



Blockchain for Logistics

Usha Krishnan

Global Black Belt Blockchain
Architect



Today we will discuss . . .

The growth opportunities that new technologies bring to the logistics sector

Blockchain with a dash of
Internet of Things (IoT)
& Artificial Intelligence (AI)
(Let's see why and how)



What is blockchain?

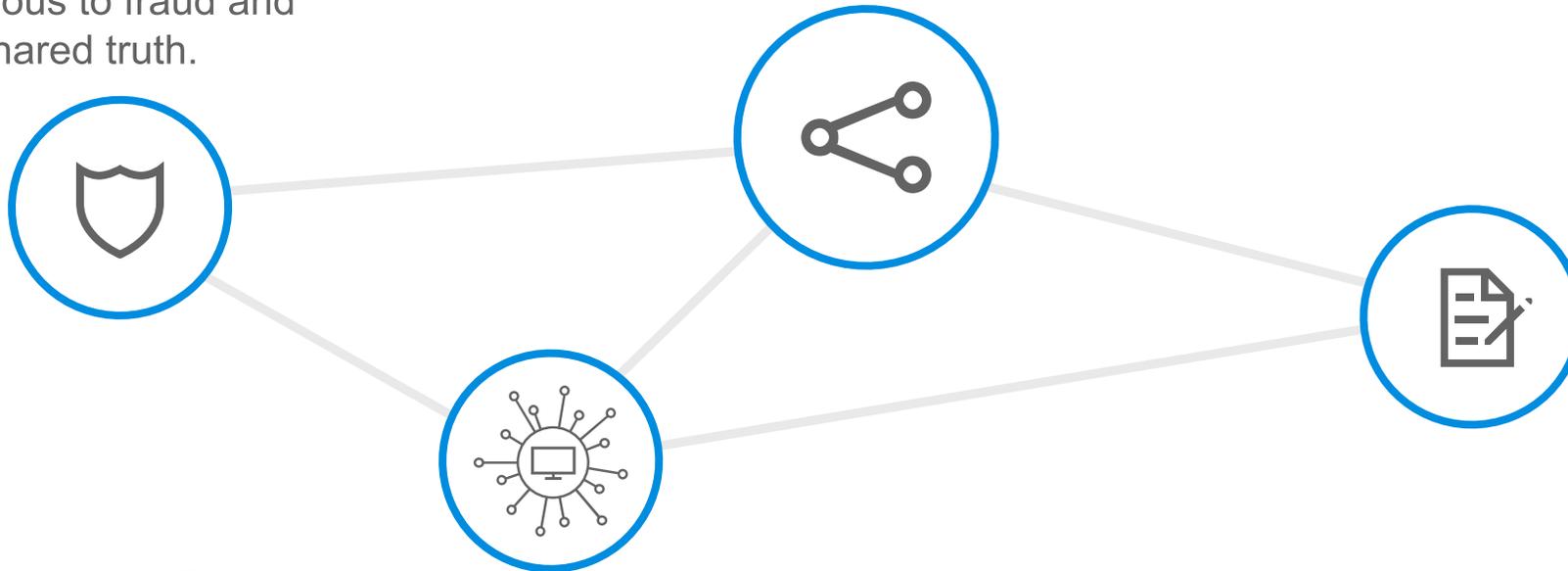
Fundamentals | Blockchain is a secure, shared, distributed ledger

Secure

Uses cryptography to create transactions that are impervious to fraud and establishes a shared truth.

Shared

Blockchain value is directly linked to the number of organizations or companies that participate in them. There is huge value to even the fiercest of competitors to participate with each other in these shared database implementations.



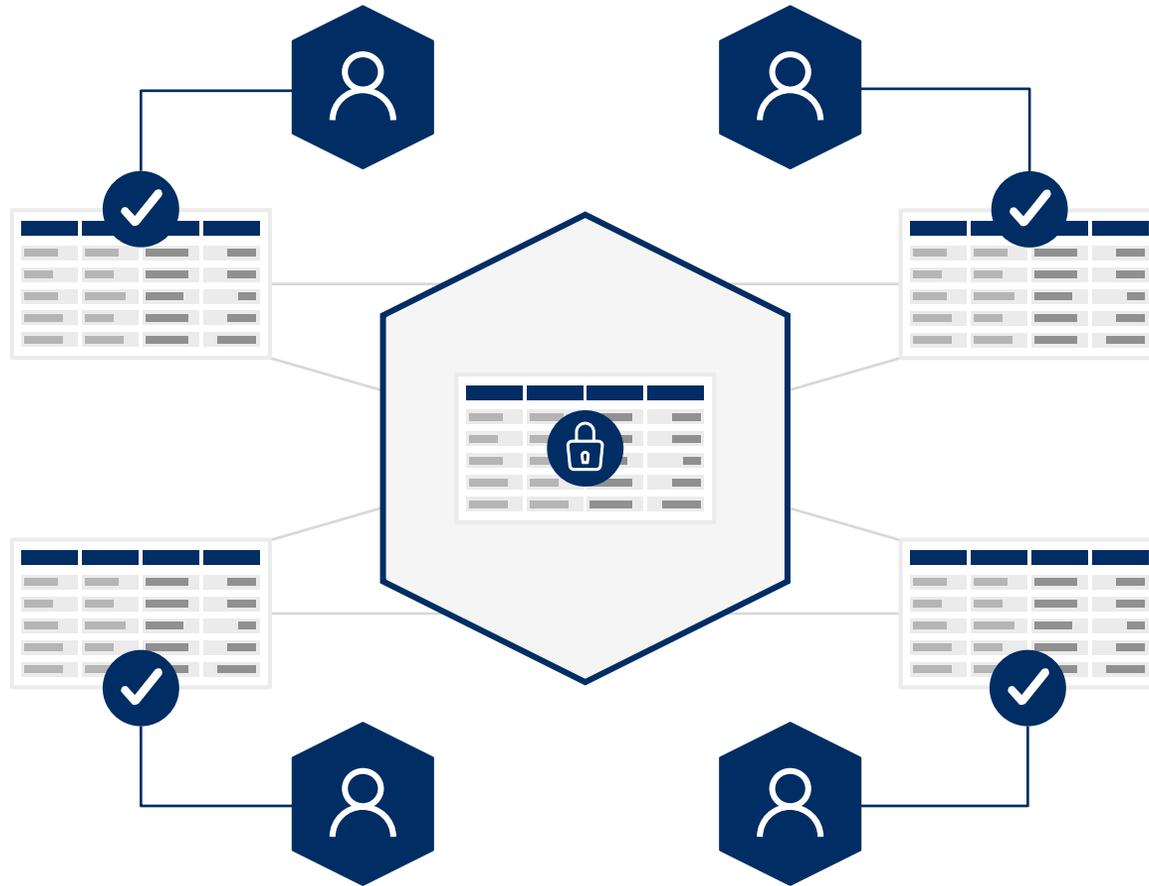
Ledger

The database is “write once” so it is an immutable record of every transaction that occurs.

Distributed

There are many replicas of the blockchain database. In fact, the more replicas there are the more authentic it becomes.

Fundamentals | Blockchain establishes a secure, single source of truth



Data is stored in a ledger—
a record of every transaction

Everyone in the network has
an individual, identical copy

The ledger can only be
updated by network
consensus, and information
can't be altered or deleted
without the knowledge of the
whole network.



When is
blockchain the
right choice?

Benefits| The Importance of Trust

Blockchain was developed to enable transactions in **completely untrusted environments**

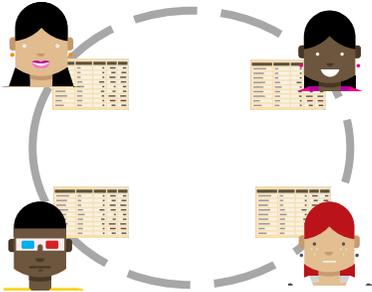
Blockchain shines where different parties that don't fully trust each other **need to share data and cooperate.**

Benefits| Recognizing scenarios

Answering a few questions can determine if blockchain is appropriate

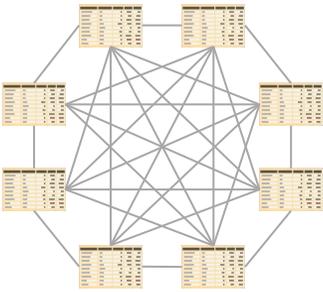
Do multiple parties share data?

