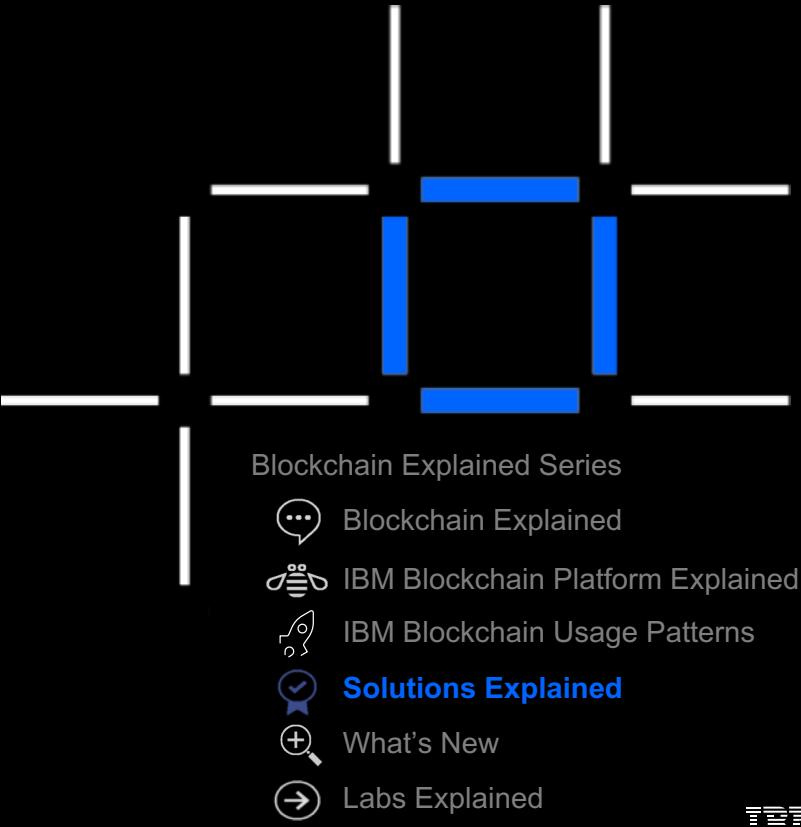
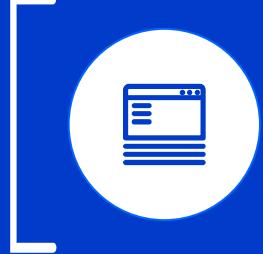


# Solutions Explained

## IBM Blockchain Networks

Jin VanStee  
Blockchain Z  
[jinxiong@us.ibm.com](mailto:jinxiong@us.ibm.com)



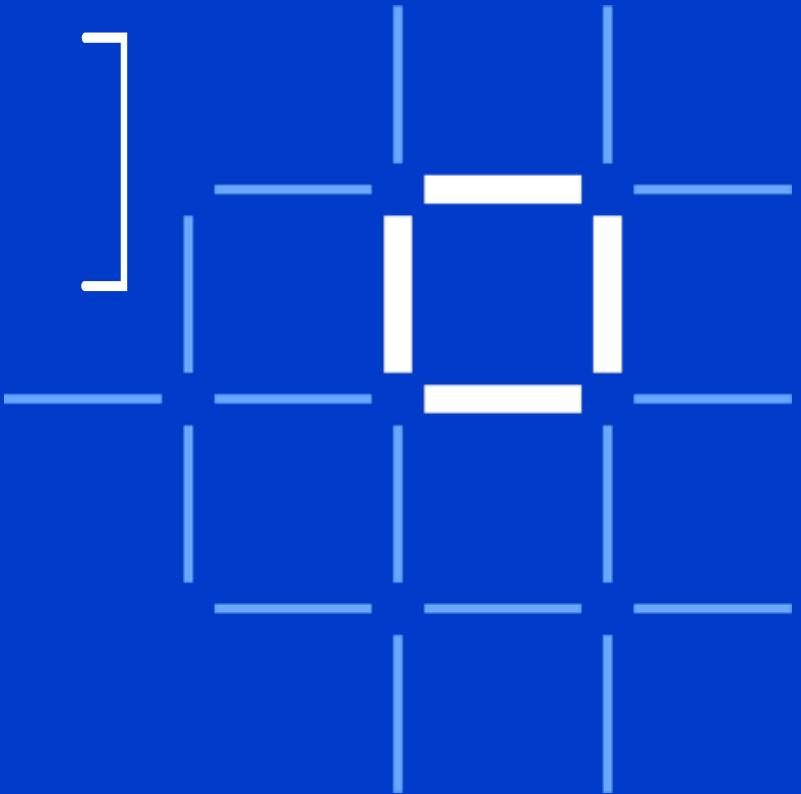


IBM Solutions

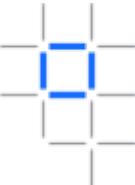
- Food Trust
- World Wire



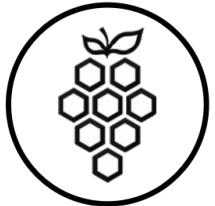
Your Solution



# IBM Solutions



- The aim of this presentation is to provide introductions to IBM blockchain solutions
- It is suitable for clients and IBMers wishing to find out more about one or more of these solutions
- See also the [Client References](#) presentation that gives summary information on many more blockchain projects



Food Trust

IBM Blockchain



# Only 1 in 4 Consumers Trust the 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

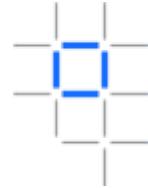


**1 in 5**

seafood samples mislabeled  
worldwide

(43% mislabeled in NYC)

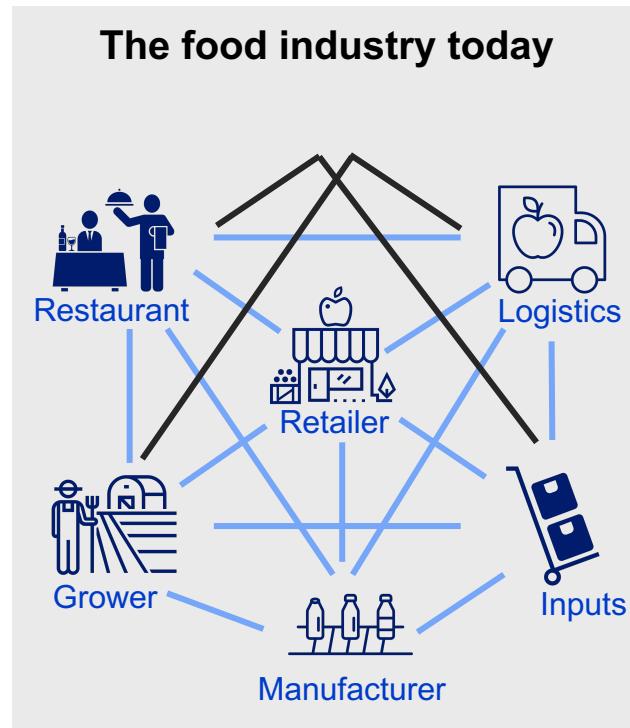
**The root of these issues, and many others, are the lack of trust and transparency**



