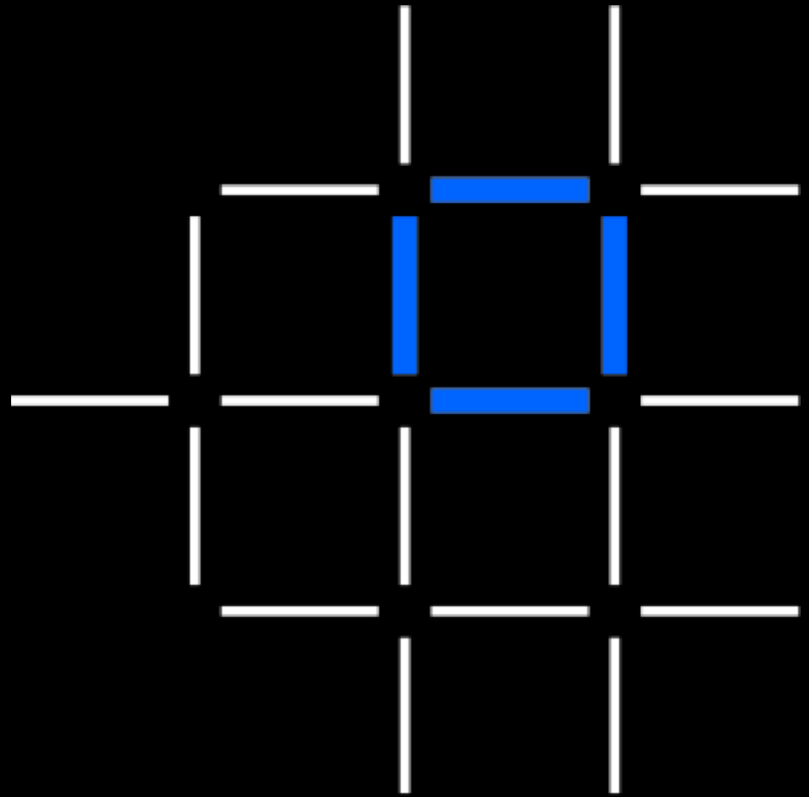
Blockchain Immersion

Dallas – July 25/26



Agenda Day 1

- 9am Blockchain Introduction
- 10am Vehicle Lifecycle Demo
- 10:20am What Makes a Good Use Case
- 10:30am Lab: Hyperledger Playground, IMMUNIChain
- 12pm Lunch / Use Case Breakout
- 1pm Blockchain Integrated
- 1:30pm Lab: Hyperledger Composer Smorgasbord
- 3:30pm Blockchain Explored Part 1

Agenda Day 2

- 9am Blockchain Explored Part 2
- 10am IBM Blockchain Platform
- 11am Next Steps
- 12pm Lunch
- 1pm Lab: Hyperledger Fabric Verify and Install
- 2:30pm Lab: Marbles Smart Contract and Install
- 4pm Lab: Hyperledger Explorer

