

EVOLVING SOLUTIONS

Blockchain Immersion Workshop



Who are we?

People simplifying technology.

What is our passion?

Creating enduring relationships.

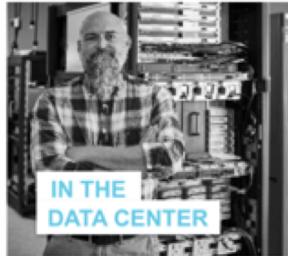


WHO WE ARE

Leading Technology, from Expert Talent

Evolving Solutions has been implementing technology solutions for over 20 years. We have structured our business model to encourage long-term client relationships. We don't go for the sell. Instead, all of our people are given the freedom to do what is best for our clients.

When faced with some of the most complex environments, our team thrives. As we work with you to develop a solution, our team truly becomes an extension of your internal team.



WHAT WE DO

Relationship Driven.

Our relationship with our clients is more than just a transaction. We have structured our business model in a way that encourages long-term client relationships and gives our employees the freedom to put clients first, no matter what.

Customized.

We know every business is different. That's why each of our clients receives a personalized experience from start to finish. We work hard to ensure your unique situation and goals are recognized and addressed. It's this service mentality that keeps our customers coming back time and time again to get the job done right.

Effective.

Our process is simple, yet effective. We know the importance of keeping our engagements consistent for our clients. Time and time again, we follow our tried and true methods that our clients have come to recognize as the experts in our industry.



BUILDING UPON A STRONG BUSINESS FRAMEWORK



Core Investments

- Datacenter Infrastructure Leadership
- Hyperconverged / Software Defined
- Select Manufacturer Partnerships
- Expert Technical Capabilities
- White Glove Client Experience

Reinventing the Core
Strategic Partner Diversification
Prescriptive Resource Investment



Transitional Investments

- ITaaS / Software Defined Datacenter
- Hybrid IT / Private & Public Cloud
- DevOps / Agile / Design Thinking
- IT Automation & Orchestration
- Containers / Cloud Native Platforms

Accelerated Services Investment
Thought Leadership
Build-Acquire-Partner



Emerging Investments

- Blockchain
- AI & Machine Learning
- Internet of Things (IoT)
- Augmented Reality

BEA Process
Intellectual Capital Ownership
Strategic Partner Alignment

10-15% Services

30-50% Services

75+% Services



HOW WE DELIVER

Whether it involves working with compute, storage, software environments, on-premise or on the cloud, we promise a complete solution, crafted by the best consultants, to get the job done right – every time.



OUR PROMISE

Done Right, Every Time.

At Evolving Solutions, our dedication to our clients is second to none. It's a service mentality that drives us to do anything and everything to ensure your complete satisfaction, no matter the obstacles. We promise to provide a job done right, every time.



AGENDA

Day 1

9am	Welcome	9am	BLOCKCHAIN EXPLORED: Part 2
10am	Vehicle Lifecycle Demo	10am	IBM Blockchain Platform
10:20am	What Makes a Good Use case	11am	Next Steps
10:30am	LAB: Hyperledger Playground, IMMUNICChain	11:30am	Lunch
11:30am	Lunch / Use Case Breakout	12:30pm	LAB: Hyperledger Fabric Verify & Install
12:30pm	Blockchain Integrated	2pm	LAB: Marbles Smart Contract & Install
1pm	LAB: Hyperledger Composer Smorgasboard	3:30pm	LAB: Hyperledger Explorer
3pm	BLOCKCHAIN EXPLORED: Part 1		
4:30pm	HAPPY HOUR: East Patio		

Day 2

8
9
10
11
12
13
14
15
16
17
18



**WE ARE
EVOLVING SOLUTIONS**

Let's Get to Work.

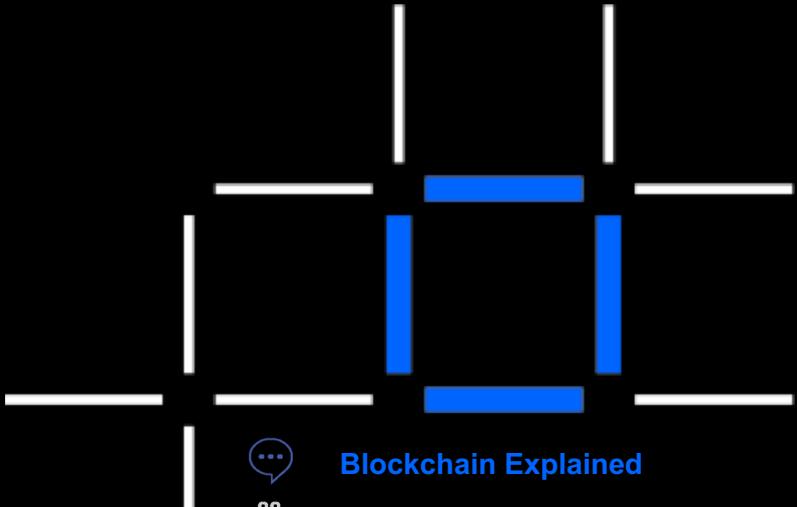


Blockchain Explained

An Introduction to Blockchain for Business

Austin Grice
Blockchain Technical Leader

austin.grice@ibm.com



Blockchain Explained



IBM Blockchain Platform



Blockchain Solutions



Blockchain Composed



Blockchain Architected



Blockchain Explored



Next Steps





What is Blockchain?