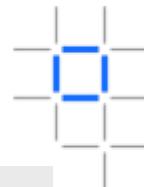
# Today, traditional system constructs limit transparency

## The Problem:

- **Data is siloed** within each company and accessing it requires a request and time
- Exchange of information takes place between a pair of partners; to get information from a distant partner may require **intermediaries**, time, resources
- Most transactions are still **paper-based**, creating inefficiencies and opportunities for fraud
- Because everyone maintains their own record of transactions, **differences** take time and resources to reconcile

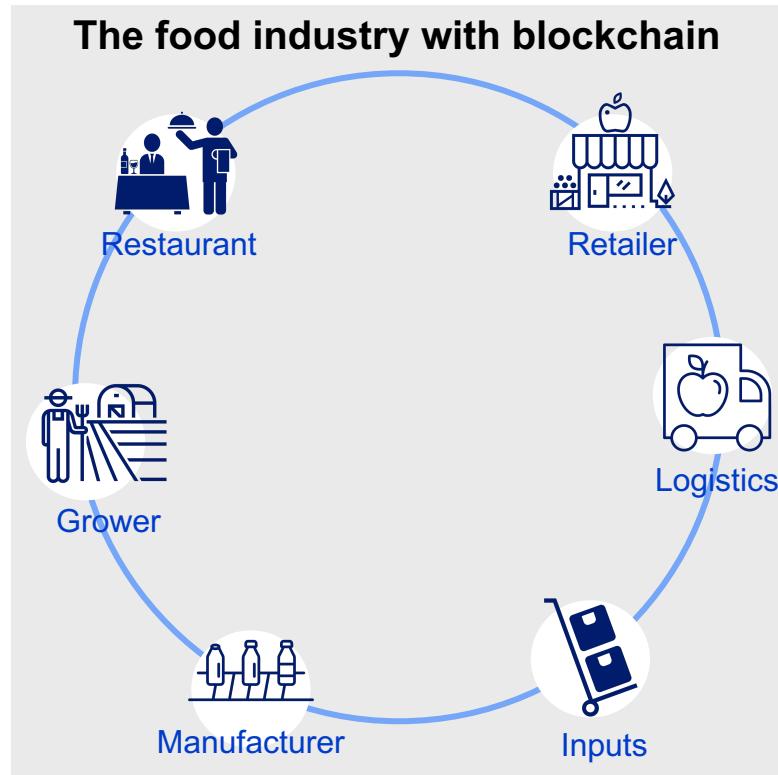


# Blockchain transforms systems with trust and transparency

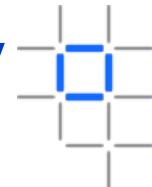


## The Solution:

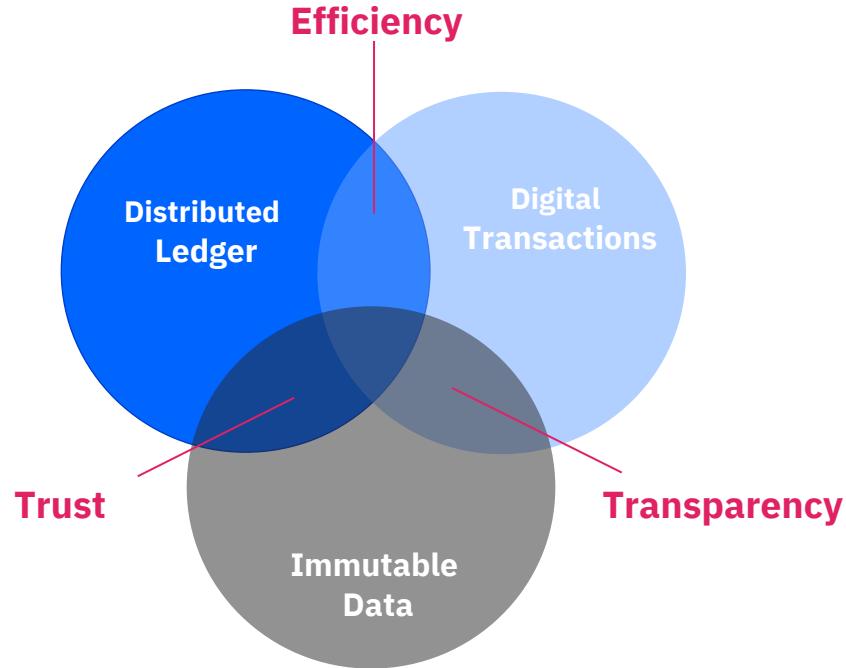
- Because blockchain provides an **independent data-sharing platform**, participants **trust** it
- Once data is shared in a single data-sharing platform, everyone has **instant transparency** into the transactions they are authorized to view; no intermediation required
- **Data immutability** creates an auditable record of all transactions, disincentivizing fraudulent behavior
- **Dispute resolution** from the shared ledger can be automated saving time and resources

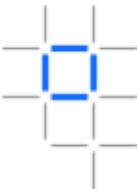


# Introducing IBM Food Trust™ built on Blockchain technology



- The IBM Food Trust solution is a set of modules providing traceability to improve food transparency and efficiency
- Blockchain is used to create a trusted connection with shared value for all ecosystem participants, including end consumers
- The solution offers connectors for interoperability and leveraging existing standards (e.g., GS1)
- Blockchain properties come together to create a more trusted, transparent, and efficient data-sharing platform.