Blockchain Explained

An Introduction to Blockchain for Business

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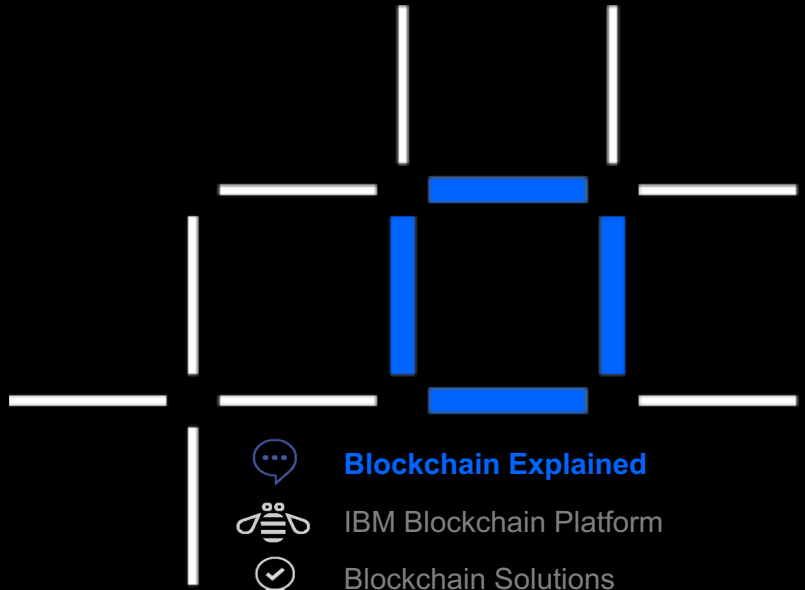
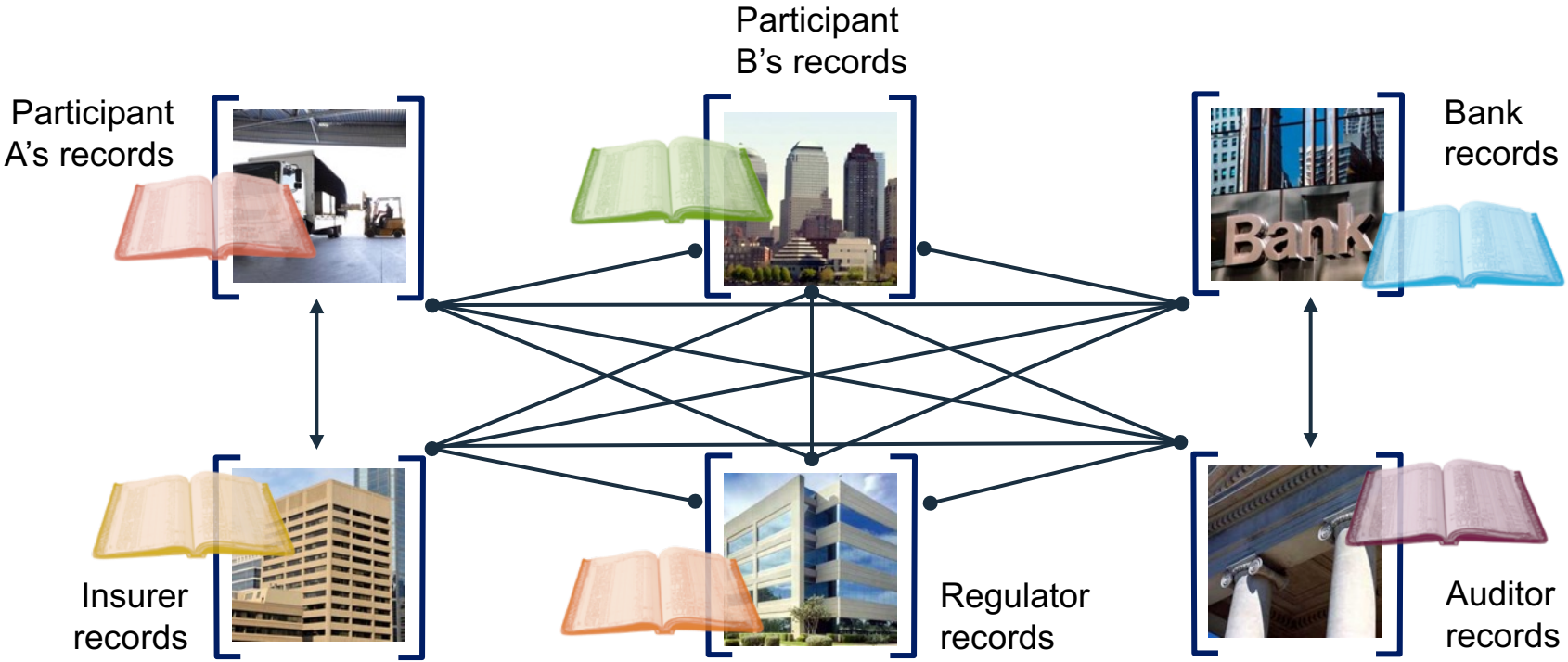


What is Blockchain?

Why is it relevant for our business?

