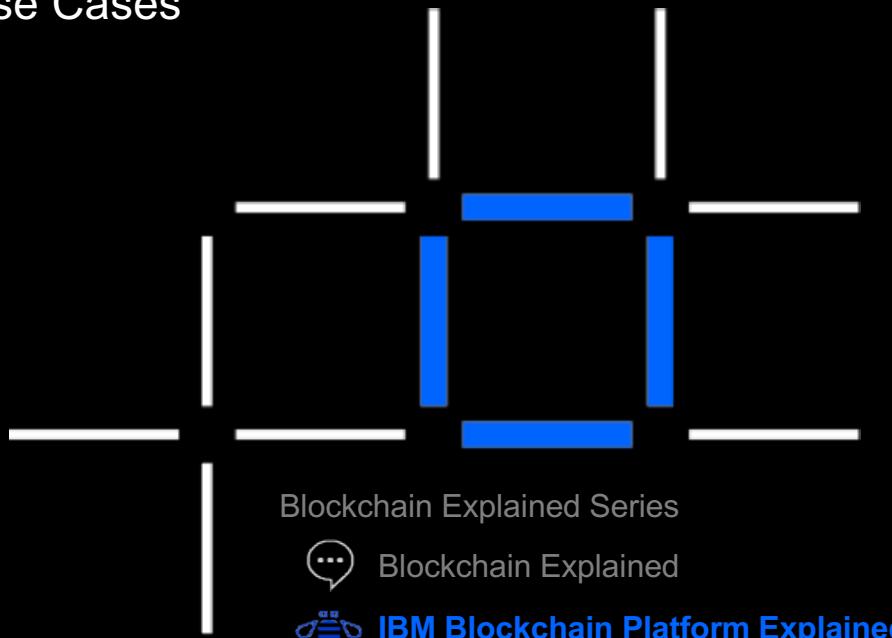


IBM Blockchain Platform Explained

An Introduction to the IBM Blockchain Platform and Use Cases

Jeff Tennenbaum
Blockchain Solutions Architect
Tennenjl@us.ibm.com



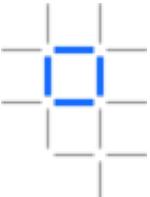
Blockchain Explained Series

- 💬 Blockchain Explained
- 🌐 **IBM Blockchain Platform Explained**
- ↗ IBM Blockchain Usage Patterns
- ✅ Solutions Explained
- ➕ What's New
- ➡ Labs Explained

V2.2, 19 January 2020

IBM Blockchain





When Does Blockchain Make Sense?

A business problem that cannot be more efficiently solved with other technologies

- Tradeoffs between performance & Trust/Transparency



An identifiable business network with Participants, Assets and Transactions



A need for trust and transparency which can be provided by blockchain attributes:

- Consensus, Immutability, Finality or Provenance



Do existing processes often require reconciliation?

Supply chains

Across all industries can benefit
from blockchain technology



Three trends are challenging today's supply chains. With the right ingredient, these challenges can become key drivers for business success...



Complexity and cost



70% of supply chain leaders oversee extremely complex supply chains



Competition



79% of companies with high-performing supply chains achieve higher revenue growth than the industry average



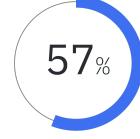
Consumer demand



Consumers are willing to pay up to 10% more for products from companies that provide visibility and transparency



Companies with global supply chains can be standing on a cost base of 90%, which is caused by supply chain expenditure



57% of firms see supply chains as a competitive advantage (vs. a cost to optimize)



20% of supply chain executives saw fluctuating consumer demand as the most critical supply chain challenge (placing #2 in biggest challenge)

What is that ingredient? Supply chain visibility.

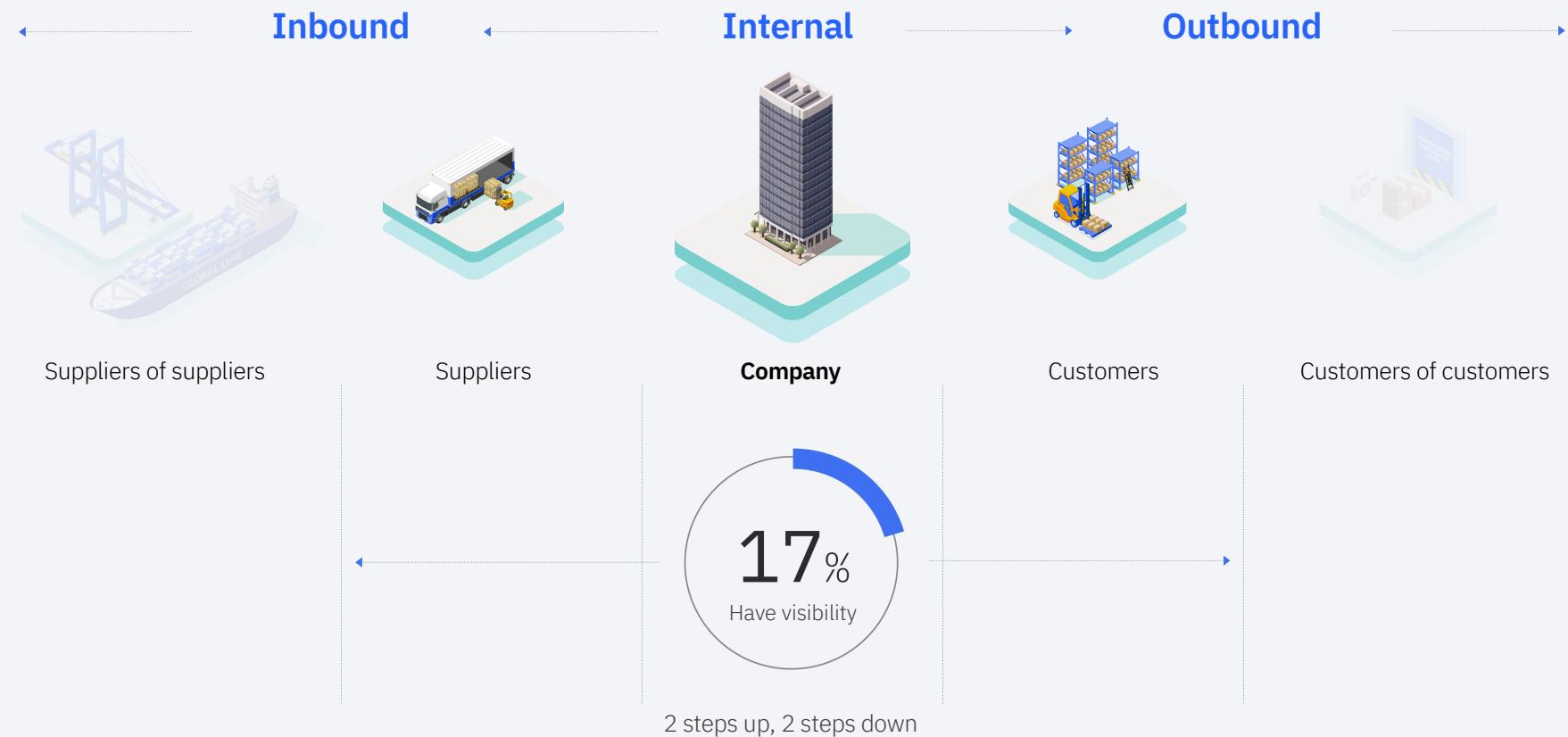
**But supply chain visibility
is still limited across
industries...**