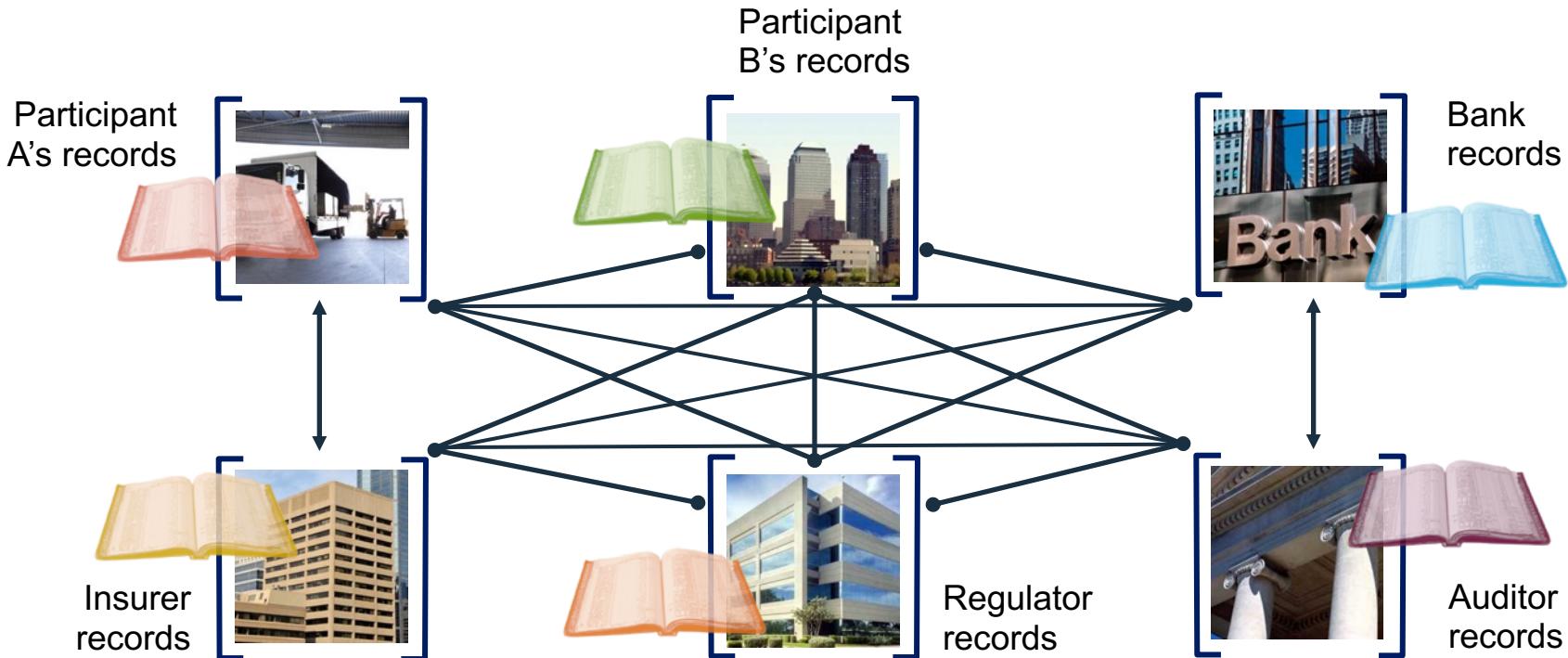
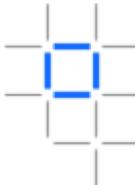
Why is it relevant for
our business?