Would a complete and reliable shared system of record benefit each of the participants in a business relationship?



Do multiple parties update data?

Would there be greater data accuracy and timeliness if multiple participants can record and propagate concurrent transactions?



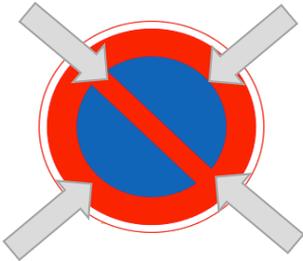
Is there a requirement for verification?

Would tamper-proof logging increase transactional throughput and reliability amongst semi-trusted business partners?

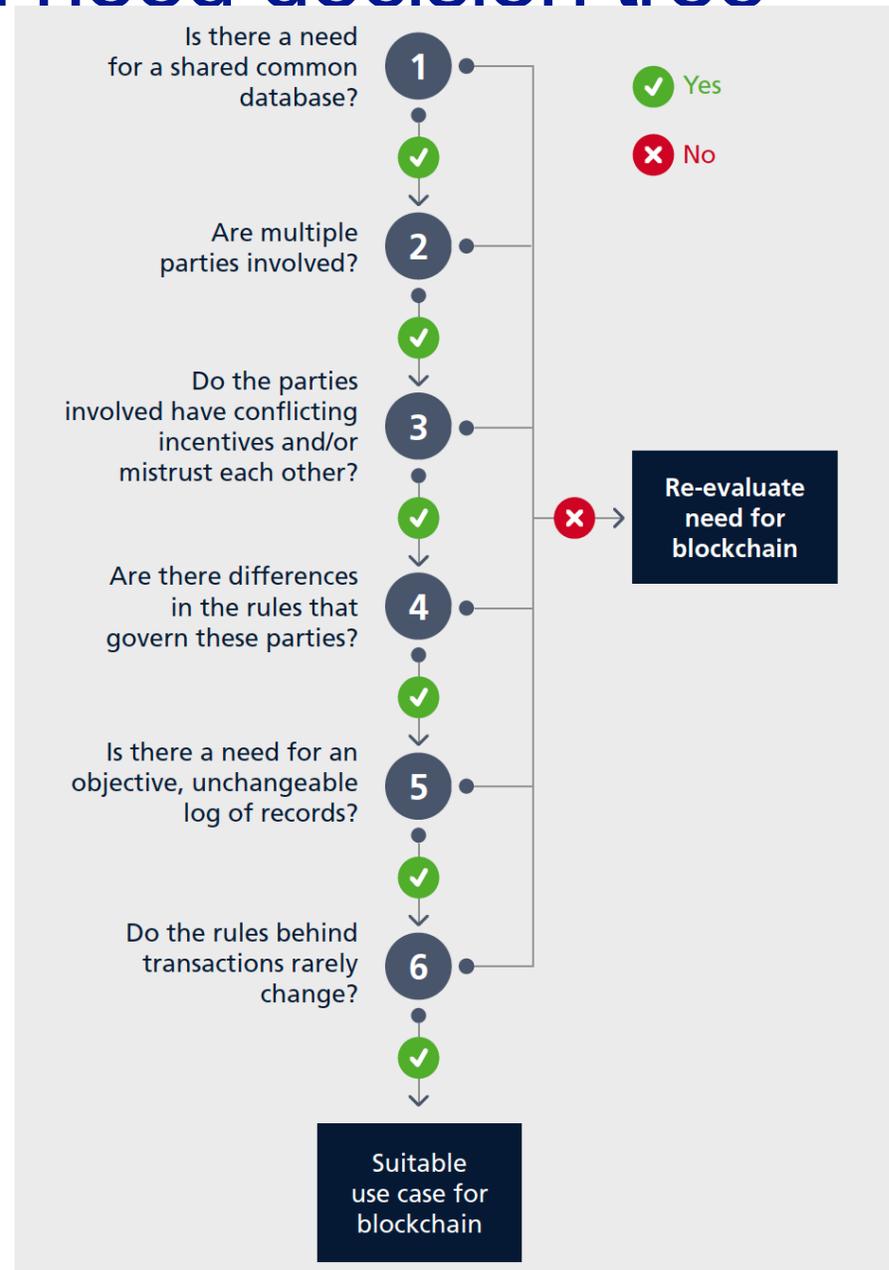


Can intermediaries be removed?

Would the removal of intermediaries reduce cost and complexity?



Benefits | Simplified blockchain need decision tree



Source: [DHL Report](#)

Benefits | Impact across many different industries



Financial

Redesign costly legacy workflows, improve liquidity and free up capital. Help reduce infrastructure costs, increase transparency, reduce fraud and improve execution and settlement times.



Healthcare

Removes third-party verifiers such as health information exchanges by directly linking patient records to clinical and financial stakeholders. Provides fast, secure, authenticated access to personal medical records across healthcare organizations and geographies.



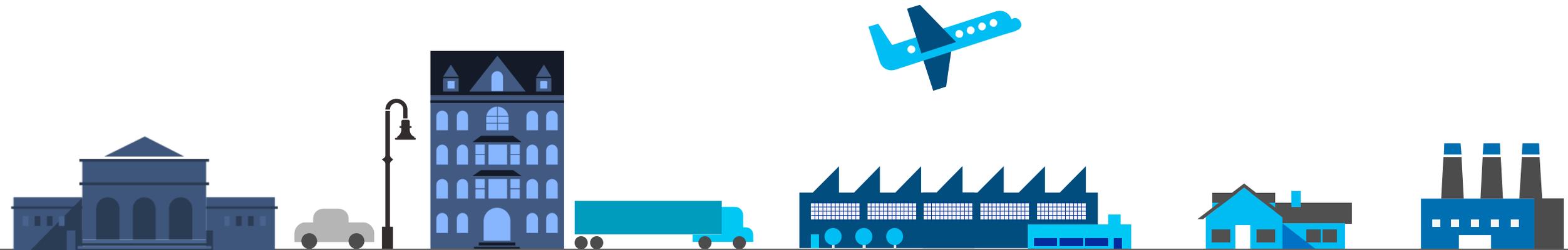
Government

Increase transparency and traceability of how money is spent. Track asset registration, such as vehicles. Reduce fraud and operational costs.



Retail & Manufacturing

Better supply chain management, smart contract platforms, digital currencies, and tighter cybersecurity.



Room Check

Everybody with me?

Blockchain for logistics

Logistics | Major Pain Points in Logistics Industry

**Overbookings
by Carriers**



**Cancellations by
Shippers**



These two issues alone are currently estimated to cost the Ocean freight industry ~\$23bn annually

Source: New York Shipping Exchange, Morgan Stanley Research

Logistics | Pain Points in Logistics Industry



Logistics | How can blockchain help?

