

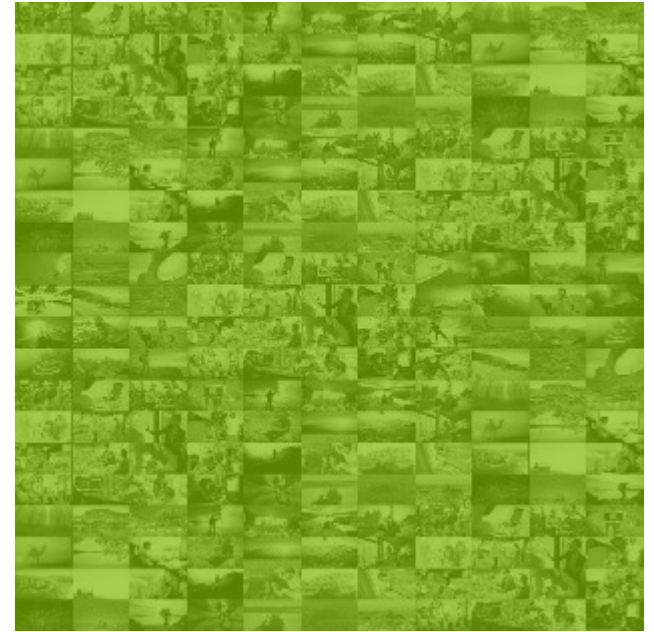
Blockchain as a Service

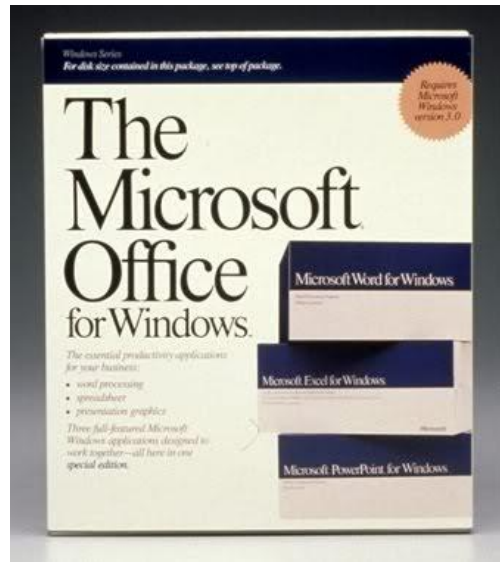
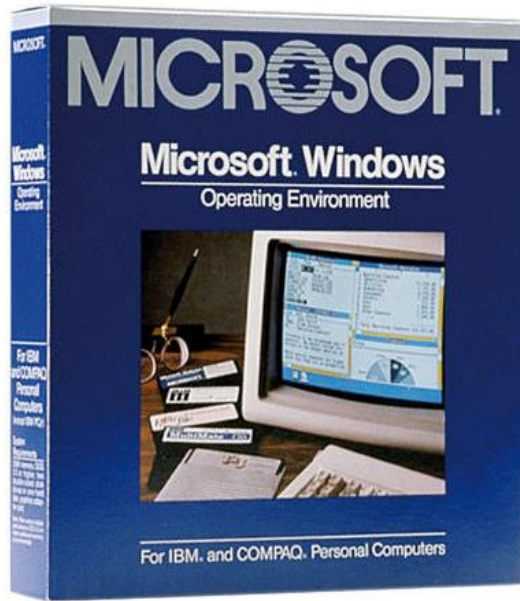
Yorke Rhodes
Principal Program Manager
Blockchain Engineering
Microsoft Corporation



Microsoft mission

Empower every person and every organization on the planet to achieve more





EXCEL 1.0

Microsoft Excel 1.0 was released for the Mac in 1985. It didn't appear on Windows until 1987, after Windows 2.0 had been released. Excel was actually Microsoft's second attempt at a spreadsheet program; it followed the relatively successful Multiplan, a spreadsheet program that was ported to a variety of systems such as MS-DOS, Apple II, Commodore 64 and more.

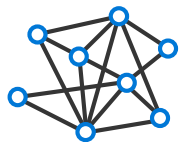
Sales Consolidation				
	A	B	C	D
1				
2		1982	1983	1984
3	Net sales	\$263,537	\$277,545	\$326,268
4	Total expenses	\$245,368	\$242,816	\$270,468

West				
	A	B	C	D
1	Sales:	1982	1983	1984
2	Model TD328-W	\$58,635	\$58,993	\$71,000
3	Model NH619-P	\$45,645	\$38,456	\$58,500
4	Model PH521-A	\$23,980	\$38,922	\$30,300
5	Total sales	\$128,260	\$136,371	\$159,800
6				

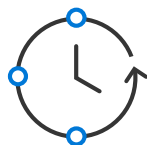
	A	B	C	D
1	Sales:	1982	1983	1984
2	Model TD328-W	\$65,000	\$29,766	\$34,555
3	Model NH619-P	\$56,777	\$67,400	\$74,098
4	Model PH521-A	\$13,500	\$44,008	\$57,815
5	Total sales	\$135,277	\$141,174	\$166,468