# IBM Food Trust offers industry-specific functionality targeted at key pain points

Capabilities

## 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

Blockchain Technology



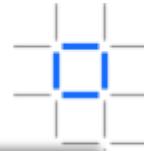
Food Supply Ecosystem

Information-sharing Platform

IBM Blockchain Platform

Hyperledger Fabric

# Trace



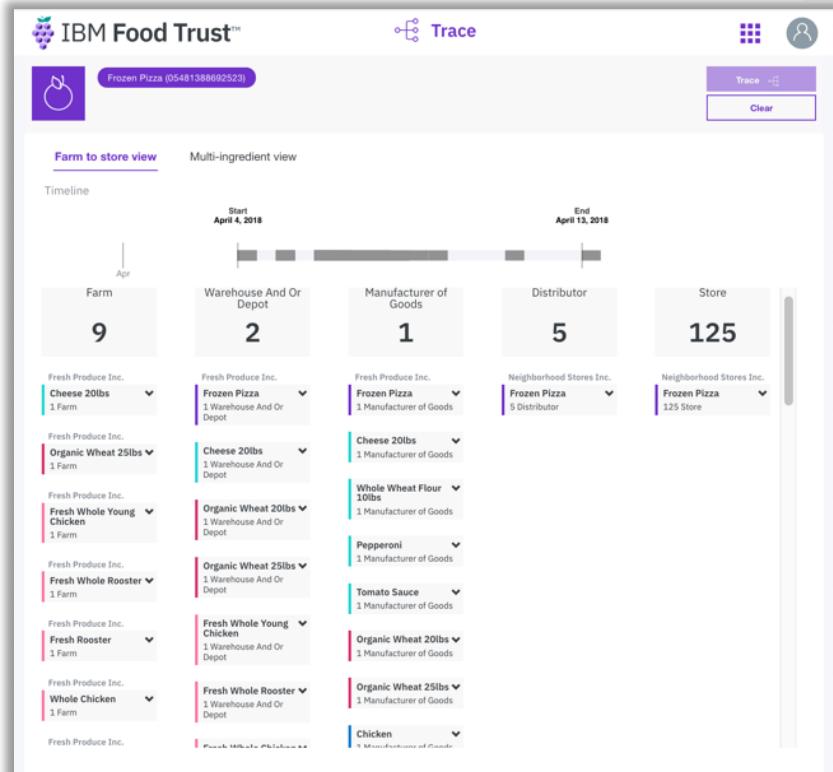
Last year, there were at least **456 food safety recalls** globally due to contamination, with each recall estimated to cost an average of **\$10 million**.

## Functionality

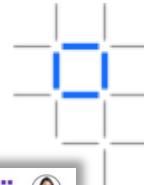
- Securely and transparently trace the location and status of food products upstream and downstream in seconds.

## Impact

- Improve food safety
- Conduct surgical recalls
- Identify ingredient provenance
- Reduce Food Fraud



# Certifications



Driven by today's food system complexity, food fraud is a global business estimated to cost **\$40 billion** annually.

## Functionality

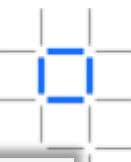
- Easily digitize and share inspections, quality certifications, and registrations.

## Impact

- Improved brand trust
- Reduced food fraud
- More sustainable ecosystem

The screenshot shows the IBM Food Trust interface for managing facility certifications. At the top, there are navigation links for 'Find a Facility' and 'Certifications'. Below that, two boxes show 'Expiring Certificates' (5) and 'Expired Certificates' (3). The main area is a table listing facilities with their certificates. The columns include: Number of Certificates, Owning Company, Facility Type, Facility Name, and Address. A dropdown menu allows filtering by 'Owning Company', 'Facility Type', and location ('USA', 'California', 'Fresno'). The table lists the following data:

Number of Certificates	Owning Company	Facility Type	Facility Name	Address
> 2	Jeremy's	MANUFACTURER_OF_GOODS	Main Facility	9873 Pointout Drive, Fresno, CA US
> 1	Basilion	PROCESSING_PLANT	Main Facility	76 Ridgeangle Drive, Fresno, CA US
3	Juniper Roof	GROWER	Main Farm	8909 Jordan Court, Fresno, CA US
3	Juniper Roof	GROWER	Main Farm	8909 Jordan Court, Fresno, CA US
3	Juniper Roof	GROWER	Main Farm	8909 Jordan Court, Fresno, CA US
3	Hewetts	DISTRIBUTION_CNTN	DC #1025	432 Pinewood Rd, Fresno, CA, US
2	MicroGrowers	GROWER	Farm #750	55 Quaker Town Blvd, Fresno, CA US



# Fresh Insights

40-50% of root crops, fruits and vegetables are wasted annually. Food losses and waste amounts to roughly **\$680 billion** in industrialized countries.

## Functionality

- Real time insights on inventory flow, average dwell time, time-since-harvest. Enables root-cause diagnosis and provides alert capabilities.

## Impact

- Supply chain efficiencies
- Reduced food waste
- Increased Shelf Life
- More sustainable ecosystem

The screenshot displays the IBM Food Trust Fresh Insights platform. At the top, it shows a product name "Demo: fresh strawberry" and a GTIN number "123234564323478". Below this, there are two tabs: "Current inventory" (selected) and "Insights".  
**Facility Data:**

Facility	Total facilities
Farms	420
Packing houses	20
Manufacturing of goods	15
Warehouses	13
Distribution centers	120
Stores	1,230

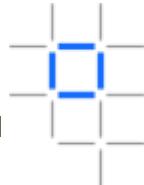
  
**Map:** A map of the United States with various locations marked by colored dots (orange, red, purple) indicating inventory risk. A callout text says "Map shows all inventory at risk."  
**Inventory summary:**

Facility location	Unit	Last 24 hours inflow	Last 24 hours outflow	Current inventory	At risk inventory	At risk percentage
Address of location...	lbs	28,200	13,200	34,000	2	2.07%

  
**At risk inventory:**

Serial number	Inventory	Expiration date
L2160.23	2,300 lbs	12/12/2018
L2190.45	2,300 lbs	12/12/2018

# IBM Food Trust provides value to the entire food ecosystem



## Farmers / Producers

- Prove farm is not a source of outbreak
- Ease of connectivity to the supply chain



## Food Manufacturers / CPGs

- Instill trust between retail, suppliers & customers
- Automate & reduce manual certificate management



## Wholesalers/ Distributors

- Conduct targeted recalls
- Enable internal data sharing



## Food Logistics

- Enhance ability to meet compliance standards
- Reduce manual processes



## Food Retailers

- Assure customers food supplied is safe
- Conduct targeted recalls quickly



## Consumers

- Learn about recalls and increased transparency
- Reduce risk of being victimized by food fraud



## Certification Bodies

- Reduce fraudulent certificates
- Increase renewal speed



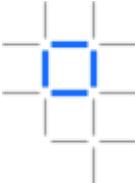
## Food Service

- Assure customers food supplied is safe
- Reduce wasted food



## Regulators

- Identify contamination quickly
- Reduce unnecessary testing



# The effectiveness of the IBM Food Trust solution was demonstrated with a Walmart mango pilot

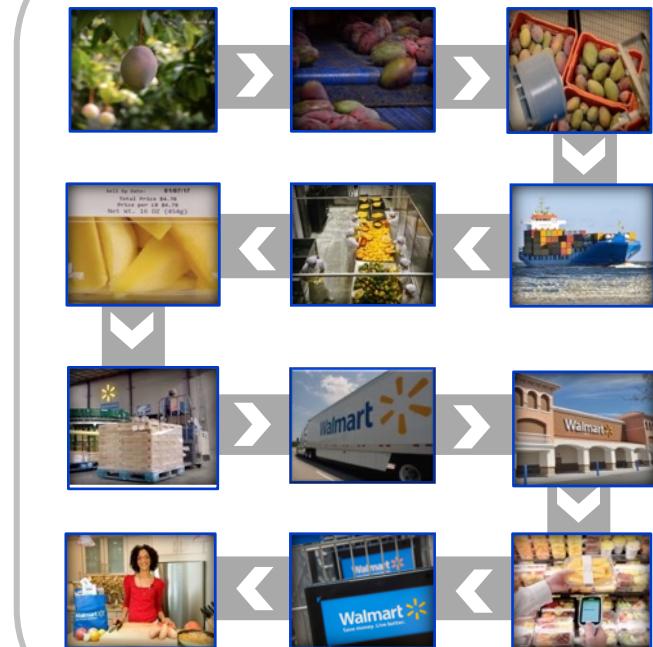
## Pilot Test Case

How long does it take to trace a package of sliced mangoes back to the farm?