Standardize Payments

- Create a standardized payment system across logistics providers
- Reduce transaction time and cost
- Allow for real-time fraud prevention



Verify Product Quality

- Allow close management of individual items
- Digital "signatures" prevent inaccurate labeling/theft of goods
- Reduce cost of paperwork and authentication



Optimize Cargo Capacity

- Identify empty containers and find takers for extra capacity ("Uberization of freight")
- Enable drivers to input truck reports and hours to streamline operational data



Increase Supply Chain Transparency

- Real-time visibility from pickup to delivery
- Increase accountability and reduce costs
- Limit "exceptions" and possibly solve them using AI

Logistics | Import process without blockchain

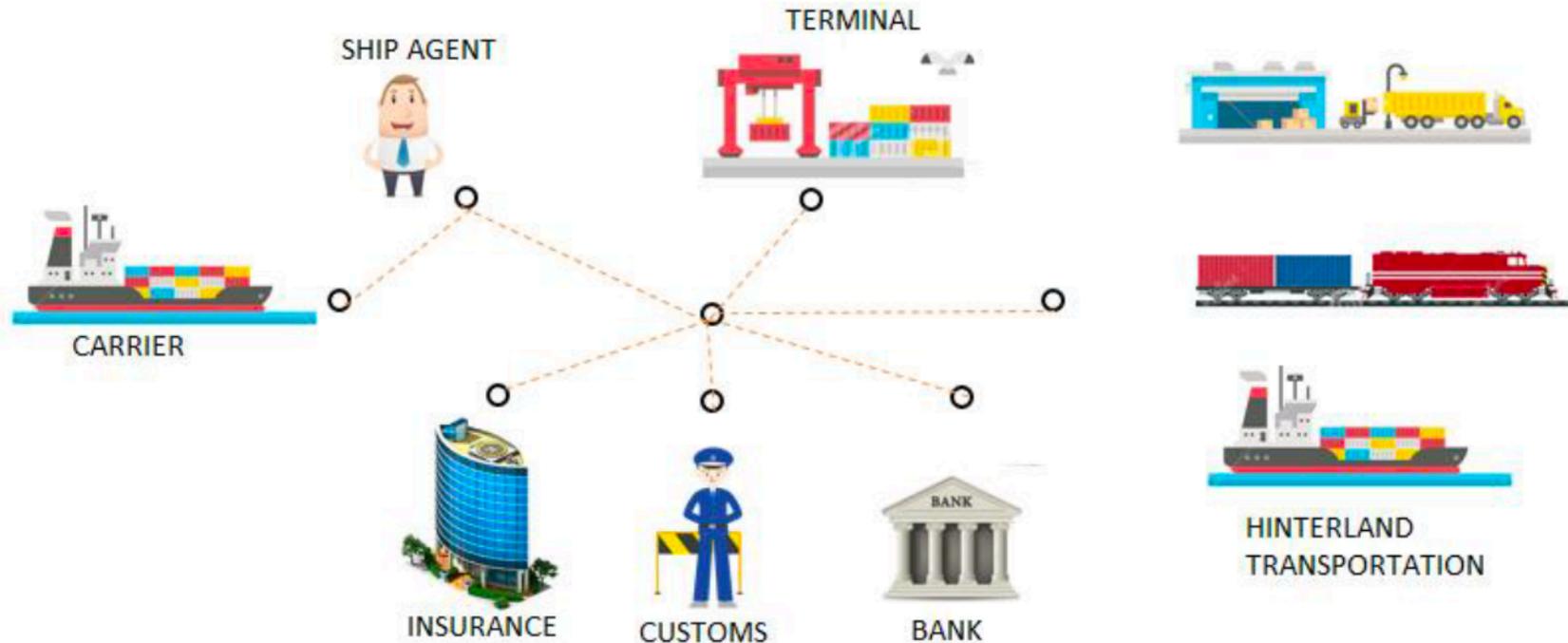
The Blockchain Potential for Port Logistics

Marissa Oude Weernink

Willem van den Engh

Mattia Francisconi

Frida Thorborg



Blockchain makes port smarter

- Trust between parties
- Higher container throughput
- Network security
- Transaction automatization
- Container tracking/tracing

Source: [Smart-Port.nl](https://www.smart-port.nl)

Current information flow in the import carrier process

Logistics | Import process with blockchain

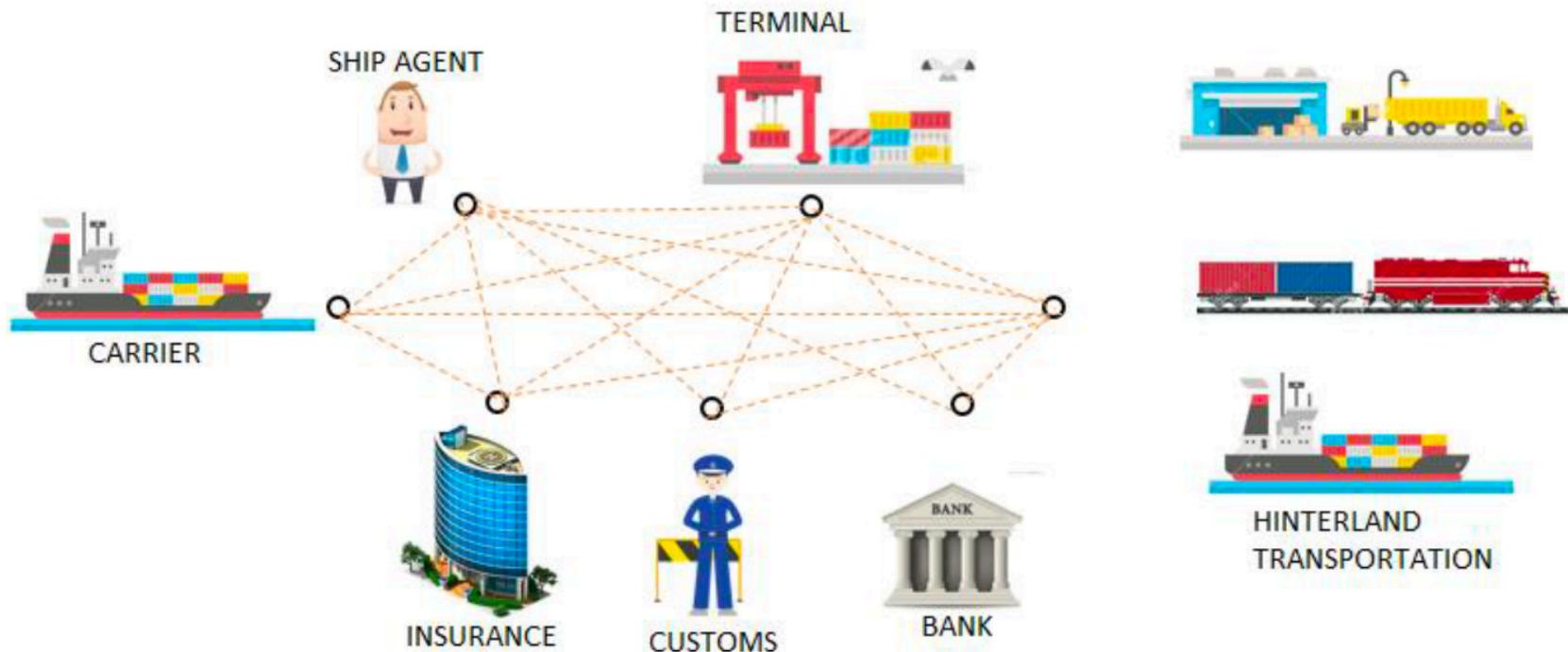
The Blockchain Potential for Port Logistics