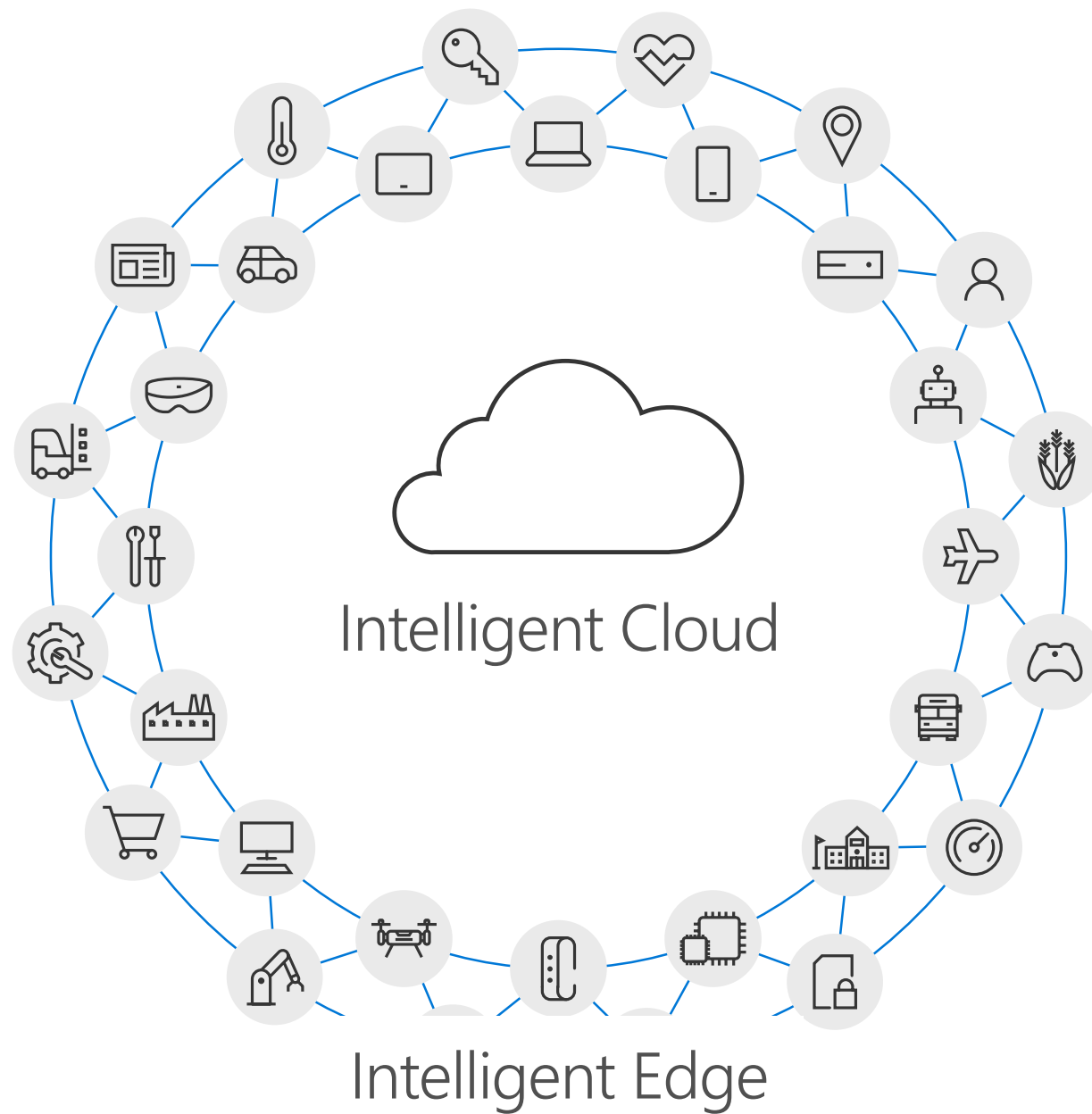
Multi-device



Artificial Intelligence



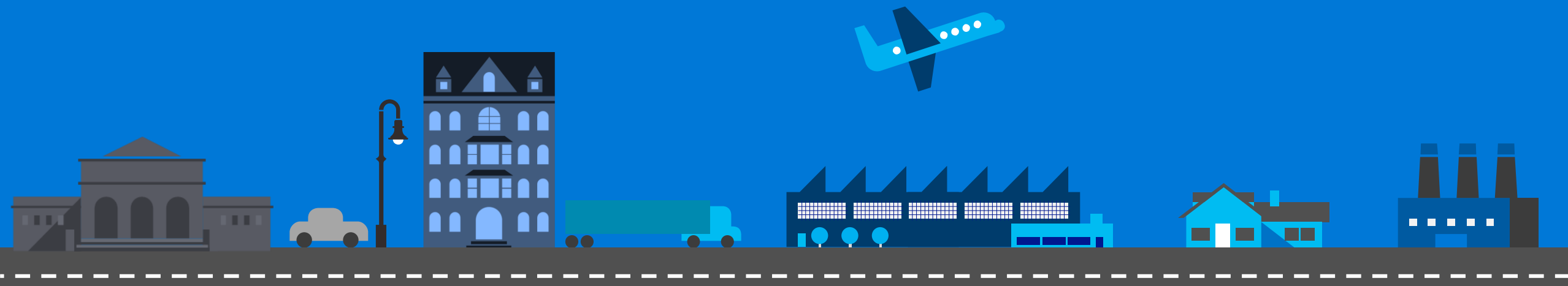
Serverless



Why Blockchain?



What if you could have one trusted,
transparent and immutable record of truth
between all participants in a transaction and
across businesses?





Yorke E. Rhodes III

@yorkerhodes



If you are asking "isn't this just a database, and if so, why do I need blockchain?" It's just a phase, you'll grow out of it...

What is blockchain?

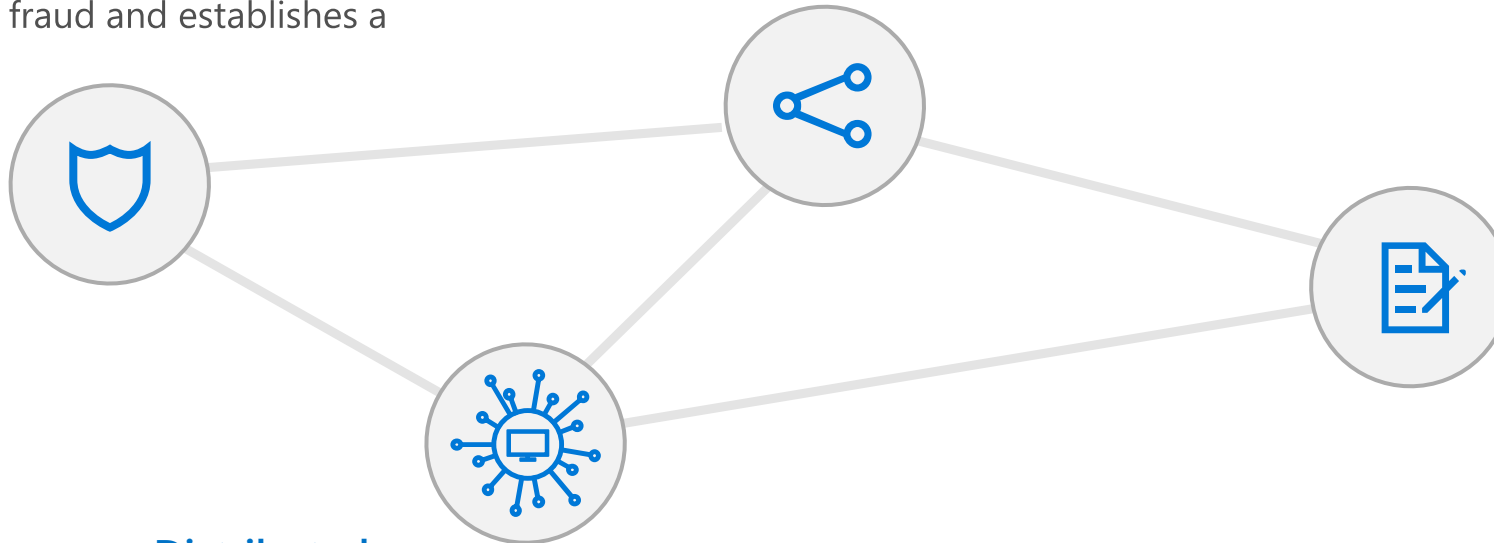
Blockchain is a secure, shared, distributed ledger

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.



Distributed

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

Ledger

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

Smart Contracts

Smart Contracts are objects available on some blockchains

They allow agreements between parties to be reduced to code, variables and properties, that can be published to a blockchain

Promising for multi-party contracts, and processes

NEW/USED Used	YEAR 2007	MAKE / MODEL FORD Focus ZX4 S	ODOMETER 45245
LIC. NO. A1D5484			
<small>The words "our", "we" and "us" refer to the creditor/seller in this contract, or upon any in this contract. We call you the motor vehicle described above on credit. The credit price you agree to buy the vehicle on credit and pay the Total Sale Price according to the terms each is together and individually responsible for all agreements in this contract. SEE OTHER PAGES FOR ADDITIONAL TERMS AND AGREEMENTS.</small>			
A.		FEDERAL TR	
ANNUAL PERCENTAGE RATE: <small>The cost of your credit as a yearly rate.</small>	FINANCE CHARGE <small>The dollar amount the credit will cost you.</small>	Amo <small>The amo to you on</small>	
21.533 %	\$ 2,553.84	\$	

B.	YOUR PAYME
Number of Payments:	Amount of Pa
One Payment of	\$500.00
One Payment of	
One Payment of	
47	\$156.83
One final payment	

C.