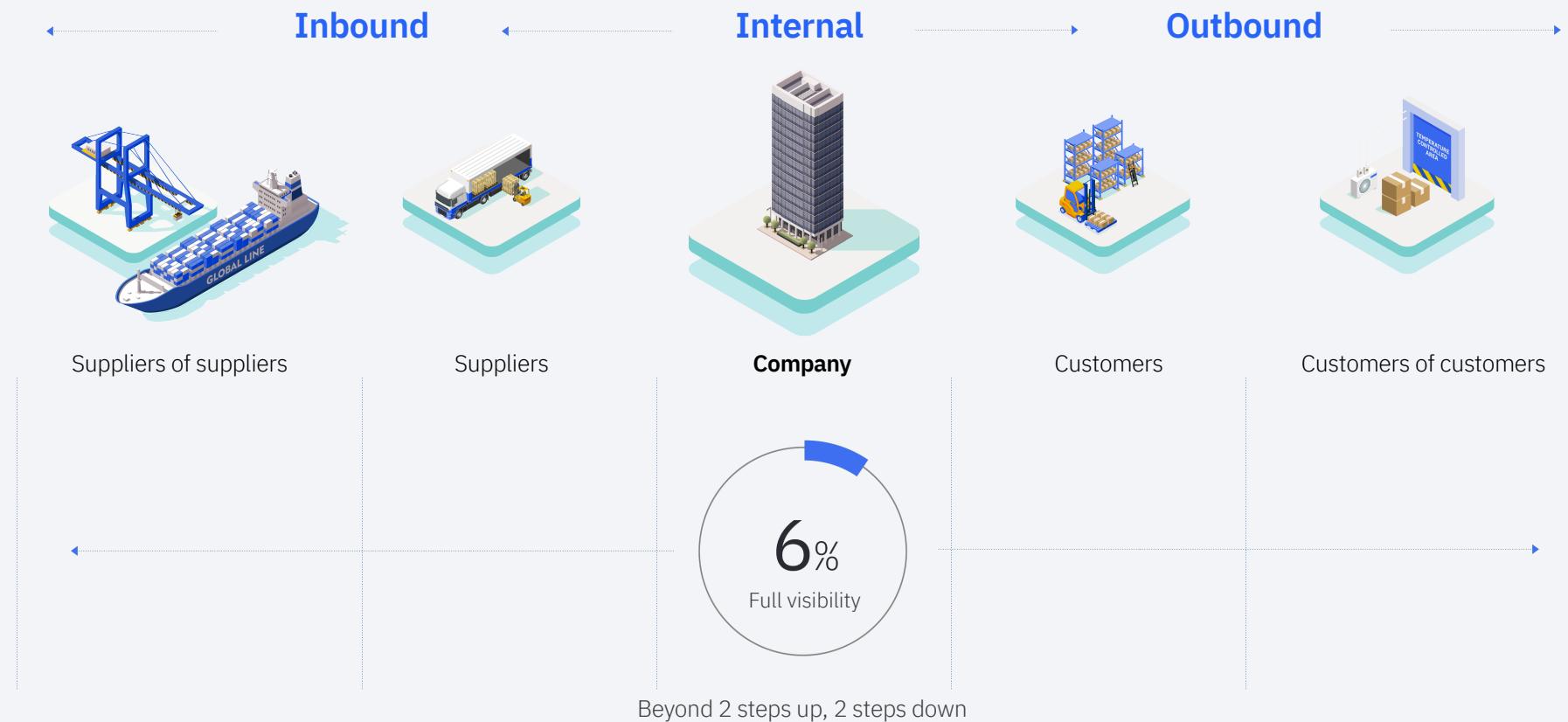
**But supply chain visibility
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industries...**



**But supply chain visibility
is still limited across
industries...**

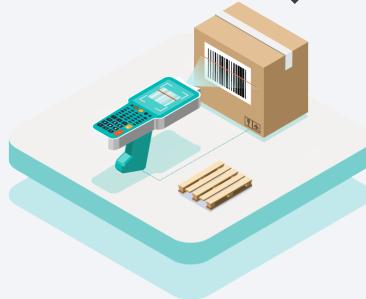


**But supply chain visibility
is still limited across
industries...**



With blockchain, supply chains can do things that before were not possible

Track the physical flow of goods from end-to-end



Traditionally, supply chains track perpetual inventory which is derived from documentation.

Tracking the actual physical inventory is not only more accurate, but also introduces unprecedented speed to insights.

Combine data on flow of goods & financial transactions



Typically records on the flow of goods are separate from the records on the flow of financial transactions.

Stitching these together opens new and more efficient methods for payments, invoicing and dispute resolution.

Automate processes across companies



While automation within individual companies is gaining traction, automation that spans across companies is new ground.

Automating intra-company processes creates next-generation supply chain efficiency, responsiveness and agility.

Manufacturing

Global, diversified supply chain

Multi-plant sourcing from around the world raises both complexity and supply chain management costs.

Greater variety and shorter lead time

Manufacturing customers want faster and more unique fulfillments. This is made more challenging by fluctuating demand.

Quality and product recalls

Social media and online consumer reviews make quality and avoiding recalls more important than ever. Optimize with business process automation.



Pharmaceuticals

Supply chain integrity

Damage, contamination and temperature control can affect quality.

Supply disruptions

Theft, fraud and integrity issues can cause gaps in the pharmaceutical supply.

Regulation

Pharma is highly regulated creating additional requirements and costs around compliance.



COVID-19 Emergency Supplier Onboarding

Rapid Supplier Connect is a blockchain-enabled, trusted source of supplier information and digital identity reducing risk while simplifying and accelerating supplier onboarding and supplier management.

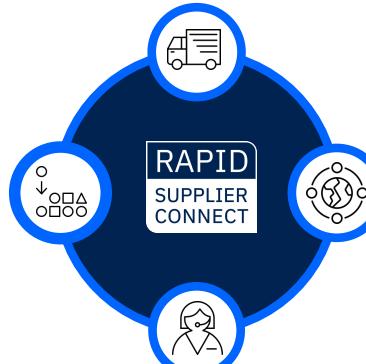
Suppliers currently on the Rapid Supplier Connect blockchain platform include Project N95, which helps health-care workers procure personal protective equipment, and about 200 companies that are members of the Worldwide Supply Chain Federation.

DATA PROVIDERS

“I can verify information to minimize risk while providing actionable insights.”

SUPPLIERS

“I only have to provide my company information once regardless of who is buying from me.”



BUSINESS NETWORKS

“Up-to-date client data allows me to automate onboarding, maintenance and offer new services.”

BUYERS

“I have instant to timely, holistic, pre-verified supplier information plus their inventory availability.”