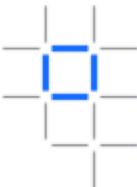
IBM and Blockchain



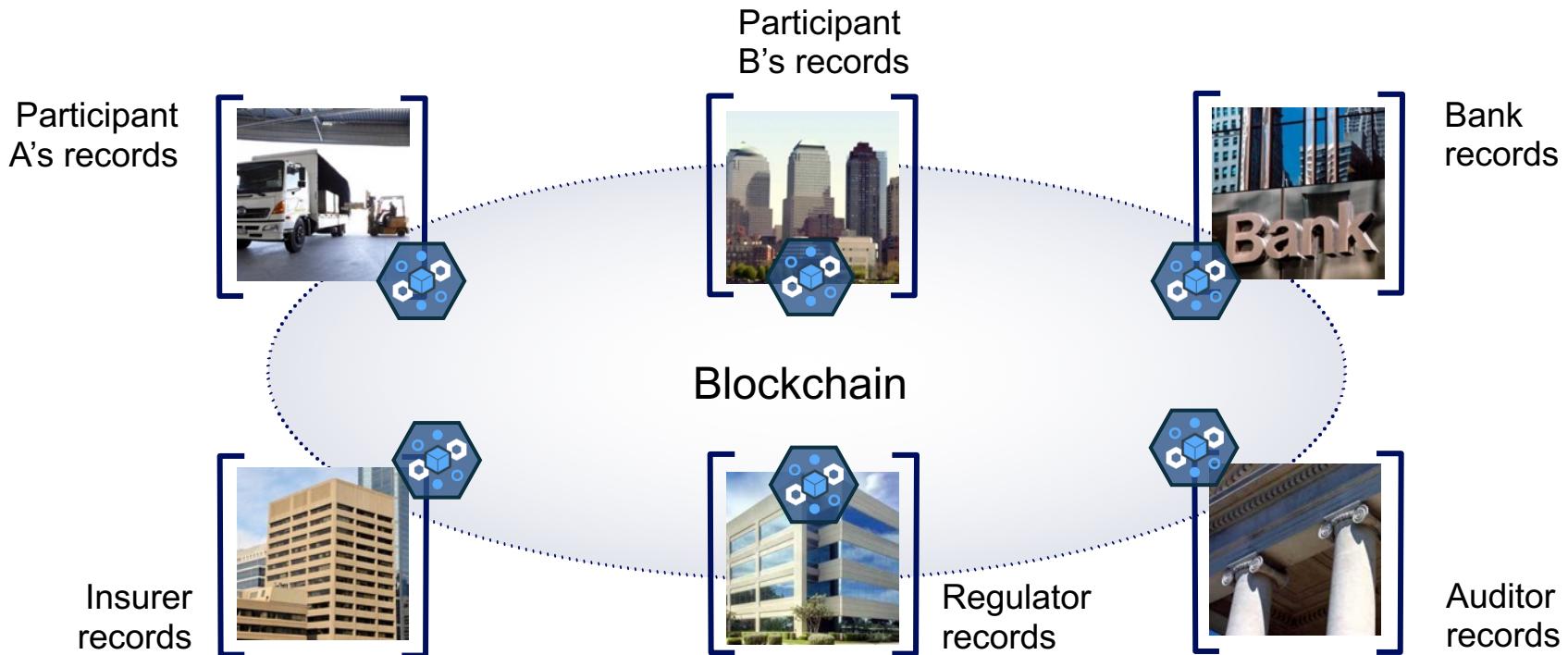
Problem...



... inefficient, expensive, vulnerable

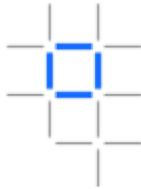


A shared, replicated, permissioned ledger ...



... 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

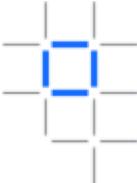
- Tangible, e.g. a house
- Intangible, e.g. a mortgage

Intangible assets subdivide

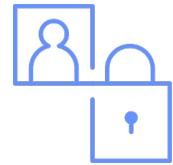
- Financial, e.g. bond
- Intellectual, e.g. patents
- Digital, e.g. music

Cash is also an asset

- Has property of anonymity



Requirements of blockchain for business



SHARED LEDGER

Participants decide which assets to share

IDENTITY

Participants know who they are dealing with

ENDORSEMENT

Participants give provable endorsement

CONFIDENTIALITY

Information shared is need-to-know



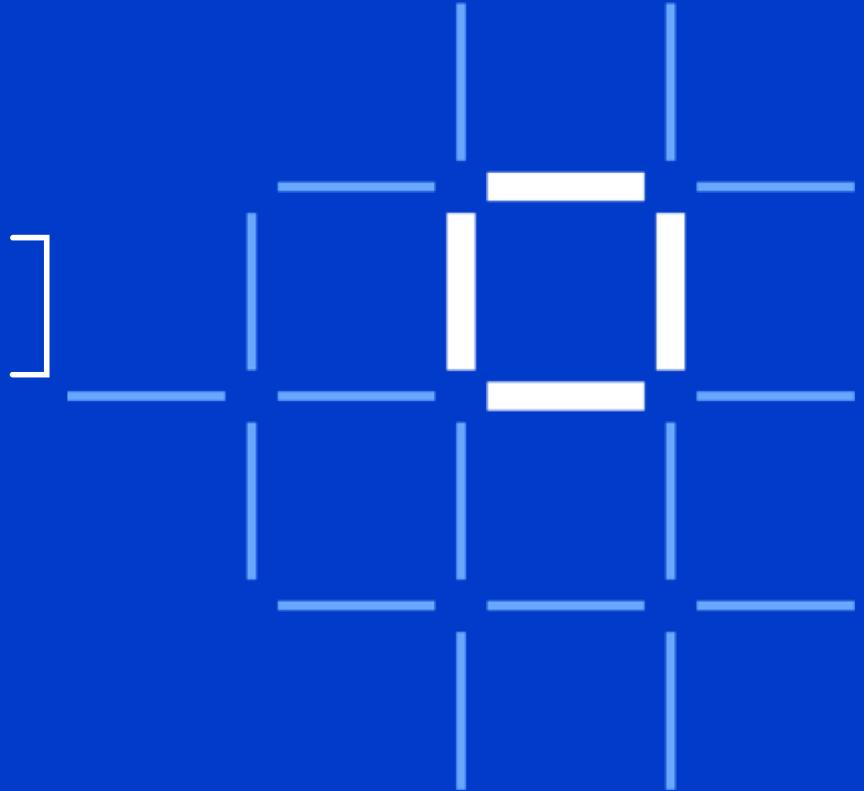
What is Blockchain?