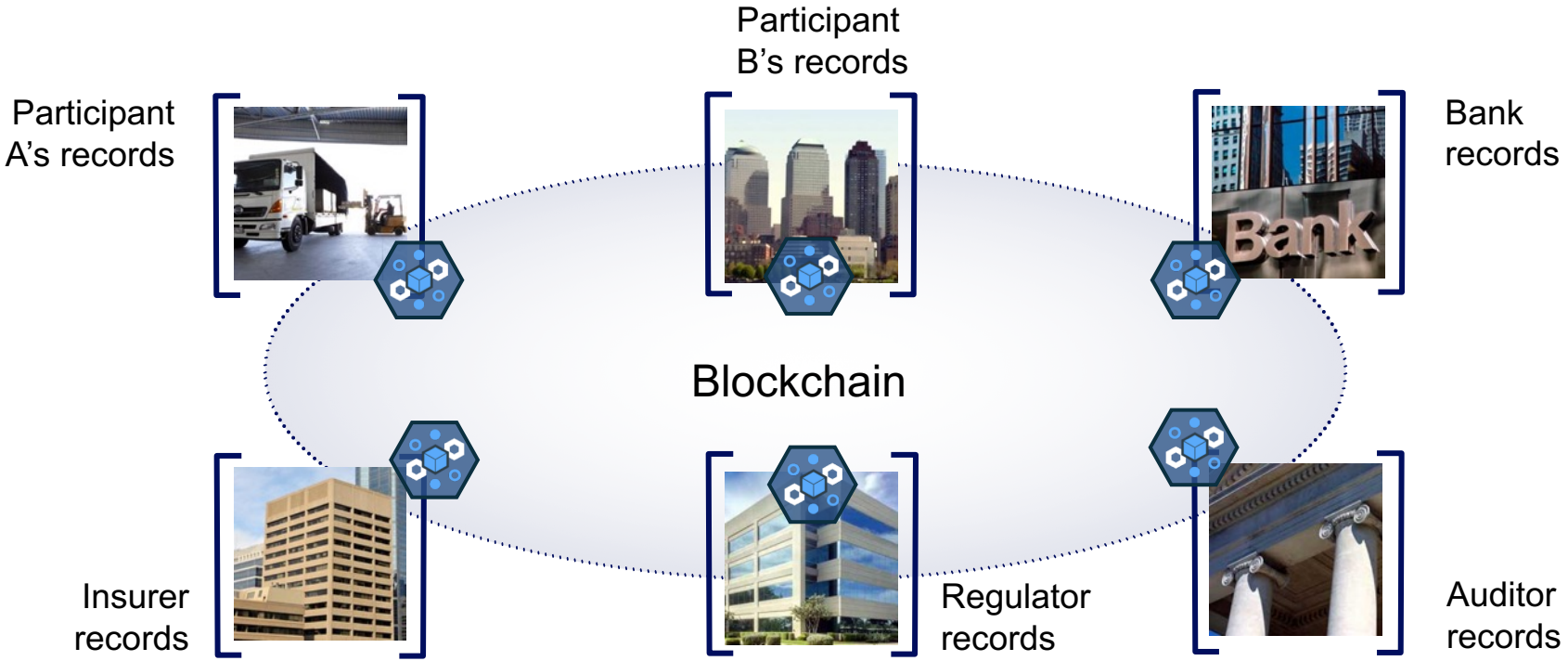
IBM and Blockchain

Problem…



… inefficient, expensive, vulnerable

A shared, replicated, permissioned ledger …



… with consensus, provenance, immutability and finality

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

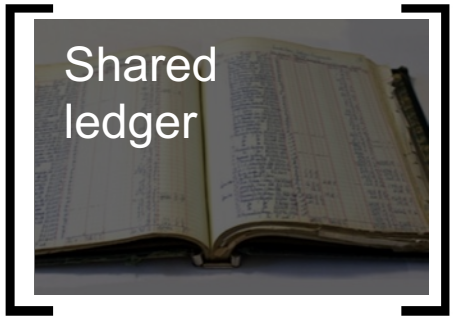
- Financial, e.g. bond
- Intellectual, e.g. patents
- Digital, e.g. music

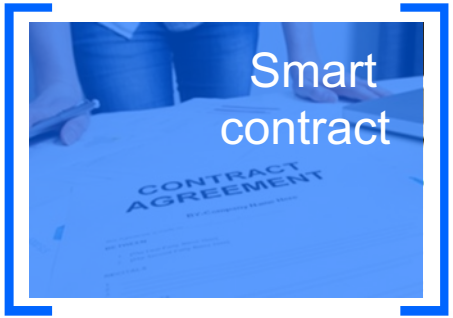
Cash is also an asset

- Has property of anonymity

Blockchain for business requires **trust**

Append-only distributed system of record shared across business network





Business terms executed with transactions

Transactions are secure with appropriate visibility

Transactions are provably endorsed by relevant participants

What is Blockchain?

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IBM and Blockchain

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?

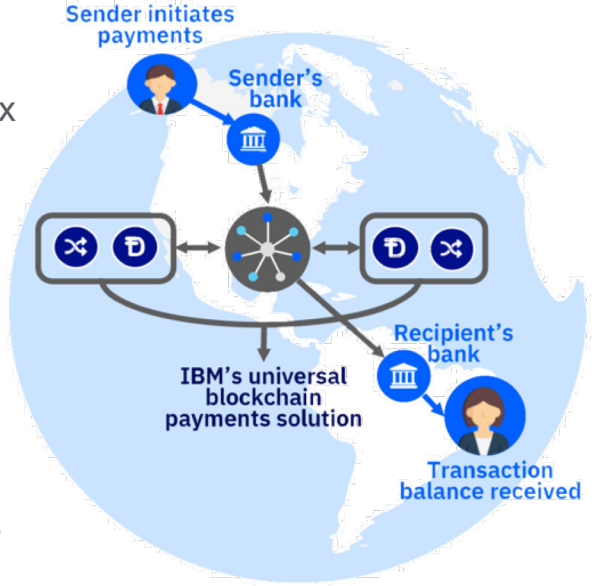
- A universal rail for real-time clearing and settlement on an integrated Blockchain network

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?

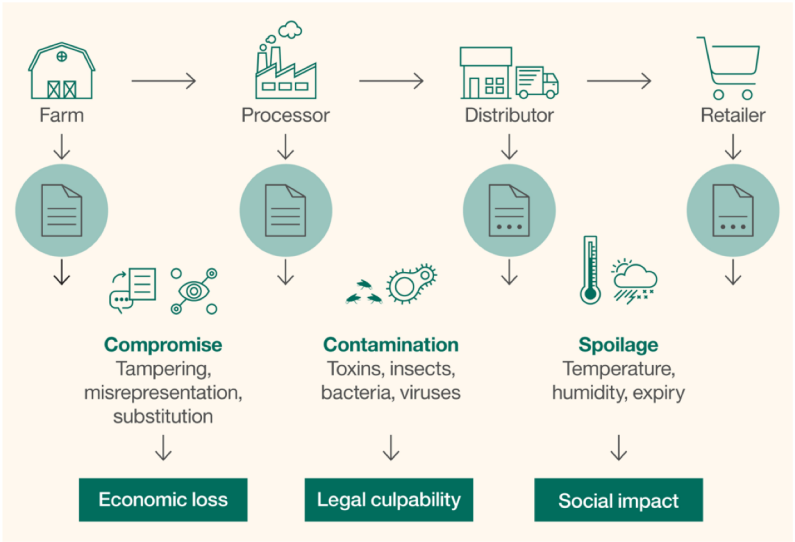
- Provide a trusted source of information and traceability to improve transparency and efficiency across the food network.

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-bourne illnesses.



Global Digitized Trade

What?