IBM Food Trust

Overview

Only 1 in 4 consumers trust today's food ecosystem

Food Safety



1 out of 10 people get sick each year, and 420,000 die from foodborne illness

Supply Chain Inefficiency



80% of CPGs business are partially or entirely paper-based

Food Waste



1 / 3 of fresh food is thrown out because it is considered unacceptable

Food Fraud



1 in 5 seafood samples is mislabeled worldwide
(43% mislabeled in NYC)

The root of these issues, and many others, are the lack of trust and transparency

Built on a blockchain platform, IBM Food Trust offers industry-specific functionality targeted at key pain points

Trace

Trace the location and status of food products upstream and downstream across the supply chain

Certifications

Enable reliability and accountability with instant access to digitized records and documents

Fresh Insights

Access real-time and aggregate supply chain data to extend product freshness and shelf life

Third-party

Partner to expand functionalities and deliver new value across the food system through our APIs

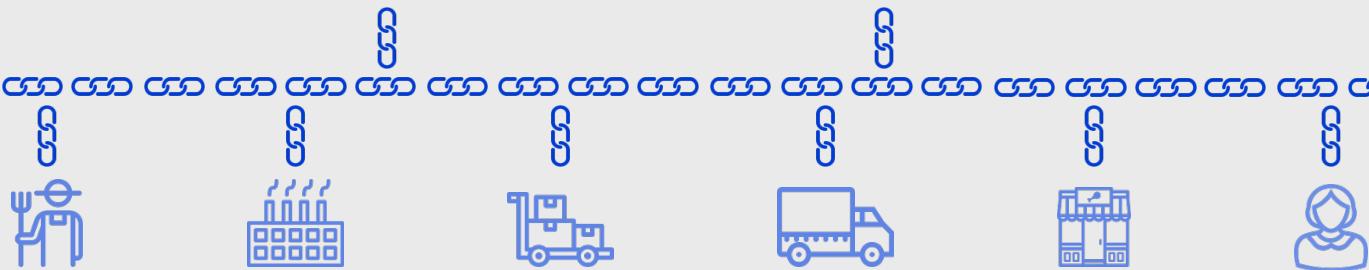
Capabilities

APIs can be used to retrieve platform data to create new applications for internal and consumer facing applications