IBM Blockchain

## Supply Chain



## Results

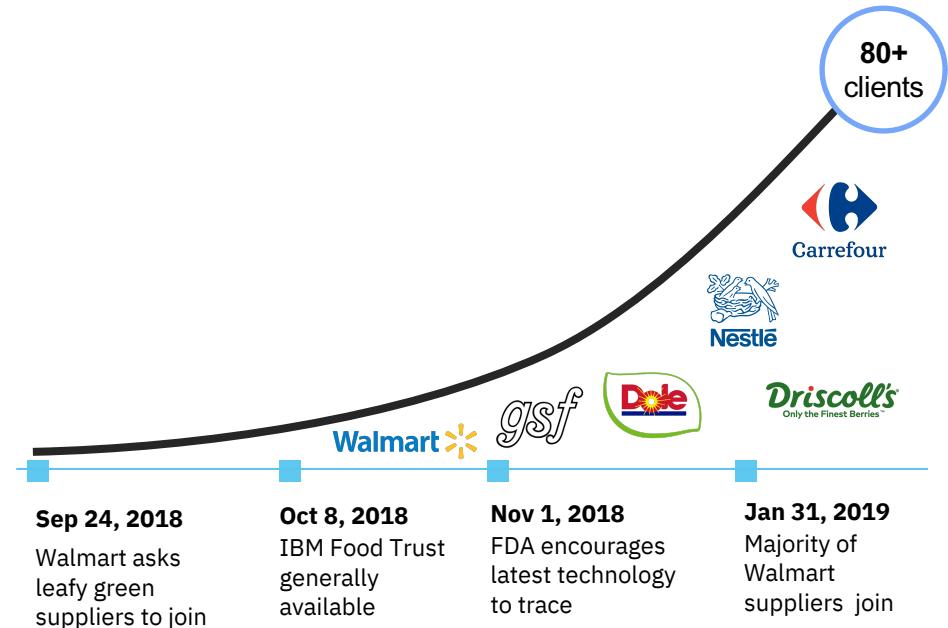
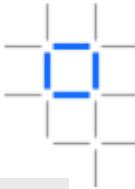
Typical manual, mixed digital and paper-based method  
**6 days**  
**18 hours**  
**26 minutes**

IBM Food Trust digital solution

**2.2 seconds**

IBM

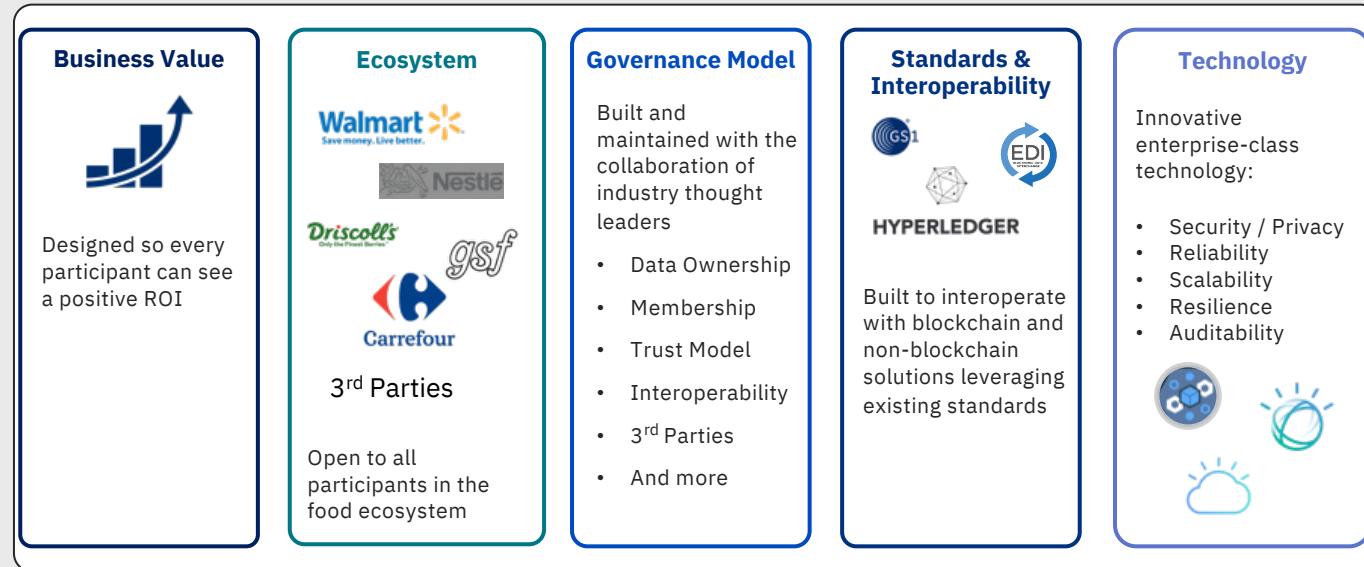
# Momentum is growing



Today, we have full in-production capability after over a year of testing:

- One of the **largest** non-crypto blockchain networks in the world
- **5M+** food products on retail shelves
- **~1,200 SKUs/items** digitized, representing **4M+** transactions
- **200K** traces conducted to date

# It is more than just blockchain technology; five pillars underpin a successful blockchain ecosystem



**The only enterprise-class blockchain solution for the food system**



World Wire

IBM Blockchain



# Traditional Payment Rails

\* Very little investment has been directed toward new payment infrastructure in the last 50 years!

## Cards

Credit, Charge  
Debit, Prepaid



## ACH / CCP

Credit Transfer  
Direct Debit



## Checks



## Wires

Domestic: RTGS  
International: Correspondent Banks



## Cash



< what is the next rail? >\*

Real time, frictionless, cross-border,  
low fees, high volume...