SECURITY: You are giving a security interest any payment is more than 10 days late you

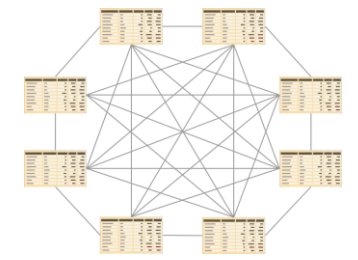
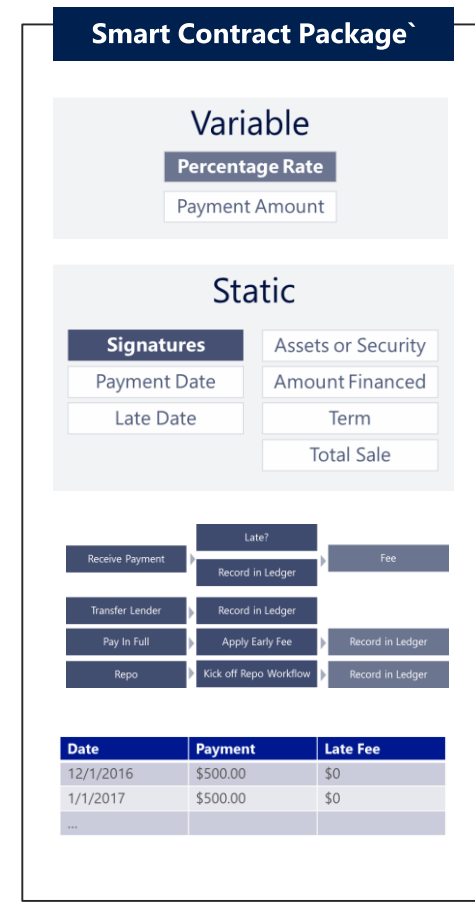
PRE-PAYMENT: If you pay early, you may be contract for any additional information about the scheduled date and prepayment refund:

I warrant and agree that upon closing of the a of comparable sale.

Daniel P. Sullivan
(Signature)

Janet K Sullivan
(Signature)

MORTGAGEE:
DANIEL P. SULLIVAN
Individually
JANET K. SULLIVAN
Individually



What makes this special / challenging?

Blockchain is a secure, shared, distributed ledger

Shared

Business Logic

Network

SLA

Governance

Code

DevOps

RunTime

Security

...

Special

Immutable Business Logic

Network tx/sec variability

SLA of?

Governance

code updates

participants

Code

DevOps

RunTime rules

Security requirements

...

Not just technology – consortia considerations

Member
Selection

Type of
Formation

IP Ownership

Governance

Identity
Federation

Network
Federation

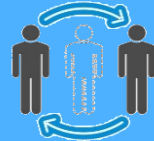




Source Code
Control

Technology
Selection

What's Possible Today

Blockchain can drive significant business value

Blockchain can bring greater transparency, security, and efficiency in our current business processes eliminating inefficiencies. It can enable new business models based on distributed marketplaces and technology

- 1 Eliminates Intermediaries**
Allows industries to redefine or create new business models. 
- 2 Reduces Fraud related to data integrity**
Highly secure and transparent, making it nearly impossible to change historical records. 
- 3 Increases Efficiency and Speed**
For transactions involving multiple parties in a trustless environment it enables T+Zero settlement time. 
- 4 Reduce counterparty risk**
Smart contracts enable "trustless" transactions between multiple parties 
- 5 Increases Revenue and Savings**
Potential savings and new revenue opportunities through more efficient processes and reduced costs. 

Key Value Drivers for Blockchain Use in Business Scenarios

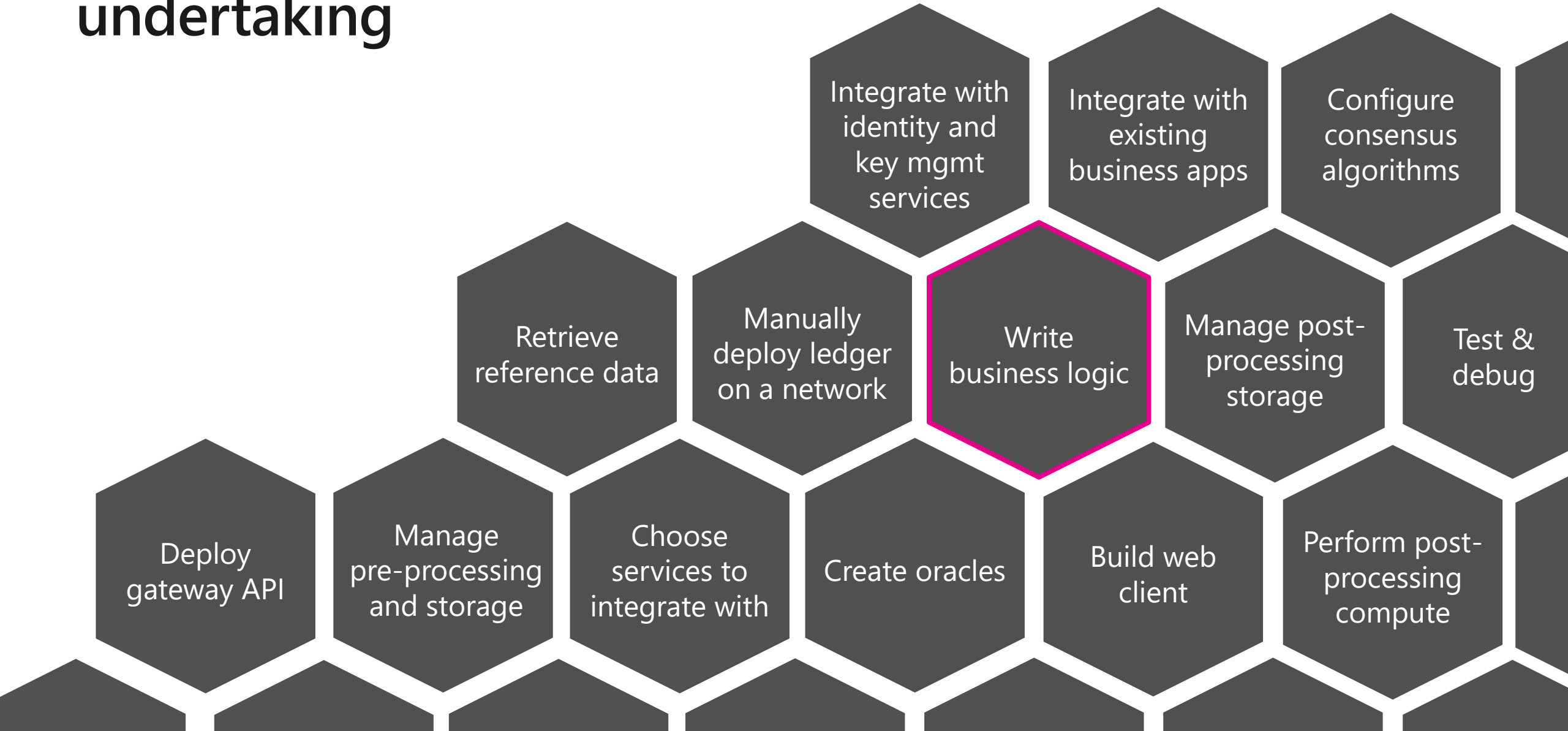
Value Driver	Detail
Operational simplification	Blockchain reduces / eliminates manual efforts required to perform reconciliation and resolve disputes
Regulatory efficiency improvement	Blockchain enables real-time monitoring of activity between regulators and regulated entities
Counterparty risk reduction	Blockchain challenges the need to trust counterparties to fulfill obligations as agreements are codified and executed in a shared, immutable environment.
Clearing and settlement time reduction	Blockchain distintermediates third parties that support transaction verification / validation and accelerates settlement.
Liquidity and capital improvement	Blockchain reduces locked-in capital and provides transparency into sourcing liquidity for assets
Fraud minimization	Blockchain enables asset provenance and full transaction history to be established with a single source of truth

Common Characteristics of High Potential Use Cases

	Characteristic	Example
Shared repository	A shared repository of information is used by multiple parties	<i>Ledger that stores financial assets in which an owner and owned assets are tracked and shared with other internal/external parties (e.g. regulators and other geographical units)</i>
Multiple writers	More than one entity generates transactions that require modifications to the shared repository	<i>Payments system collectively managed and maintained by a small group of banks, but each bank has millions of end users transacting with their bank</i>
Minimal trust	A level of mistrust exists between entities that generate transactions	<i>Multiple parties within a trade finance arrangement (e.g. importer, exporter, issuing bank, receiving bank, correspondent banks and customs) that do not "trust" each other and, therefore, institute layer of verification and impose collateral requirements.</i>
Intermediaries	One (or multiple) intermediary or a central gatekeeper is present to enforce trust	<i>Removing and/or reducing the importance of a central intermediary whose primary role is to provide "trust" to the post-trade ecosystem.</i>
Transaction dependencies	Interaction or dependency between transactions is created by different entities.	<i>A situation in which Alice needs to send funds to Bob, then Bob needs to send funds to Charlie. Bob's transaction is dependent on Alice's transaction, and one cannot verify Bob's transaction without checking Alice's first.</i>

95%

Building an end-to-end blockchain app is a huge undertaking



It's hard to bridge the gap and deploy blockchain in your business

Organization 1

Organization N

Existing SaaS tools



Client apps & devices



Enterprise ledgers



Optimize your supply chain

A close-up photograph of cocoa pods and beans on a dark wooden surface. Two large, yellowish-brown cocoa pods are the central focus, surrounded by numerous dark brown cocoa beans. Some pods are partially open, revealing the beans inside. The background is a dark, textured wooden surface.

