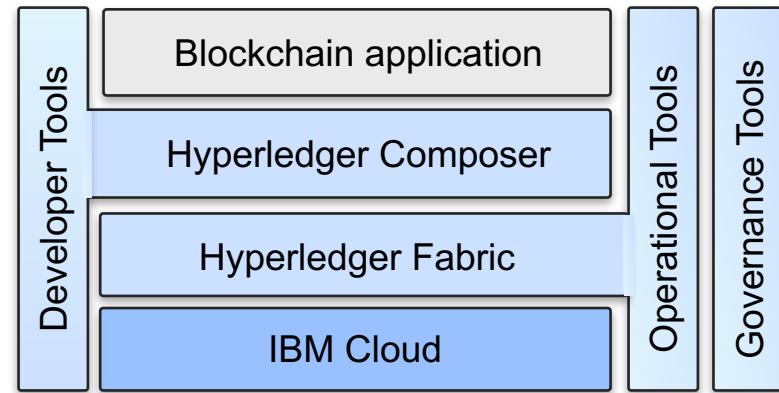


Introducing the IBM Blockchain Platform

http://ibm.biz/Platform_Demo

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



Security is implemented at each layer of the architecture



Security is implemented at each layer of the architecture

- Hyperledger Fabric
 - Membership Services: Organizations are invited to join and authenticated using an Enrollment Certificate
 - Transaction Consensus: Each transaction is endorsed and validated by multiple peers before committing to the ledger
 - Controlled Ledger Access: Channels restrict transactions to a set of organizations that are shared on the ledger
 - Secure Communications: Between the end-user application and smart contract is secure
 - Extensive security scans and audits performed by IBM, and independently by IBM and Linux Foundation sponsored 3rd-party penetration testing and code audits
- Secure Service Containers
 - Secure appliance framework providing infrastructure services encapsulating the Hyperledger Fabric
 - No root access: Access system and software only through API's; even trusted administrators
 - Impervious to the injection of malware: Installed from encrypted, signed boot image
 - Data Privacy: Encryption of data in flight and at rest on the ledger
- Secure Performant Hardware
 - Keys stored in HSM certified to FIPS 140-2 level 4
 - Fastest cryptographic acceleration: used by block hashing and digital signatures

Flexible plans

Plan	Key Features	Deployment
Starter	Easy on-ramp for blockchain-as-a-service	IBM Cloud
Enterprise	Production plan for industries comfortable with cloud	IBM Cloud
Enterprise +	Production plan for regulated industries, multi-region HA/DR and highest performance	IBM Cloud
Support-only	Supported instances of Hyperledger Fabric and Composer running outside IBM Cloud Platform	Docker

IBM Blockchain Platform Membership Plans	Starter	Enterprise	Enterprise Plus
Suitability			
MVP	✓	✓	✓
Pilot & PoC	✓	✓	✓
Pre-production & Staging	✓	✓	✓
Production		✓	✓
Features			
Deploy and run Composer apps	✓	✓	✓
Hyperledger Fabric features and capabilities	✓	✓	✓
Multiple org simulation	✓	✓	✓
Rolling migrations with no network outages	✓	✓	✓
Low-code interface	✓	✓	✓
Ability to scale	✓	✓	✓
Support options	✓	✓	✓
Fault tolerant ordering service		✓	✓
Cryptographic Acceleration		✓	✓
HSM Available		Coming soon	Coming soon
Advanced Secure container technology		✓	✓
Isolated Compute Environment			✓
Multi-Geo/Site DR			✓

IBM Blockchain Platform Sites



- IBM Blockchain Platform Enterprise plan is hosted in multiple sites to help you satisfy data residency requirements

- More platform locations planned

- ↑ Complemented by a set of IBM Blockchain Garages to help you get started with IBM Blockchain Platform