Typical Transaction Amount

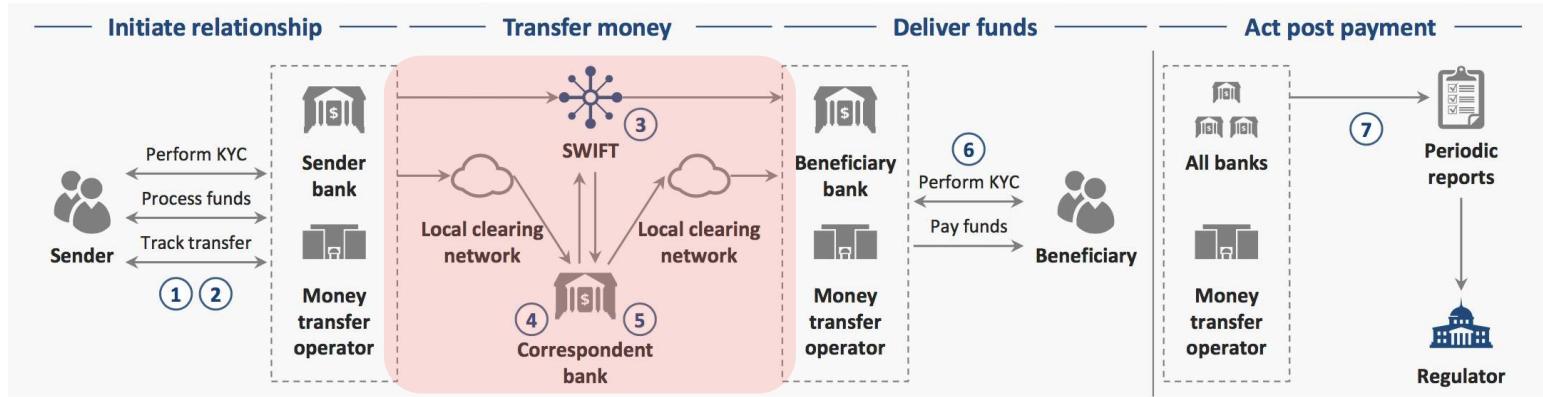
Transaction Volume / Throughput

Transaction / Network Fees

Authorization / Settlement Time

Global / Cross-Border

# Cross Border Payments: Pain Points



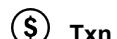
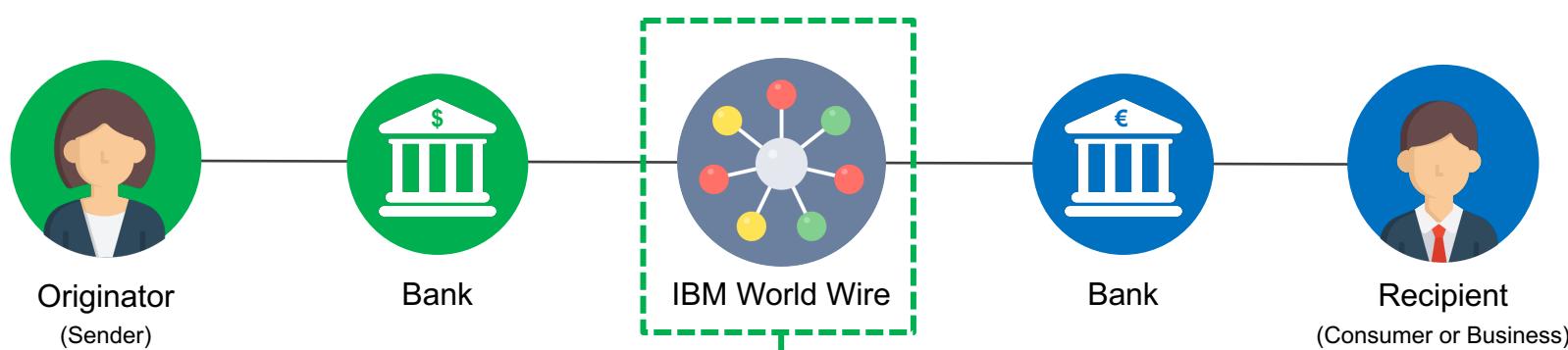
## Current-state pain points

- |   |  |   |   |
|---|--|---|---|
| <p><b>① Inefficient onboarding:</b> information about the sender and beneficiary is collected via manual and repetitive business processes</p> <p><b>② Vulnerable KYC:</b> limited control exists over the veracity of information and supporting documentation, with various maturity levels across institutions</p> | <p><b>③ Cost and delay:</b> payments are costly and time consuming depending on route</p> <p><b>④ Error prone:</b> information is validated per bank/transaction, resulting in high rejection rate</p> <p><b>Liquidity requirement:</b> banks must hold funds in nostro accounts, resulting in opportunity and hedging costs</p> | <p><b>⑤ Vulnerable KYC:</b> similar to #2, limited control exists over the veracity of information and supporting documentation, with various maturity levels across institutions</p> | <p><b>⑥ Demanding regulatory compliance:</b> due to various data sources and channels or origination, regulatory reports can require costly technology capabilities in addition to complex business processes (often supported by multiple operation teams)</p> |
|---|--|---|---|

Source: World Economic Forum, 2016

## IBM World Wire

- A global payment network for the growing market opportunity enabled by blockchain
- Universal payment support– micro payments, low value, high value, commercial, retail, remittance, etc.
- Low fee structure and operational costs
- Integrated clearing and settlement with real time FX
- Standards-based messaging (ISO 20022)
- Options for immediate or deferred / net settlement
- Immediate settlement using fungible digital assets
- Support for multiple asset alternatives and asset classes: cryptos, stable coins, central bank digital currencies, tokenized commodities



Txn Amount: Any



Txn Throughput: High



Txn Cost: Low



Settlement Time: Immediate



Cross Currency: Yes

# Operating Modes: It's all about digital assets!

## DIGITAL ASSET EXCHANGE IS THE NOVELTY OF WORLD WIRE

- Digital Assets represent stored value or dynamic obligations
- Real-time Settlement = Exchange of Digital Assets (“DA” Mode)
- Deferred Settlement / Prefunding = Exchange of Digital Obligations (“DO” Mode)

	Digital Obligation (DO)	Digital Asset (DA): Cryptocurrency	Digital Asset (DA): Stable Coin	Digital Asset (DA): CBDC
Description	A Digital Token representing a promise to pay (IOU) or prefunded balances	XLM, ETH Supported	Digital Token representing claim on fiat deposits issued by bank or commercial entity	Digital Token representing claim on fiat deposits held in reserve by central bank
Funds Availability	Immediate	Immediate	Immediate	Immediate
Settlement Speed	Varies	Less than 30 seconds	Less than 30 seconds	Less than 30 seconds
Settlement Complexity	High: Outside of Network	Low: Immediate, on-network	Low: Immediate, on-network	Low: Immediate, on-network
Liquidity	Can be high; may be supported by pre-funded <i>nostro</i> accounts or credit / netting agreements	Varies, often low	High; might be redeemed for cash; can be supported	Extremely high; legal tender; likely never requires redemption for cash
Risk	<ul style="list-style-type: none"> <li>▪ Counterparty risk; mitigated with pre-funding</li> </ul>	<ul style="list-style-type: none"> <li>▪ Price volatility</li> <li>▪ Lack of liquidity on the market</li> </ul>	<ul style="list-style-type: none"> <li>▪ Issuing entity solvency</li> </ul>	<ul style="list-style-type: none"> <li>▪ None</li> </ul>