Challenge

- Reducing supply chain management costs associated with one of their flagship confectionary products while also making it easier for customers to see the journey of the product from farm to fork

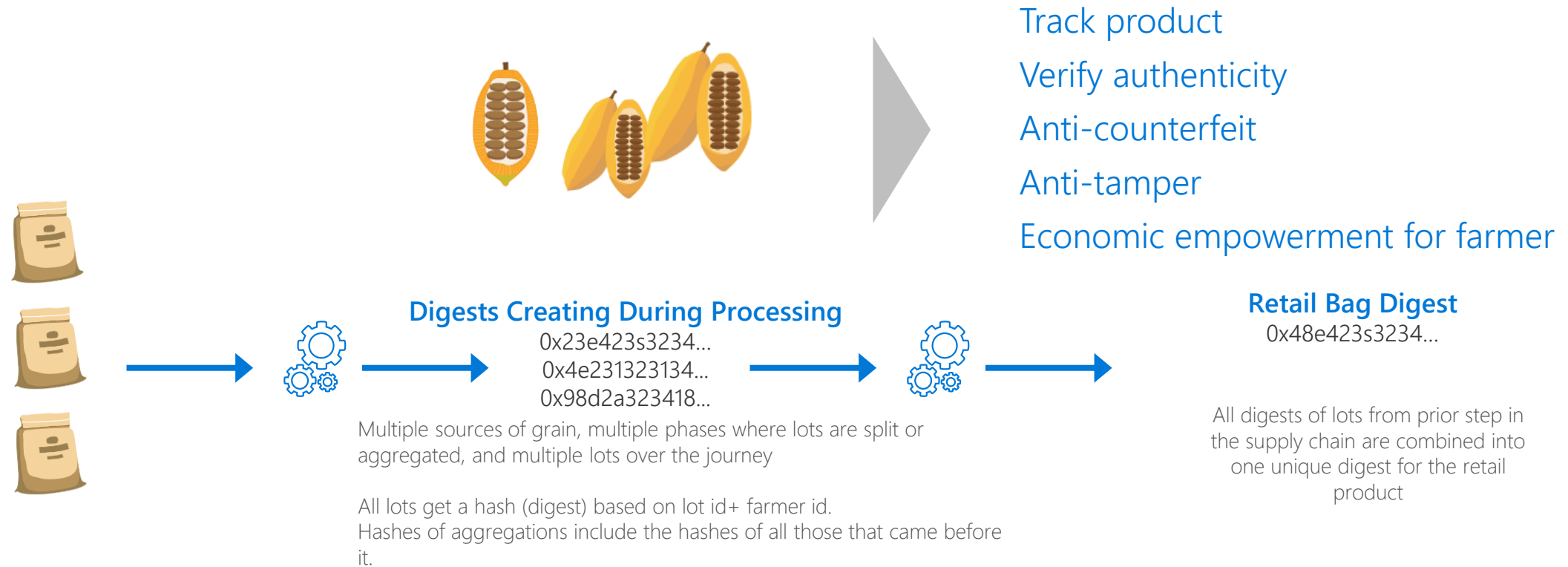
Strategy

- Design a blockchain solution to give them real-time visibility into their supply chain

Results

- Blockchain technology engaged the tactical and strategic angles of the supply chain to reduce costs, ensure quality, and increase revenue
- Enhanced visibility into their confectionary export process and improved their ability to address inefficiencies and resolve disputes involving both suppliers and consumers

Supply chain provenance and tracking



With blockchain, parties can have visibility into a digital track of retail product's development including:

- Source of the product materials
- How, where and in what conditions the product was manufactured
- How, ,where and in what conditions the product was transported

Blockchain in Action | Provenance tracking

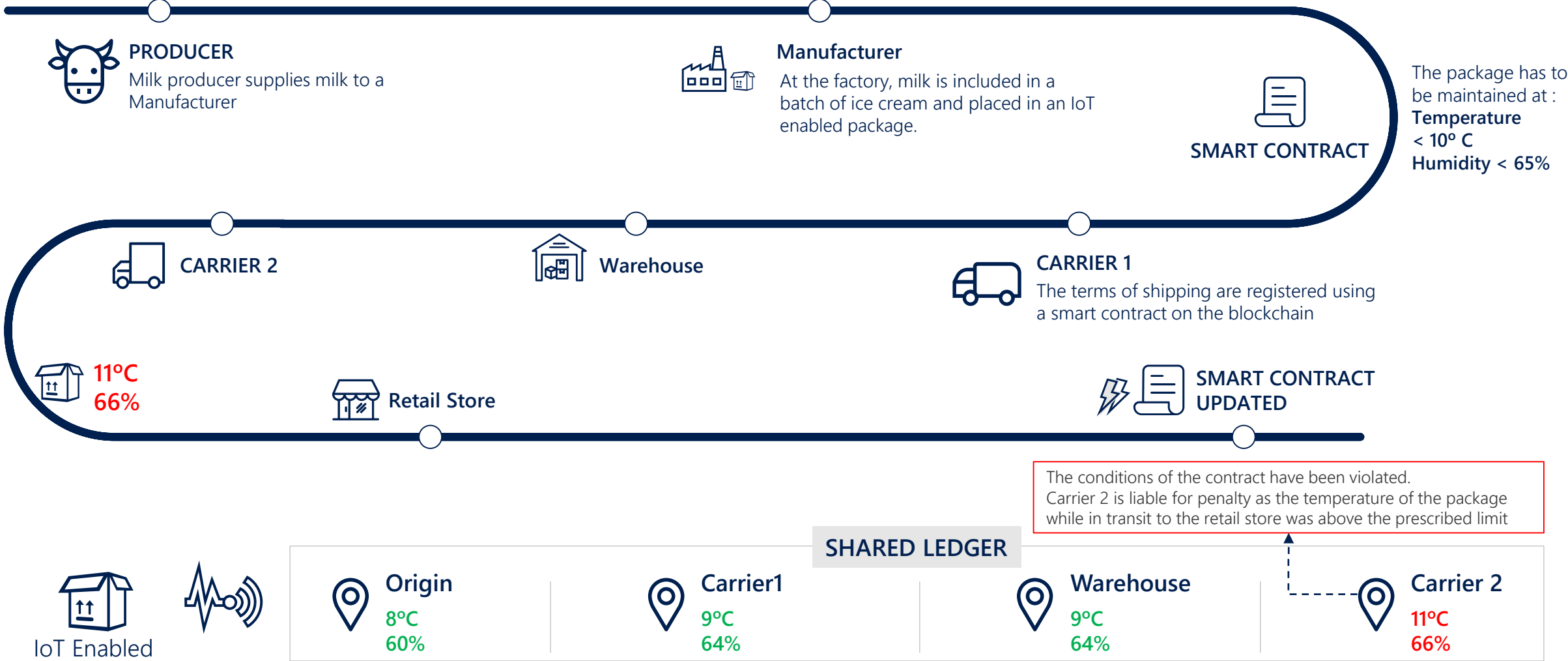


Farmer	Carrier	Manufacturer	Distributor	Retailer	Customer
<ul style="list-style-type: none"> ✓ Plot #839049 ✓ 25 tons of cocoa beans ✓ Certifications 	<ul style="list-style-type: none"> ✓ Shipped 2/5/2018 ✓ Organic ✓ Fair Trade 	<ul style="list-style-type: none"> ✓ Delivered 2/12/2018 ✓ Organic ✓ Fair Trade 	<ul style="list-style-type: none"> ✓ Delivered 2/19/2018 ✓ Organic ✓ Fair Trade 	<ul style="list-style-type: none"> ✓ Delivered 2/26/2018 ✓ Organic ✓ Fair Trade 	<ul style="list-style-type: none"> ✓ Guaranteed fresh ✓ Certified organic ✓ Certified Fair Trade