Marissa Oude Weernink

Willem van den Engh

Mattia Francisconi

Frida Thorborg



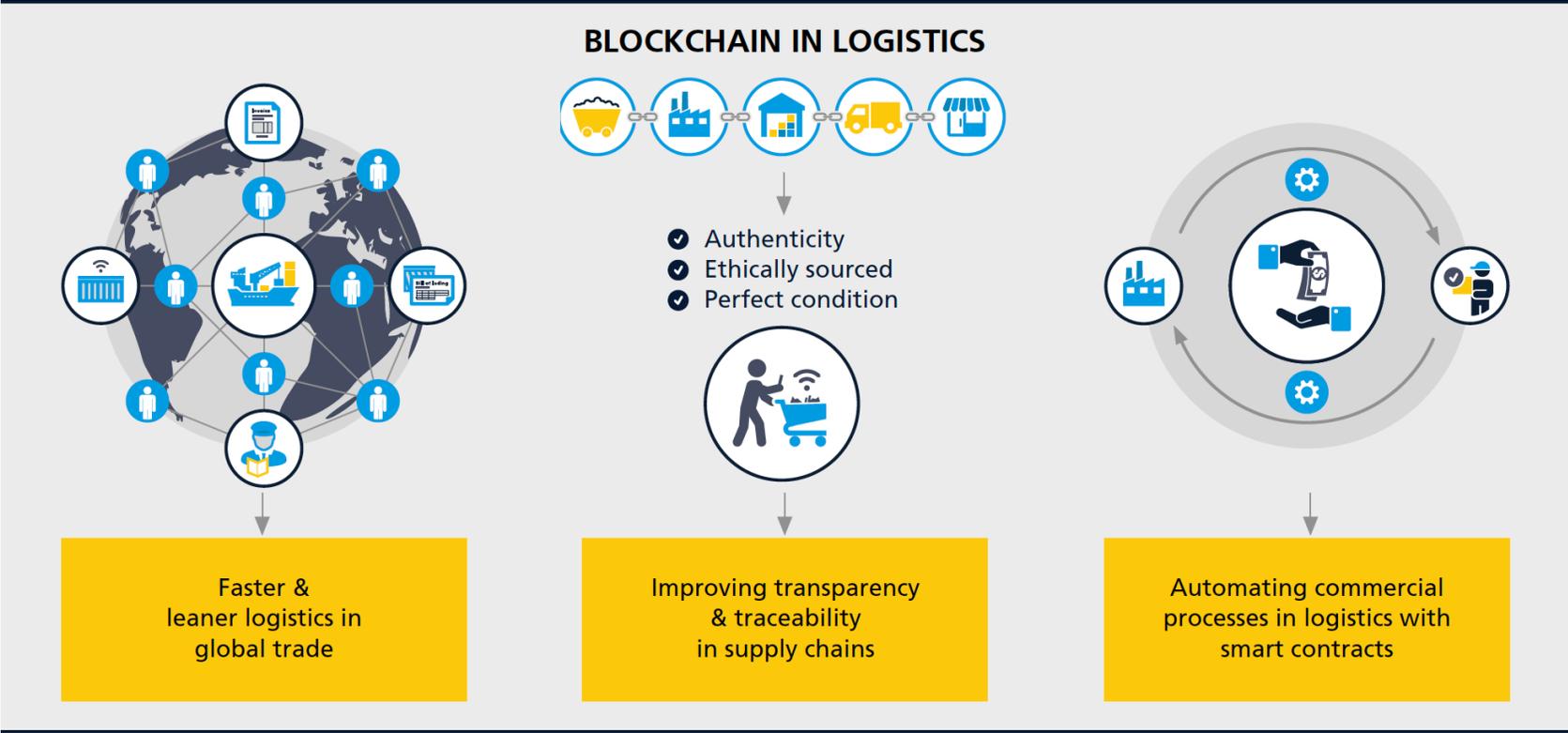
Blockchain makes port smarter

- Trust between parties
- Higher container throughput
- Network security
- Transaction automatization
- Container tracking/tracing

Blockchain information flow in the import carrier process

Source: [Smart-Port.nl](https://www.smart-port.nl)

Logistics | Import process with blockchain



Key blockchain use cases in logistics (Source: DHL)

BLOCKCHAIN IN LOGISTICS

Perspectives on the upcoming impact of blockchain technology and use cases for the logistics industry

2018

Powered by DHL Trend Research

“today there is a significant amount of trapped value in logistics, largely stemming from the fragmented and competitive nature of the logistics industry. For example, in the US alone, it is estimated that there are over 500,000 individual trucking companies”

Source: [DHL Report](#)

Room Check

Everybody with me?

VIDEO: Discover Navisphere® Vision

The next generation of supply chain visibility. Real-time updates and predictive analytics let you see more of your supply chain, know more about the events that can impact it, and do more to help ensure that your products are efficiently delivered into your customers' hands.

Selected Microsoft Blockchain Projects

Bank Hapoalim | Streamline the bank guarantee process

Challenge

- Bank Hapoalim wanted to improve their process for issuing bank guarantees that are required for large purchases like real estate
- Traditionally, customers had to visit a branch multiple times to move through the application process

Strategy

- Bank Hapoalim and Microsoft developed a real-time blockchain enabled platform to collaborate on documents with customers
- The solution let customers and banks update documents securely without in-person verification

Results

- Blockchain technology improved the customer experience and confidence in the banking system by enabling them to receive automated, digital documents without the need to repeatedly visit a physical bank branch
- The solution created a competitive advantage and cost savings for Bank Hapoalim by streamlining existing systems and services

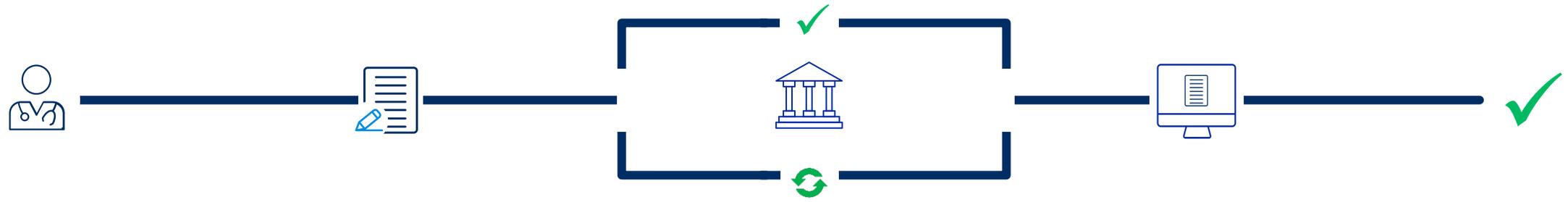
“The use of Blockchain technology will significantly improve the customer experience and the level of trust in the banking system”



— Arik Pinto, Chief Executive Officer of Bank Hapoalim

Blockchain in Action | Remote bank guarantee issuance

Automatic approval
Standard language is pre-approved by bank



Beneficiary
A healthcare organization wants to build a hospital, and seeks a bank guarantee to verify solvency of construction firms

Draft of guarantee
Beneficiary submits draft to bank with desired terms and conditions

Review and negotiation
Bank's legal team and beneficiary collaborate on non-standard language

Online application
Bank publishes finalized guarantee as an easily accessible online application

Bank approval
Construction firm meets requirements and is granted a bank guarantee



Customer
Construction firm applies for bank guarantee online

SHARED LEDGER

Draft of guarantee terms and conditions

- Customer requirements:
 - Provide valid license
 - Provide \$5 million in collateral
- Bank requirements: guarantee \$50M

Bank review

- Customer requirements: Standard – approved
- Bank requirements: Non-standard – revised to \$40M

Final text of guarantee

- Customer requirements established
- Bank requirements established

Customer application

- Contractor license #: L76GN4229
- Collateral available: \$5 million

Bank guarantee

- Bank: signed
- Beneficiary: signed
- Customer: signed



Bank of America Merrill Lynch | Simplify commercial trade finance

Challenge

- Bank of America Merrill Lynch needed to reduce the time to issue a Standby Letter of Credit (SBLC) for Microsoft Treasury as Microsoft's partner channels grew in the cloud age
- The traditional process required costly and time-consuming manual steps involving multiple parties and took between 3-5 weeks

Strategy

- Bank of America Merrill Lynch and Blockchain Engineering established the first blockchain-powered transaction engine between a major corporate treasury and a financial institution