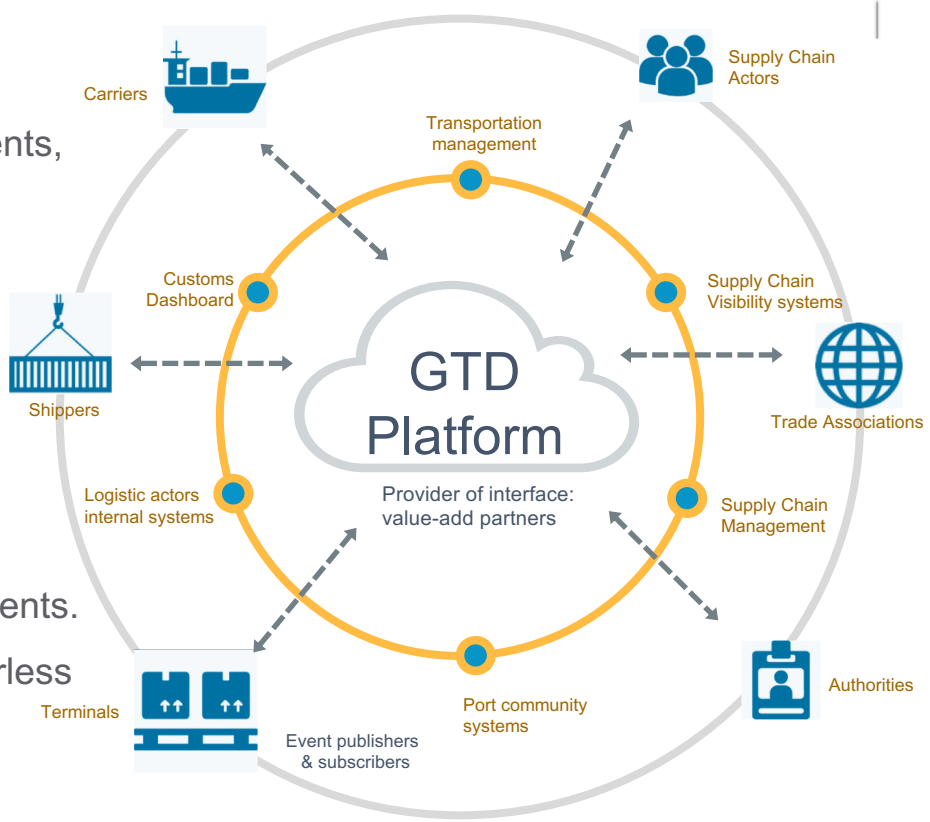
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

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



Global Financing: Dispute Resolution

What?

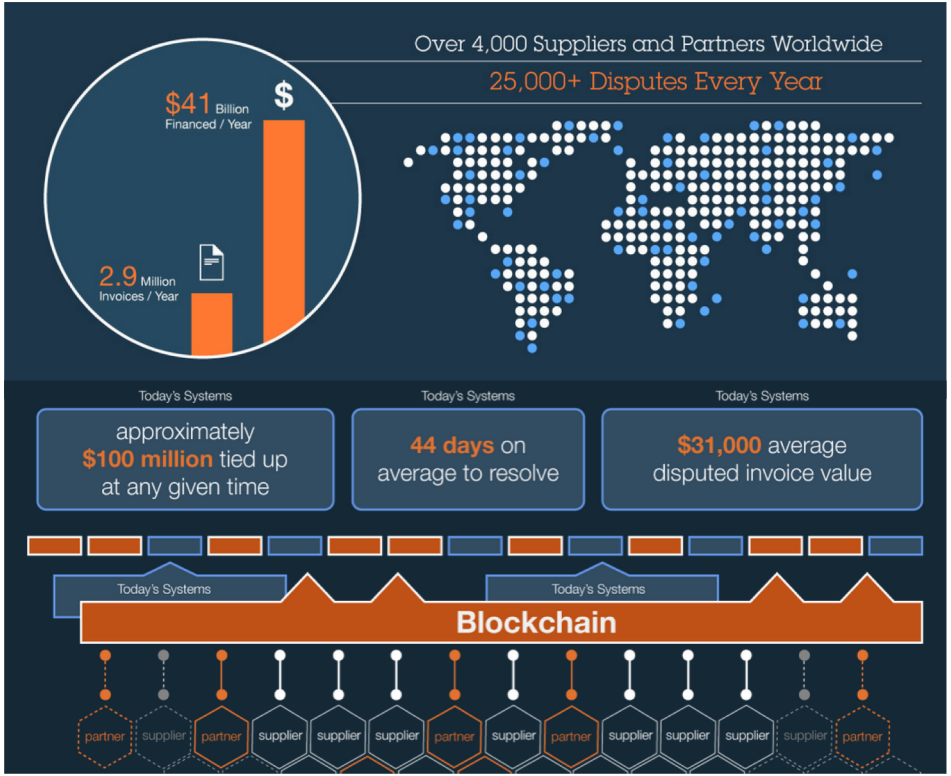
- IBM Global Finance provides a $41bn channel financing per year. There are a number of disputes that take time to resolve and can lock up transactions costing time and money

How?