Consumer visibility

At various points in the journey, an IoT device scans the product and records its status and condition which are updated on the blockchain

Blockchain in Action | Refrigerated Transportation



At various points in the journey, the IoT device from the package sends the Temperature & Humidity values which are recorded on the blockchain

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

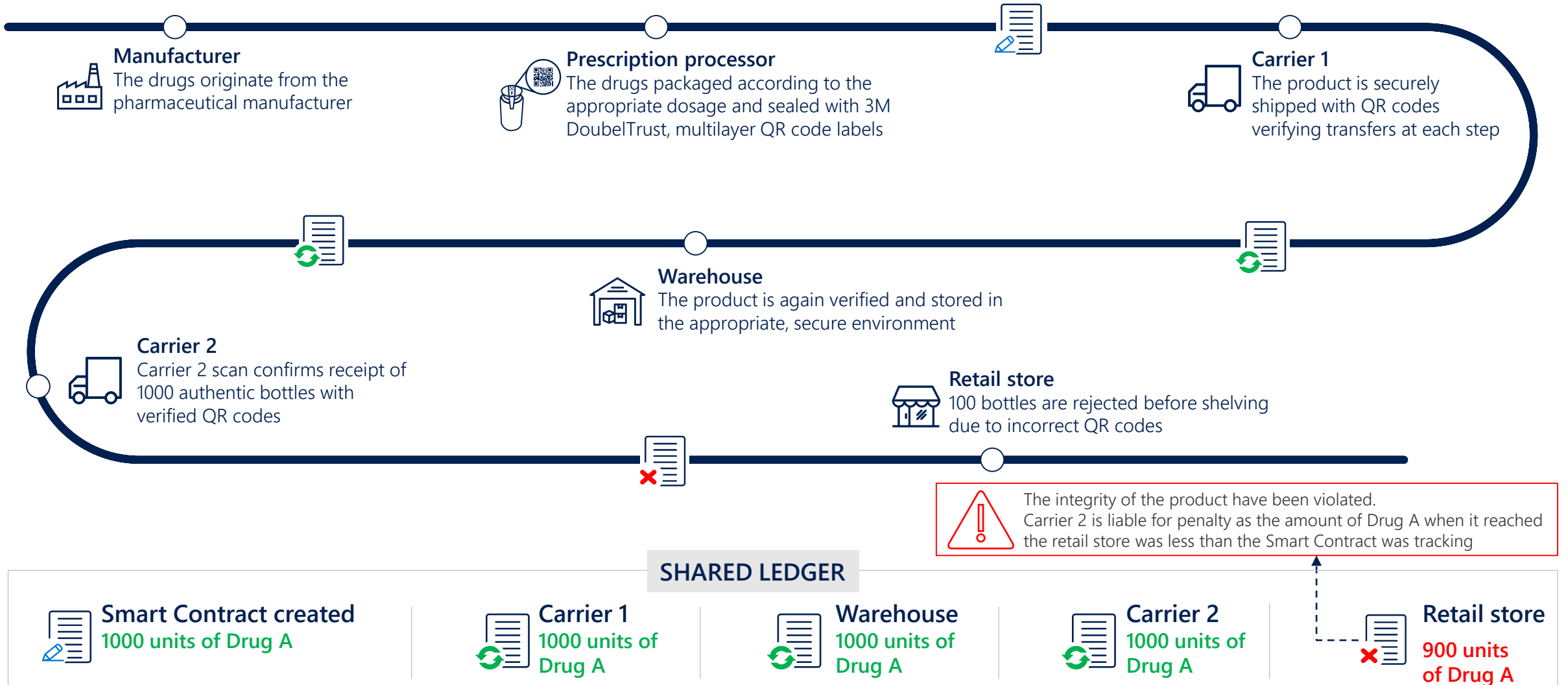
- Blockchain technology improved visibility and security at each transfer to ensure products are authentic and free of tampering
- Real-time registry, validation, and custodial recordings combated counterfeits and eliminated the risk of fraudulent double selling through secure, attestable data



“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



At various points in the journey, the IoT device scans the QR codes and records the unique serial numbers which are updated on the blockchain


Microsoft's Blockchain Approach

Microsoft Azure Blog

Announcing Azure Pipelines with unlimited CI/CD minutes for open source

September 10, 2018

With the introduction of Azure DevOps today, we're offering developers a new CI/CD service called Azure Pipelines that enables you to continuously build, test, and deploy to any platform or cloud.


 **Jeremy Epling**, Principal Group Program Manager, Azure DevOps

Read more >

Azure.Source - Volume 49

Monday, September 17, 2018

Keep current on what's happening in Azure, including what's now in preview, generally available, news & updates, and more.

 **Rob Caron**, Sr. Product Marketing Manager

Five habits of highly effective Azure users

Wednesday, September 12, 2018


There's a lot you can do with Azure. But whether you're modernizing your IT environment, building next-generation apps, harnessing the power of artificial intelligence, or deploying any of a million other solutions, there are foundational habits that can help you succeed.

 **Omar Khan**, General Manager, Microsoft Azure

Introducing Azure DevOps

Monday, September 10, 2018

Today we are announcing Azure DevOps. Working with our customers and developers around the world, it's clear DevOps has become increasingly critical to a team's success.

 **Jamie Cool**, Director of Program Management, Azure DevOps

Blog > Blockchain

Blockchain



Multi-member consortium support with Azure Blockchain Workbench 1.3.0

Monday, August 20, 2018

Continuing our monthly release cadence for Azure Blockchain Workbench, we're excited to announce the availability of version 1.3.0. You can either deploy a new instance of Workbench through the Azure...

Zeyad Rajabi, Principal Program Manager, Azure Blockchain Engineering

Updates Blockchain

Ethereum Proof-of-Authority on Azure

Tuesday, August 7, 2018

We've had great traction with our support of Ethereum on Azure. The existing Proof-of-Work solution has been deployed tens of thousands of times across a variety of industry verticals.

Cody Born, Software Engineer, Azure Global

Announcements Blockchain

Improve collaborative care and clinical data sharing with blockchain

Thursday, August 2, 2018

Currently, the healthcare industry suffers major inefficiencies due to diverse uncoordinated and unconnected data

Explore

See where we're heading. Check out upcoming changes to Azure products

[Azure roadmap](#)

Let us know what you think of Azure and what you would like to see in the future

[Provide feedback](#)

Topics

[Announcements](#) (1837)

[Artificial Intelligence](#) (72)

[Azure Maps](#) (6)

[Azure Marketplace](#) (77)

[Big Data](#) (543)

[Blockchain](#) (60)

[Business Intelligence](#) (97)

[Blog](#) > [Announcements](#)

Immutable storage for Azure Storage Blobs now generally available

Posted on September 18, 2018



Michael Hauss, Program Manager, Azure Storage

Financial Services organizations regulated by the Securities and Exchange Commission (SEC), Commodity Futures Trading Commission (CFTC), Financial Industry Regulatory Authority (FINRA), Investment Industry Regulatory Organization of Canada (IIROC), Financial Conduct Authority (FCA), and more are required to retain business-related communications in a Write-Once-Read-Many (WORM) or immutable state that ensures they are non-erasable and non-modifiable for a specific retention interval. The immutable storage requirement is not limited to financial organizations but also applies to industries such as healthcare, insurance, media, public safety, and legal services.