Blockchain Technology



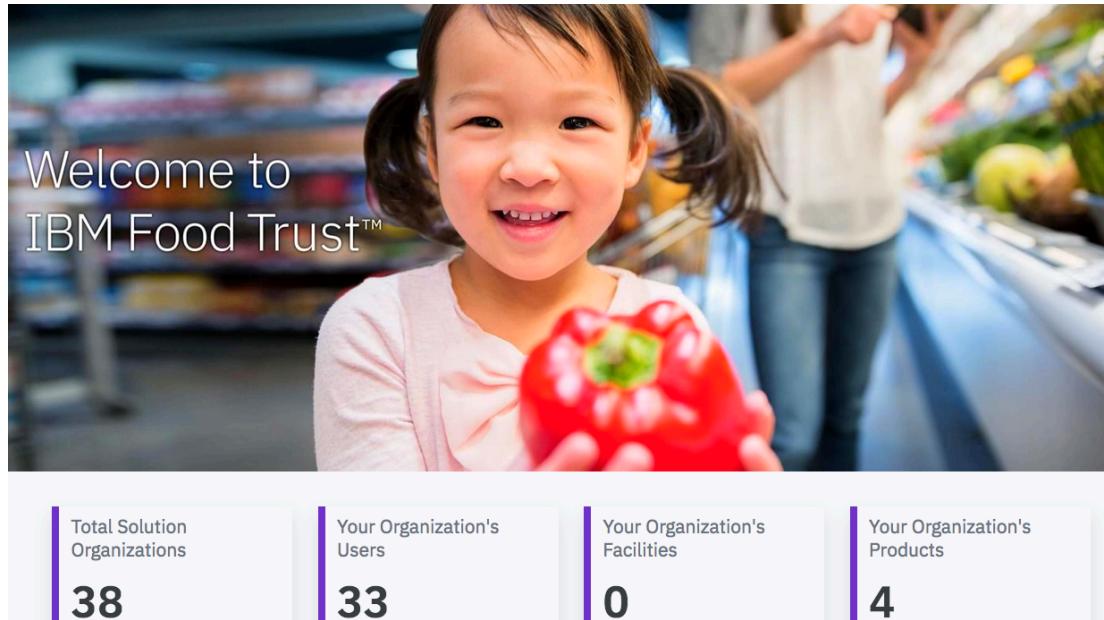
Food Supply Ecosystem



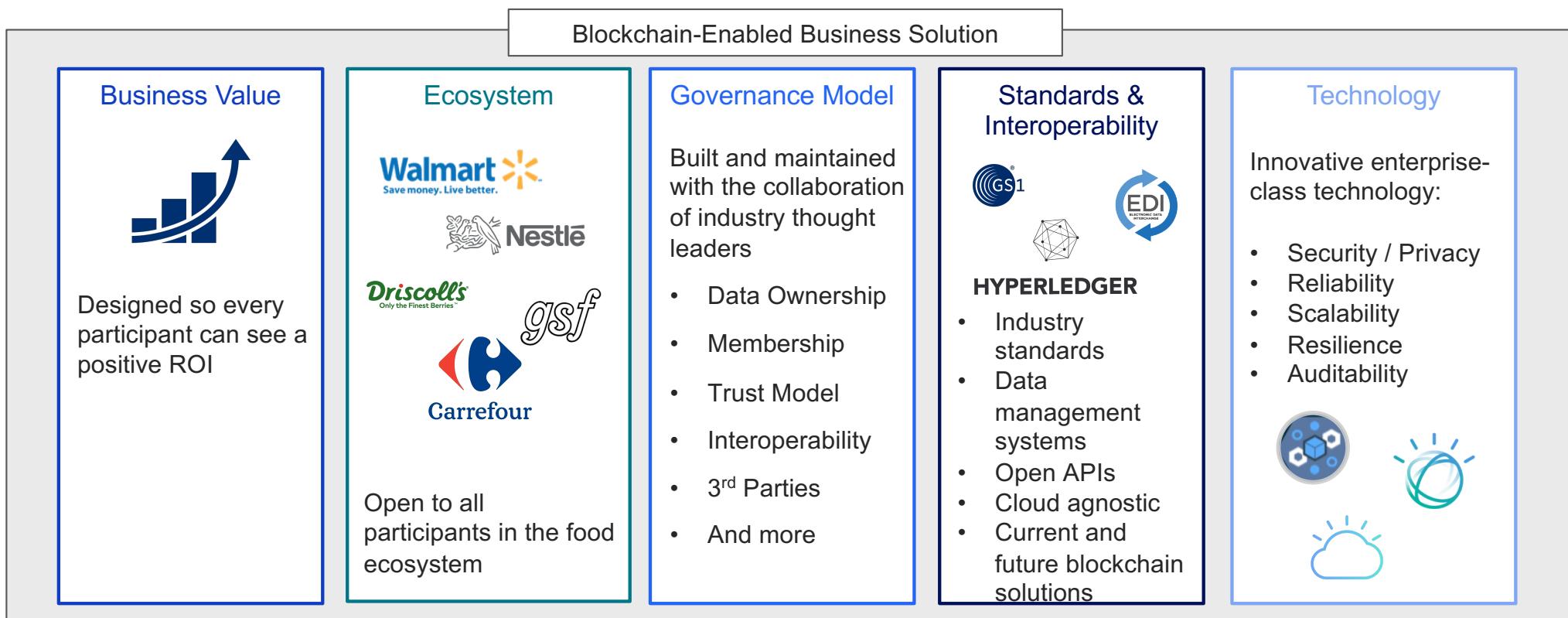
IBM Blockchain Platform

Hyperledger Fabric

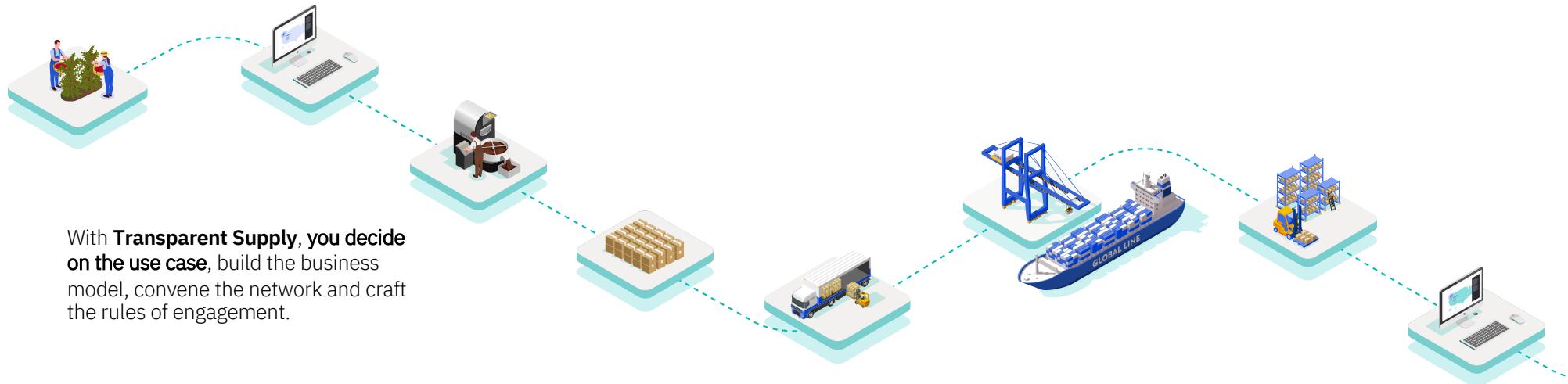
Food Trust Demo



Building a blockchain-enabled business solution requires more than blockchain



Transparent Supply is a blockchain platform solution that allows companies to build their own data-sharing ecosystem with their supply chain partners



Overview of **Transparent Supply** capabilities

Capabilities included in the core solution				Add-on capabilities	
Onboarding Connect your data to the blockchain	Home View organizational activity	Users Authorize users and assign roles	Consumer Enable consumers to see permissioned data on product journey	Insights Real-time inventory and cold chain data	
Data Upload, download and view your company's data	Data provider Enable 3rd parties to submit data on your behalf	Support and services <ul style="list-style-type: none">Blockchain infrastructure and managed servicesWhite label UILearning resourcesTechnical supportAdvanced technology services	Smart contracts Automate business processes with supply chain partners	Custom app and integration Client, IBM and third-party apps	
Membership View and change your module subscription	Data subscription Receive data packages for analysis		Transparent Supply incorporates modules, APIs, capabilities and services that allow you to build and customize your blockchain data-sharing platform.		
Trace Trace assets back and forth in the supply chain	Documents Digitize and share any document				

IBM Blockchain Transparent Supply

Secure Information Sharing & Governance



- What
- Sensitive data in government is dispersed throughout many depts, agencies, and industry partners
 - Audit and Compliance needs indelible record of all key transactions against sensitive data

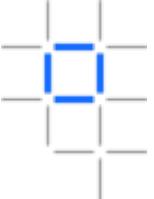
- How
- Blockchain collects transaction records from diverse set of information systems
 - Append-only and tamperproof qualities create high confidence audit trail
 - Privacy features to ensure authorized user access

IBM Blockchain

- Benefits
1. Lowers cost of audit and regulatory compliance
 2. Increases ability to share sensitive data with internal and external entities
 3. Enhanced security and integrity of data

IBM

CDC: Reference Data Chain of Custody & Consent for EHR

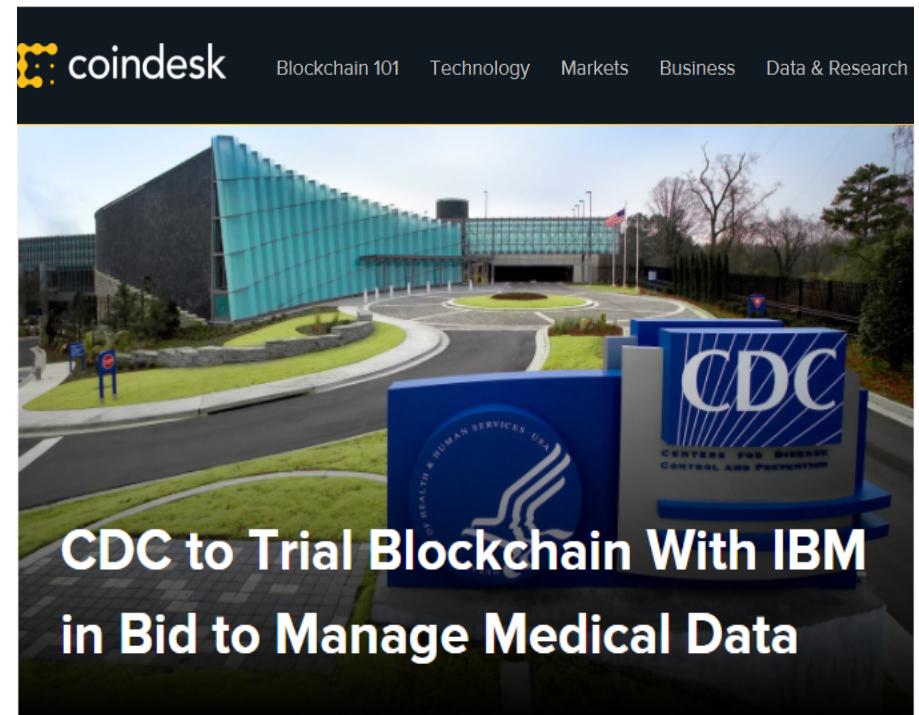


What?

- Track the chain of custody of the EHRs and how they are stored, accessed and moved through the lifecycle in compliance with specific governmental regulations
- Manage consent and sharing of EHRs

How?