Learn more at
www.ibm.com/blockchain

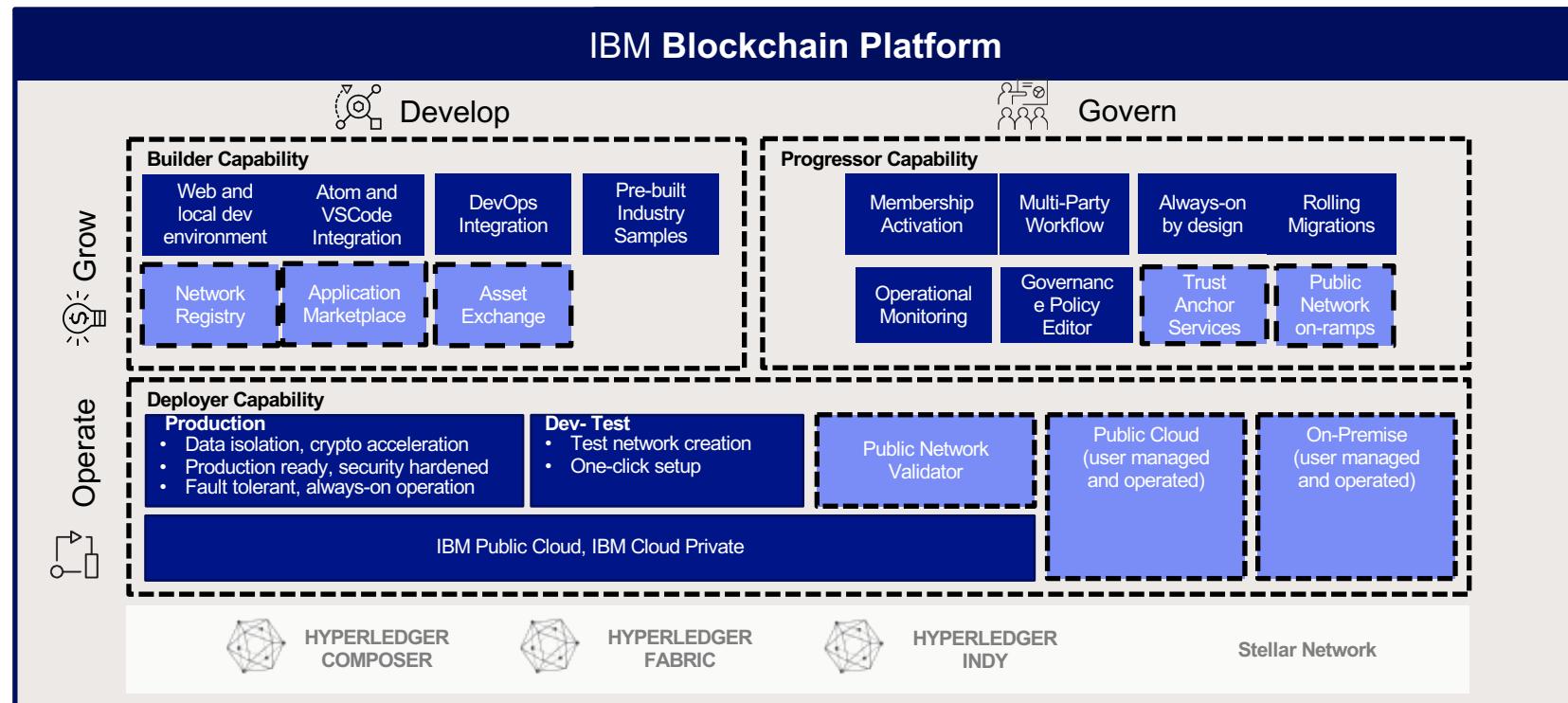
IBM Blockchain Platform

Solutions

Food Trust, universal payments, Global Trade Digitization, Identity, etc...

IBM Extensions

Watson IOT, API Management, Messaging, Workflow etc...



Blockchain Network Finder

[SIGN UP / LOG IN](#)[RESERVE NETWORK](#)

Industry

All Categories

- Accommodation and Food Services
- Admin. and Support
- Agriculture
- Arts (Entertainment and Recreation)
- Construction
- Educational Services
- Energy
- Finance and Insurance
- Healthcare
- Identity Management
- IoT - Asset Tracking
- IoT - Healthcare
- IoT - Location Based Services
- Management of Companies and Enterprises
- Manufacturing
- Media
- Mining and Oil and Gas Extraction
- Non-Profit
- Real Estate
- Real Estate Rental and Leasing
- Record Management
- Retail Trade
- Supply Chain Management
- Transportation and Warehousing
- Utilities
- Voting
- Waste Mgmt. and Remediation Ser

Search

A B C E F G J M N O S V W Y {

Name	Industry	Summary	Peers	Created Date
<code>{{2+9}}</code>			3	December 4th 2017, 4:21 AM
<code>artsexpo</code> Canada	Non-Profit		1	March 7th 2018, 2:41 AM
<code>besthouse</code> China	Real Estate, Real Estate Rental and Leasing		2	November 1st 2017, 9:48 AM
<code>coffeeshopschain</code> United States	Retail Trade, Supply Chain Management	This is the main chain for updates regarding Coffeeshops in the US - look here for updates, deals, promotions, branches...	3	January 4th 2018, 11:53 AM
<code>ecodisposal</code> USA	Waste Mgmt. and Remediation Services		4	November 1st 2017, 9:52 AM
<code>ewewde</code>		ВИСИВСИВСИВС	3	March 7th 2018, 12:12 AM
<code>fishmarket</code>	Agriculture, Supply Chain Management, Wholesale Trade	This is a Fish Market blockchain	3	March 6th 2018, 7:41 AM
<code>friendsid</code>			2	November 1st 2017, 8:42 AM
<code>garcoin</code>				November 1st 2017,