Today, we are excited to reveal the general availability of immutable storage for Azure Storage Blobs to address this requirement. The feature is available in **all Azure public regions**. Through configurable policies, users can keep Azure Blob storage data in an immutable state where Blobs can be created and read, but not modified or deleted.

Typical applications include:

- **Regulatory compliance:** Immutable storage for Azure Blobs is designed to help financial institutions and related industries address SEC 17a-4(f), CFTC 1.31©-(d), FINRA etc. A technical whitepaper with details on how the feature addresses these regulatory requirements is downloadable now via the [Service Trust Portal](#). The [Azure Trust Center](#) contains detailed information about our compliance certifications.
- **Secure document retention:** Users receive maximum data protection as the immutable storage feature for Azure Blobs service ensures that data cannot be modified or deleted by any user including those with account administrative privileges.



Explore

See where we're heading. Check out upcoming changes to Azure products

[Azure roadmap](#)

Let us know what you think of Azure and what you would like to see in the future

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Topics

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[Business Intelligence](#) (97)

We started by creating modular preconfigured templates and infrastructure

Ledger and topology choice



ethereum



HYPERLEDGER

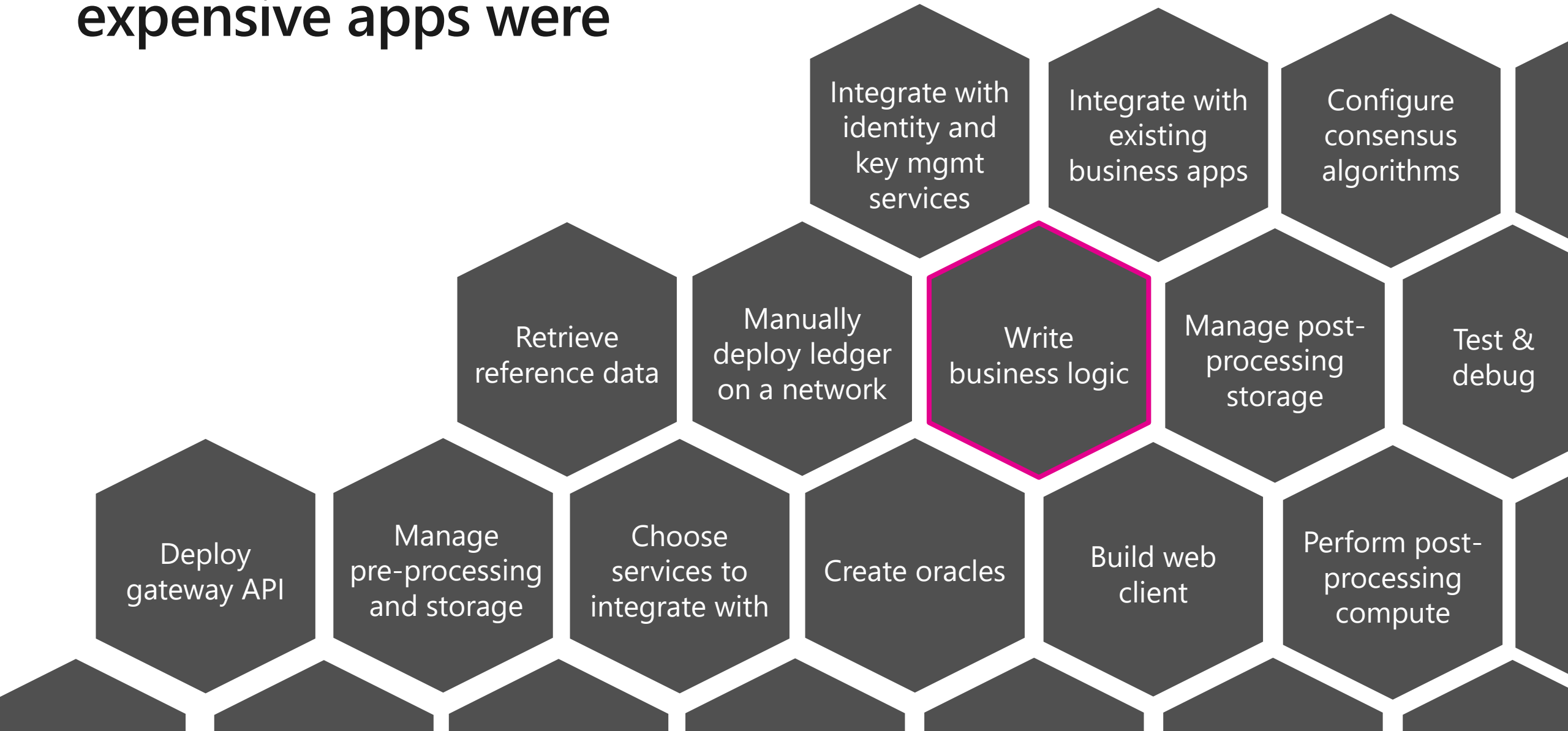


Quorum

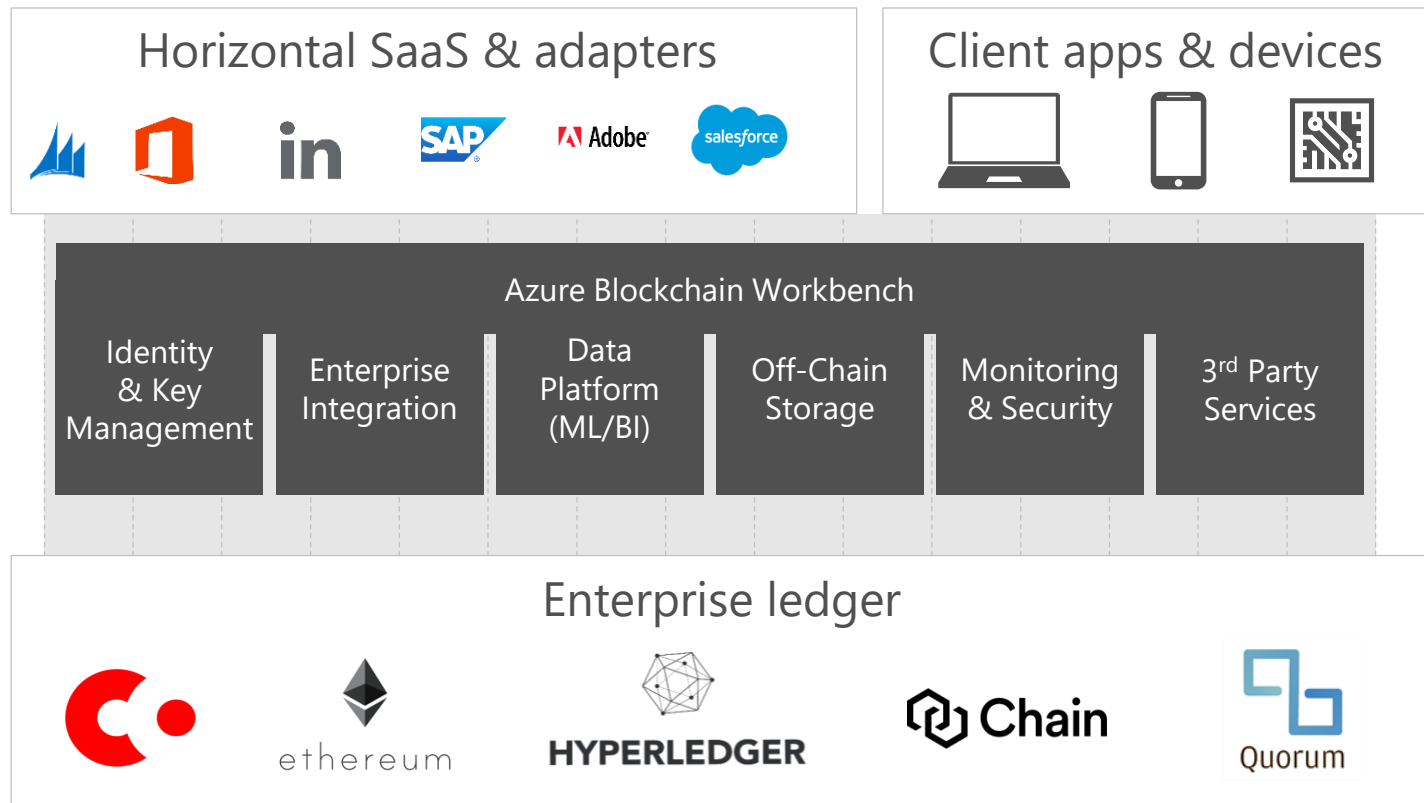
Choose the ledger that meets your needs

Deploy on flexible topologies (dev test, single-node, or multi-node) so you can expand when you're ready