- Each participant agrees to capture the access and storage of EHR data on the blockchain
- Blockchain creates single view of the EHR reference data
- Include consent model so that owners of data can quickly and easily provide consent for others to access their data and then record consent to avoid dispute

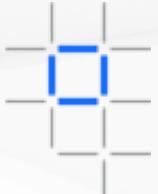


A screenshot of a Coindesk news article. The header features the Coindesk logo and navigation links for "Blockchain 101", "Technology", "Markets", "Business", and "Data & Research". Below the header is a photograph of the CDC headquarters building, a modern glass structure with a curved entrance. In the foreground, two blue signs are visible: one for the "Centers for Disease Control and Prevention" and another for the "Health & Human Services". The main title of the article is "CDC to Trial Blockchain With IBM in Bid to Manage Medical Data".

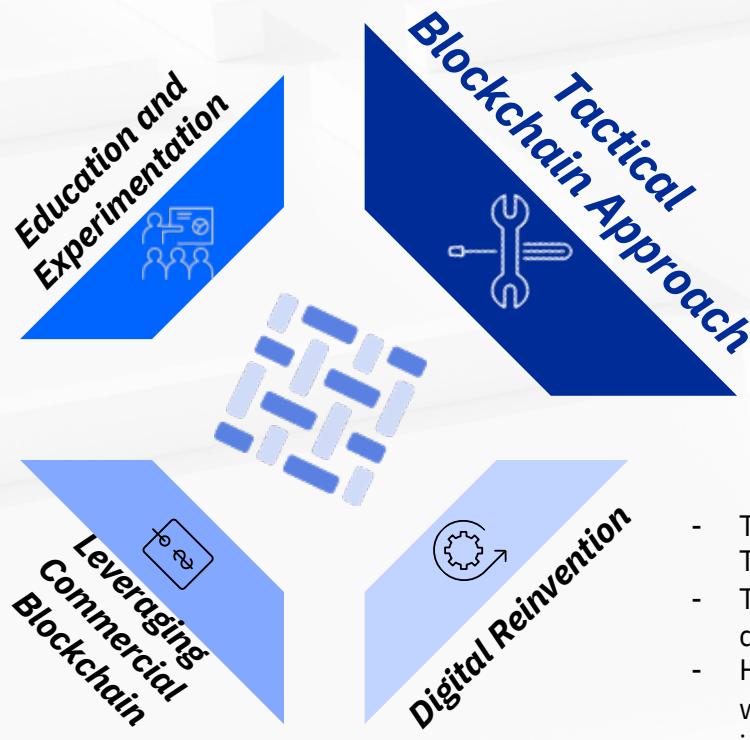
IBM Blockchain

IBM

Where are Federal Agencies Considering Blockchain?



- Blockchain 101 and preliminary understanding
- Blockchain RFP/RFI requirements
- Blockchain feasibility exploration

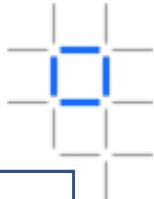


- Federal requirements or regulatory role met by participation in commercial blockchain networks
- Consumer role, accessing newly created ledger data to value

- Validated use-case that solves a problem agencies have today that cannot be addressed with traditional approaches
- There is a government sponsor willing to drive network adoption, governance, and use
- Business network exists today that can gain value, outside of sponsoring agency
- Start small and scale
- Demonstrate ROI to gain stakeholder buy-in and increase network adoption

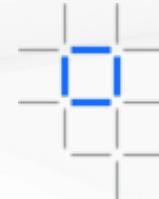
- The Modernizing Government Technology (MGT) Act
- Transformative and possibly disruptive
- How can blockchain change the way federal business networks interact?

Federal Blockchain Projects – Moving Forward



 <p>Simplifying Resource Hiring Actions with Visibility, Smart Contracts, and a Blockchain-enabled Business Process</p>	 <p>Explore how Blockchain can augment Certificate Export Process</p>
<p>USINDOPACOM - IBM is working to create a blockchain-enabled process for hiring under the Intergovernmental Personnel Act (IPA). This system will enable USINDOPACOM to more accurately, easily and accountably procure high-value resources at low cost. It addresses the current inefficient, error-prone IPA process to keep IPAs paid and focused on their mission tasks while facilitating procurement of new IPAs.</p>	<p>USDA FSIS – The USDA Food Safety Inspection Service is exploring how Blockchain can provide value to the business network when exporting the US' commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labeled and packaged. This project is in the exploratory phase and is examining processes related to export certificates.</p>
 <p>International Mail tracking, Analytics, Alerts, and Error resolution</p>	 <p>Exploring Plans for Blockchain-as-a-Service</p>
<p>USPS is continuing to scale their Pilot blockchain solution to help better track and understand international mail between itself, air carriers, and foreign post offices. By leveraging the trusted, immutable, blockchain ledger, the network can create an actionable data source to feed analytics engines, operational alerts, and reporting on a per-member basis for USPS, carriers, and foreign posts.</p>	<p>DISA is working to create Blockchain as a Service (BaaS) capability on a secure, scalable, and fully-accredited DoD blockchain environment using permissioned Hyperledger Fabric to offer a managed service. Having the environment on a certified infrastructure will enable resource management, network administration, and Cloud support services as well as enhance network monitoring and security.</p>

Decentralized trusted identity



- Sovrin pushes identity to the edge of the network
- Cryptographic, point to point exchange of identity
- Based on Hyperledger Indy technology

Benefits

- A decentralized approach that establishes trust and puts the end user in control
- Every person, organization, and thing has a digital wallet to control the flow of their identity
- No PII is stored on the public ledger!

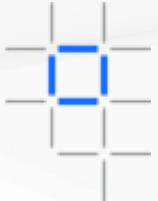


 **sovrin**
identity for all

IBM Blockchain

IBM

How do you get Started?



POC/MVP

- Problem statement
- Solution concept
- Design Thinking Workshop
- Prototyping and demo
- Initial benefits analysis



Phase 1 Pilot

- Pilot operation of solution
- Investment / business case
- Production scoping and roll-out plan
- Ecosystem consulting



Scale

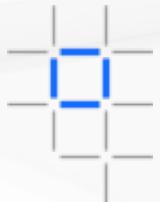
- Scale solution across ecosystem
- Strategy to expand network
- Define additional requirements and modules
- Stabilize operations



Innovate

- Innovate for new offerings and modules
- Integrate new technologies such as IoT, AI and analytics
- Build network-of-networks
- Explore new business models

It is important to ideate potential use-cases



Day 1

[A] Use Case	
	
Blockchain Recap	30
Use Case Selection	30
Blockchain Fit	20
Business Network	15

Day 2

[C] Hills	
Formulating Hills	60
Playback Hills	15
Refine Hills & Check Fit	35
Prioritize Hills	15

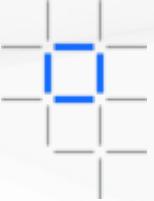
[B] User

[D] Going Agile

Design Thinking	30
Empathy Mapping	45
As-is Experience	45
Explore Possibilities	30
Focus Outcomes	15

Storyboarding	45
First Project Method	30
Sprint Zero	20
Non-functional Details	15
Action Plan	20

Assessing Business Value



- It can be difficult to accurately quantify investment case for blockchain
- Things to consider:
 - Existing Pain Points
 - Scope – participants, assets, transactions
 - Benefits: baseline, minimum viable ecosystem (MVE) & mature network
 - Blockchain Design Points
 - References

Blockchain Value Design (BVD) activity will help elaborate these items!