Results

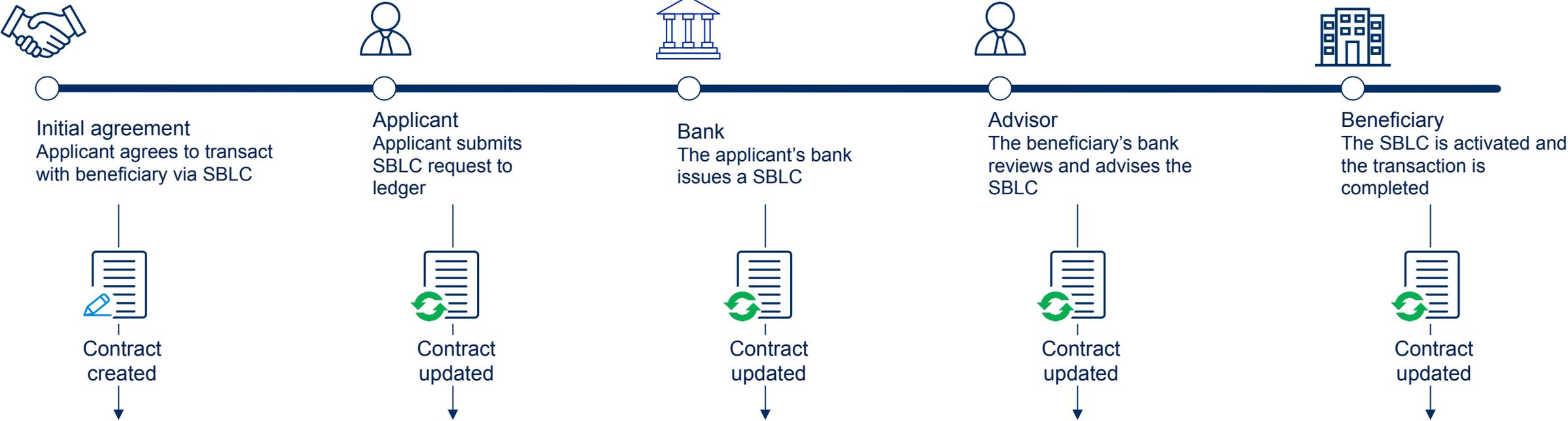
- Issuance time for an SBLC was reduced to 3 days
- Blockchain created trust and decreased counterparty risk by automating authentication of partner financial details
- The solution further provided regulators with a real-time view of essential documents to assist in enforcement and AML activities



“By working with Bank of America Merrill Lynch on cloud-based blockchain technology, we aim to increase efficiency and reduce risk in our own treasury operations”

— Amy Hood, Chief Financial Officer at Microsoft

Blockchain in Action | Standby letter of credit issuance



SHARED LEDGER

<ul style="list-style-type: none"> • Partner ID: #93042 • Unit quantity: 100,000 • Unit price: \$200 each 	<ul style="list-style-type: none"> • Requested limit: \$20 million • Projected income: \$25 million 	<ul style="list-style-type: none"> • Credit limit: \$20 million 	<ul style="list-style-type: none"> • Credit limit: \$20 million • Advisor approval note 	<ul style="list-style-type: none"> • Units delivered: 100,000 • Unit price: \$200 each • Price paid: \$20 million
--	---	--	---	--

The shared ledger is updated remotely which cuts issuance time from weeks to days and increases transparency and confidence across all parties

Maersk | Secure marine insurance

Challenge

- Webjet wanted to eliminate duplication, inefficiency, lack of transparency, data fraud, and errors across the plethora of parties interacting in marine insurance
- Additionally, they sought to manage compliance across multiple regulatory bodies and jurisdictions while balancing insurance rates and costs

Strategy

- Maersk, EY, Guardtime, and Microsoft developed a real-time blockchain enabled platform for marine insurance
- The solution streamlined claims and settlement processes, while reducing errors

Results

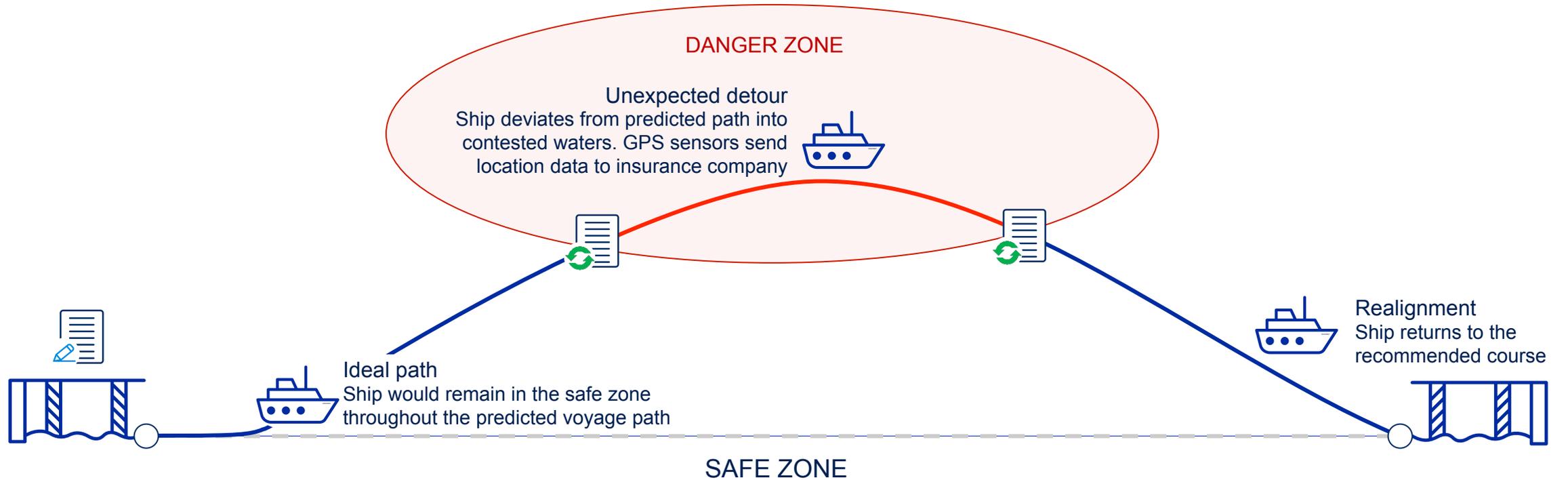
- Real-time visibility into the location, condition, and safety of high-value assets moving around the world
- Accurate, dynamic, and fair underwriting and pricing based on that visibility
- Streamlined regulatory reporting and compliance
- Accurate and transparent data sharing among all relevant stakeholders with audit trail
- Capital freed from poor credit system

“It is a priority for us to leverage technology to streamline and automate our interaction with the insurance market. Insurance transactions are currently far too tedious and frictional. The distance between risk and capital is simply too far”

— Lars Henneberg, VP, Head of Risk and Insurance of A.P. Moller-Maersk



Blockchain in Action | Real-time maritime risk assessment



SHARED LEDGER

 Contract created

- Path: A → B
- Risk: Low
- Insurance premium: \$\$

\$

 Contract updated

- Path A → C → B
- Risk: **High**
- Insurance premium: \$\$

\$

 Contract updated

- Path: A → B
- Risk: Low
- Insurance premium: \$\$

\$

3M | Validate your product's authenticity

Challenge

- 3M sought a solution to reduce tampering and prevent the introduction of counterfeit drugs into the pharmaceutical supply chain – which is a \$200 billion criminal industry
- Counterfeit drugs negatively impact brand reputation and overall revenue but, ultimately, they hurt unsuspecting customers

Strategy

- 3M and Microsoft leveraged Azure Blockchain to build an innovative service to track specially labeled packages through any supply chain
- Multilayer QR code labels were used to expose tampering and facilitate easy tracking