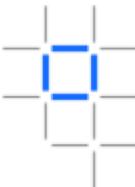


Why is it relevant for
our business?



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.



World Wire: Global Payments

What?

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

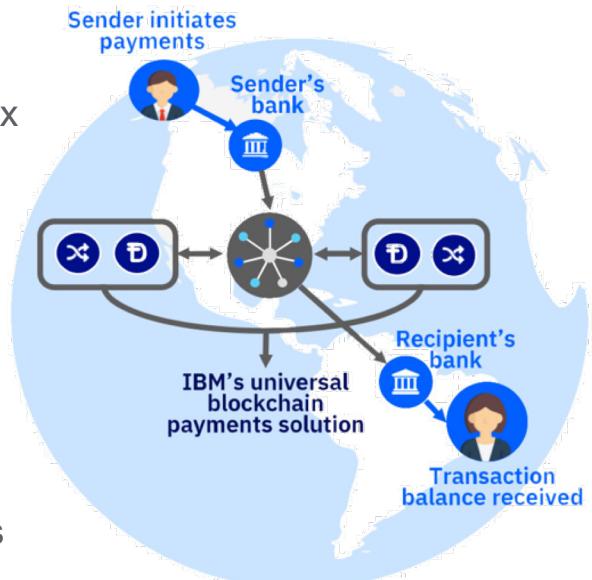


How?

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

Benefits

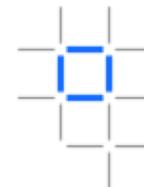
- Create secure, high volume, low-cost cross-border payments services without sacrificing margins
- Access new markets and currencies with limited risk
- Generate new sources of revenue with value-added products and services
- Aim: near real-time international payments



Food Trust



MCLANE
INTELLIGENT. SOLUTIONS



What?

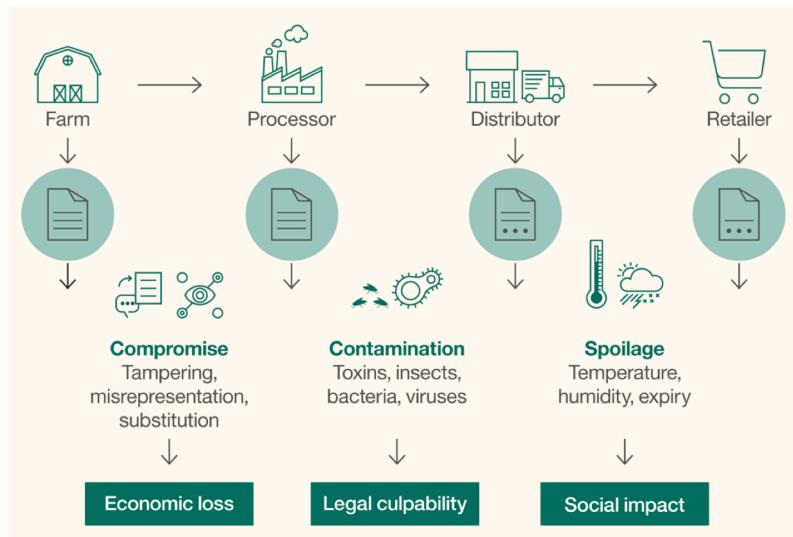
- Provide a trusted source of information and traceability to improve transparency and efficiency across the food network.

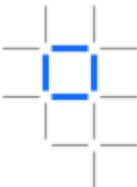
How?

- 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.





Example: TradeLens

What?

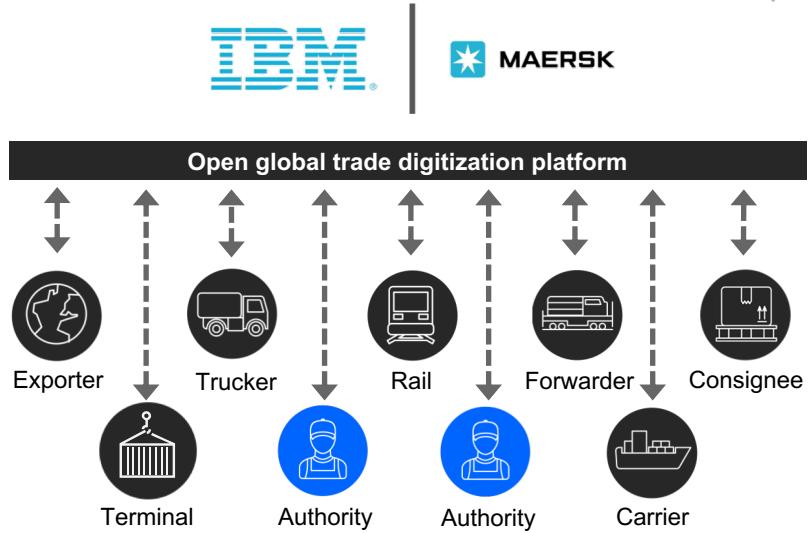
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

How?

- Providing Shared Visibility and Shared State for Container Shipments

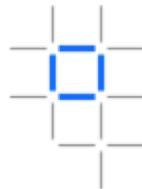
Benefits

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





Global Financing: Dispute Resolution



What?