# How Money Moves

## Current international payment system today

**COMPLEX**  
Multiple intermediaries, limited transparency, error prone, reconciliation heavy



**COSTLY**  
Expensive fees, high liquidity requirements

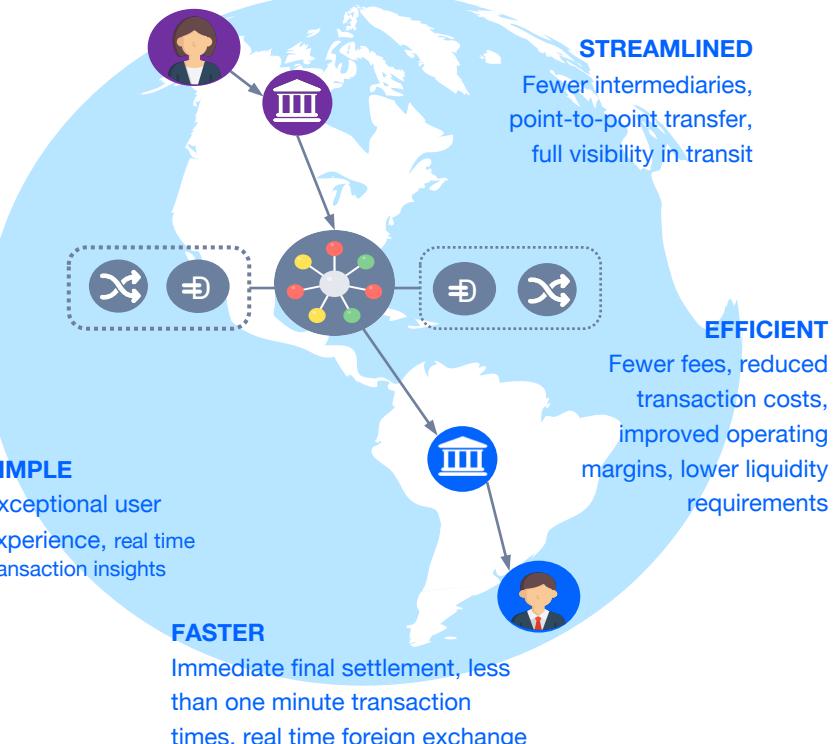
**SLOW**  
2-10 days to settle, limited visibility in transit

**PAINFUL**  
Slow client inquiry times, poor user experience

10 – 20% savings in operational efficiencies & liquidity management

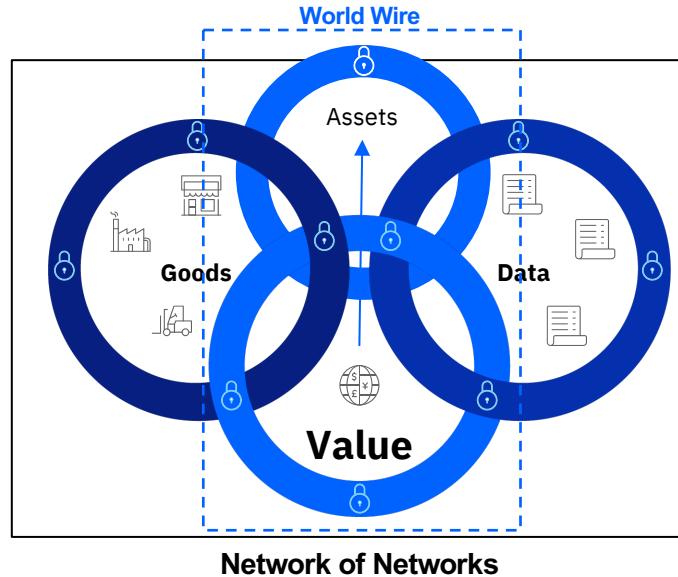
55 – 85% reduction in overall transaction costs

## IBM World Wire Payments Simplified with Blockchain



## World Wire is a Strategic Core to IBM's Blockchain Portfolio

To service our enterprise clients, IBM has built solutions and capabilities around three common elements pervasive across blockchain use cases: (1) the *flow of goods* (e.g. Food Trust), (2) the *flow of data* (e.g. TradeLens) and (3) the *flow of value* or payments (e.g. World Wire).

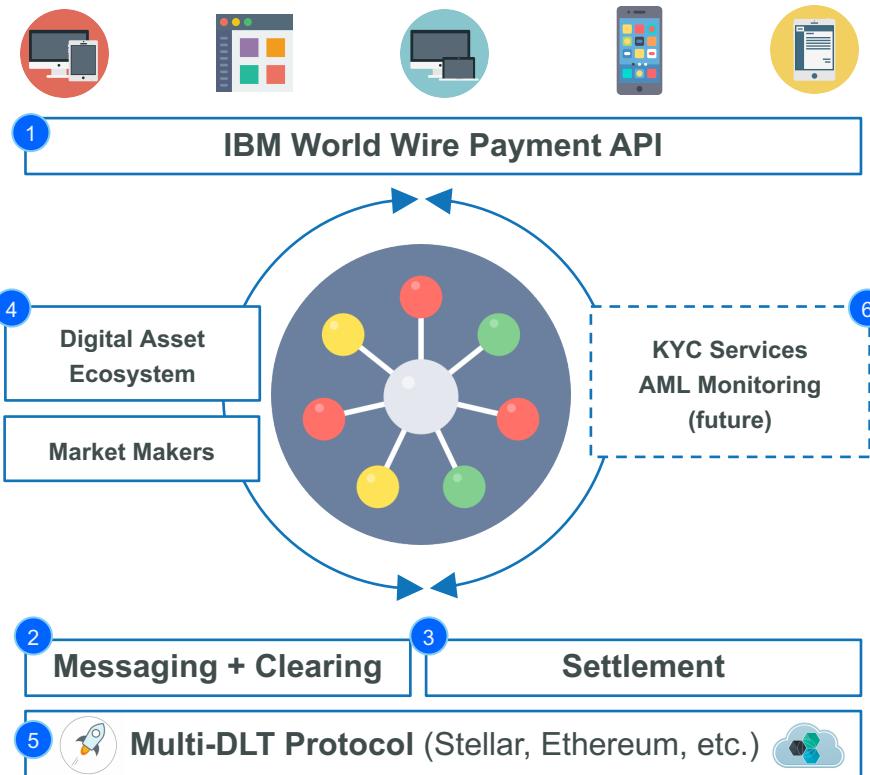


Payments are a critical component to enabling a trusted economy.