- Blockchain provides visibility and provenance end-to-end across supply chain

Benefits

- Reduced dispute resolution time by 75%
- Released working capital from $100m
- Combine IGF and Supplier info to further expand benefits further
- In production since Sept 2016



Making blockchain real for business…

Trade Finance	Pre and Post Trade	Complex Risk Coverage
we.trade more trust. more trade. · MIZUHO · NATIXIS · TRAFIGURA	DTCC · CLS Fundamental to FX · Bolsa Comercio Santiago · JPX	AIG · Standard Chartered
Identity/ Know your customer (KYC)	**Unlisted Securities/ Private Equity Funds**	**Incentive Program**
SECURE KEY · Crédit Mutuel ARKEA · DIACC	NORTHERN TRUST · BORSA ITALIANA · SBI証券	Interac · UnionPay 银联
Medicated Health Data Exchange	**Government**	**Distributed Energy/ Carbon Credit**
FDA	دبي الذكية SMART DUBAI	TenneT · Energy Blockchain Labs
Supply Chain	**Food Trust**	**Provenance/ Traceability**
MÆRSK · PSA The World's Port of Call	Walmart · Driscoll's Only the Finest Berries · Tyson · McLane · Dole · Kroger · Nestlé · Unilever · gsf golden state foods · McCormick	everledger

Further examples by (selected) industry

Financial

- Trade Finance
- Cross currency payments
- Mortgages

Public Sector

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

Retail

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

Insurance

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

Manufacturing

- Supply chain
- Product parts
- Maintenance tracking

What is Blockchain?

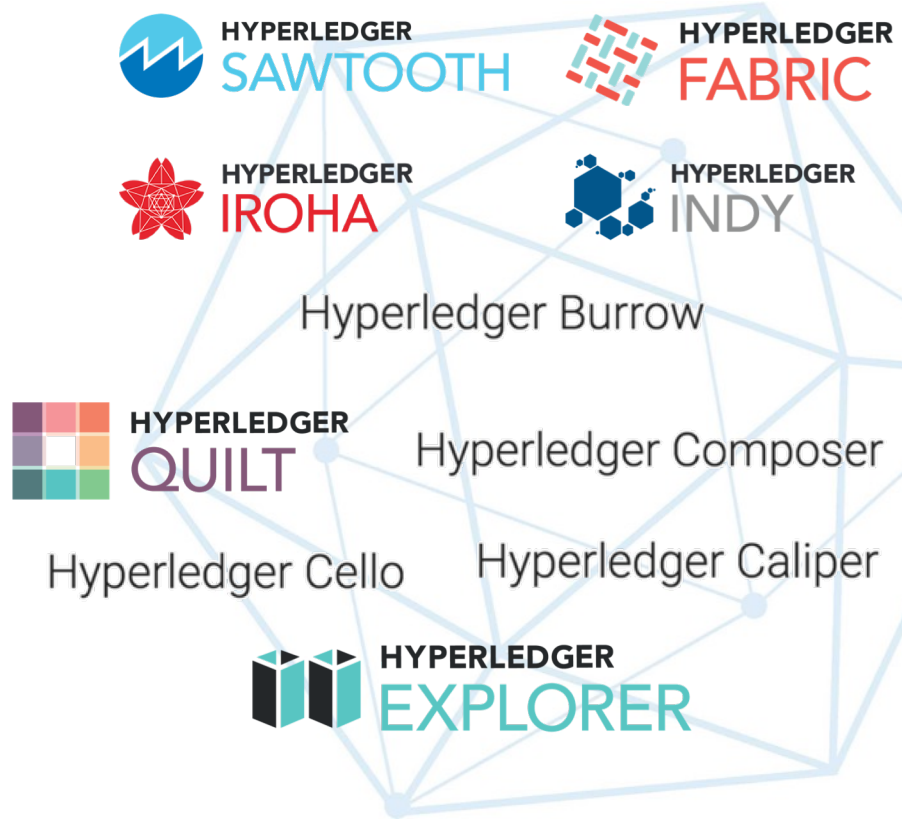
Why is it relevant for our business?

IBM and Blockchain

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

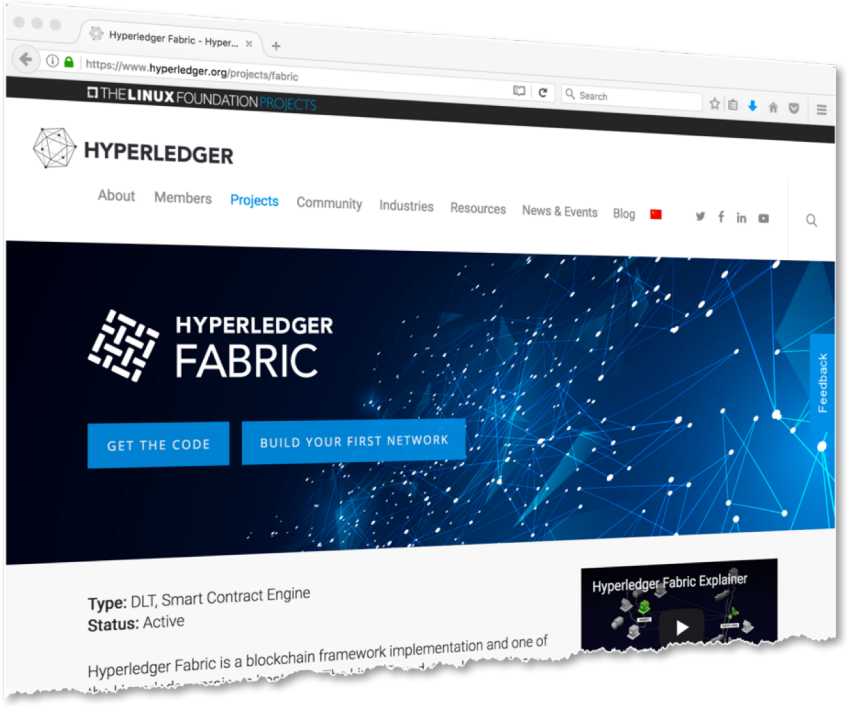
Associate

General

Associate (Academia)