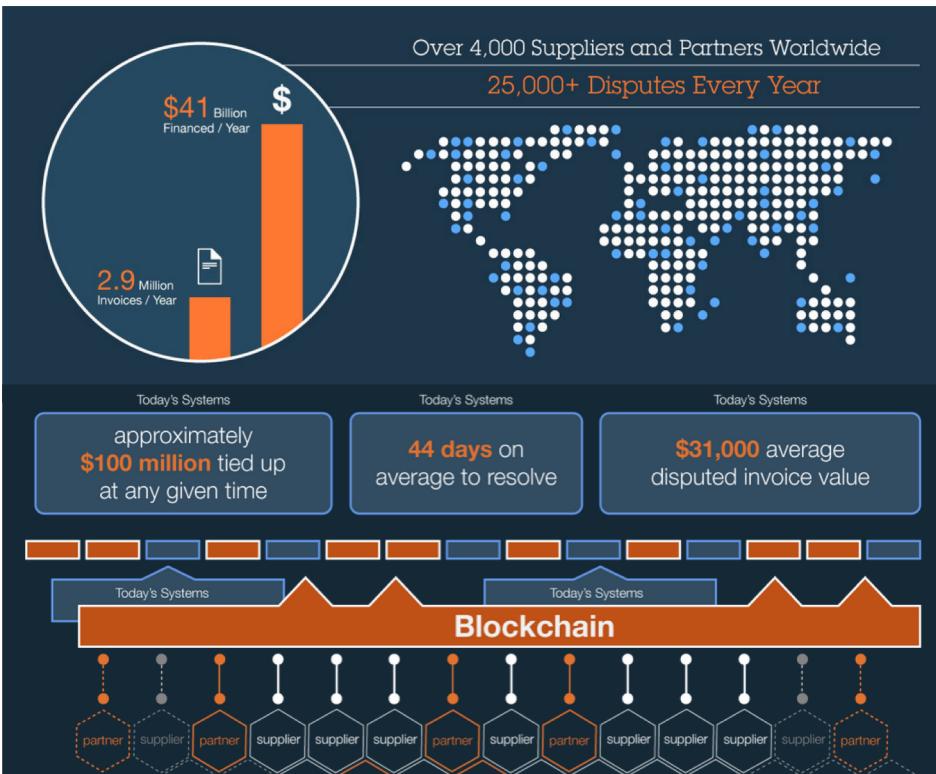
- IBM Global Finance provides a \$41bn channel financing per year. There are a number of disputes that take time to resolve and can lock up transactions costing time and money

How?

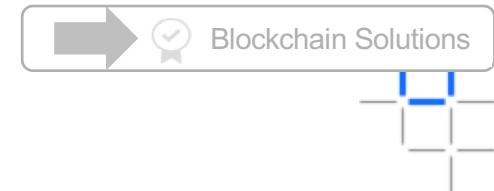
- Blockchain provides visibility and provenance end-to-end across supply chain

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

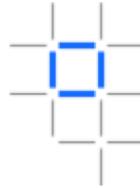


Making blockchain real for business...



Trade Finance	Pre and Post Trade	Complex Risk Coverage
 we.trade more trust. more trade. 	  	 
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
 	       	 

Further examples by (selected) industry



Financial	Public Sector	Retail	Insurance	Manufacturing
<ul style="list-style-type: none">• Trade Finance• Cross currency payments• Mortgages	<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



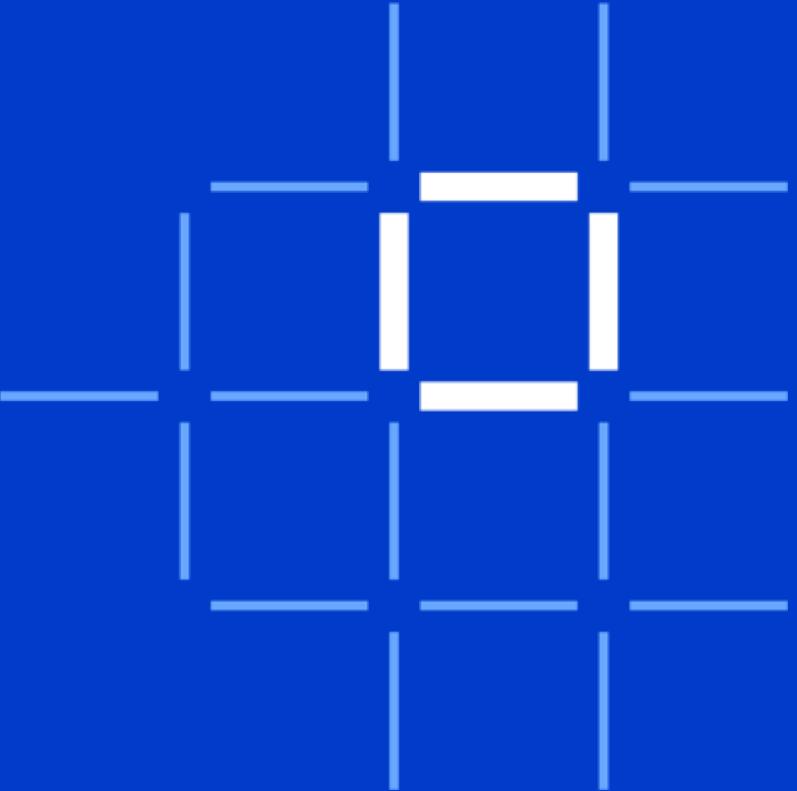
What is Blockchain?