# Platform Overview

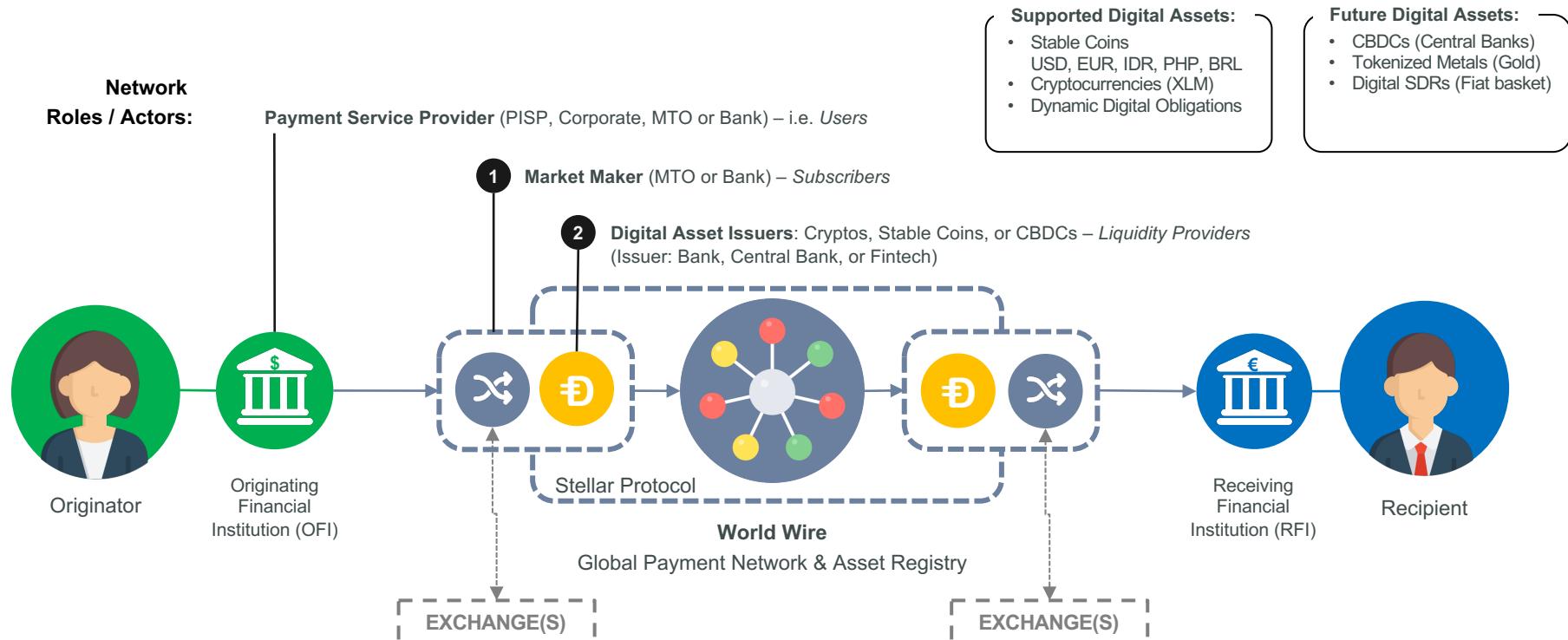
A new global payment rail for real time clearing and settlement using blockchain technology

- 1 Simple API for immediate peer-to-peer payments, regardless of size, origination, destination, currency
- 2 Messaging and clearing using ISO 20022 payment messages
- 3 Settlement is token-centric, supporting multiple modes and digital assets issued on Stellar and other DLT networks, e.g. ERC20 (future)
- 4 Efficient real-time market pricing across digital and fiat currencies driven by open ecosystem of market makers
- 5 IBM's enterprise scale secure infrastructure, cloud, and network governance
- 6 Future proof: Integration with digital identity solutions and new value-added services



# World Wire Network Roles and Actors

*A new global payment network enabling real time FX*



# Network Participant Roles

## Payment Service Provider \*

Banks + money transfer operators + money service businesses + non-banks (corporates) + remittance providers + retailers, etc. ... i.e. any authorized entity acting as, or on behalf of money senders, which may be consumers or businesses.

**These are the beneficiaries and users of the World Wire Network (indirect participants)**

I.e. Payment Initiation Service Providers (PISP) according to PSD2 definitions = those acting on behalf of senders (i.e. PSUs = Payment Service Users)



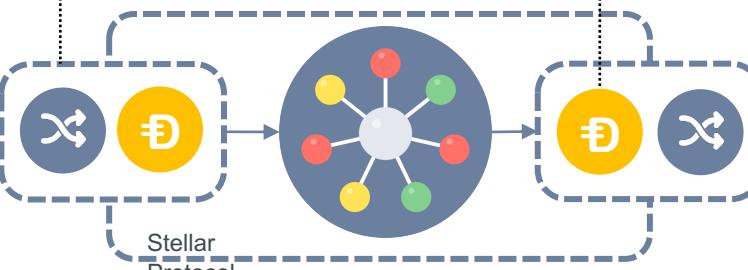
Originator



Originating Financial Institution (OFI)

## 1 Market Maker

Regulated money service businesses, including banks, non-bank financial institutions, or any entity authorized by their regulators to handle money and/or perform exchange functions, converting fiat currency to/from digital assets. **This role is crucial to the function of the World Wire network**, providing endpoints for deposits and payouts in different currencies. **These are the subscribers of the World Wire network (direct participants)**.



## 2 Digital Asset Issuer / Liquidity Provider

Banks, central banks and financial services entities who issue digital tokens representing a legal claim on real world assets. This includes especially Stable Coins and Central Bank Digital Currencies, but also crypto currencies like ETH, and XLM. **This is the novelty of World Wire**, i.e. the exchange of digital assets is what enables real time settlement.