With infrastructure, it became apparent how hard and expensive apps were



Azure Blockchain Workbench facilitates rapid, low cost development



Workflow execution

Identity & key management

Ledger-neutral approach

Auto-generate starter apps

Integration APIs & events

Workflow/user admin

Azure data integration

Filter by title

Azure Blockchain Workbench (public preview)

Overview

About Azure Blockchain Workbench

Concepts

Architecture

Integration patterns

How-to guides

Deploy Workbench

Create blockchain app

Manage Workbench users

Use blockchain app

Use Workbench API

Troubleshoot apps

> Use Workbench data

> Reference

> Resources

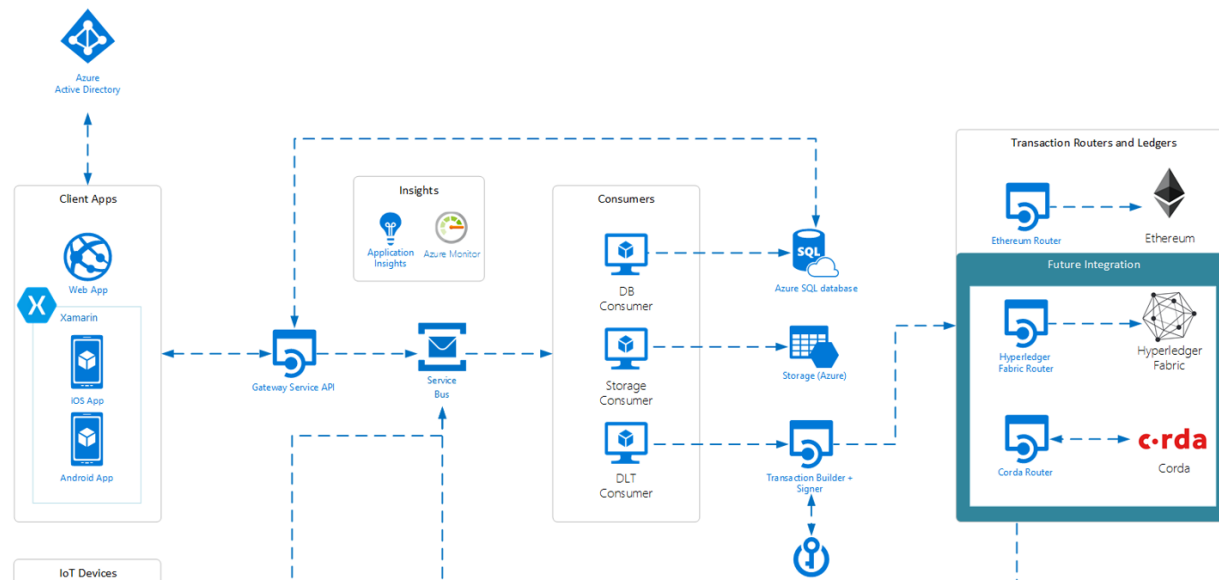
Ethereum Proof of Authority

Download PDF

Azure Blockchain Workbench architecture

04/19/2018 • 7 minutes to read • Contributors

Azure Blockchain Workbench simplifies blockchain application development by providing a solution using several Azure components. Blockchain Workbench can be deployed using a solution template in the Azure Marketplace. The template allows users to pick the modules and components to deploy with Blockchain Workbench, such as blockchain stack, type of client application, and support for IoT integration. Once deployed, Blockchain Workbench provides access to a web app, iOS app, and Android app.