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

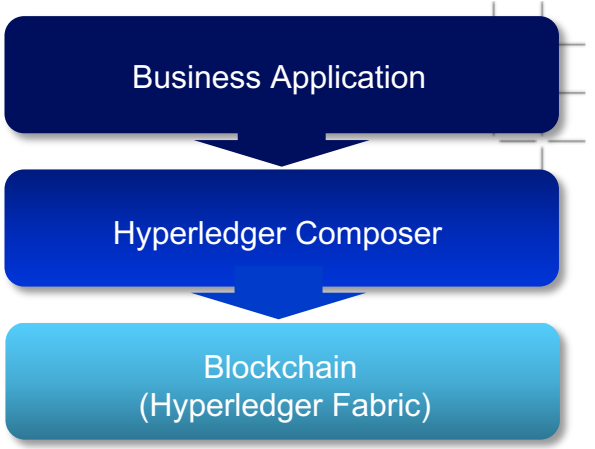
Distributed ledger platform



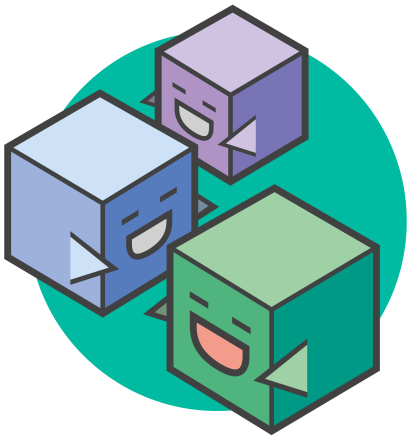
- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.2 released July 2018
  - Includes performance enhancements and additional security with Private Data
- IBM is one of the many contributing organizations

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

Hyperledger Composer: Accelerating Time to Value

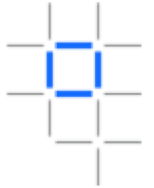


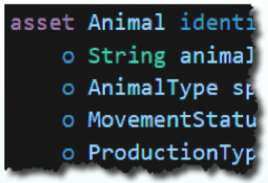
- A suite of high level application abstractions for business networks
- Emphasis on **business-centric vocabulary** for quick solution creation
- Reduce risk, and increase understanding and flexibility



- 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/

Extensive, Familiar, Open Development Toolset





Data modelling

JavaScript business logic

Web playground

Client libraries

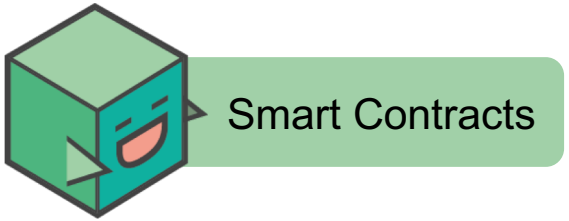
Editor support

CLI utilities

Code generation

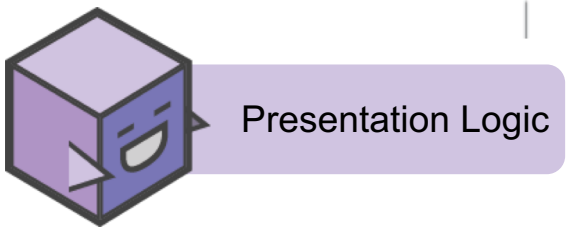
Existing systems and data

The Developer's role



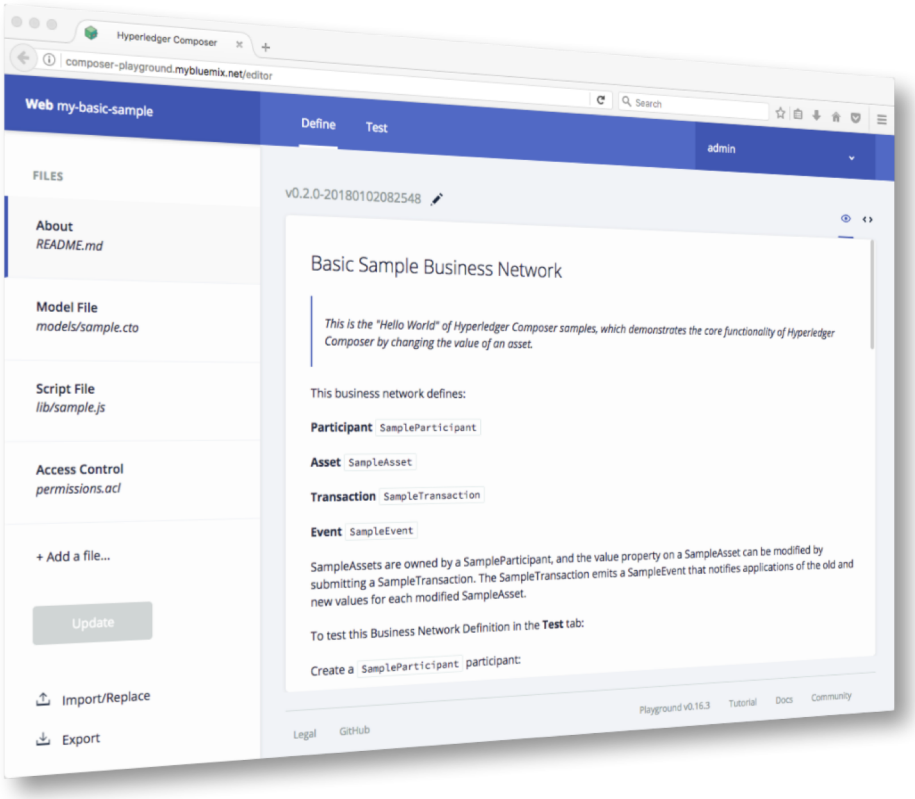
- Implements the logic deployed to the blockchain
  - **Models** describe assets, participants & transactions
  - **Transaction processors** provide the JavaScript implementation of transactions
  - **ACLs** define privacy rules
  - May also define events and registry queries