Recipient

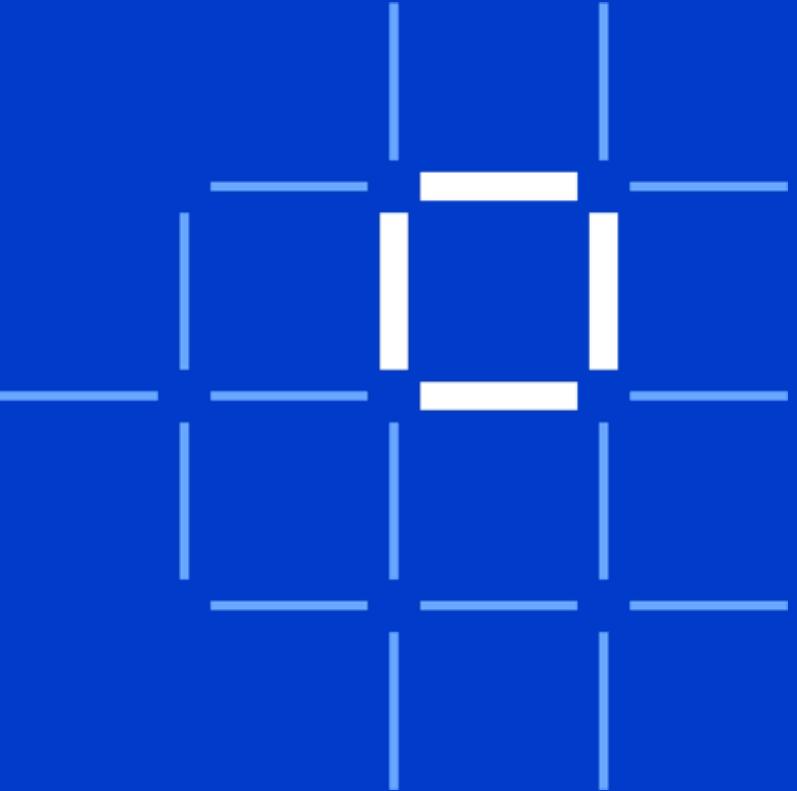


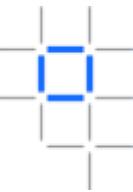
## IBM Solutions

- Food Trust
- TradeLens
- World Wire
- Digital Identity



Your Solution





# Good blockchain use-case or bad?

Food  
Provenance

Holiday  
Tracking  
Tool

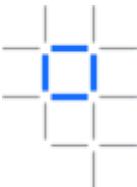
Know Your  
Customer

Secure  
Document  
Store

Track Your  
Child

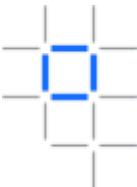
Electronic  
Medical  
Records





# What makes a good blockchain use case?

- Identifying a good blockchain use-case is not always easy!
  - However there should always be:
    1. A **business problem** to be solved
      - That cannot be more efficiently solved with other technologies
    2. An identifiable **business network**
      - With Participants, Assets and Transactions
    3. A need for **trust**
      - Consensus, Immutability, Finality or Provenance



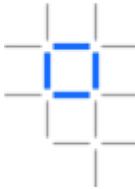
# What makes a good first blockchain use case?

– First use-cases are even more difficult to identify!

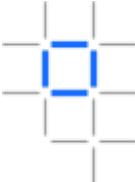
1. A limited scope, but still solves a real business problem
  - Minimum Viable Product in a few weeks of effort
2. A smaller business network
  - Usually without requiring regulators and consortia
3. Allows for scaling with more participants and scenarios
  - Consider shadow chains to mitigate risks

Start small, succeed and grow fast!

# Sample questions to ask for the selected use case:



1. What is the specific business problem / challenge that the first project will address?
2. What is the current way of solving this business problem?
3. Assuming the business problem is large, what specific aspects of this business problem will be addressed?
4. Who are the business network participants (organizations) involved and what are their roles?
5. Who are the specific people within the organization and what are their job roles?
6. What assets are involved and what is the key information associated with the assets?
7. What are the transactions involved, between whom, and what assets are associated with transactions?
8. What are the main steps in the current workflow and how are these executed by the business network participants?
9. What is the expected benefit of applying blockchain technology to the business problem for each of the network participants?
10. What legacy systems are involved? What degree of integration with the legacy systems is needed?



# It is important to ideate potential use-cases

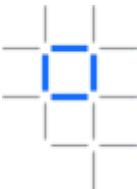
Day 1

[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

[D] Going Agile	
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

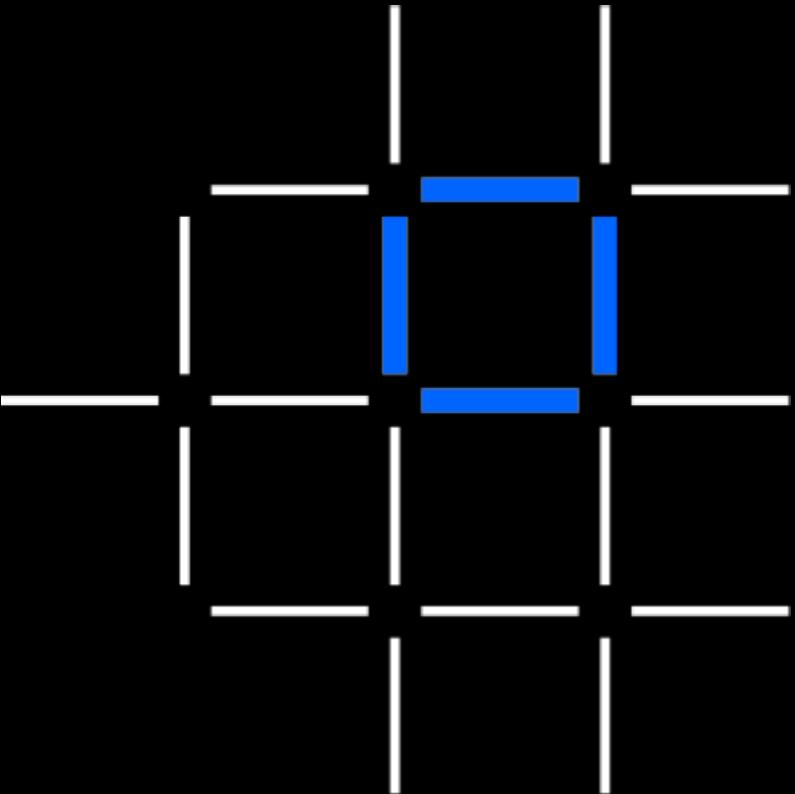
Blockchain Value Design (BVD) activity will help elaborate these items!

# 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"> <li>Transport remains highly dependant on a flood of paper that is never digitised</li> <li>Shipping information must pass through many hands, increasing potential for delays in transport.</li> <li>One shipment can require sign-off from 30 unique organizations and up to 200 communications.</li> <li>One lost form or late approval could leave the container stuck in port</li> <li>The entire process can take more than one month..</li> <li>Fraudulent changes may be made to the Bill of Lading</li> </ul>
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"> <li>Find new value propositions to exploit the network effect between members</li> </ul>	ANO -1
Improve client experience	Increase in customer satisfaction Increase in trade volumes Cycle times (transit & shipping)	- - 30 days	5% +5% 25 days	10% +15% 10 days	<ul style="list-style-type: none"> <li>Securely and transparently trace the container's path through the supply chain on the blockchain</li> <li>Add trust (Immutability and Provenance) around the Bill of Lading and other container paperwork</li> </ul>	
Reduce transport costs	Waste as % of total shipped Fraud and errors as % of total costs Documentation admin. as % of total costs	6% 5% 20%	5% 4% 15%	1% 0.5% 5%	<ul style="list-style-type: none"> <li>Automate the transit and shipping process with Smart Contracts reducing cycle times and delays</li> <li>No reconciliation or matching of documentation with near instant updates - eliminates the need for audit and verification</li> <li>Removes paper and intermediaries</li> </ul>	ANO -2

# Thank you



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