Template – example only (Cross Border Supply Chain)

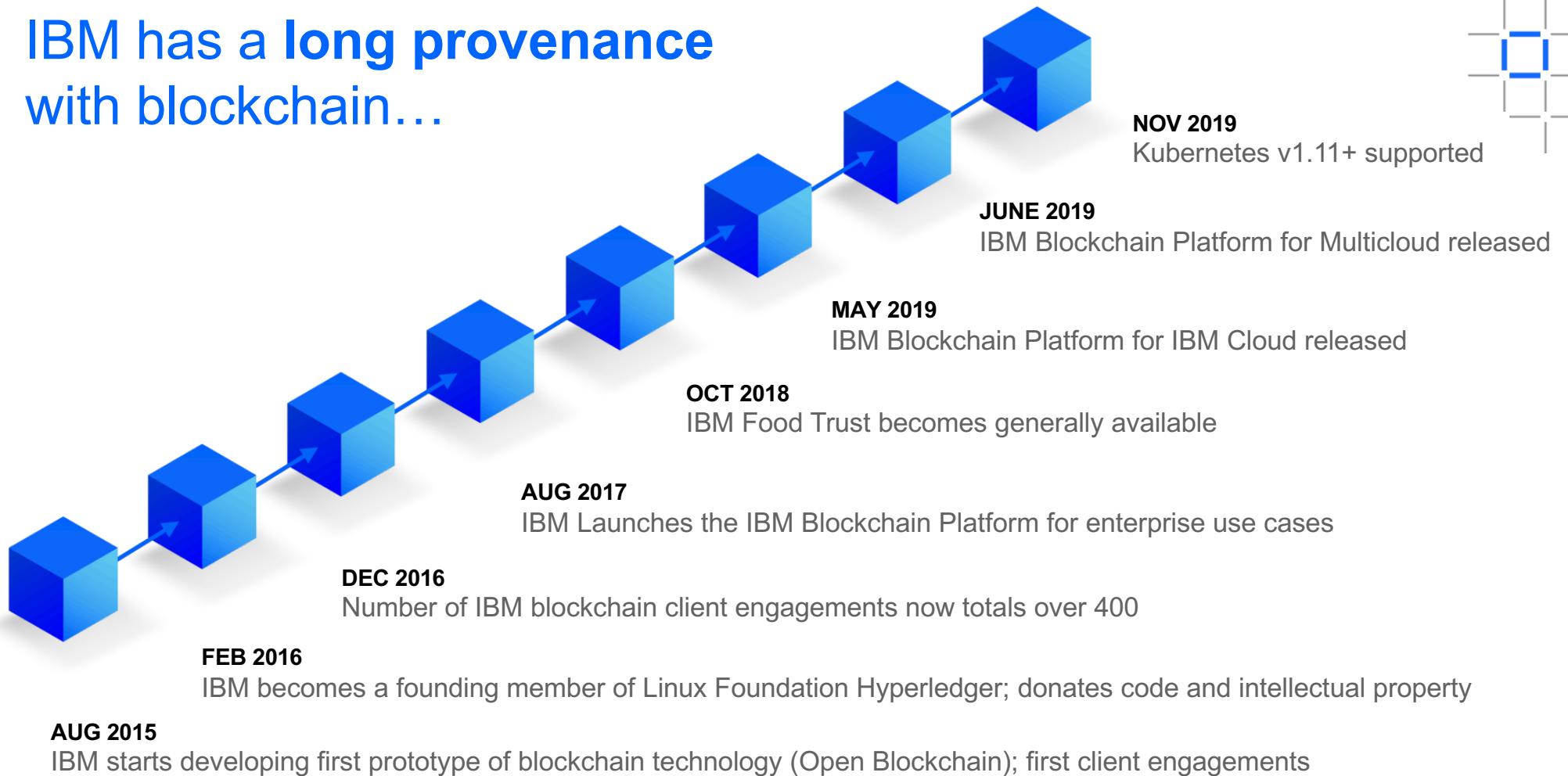
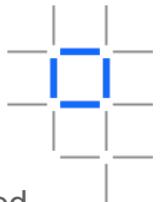
Problem	90% of goods in global trade are carried by the ocean shipping industry each year. Costs associated with trade documentation processing and administration are estimated to be up to 20% the actual physical transportation costs.	Pain Points
Solution	Manage and track the paper trail of tens of millions of shipping containers across the world by digitizing the supply chain process	<ul style="list-style-type: none"> Transport remains highly dependant on a flood of paper that is never digitised Shipping information must pass through many hands, increasing potential for delays in transport. One shipment can require sign-off from 30 unique organizations and up to 200 communications. One lost form or late approval could leave the container stuck in port The entire process can take more than one month.. Fraudulent changes may be made to the Bill of Lading
Participants	Supplier, couriers (*2), customs (*2) , ports (*2), shipper and retailer	
Asset & Trust	Need for trust around paperwork associated with a container	
Transactions	Supplier prepares to ship, release container to courier, load to ship, clear customs, retailer receipt	

Benefits benchmarks - Value Tree		Baseline	Phase 1	Phase 2-3	Blockchain : Design Points	References
KPI's (e.g.)						
New revenue	# new value propositions	-	-	1 to 3	<ul style="list-style-type: none"> Find new value propositions to exploit the network effect between members 	
Improve client experience	Increase in customer satisfaction	-	5%	10%	<ul style="list-style-type: none"> Securely and transparently trace the container's path through the supply chain on the blockchain 	ANO -1
	Increase in trade volumes	-	+5%	+15%	<ul style="list-style-type: none"> Add trust (Immutability and Provenance) around the Bill of Lading and other container paperwork 	
	Cycle times (transit & shipping)	30 days	25 days	10 days	<ul style="list-style-type: none"> Automate the transit and shipping process with Smart Contracts reducing cycle times and delays No reconciliation or matching of documentation with near instant updates - eliminates the need for audit and verification Removes paper and intermediaries 	
Reduce transport costs	Waste as % of total shipped	6%	5%	1%		ANO -2
	Fraud and errors as % of total costs	5%	4%	0.5%		
	Documentation admin. as % of total costs	20%	15%	5%		

IBM Blockchain Platform



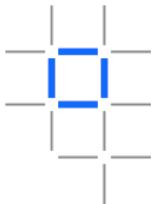
IBM has a long provenance with blockchain...