Results

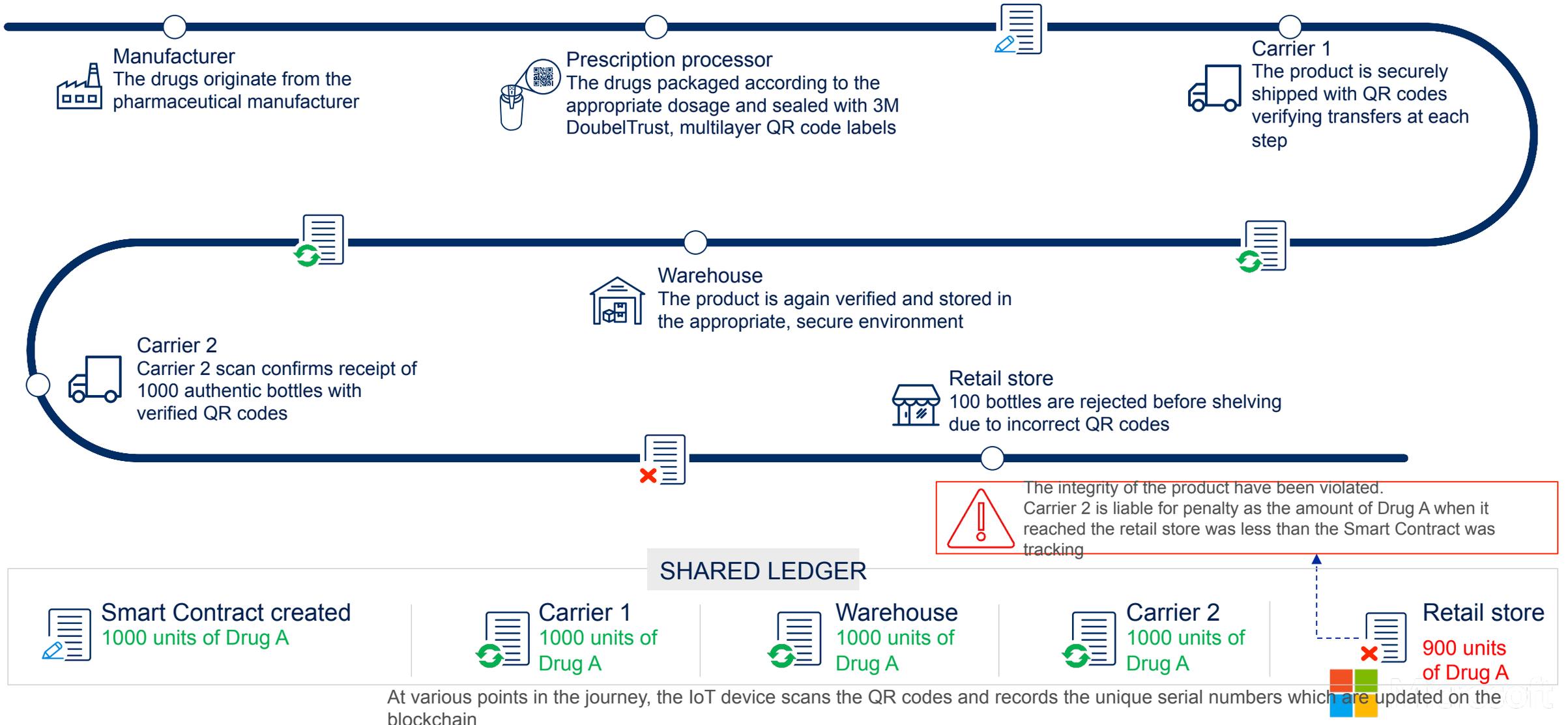
- Blockchain technology improved visibility and security at each transfer to ensure products are authentic and free of tampering
- Real-time registry, validation, and custodial recordings combated counterfeits and eliminated the risk of fraudulent double selling through secure, attestable data



“We combined 3M DoubleTrust tamper-evident labels with Azure Blockchain to create a label-as-a-service supply chain solution that can help identify counterfeits, protect business performance, and save lives.”

— Oscar Naim, PhD, Lead Software Architecture Specialist, 3M

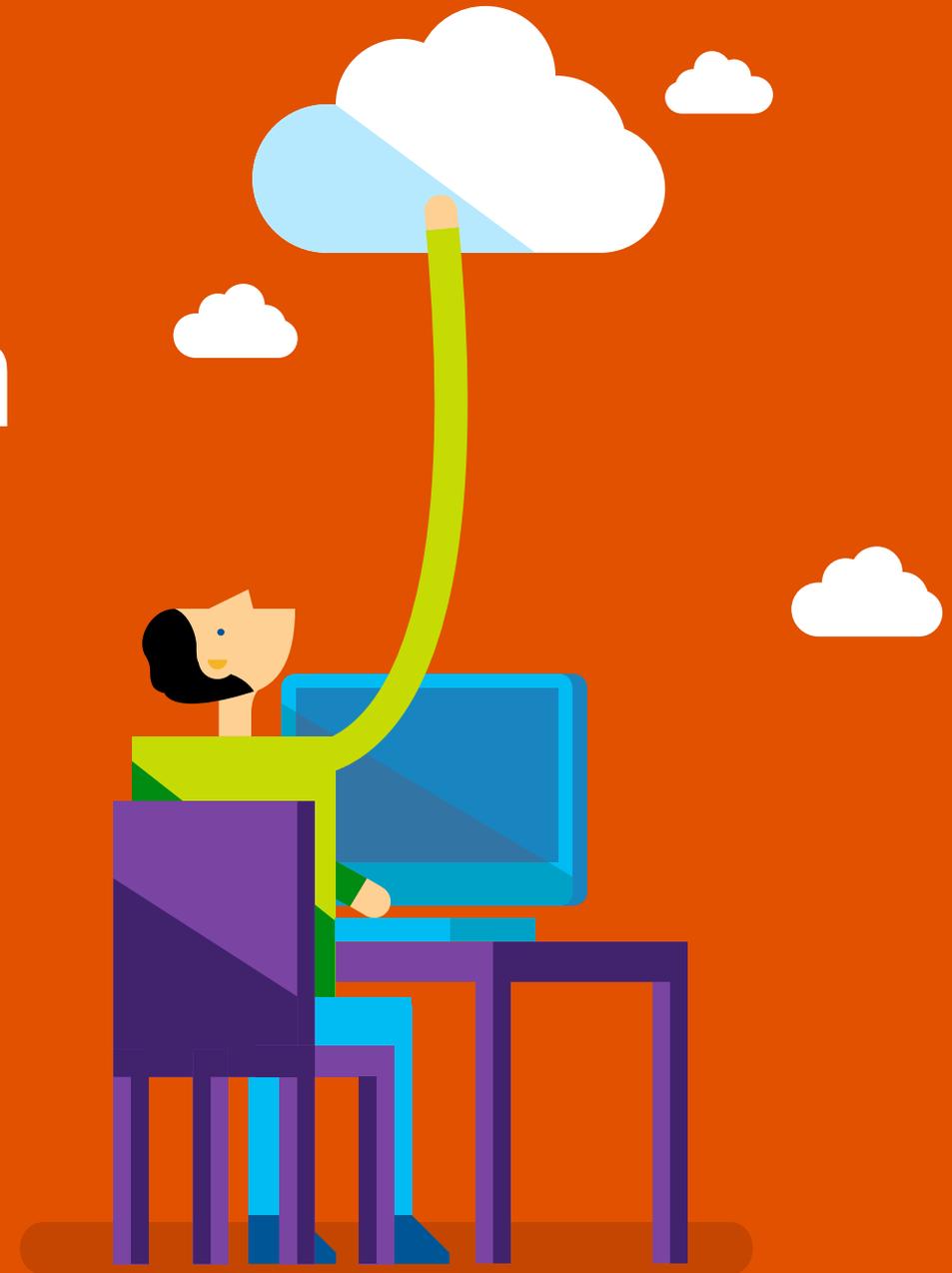
Blockchain in Action | Pharmaceutical authenticity



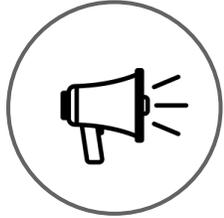
Room Check

Everybody with me?

Microsoft Blockchain Strategy and Roadmap



Strategy | Market Challenges



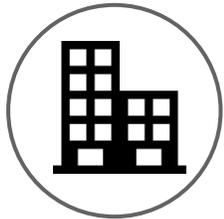
HYPE

Lots of press, announcements, and noise



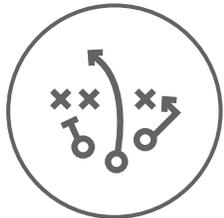
IMMATURE

Many offerings are new or experimental



NOT ENTERPRISE READY

Most technology providers don't have enterprise DNA.