- **Services** that interact with the registries
  - Create, delete, update, query and invoke smart contracts
  - Implemented inside business applications, integration logic and REST services
- Hosted by the Business Consumer



- Provides the **front-end** for the end-user
  - May be several of these applications
- Interacts with business logic via standard interfaces (e.g. REST)
- Composer can generate the REST interface from model and a sample application

Composer Playground



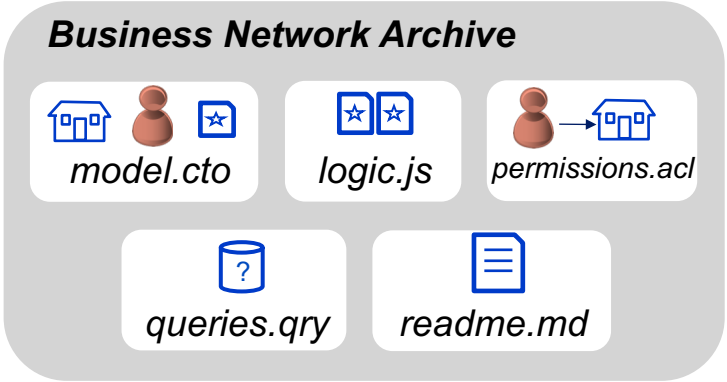
- Web tool for defining and testing Hyperledger Composer models and scripts
- Designed for the application developer
  - Define assets, participants and transactions
  - Implement transaction processor scripts
  - Test by populating registries and invoking transactions
- Deploy to instances of Hyperledger Fabric v1.1, or simulate completely within browser
- Install on your machine or run online at http://composer-playground.mybluemix.net

BNA File

- Business Network Archive (.BNA) is a package of the resources used by Fabric:
  - Model files (.CTO)
  - Transaction processors (.JS)
  - Access Control Lists (.ACL)
  - Static queries (.QRY)
  - Documentation and versioning (.MD)
  - It does *not* contain the client application

- The BNA simplifies deployment of blockchain and promotion between environments
  - c.f. TAR, WAR, EAR, JAR, BAR…

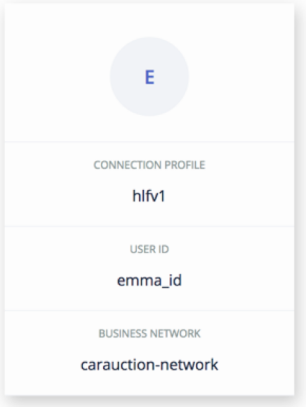
- Create BNA files from Playground or command line
  - Build from filesystem or NPM module

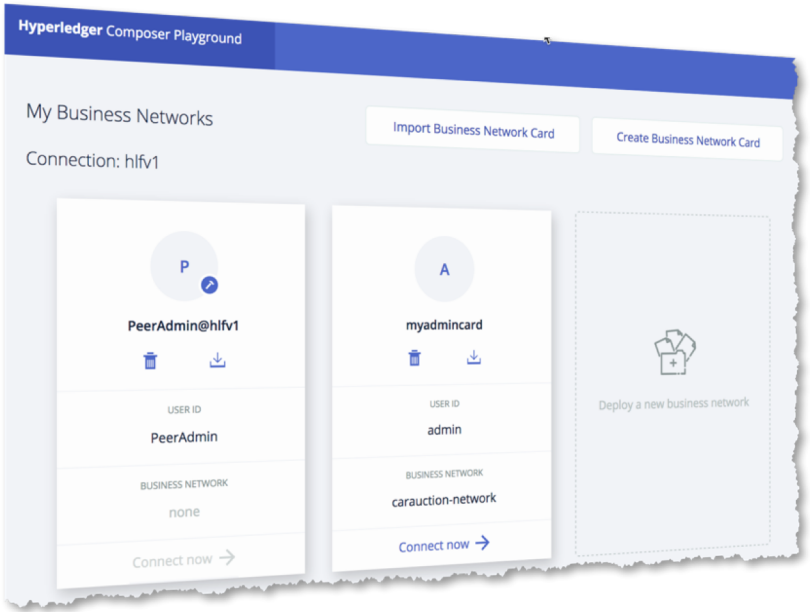



```
composer archive create –archiveFile my.bna
      --sourceType module --sourceName myNetwork
```

Business Network Cards

- Business Network Cards are a convenient packaging of *identity* and *connection profile*
  - Contains everything you need to connect to blockchain business network
  - Each card refers to a single participant and single business network
  - Similar to an ATM card





- Manage cards from both Playground and command-line
  - Create, delete, export, import, list
  - Create requires userid/secret or certificate/private key
- Use cards to connect to Fabric from Playground, command-line or from within your application

```
composer network deploy -a my.bna -c my.card
```

```
// Connect and log in to HLF
var businessNetwork = new BusinessNetworkConnection();
return businessNetwork.connect('cardName')
.then(function(businessNetworkDefinition){
    // Connected
});
```