Discover
other
networks



Your
idea



The Business
Network



Develop



Govern



Operate



Grow

Blockchain Asset Marketplace

[SIGN UP / LOG IN](#)[PUBLISH ASSETS](#)

Carbon Credit Model

v3.4

Type: Composer model

Added by: Organization

Used in: 3057 networks

[TRY NOW](#)[BUY NOW](#)

Simple Supply Chain

v5.3.6

Type: Composer model

Added by: OrganizationA

Used in: 208 networks

[TRY NOW](#)[BUY NOW](#)

Bilateral Config

v1.2

Type: Network template

Added by: OrganizationB

Used in: 12 networks

[TRY NOW](#)[BUY NOW](#)

Asset
marketplace



Your
idea



The Business
Network



Develop



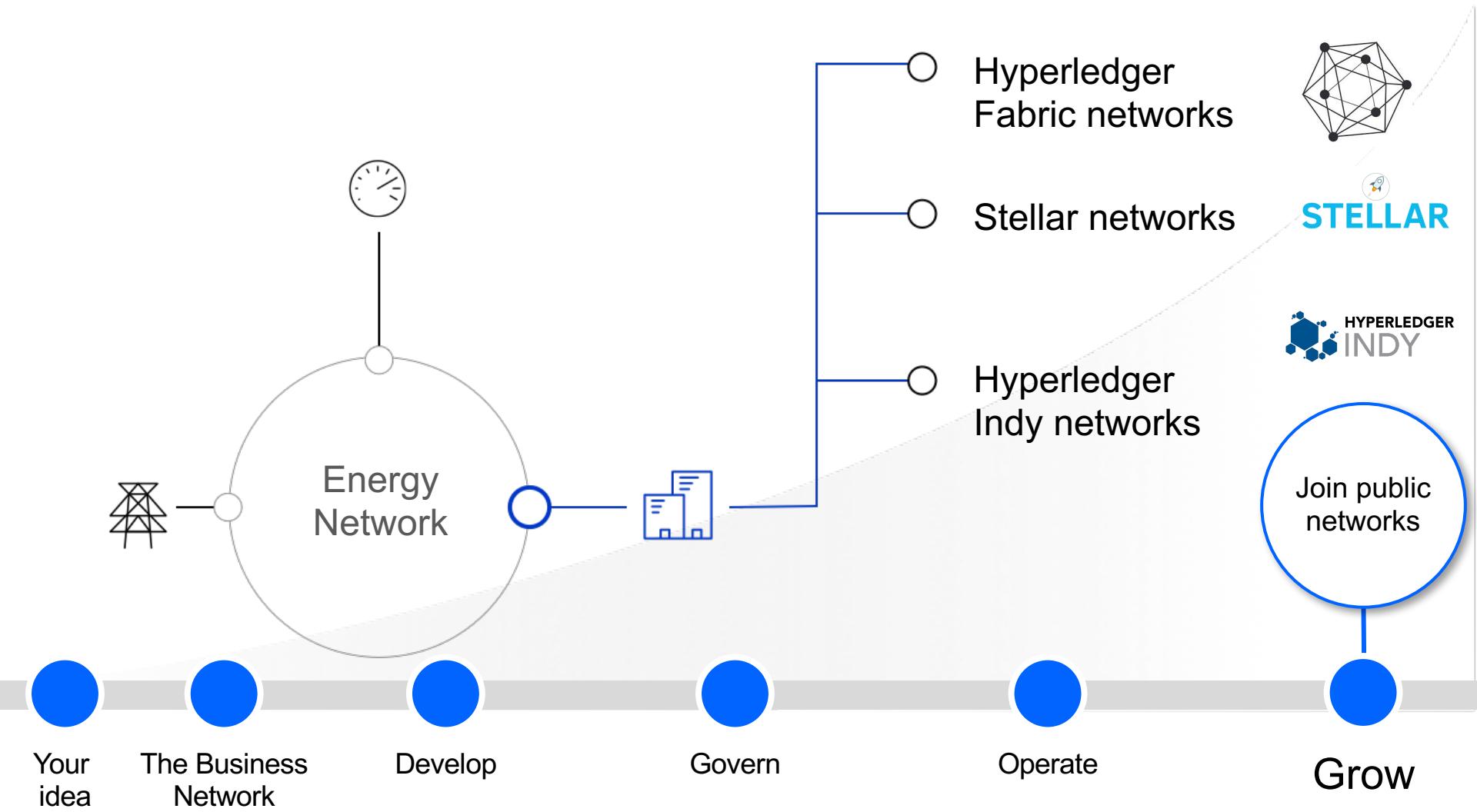
Govern



Operate

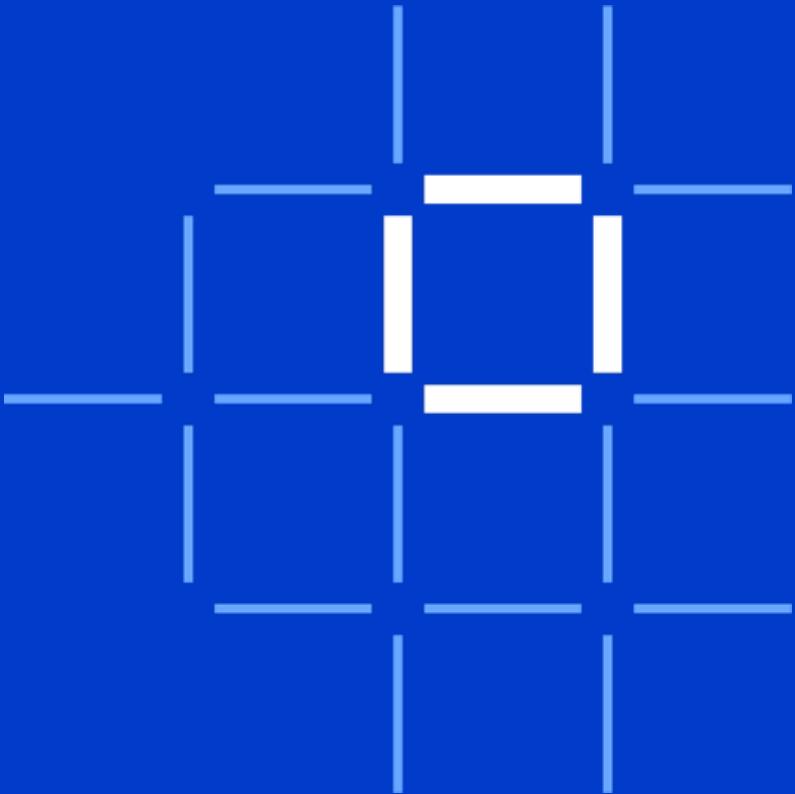


Grow

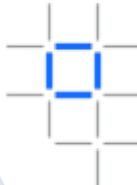




Next Steps and Resources



IBM Engagement Model overview



Let's
Talk



Blockchain
Hands-on



First
Project



Scale

1. Discuss Blockchain technology
2. Explore customer business model
3. Show Blockchain Application demo

1. Understand Blockchain concepts & elements
2. Hands on with Blockchain
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 or F2F	Face to face	Face to face
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Immersion Workshop Agenda

This 2-day workshop will enable you to understand Blockchain concepts and provide you with knowledge to start building your own permissioned Blockchain network.

Through a series of presentations and guided hands-on labs, you will learn:

- blockchain concepts and architecture
- how to model business networks that include the assets, participants, transactions, and access control lists in a sandbox environment
- how to deploy your blockchain network
- how to operate and integrate blockchain networks into existing enterprises
- how to install and deploy blockchain, and use open source tooling to manage the installed network

Day 1 of the workshop focuses on the use of Hyperledger Composer which provides an abstraction layer to reduce the time to market for Blockchain implementations. The workshop will cover both the IBM Blockchain Platform, IBM's public Blockchain Cloud offering, as well as an on prem alternative running on IBM's scalable and secure LinuxONE platform. We will review the governance and operational features of the IBM Blockchain Platform. Day 2 of the workshop focuses on installing an on prem blockchain, and using open source tooling to manage the installed blockchain network. The goal of the event is to enable attendees to become familiar with the concepts, operation, and benefits of a Blockchain, and IBM's value proposition and the resources available to you.