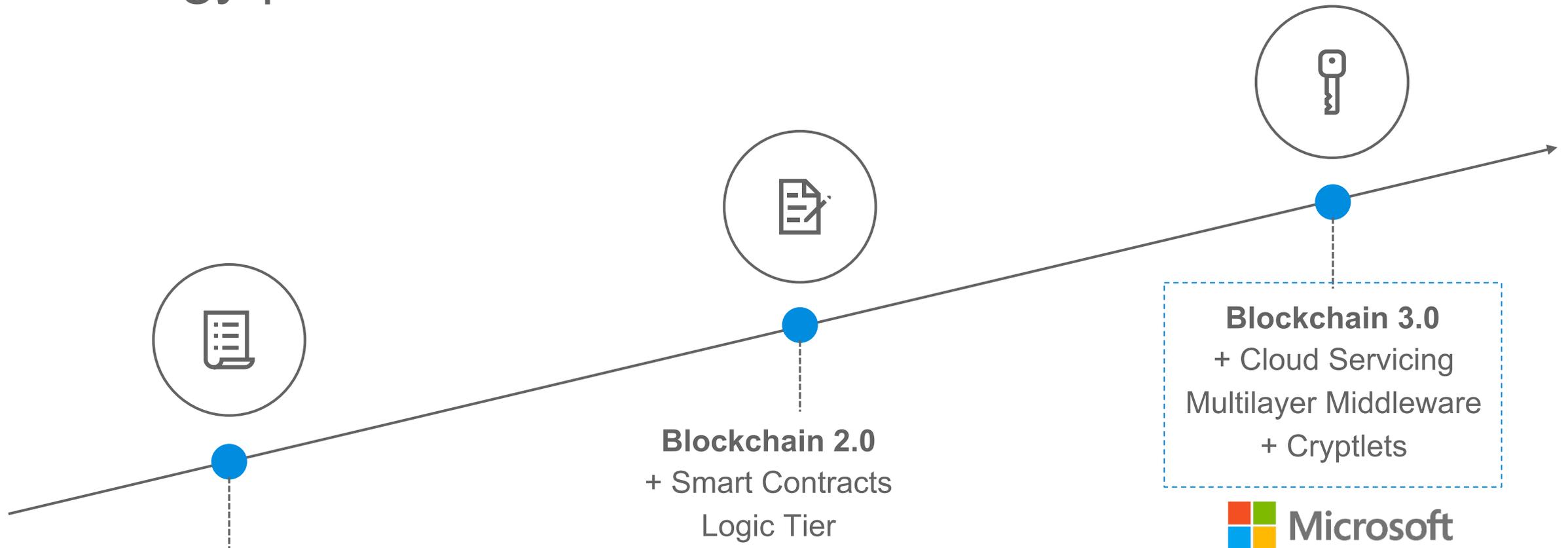
PATH TO PRODUCTION IS AMBIGUOUS

Multiple obstacles can make it difficult to move beyond a POC

Strategy | Microsoft's Strategy

- **Open Marketplace** – Allow partners and customers to monetize and make available blockchain solutions through Azure marketplace
- **Easy Network** – Make it as easy as possible to deploy a blockchain network within or across subscriptions
- **Open Cloud** – Support as many blockchain stacks as possible
- **Enterprise-Grade Services** – Allow blockchain developers to easily connect their blockchain applications to other core services, such as AAD

Strategy | Evolution of Blockchain



Blockchain 1.0
Simple Ledgers that
record transactions

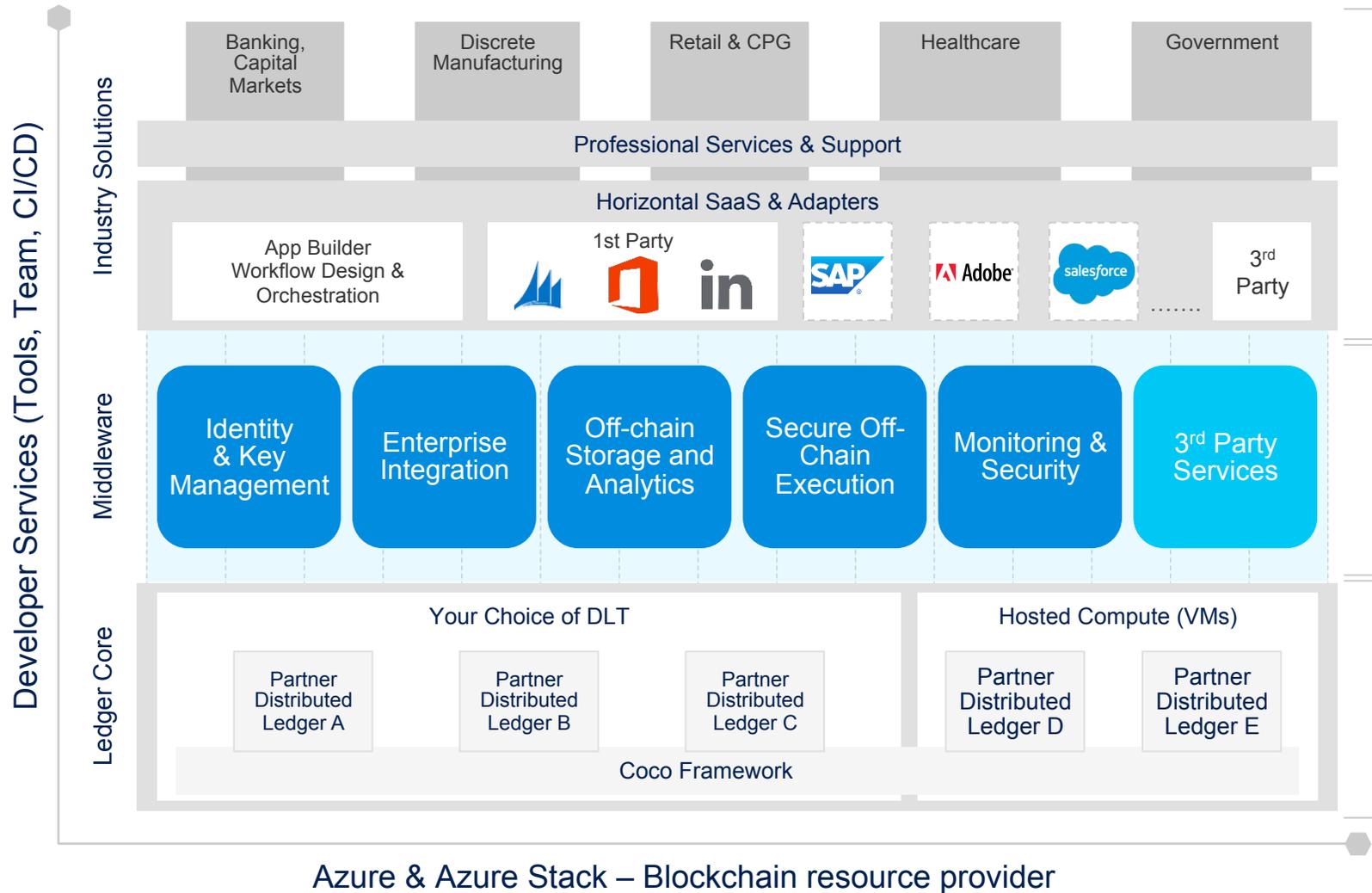
Blockchain 2.0
+ Smart Contracts
Logic Tier

Blockchain 3.0
+ Cloud Servicing
Multilayer Middleware
+ Cryptlets



Smart Contracts are unable to access external data or events based on time or market conditions. Calling code or data outside of a Smart Contract or blockchain breaks the general trust barrier and authenticity of transactions. Cryptlets will allow the blockchain to access external data securely, while maintaining the integrity of the blockchain.