Benefits of Hyperledger Composer

Increases understanding

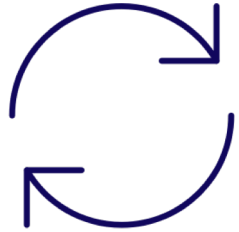
Bridges simply from business concepts to blockchain

Saves time

Develop blockchain applications more quickly and cheaply

Reduces risk

Well tested, efficient design conforms to best practice



Increases flexibility

Higher level abstraction makes it easier to iterate

Hyperledger Fabric and Composer Roadmap (Linux Foundation)

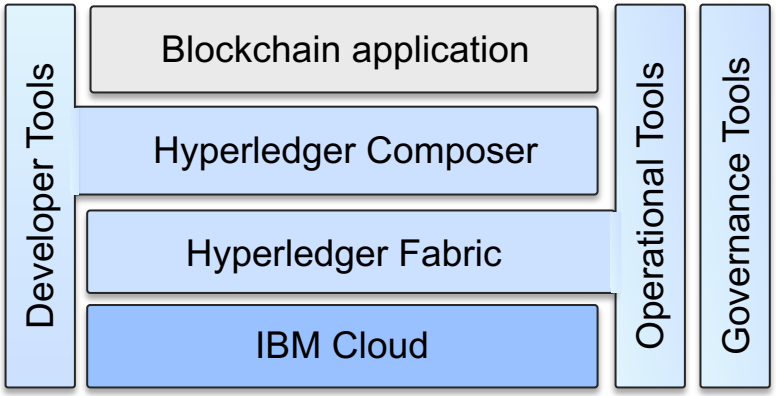
	Q1	Q2	Q3	Q4
Fabric	**1.1 release** • JS Chaincode • Channel events • CouchDB indexes • CRL • Mutual TLS • Connection profiles • Performance and scale improvements • Experimental: SideDB, fine-grained, access control etc.	**1.2 release** • UX improvements • Technical debt • Experimental from 1.1 • Native asset model • Pluggable transaction mode • State-based ownership • Flexible policies for chain code governance • Private transactions with SideDB • Service Discovery • Identity Mixer	**1.3 release** • Zero Knowledge Proof (confidential transactions) • RAFT consensus • Experimental: BFP consensus	**1.4 release** • TBD
Composer	**0.18 release** • Hyperledger Fabric JS Chaincode integration • Cloud storage for network identities • HSM support • Enhanced data collection • Application generator capability	**1.0 release** • Standalone test tool • Additional industry samples • Integrated documentation	**1.1 release** • Enhanced transaction processing function • Onboarding and secure document store integrations	**1.2 release** • Public network integration

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



Why IBM Blockchain Platform

Reduces risk

- Flexible pricing and support options for all sizes of deployments
- Democratic governance policies to help prevent unauthorized network changes

Saves time

- Implement blockchain projects more quickly
- Extensive toolset for development, governance and operation of blockchain networks

Enterprise ready

- Architected for High Availability and Disaster Recovery
- Highly secured and suitable for transactional workloads

Open

- Based on popular and open Linux Foundation Hyperledger technologies
- Avoid vendor lock-in! Embraces open source, open standards and open governance

Thank you

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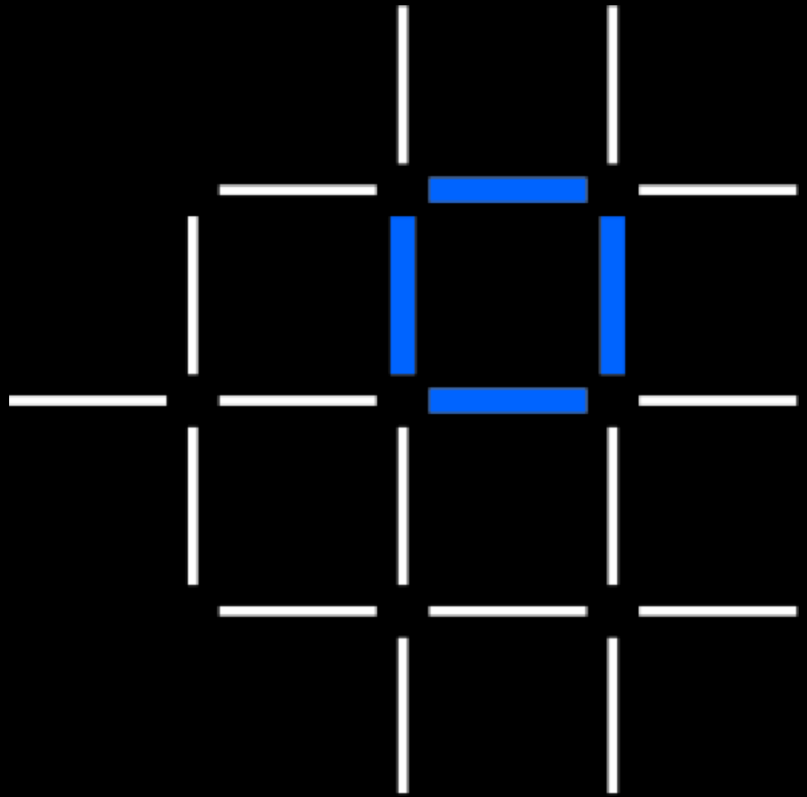

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