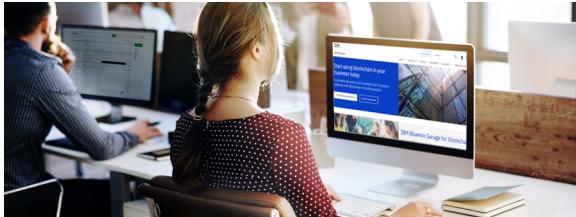
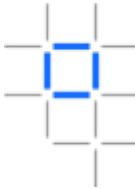
Immersion Workshop Agenda

Day 1	Focus: Blockchain concepts and designing your first blockchain network
Blockchain Explained	Understanding what blockchain is, why it is important, industry use cases, and how the IBM Blockchain Platform provides the only fully integrated enterprise-ready blockchain platform designed to accelerate the development, governance, and operation of a multi-institution business network.
Vehicle Asset Lifecycle Demo	Show a blockchain application that deals with Vehicle lifecycle from the perspective of different participants in the network.
Blockchain Composed	Introduction to Hyperledger Composer for accelerating blockchain implementations.
Lab: Hyperledger Composer Playground	Hands-on lab to learn how to use the Hyperledger Composer Playground in the IBM cloud.
Lab: Hyperledger Composer Developer Tutorial	Hands-on lab to learn how to quickly model business networks and develop applications using the Hyperledger Composer framework and tooling plug-ins.
Blockchain Explored	Deep dive into the different components of Hyperledger Fabric and learn how consensus works.

Immersion Workshop Agenda

Day 2	Focus: IBP, On Prem deployment and Enterprise Integration
The IBM Blockchain Platform	Learn about The IBM Blockchain Platform, the fully integrated blockchain as a service offering based on the Hyperledger Fabric implementation of blockchain.
Hyperledger Fabric Installation overview	Quick overview of the installation process.
Lab: Hyperledger Fabric Installation & Verification	Install Hyperledger Fabric and run end to end test to verify that it is working (deploy a sample blockchain network to running fabric).
Lab: Marbles Smart Contract and UI	Lab consisting of transacting assets amongst organizations.
Hyperledger Explorer overview	
Lab: Hyperledger Explorer installation & usage	Lab to install Explorer and to use it to view activity on the sample blockchain network.
Blockchain Integrated	Introduce blockchain integration reference architecture, learn how to integrate a blockchain network to the enterprise.
Next Steps	Learn about next steps for use case selection and refinement.

Getting started on your blockchain journey



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Application](#)



[Activate and Grow your
Blockchain Network](#)

Thank you

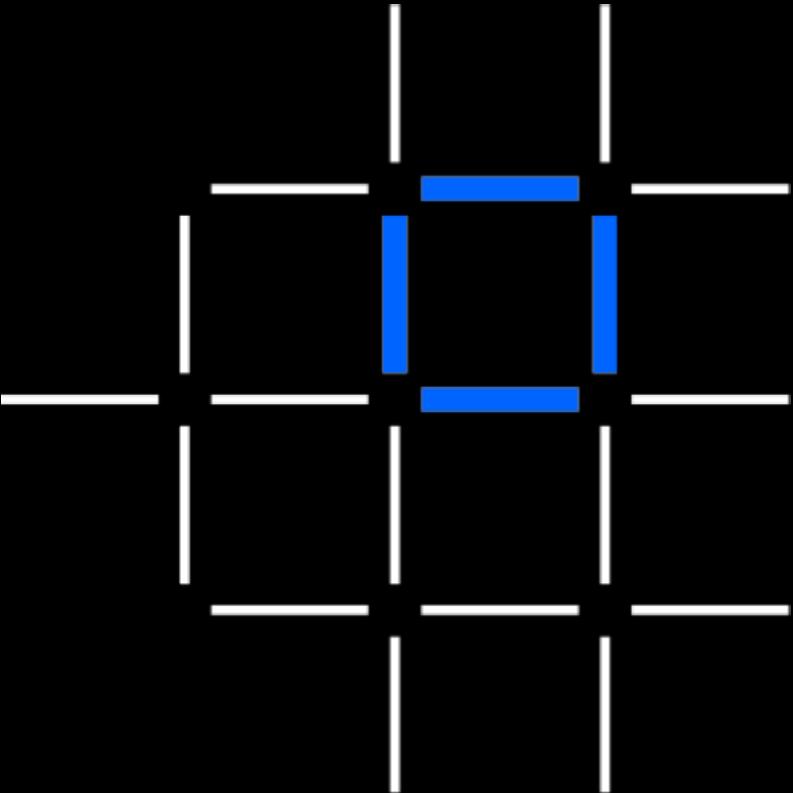
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Questions? Tweet us or
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