IBM Blockchain

IBM

IBM is the leader in enterprise blockchain technology



We are the only provider of end to end enterprise blockchain services in the industry

IBMer are the undisputed enterprise blockchain experts

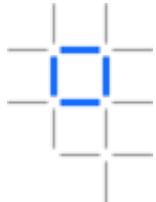
IBM has more production blockchain networks than any other competitive platform

Enterprise blockchain platform with true multi-cloud capabilities

Most advanced developer and operator tools that make network configuration simple

Blockchain platform that doesn't lock you in to a single vendor

IBM Blockchain Platform is a key part of IBM's Blockchain Strategy



Services



Collaborate with services teams to build your solution 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 or joining new business networks and applications

IBM Blockchain Platform

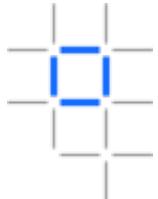


Build and operate blockchain networks in heterogeneous environments of your choice



Founding and premier member of Hyperledger, IBM is committed to open source, standards, and governance

Advanced features, deployment options, and circumventing vendor lock-in has been embraced by the industry



Advanced Tooling

Create and manage all components and policies that encompass a blockchain network

Build

Seamless developer tools

- VSCode extension
- SDKs
- Gateway to Platform

Operate

Intuitive console to manage and govern

- Manage Fabric components
- Live patches and updates
- Governance members and smart contracts

Open Technology

Hyperledger Fabric, Containers, Kubernetes



HYPERLEDGER FABRIC Open source, standards and governance

Deploy Anywhere

Comprehensive cloud & on-premises options



Kubernetes

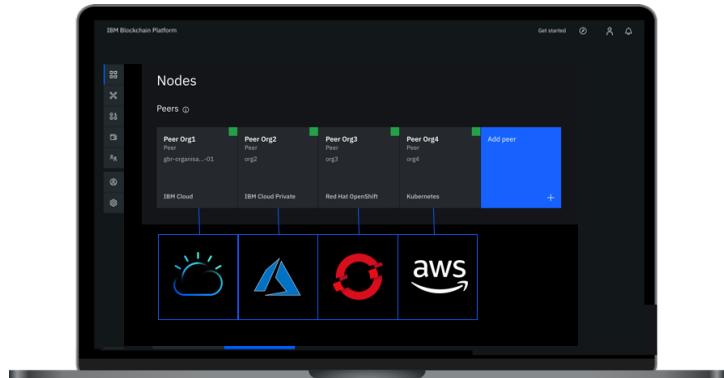


IBM Cloud

IBM LinuxONE

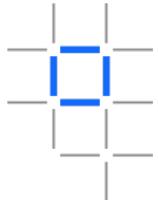


RED HAT OPENSHIFT

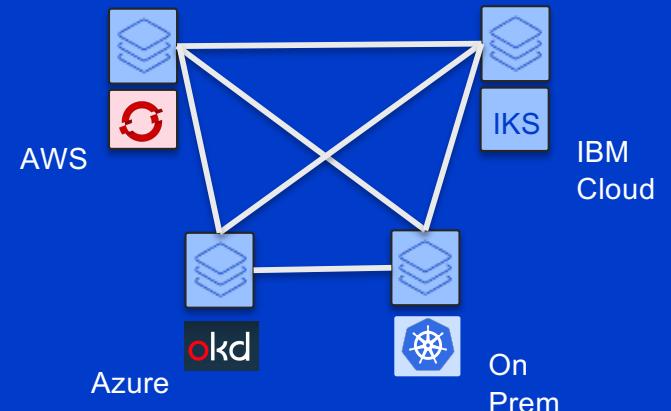




IBM Blockchain Platform: Deploy anywhere

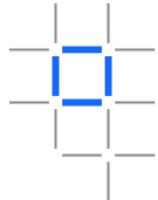


- IBM Blockchain Platform can be deployed wherever you want
 - **IBM Cloud** for an IBM-managed service, using IBM Kubernetes Service
 - **On-premises or in other cloud providers** for greater deployment flexibility, using any Kubernetes v1.11+ environment (e.g. RH OpenShift, OKD, AKS, Rancher)
- **Fully heterogeneous**: different components can be deployed in different environments
- Caters for different vendor biases in the business network and **avoids lock-in**





IBM Blockchain Platform's advanced tooling: Build



- Comprehensive developer tools for smart contracts and client applications, based on the popular **Visual Studio Code** environment
- A library of **getting started developer tutorials** that lead to accredited badges
- **Simplified DevOps** allows you easily move from development to test to production from a single console

File Edit Selection View Go Run Terminal Help IBM Blockchain Platform Home - Untitled (Workspace) - Visual Studio Code

IBM Blockchain Platform v1.0.33

This extension supports the complete development workflow for Hyperledger Fabric and IBM Blockchain Platform. Get started, learn best practices and earn developer qualifications with our tutorials.

Tutorials

Learn about Hyperledger Fabric development using IBM Blockchain Platform. Complete these tutorials to grow your blockchain skills and earn accredited badges along the way!

Other Resources

Access these resources for reference and further learning outside the tutorials.

Extension documentation Sample code: FabCar

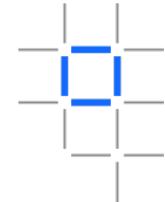
Release notes Sample code: Commercial Paper

DEBUG CONSOLE PROBLEMS OUTPUT TERMINAL Blockchain

```
[6/25/2020 1:23:27 PM] [INFO] connect  
[6/25/2020 1:23:30 PM] [INFO] connect  
[6/25/2020 1:23:32 PM] [SUCCESS] Connecting to drivenet
```



IBM Blockchain Platform's advanced tooling: Operate



- Maintain **complete control** of your blockchain: govern and operate ledgers, channels, identities and other assets in one intuitive console
- Deploy only the blockchain components you need and manage them - wherever they are hosted
- Support for **highly available** environments and **disaster recovery** scenarios

Euro Credentials

Certificate Authority (CA)

Node location
IBM Cloud

Fabric version
1.4.0-1.1b55197

admin
Enroll id for Root CA

admin
Enroll id for TLS CA

Root Certificate Authority TLS Certificate Authority Usage and info Patch available

The root CA provides keys to your nodes and applications. Normally this is the CA you will use to create the identities that are required to deploy, operate, and interact with your network.

Registered users

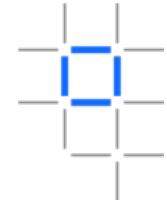
Enroll ID	Type	Affiliation
admin	client	
tester2@test.com	client	org1
tester3@test.com	client	org1
tester@test.com	client	org1
user2	client	org1