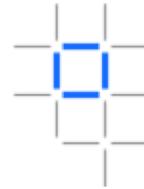
Why is it relevant for
our business?



IBM and Blockchain

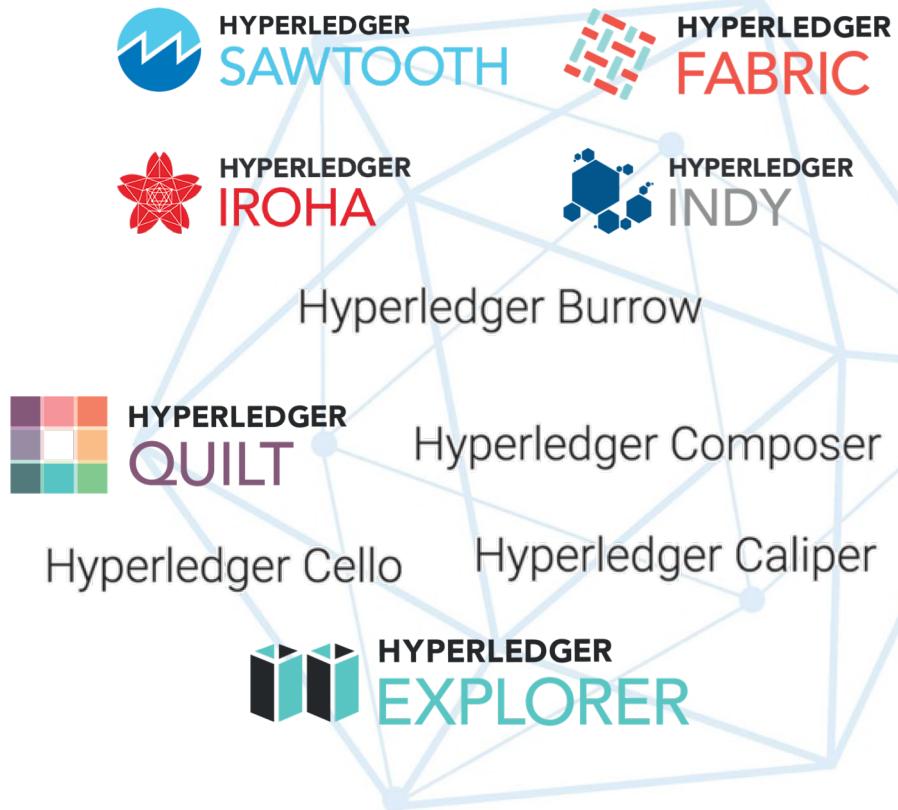


Hyperledger: A Linux Foundation project



- 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



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

General

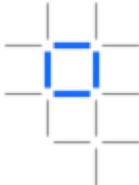


Associate (Academia)





Distributed ledger platform



A screenshot of a web browser displaying the Hyperledger Fabric project page. The URL is https://www.hyperledger.org/projects/fabric. The page is part of THE LINUX FOUNDATION PROJECTS section. The main header features the Hyperledger logo and the text "HYPERLEDGER FABRIC". Below the header are two buttons: "GET THE CODE" and "BUILD YOUR FIRST NETWORK". A large blue background image shows a network of nodes connected by lines. At the bottom left, it says "Type: DLT, Smart Contract Engine" and "Status: Active". A note at the bottom states: "Hyperledger Fabric is a blockchain framework implementation and one of the most popular open source blockchain projects in the world." To the right, there is a thumbnail for "Hyperledger Fabric Explainer" with a play button icon.

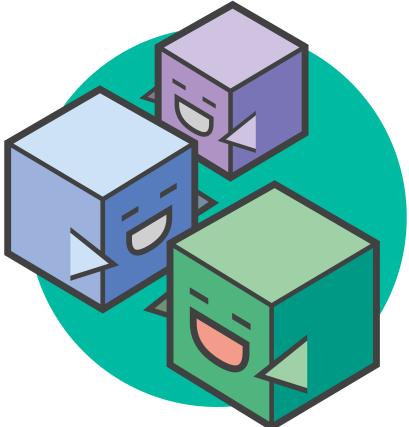
- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.2 released July 2018
 - Includes performance enhancements and additional security with Private Data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

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

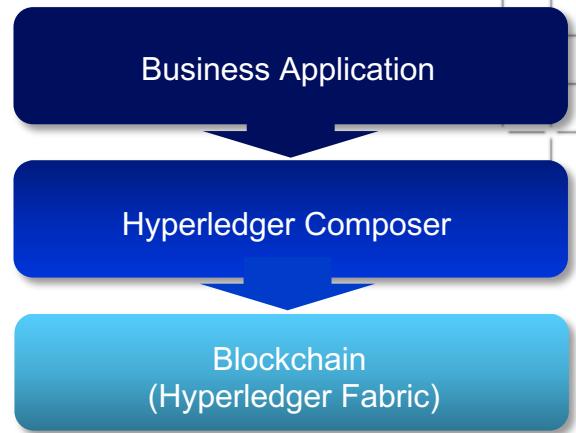


Hyperledger Composer: Accelerating Time to Value

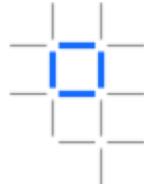
- A suite of high level application abstractions for business networks
- Emphasis on **business-centric vocabulary** for quick solution creation
- Reduce risk, and increase understanding and flexibility



- 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



```
asset Animal identi  
  o String animal]  
  o AnimalType sp  
  o MovementStatus  
  o ProductionTyp
```

Data modelling

A yellow square containing the letters "JS" in black.