Strategy | Leverage an enterprise-friendly platform



Connect to existing apps and workflows

Coordinate with relevant tools

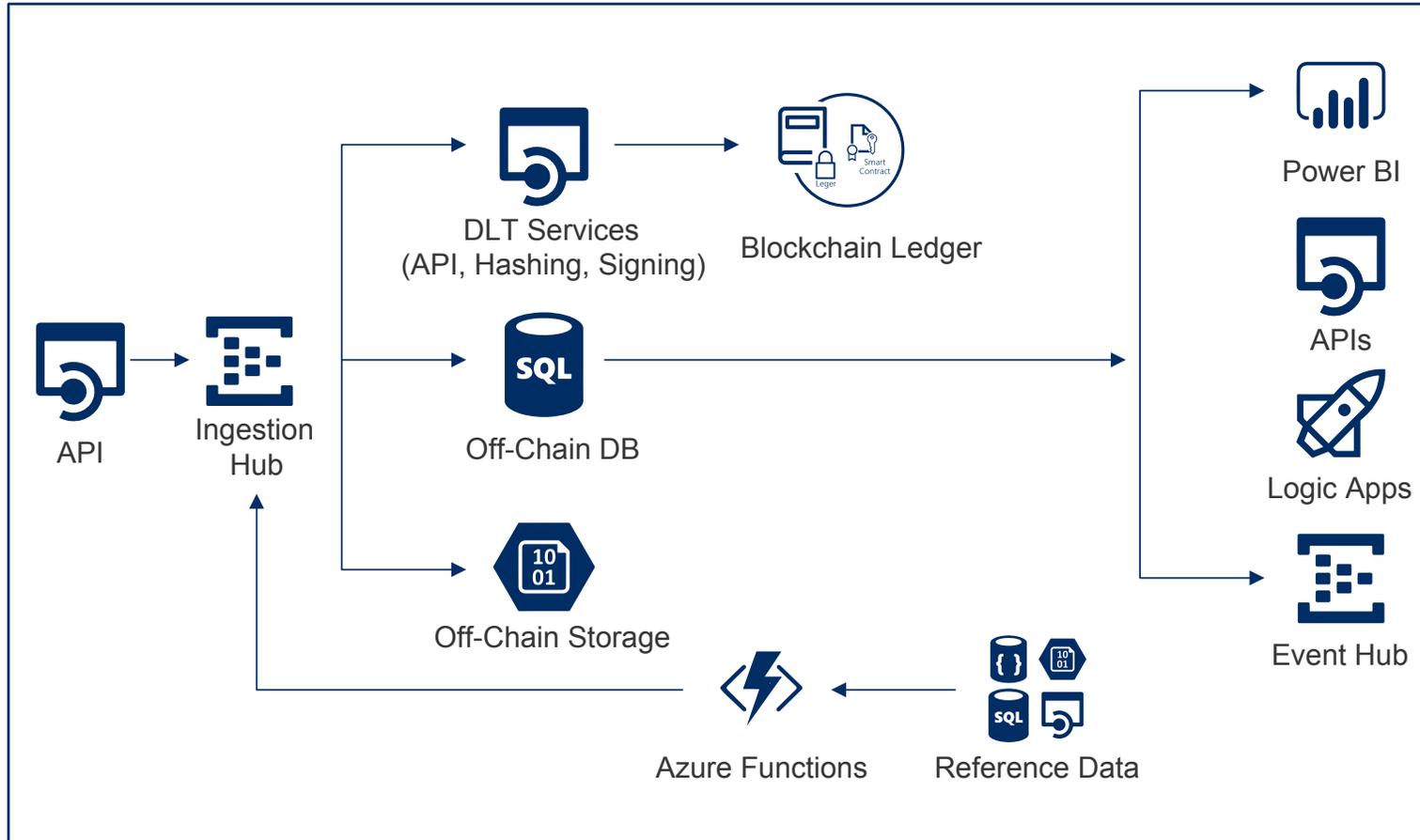
Choose the ledger that fits your needs

Dash of Magic | Blockchain + IoT + AI

Data Sources

Apps

Sensors Data



Consuming Apps, Services & Systems

Azure AD

Azure Key Vault

Application Insights

Virtual Networking

Demo

Blockchain and IoT working in harmony to provide a farm to fork provenance

Made with
**Azure Blockchain
Workbench**



Room Check

Everybody with me?

Learn More | Microsoft whitepapers available for pickup

Empowering Blockchain Solutions 



Supply Chain Provenance Tracking

Enabling modern day supply chains to provide next generation capabilities via blockchain technology

Current generation supply chains in most cases are silos of data for each participant (sourcer, supplier, distribution, etc.) This makes effective item tracking very opaque and possible synchronization issues can result in incorrect status of components and products in flight. Blockchain technology can improve these systems by providing a logical single source of truth of components in the supply chain as they originate and move through to distribution and to the end customer.

Microsoft Azure has committed to making blockchain technology a key part of the cloud.

Azure provides a simple way to create blockchain infrastructure allowing customers to focus on the core applications that will utilize the unique capabilities that blockchain enables.

Microsoft has also partnered with the leaders in the blockchain industry to bring their solutions to the high scale cloud via Azure.

 Azure Blockchain





How blockchain will transform the modern supply chain

Transform shared business processes with Microsoft Azure Blockchain 



Why is blockchain relevant to business?

Blockchain has the potential to extend digital transformation beyond a company's walls and into the processes it shares with suppliers, customers, and partners. At its core, a blockchain is a data structure used to create a digital transaction ledger that, instead of resting with a single provider, is shared among a distributed network of computers. The result is a more transparent and verifiable system that will change the way we think about exchanging value and assets, enforcing contracts, and sharing data.

Why work with Microsoft on blockchain?

A growing number of enterprises are investing in blockchain as a secure and transparent way to digitally track asset ownership across trust boundaries, reimagine shared business processes, and create new models for cross-organizational collaboration. Azure Blockchain enables enterprises to:

 Simplify development	 Accelerate time to value	 Innovate with confidence
<ul style="list-style-type: none">Choose the blockchain that makes the most sense for your use caseCut development time with integrated tooling pre-built templatesExperiment on your own timeline and scale out when ready	<ul style="list-style-type: none">Build applications in days not monthsConnect blockchain to the best of Azure without the heavy liftingUse the apps and tools you already have instead of creating new onesTake advantage of our growing blockchain partner ecosystem	<ul style="list-style-type: none">Safeguard your data and meet compliance, privacy, and security standardsBuild anywhere and scale when you need to leveraging the global availability and reliability of AzureDeploy where your data lives, on-premises or in the cloud.

Key benefits

Businesses across industries are looking to blockchain to:

- Eliminate intermediaries** – Establishes "trust" directly between companies rather than relying on a 3rd party
- Prevent fraud** – Creates a single, shared source of truth where each new transaction is verified by the network participants
- Reduce counterparty risk** – Operates without a central authority capable of unilaterally changing transaction history
- Increase efficiency** – Enables instant settlement time for transactions between multiple parties
- Find cost savings** – Codifies and automates self-executing smart contracts, reducing the need for wet ink signatures and manual verifications

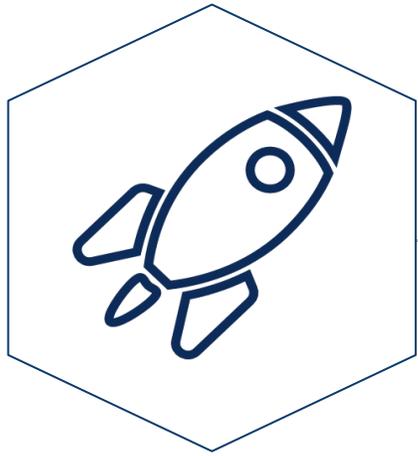
Blockchain use cases across industries

Examples of how blockchain offers value in select industries include:

-  **Finance** – Redesign costly legacy workflows, improve liquidity, and free up capital
-  **Healthcare** – Provide fast, secure, authenticated access to personal medical records across healthcare organizations and geographies
-  **Retail & manufacturing** – Create smarter supply chains capable of real-time audits, and improve visibility into asset provenance and chain of custody
-  **Government** – Improve transparency and traceability of spending and asset registration

Learn More| How can we help you?



Sign up for an Azure account and join our [Blockchain Preview Program](#)



Visit our [Azure Blockchain Page](#)



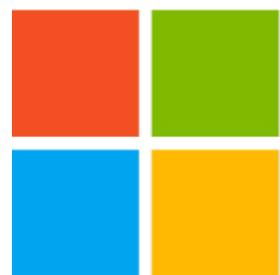
Visit the [Azure Blockchain Blog](#) and our [Blockchain User Voice](#)



Connect with the [Microsoft Tech Community](#)



Join the conversation on [Azure Advisors](#)



Microsoft