Register user +

Cookie Preferences



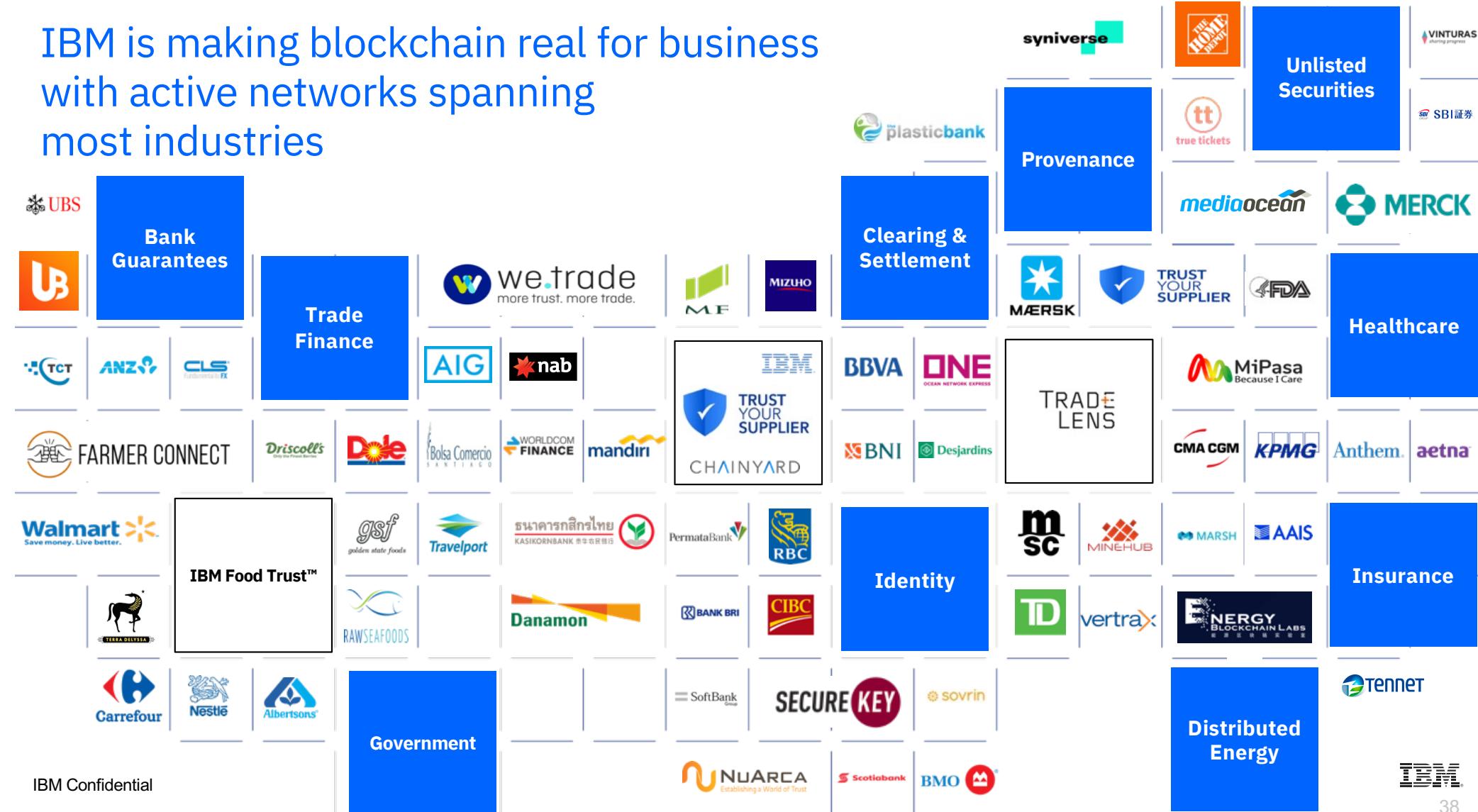
IBM Blockchain Platform has **affordable pricing** that scales with your network



Pricing options** (1 VPC = 1 CPU = 1 vCPU)	Test Network	Join a Network
CPU allocation	1.65 vCPU Includes: - 1 peer (1.1 vCPU) - 2 CAs (0.1 vCPU x 2) - 1 ordering node (0.35 vCPU)	4.5 vCPU Includes: - 2 peers (for HA) (2x default compute = 2 x 1.1 x 2) - 1 CA (0.1)
Hourly cost: IBM Blockchain Platform	\$0.48 USD (1.65 vCPU x \$0.29 USD/VPC-hr)	\$1.31 USD (4.5 vCPU x \$0.29 USD/VPC-hr)
Hourly cost: IBM Cloud Kubernetes cluster	\$0.27 USD (Compute: 4 x 16 lowest tier; 1 worker node; 1 zone) (IP Allocation: \$16 USD/month)	\$0.46 USD (Compute: 8 x 32 lowest tier; 1 worker node; 1 zone) (IP Allocation: \$16 USD/month)
Hourly cost: Storage	\$0.07 USD 340GB <u>Bronze</u> ↗ 2 IOPS/GB	\$0.13 USD 420GB <u>Silver</u> ↗ 4 IOPS/GB
Total hourly cost	\$0.82 USD	\$1.90 USD

<https://cloud.ibm.com/docs/blockchain?topic=blockchain-ibp-saas-pricing>

IBM is making blockchain real for business with active networks spanning most industries



Thank you

Jeff Tennenbaum

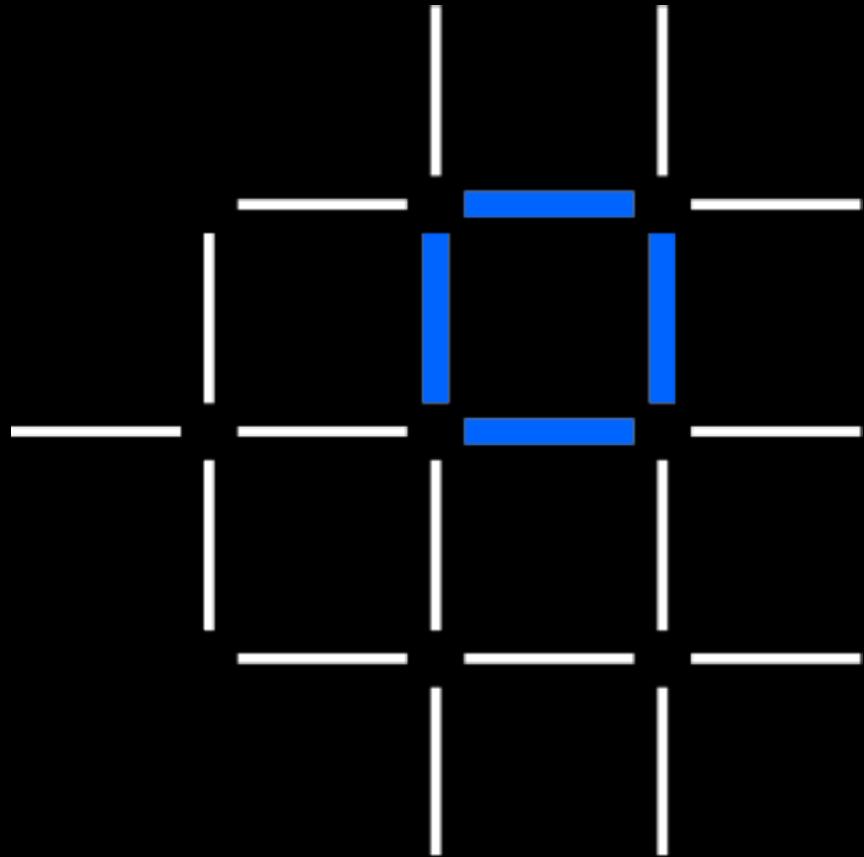
*Questions? Tweet us or
go to ibm.com/blockchain*

 @IBMBlockchain

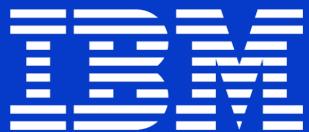
 IBM Blockchain

 IBM Blockchain

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