JavaScript
business logic



Web playground

```
composer-client  
composer-admin
```

The npm logo, consisting of the lowercase letters "npm" in a red sans-serif font.

Client libraries



Editor support

```
$ composer
```

CLI utilities



Code generation

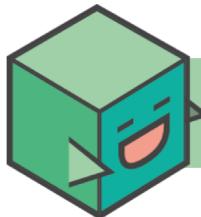
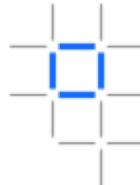
Powered by
 LoopBack
Node.js Framework

The Swagger logo, which is a green circle containing three white curly braces "…".

Swagger

Existing systems and
data

The Developer's role



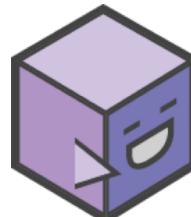
Smart Contracts

- 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



Business Logic

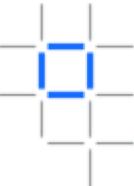
- **Services** that interact with the registries
 - Create, delete, update, query and invoke smart contracts
 - Implemented inside business applications, integration logic and REST services
- Hosted by the Business Consumer



Presentation Logic

- 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

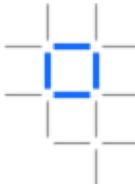
Composer Playground



A screenshot of the Hyperledger Composer Playground web application. The left sidebar shows files: README.md, models/sample.cto, lib/sample.js, and permissions.acl. A central panel displays the "Basic Sample Business Network" definition. It includes a description of the "Hello World" sample, definitions for Participant (SampleParticipant), Asset (SampleAsset), Transaction (SampleTransaction), and Event (SampleEvent). It also describes how SampleAssets are owned by a SampleParticipant and can be modified by submitting a SampleTransaction, which emits a SampleEvent. Instructions for testing are provided, along with a note to create a SampleParticipant participant. The bottom navigation bar includes links for Legal, GitHub, Tutorial, Docs, Community, and playground v0.16.3.

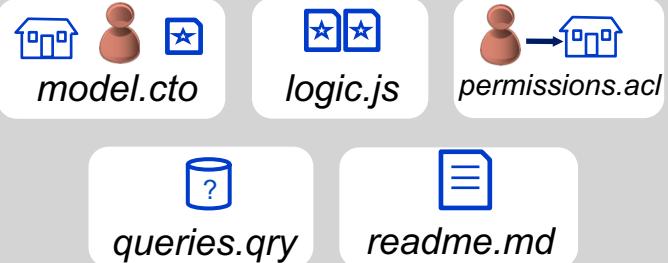
- Web tool for defining and testing Hyperledger Composer models and scripts
- Designed for the application developer
 - Define assets, participants and transactions
 - Implement transaction processor scripts
 - Test by populating registries and invoking transactions
- Deploy to instances of Hyperledger 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

Business Network Archive



```
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

Hyperledger Composer Playground

My Business Networks

Connection: hlfv1

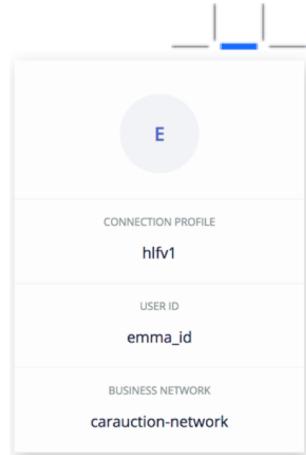
Import Business Network Card Create Business Network Card

User ID	BUSINESS NETWORK
PeerAdmin	none
admin	carauction-network

PeerAdmin@hlfv1 myadmincard

Connect now → Connect now →

Deploy a new business network

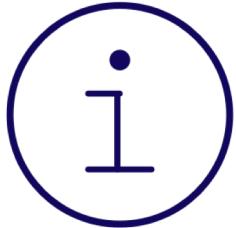
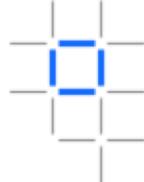


- Manage cards from both Playgroud and command-line
 - Create, delete, export, import, list
 - Create requires userid/secret or certificate/private key
- Use cards to connect to Fabric from Playgroud, command-line or from within your application

```
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



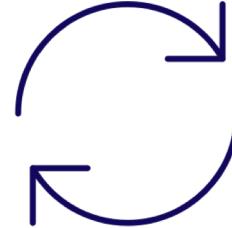
Saves time

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)

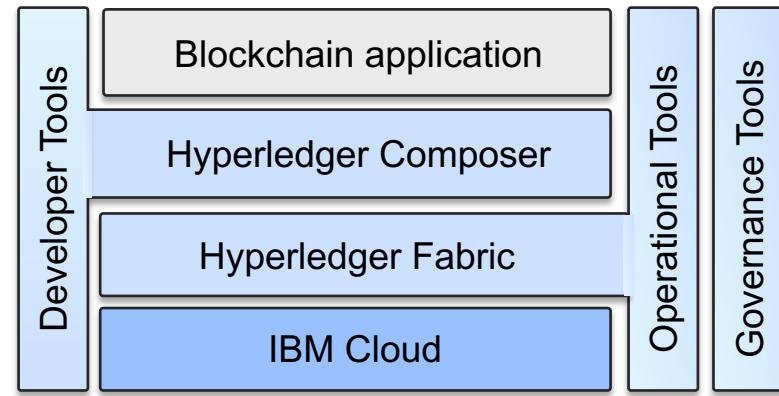
	Q1	Q2	Q3	Q4
Fabric	<p>1.1 release</p> <ul style="list-style-type: none">• JS Chaincode• Channel events• CouchDB indexes• CRL• Mutual TLS• Connection profiles• Performance and scale improvements• Experimental: SideDB, fine-grained, access control etc.	<p>1.2 release</p> <ul style="list-style-type: none">• 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	<p>1.3 release</p> <ul style="list-style-type: none">• Zero Knowledge Proof (confidential transactions)• RAFT consensus• Experimental: BFP consensus	<p>1.4 release</p> <ul style="list-style-type: none">• TBD
Composer	<p>0.18 release</p> <ul style="list-style-type: none">• Hyperledger Fabric JS Chaincode integration• Cloud storage for network identities• HSM support• Enhanced data collection• Application generator capability	<p>1.0 release</p> <ul style="list-style-type: none">• Standalone test tool• Additional industry samples• Integrated documentation	<p>1.1 release</p> <ul style="list-style-type: none">• Enhanced transaction processing function• Onboarding and secure document store integrations	<p>1.2 release</p> <ul style="list-style-type: none">• 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

*Austin Grice
Blockchain Technical Leader*

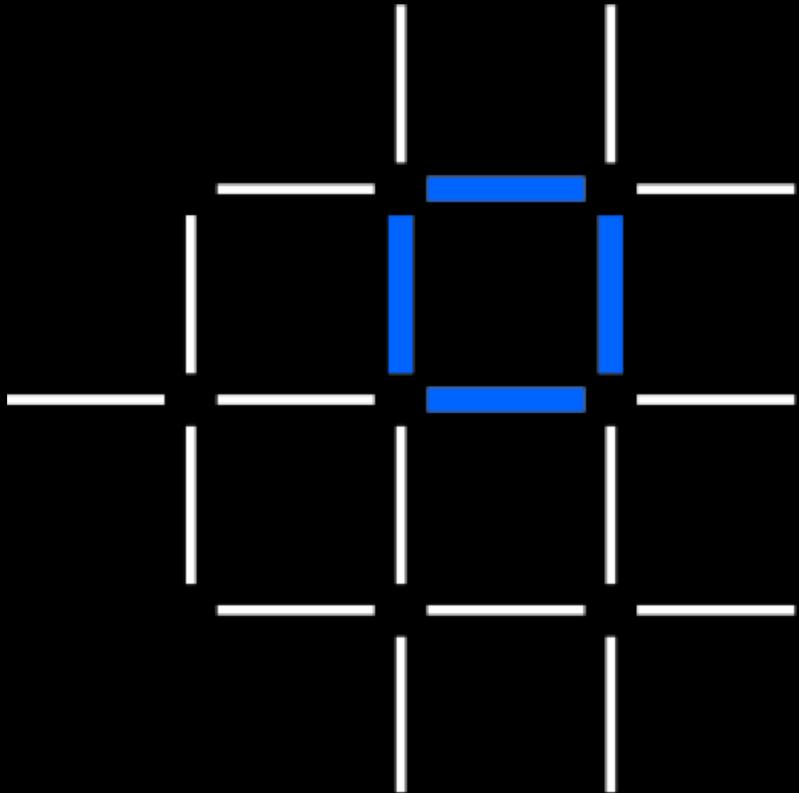
austin.grice@ibm.com

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

 @IBMBlockchain

 IBM Blockchain

 IBM Blockchain





Alex
Agency for Vehicle Standards



Paul
Buyer/Owner



Debbie
VDA
Regulations Administrator



Tommen
Insurer



Mike
Arium Logistics
Employee



Vada
Police

The central element of the diagram is a large, dark, semi-transparent hexagon containing the word "BLOCKCHAIN" in bold, orange capital letters. Inside the hexagon, there is a smaller, lighter hexagon with three rectangular boxes representing blockchain blocks. The top and bottom edges of the hexagon have small circular nodes connected by lines, suggesting a network or a chain.



Alex
Agency for Vehicle
Standards



Paul
Buyer/Owner



Debbie
VDA
Regulations
Administrator



Tommen
Insurer



Mike
Arium Logistics
Employee



Vada
Police

The diagram features a central dark grey hexagon containing the word "BLOCKCHAIN" in white capital letters. Four smaller white-outlined rectangles are positioned around the hexagon, connected by thin lines to its sides, representing blockchain blocks.



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