In this article

Identity and authentication

Client applications

Gateway service API

Message broker for incoming messages

Message broker for downstream consumers

Message consumers

Transaction builder and signer

Transaction routers and ledgers

DLT watcher

Azure SQL database

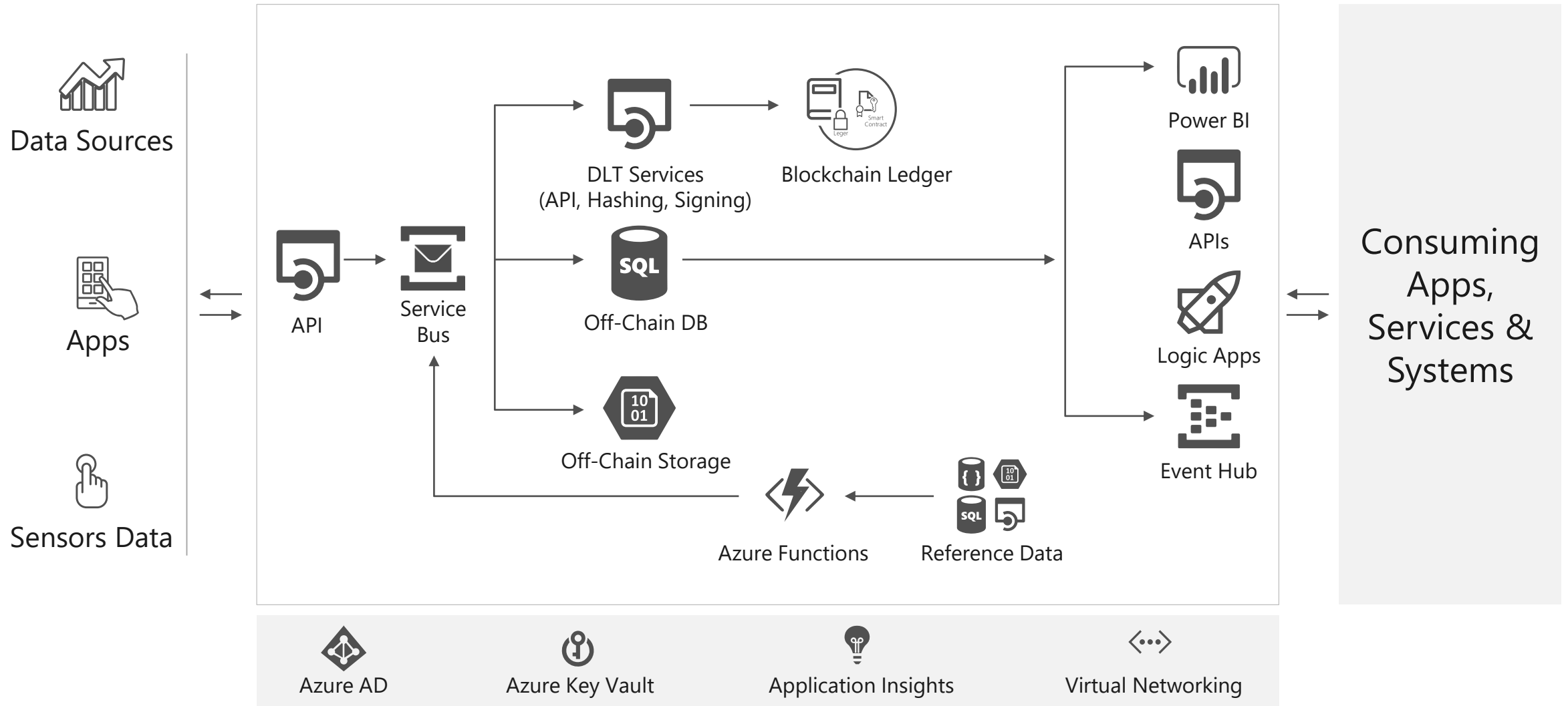
Azure Storage

Monitoring

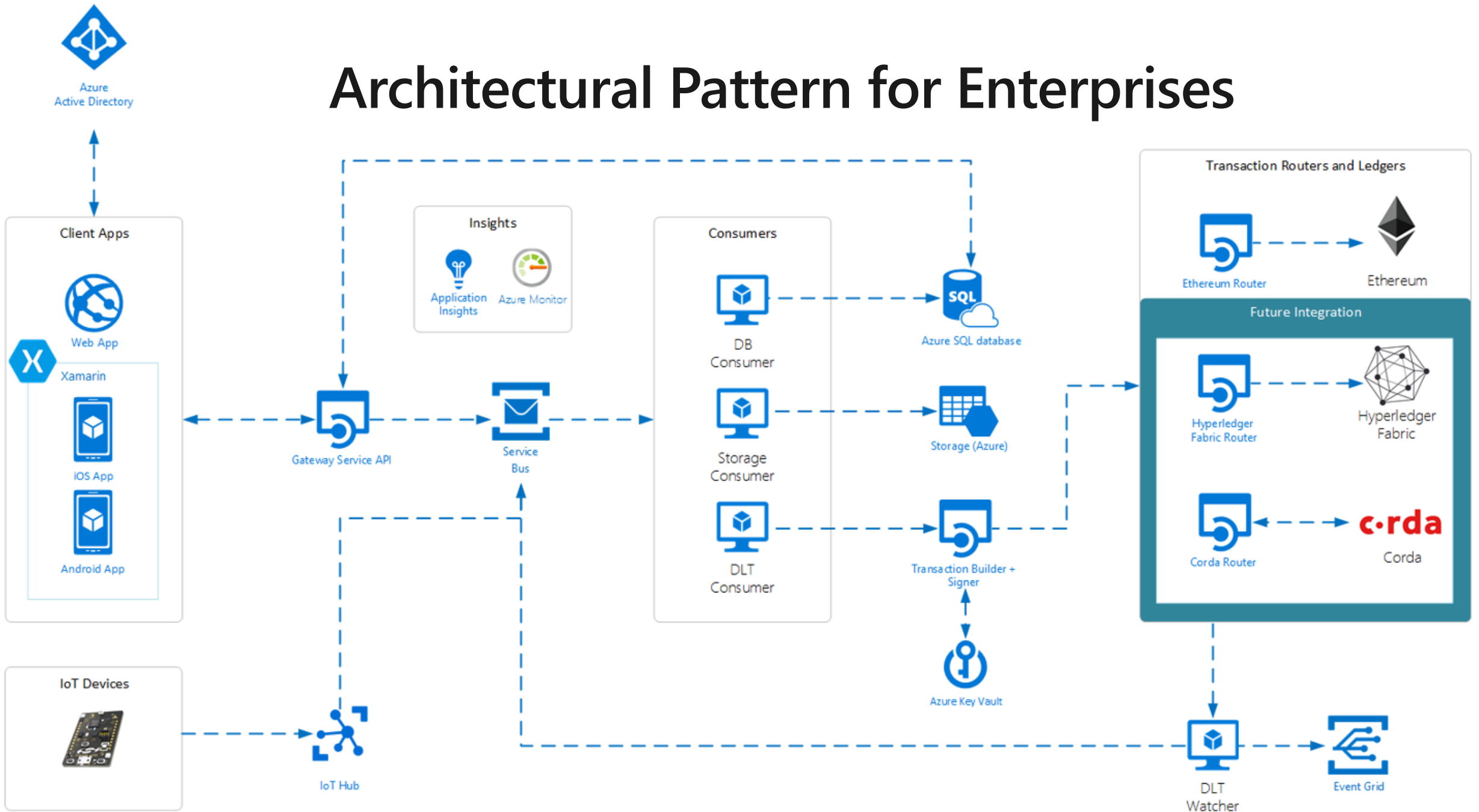
Next steps

Is this page helpful?

With an enterprise-ready, customizable approach



Architectural Pattern for Enterprises

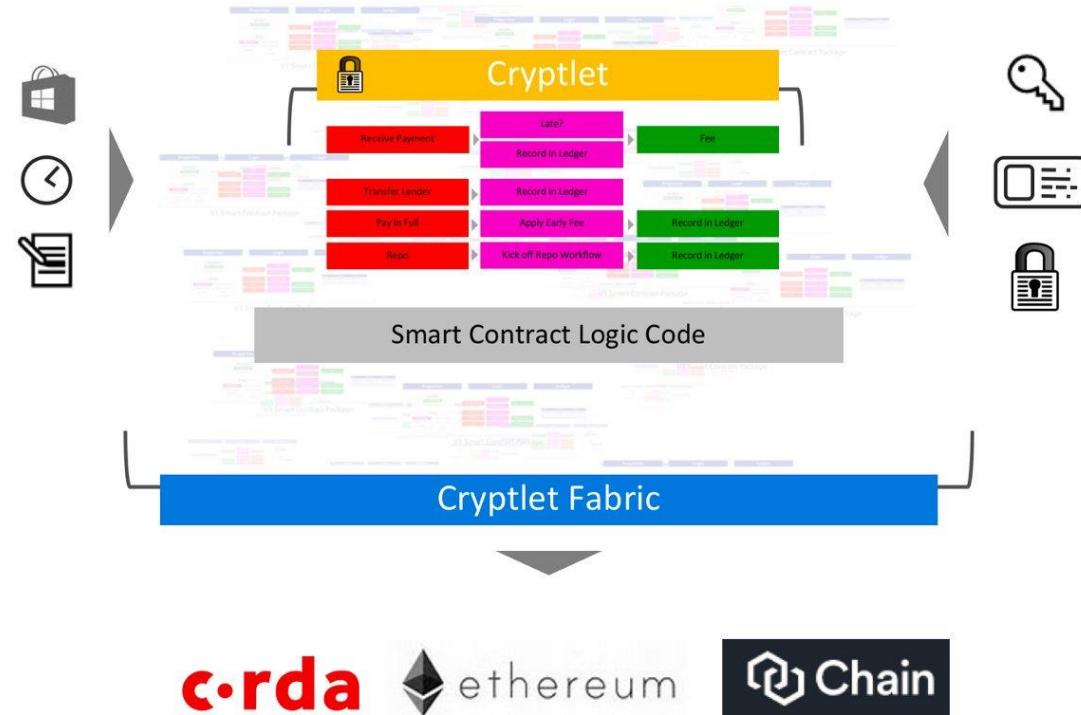



Increased Productivity and Security

Enterprise Smart Contracts

- **Security and confidence in code connecting to the blockchain**
 - Secure compute
 - Secure communications
 - Attestable code
- **Increased productivity and code re-use**
 - Write cryptlets in popular development languages
 - Re-use existing code
 - Common code base across multiple blockchain protocols
- **Performance**
 - Avoid current limitations and select the hardware profile appropriate for your workload
- **Multi-chain**
 - Communicate across blockchain protocols
- **Marketplace**
 - Marketplace for attestable code and data services

The Cryptlet Fabric



 marleyg Typo

b215ec2 on Jul 21 2017

1 contributor

178 lines (123 sloc) | 31.2 KB

Raw Blame History 🖨 📝 🗑

Enterprise Smart Contracts

Marley Gray - Microsoft

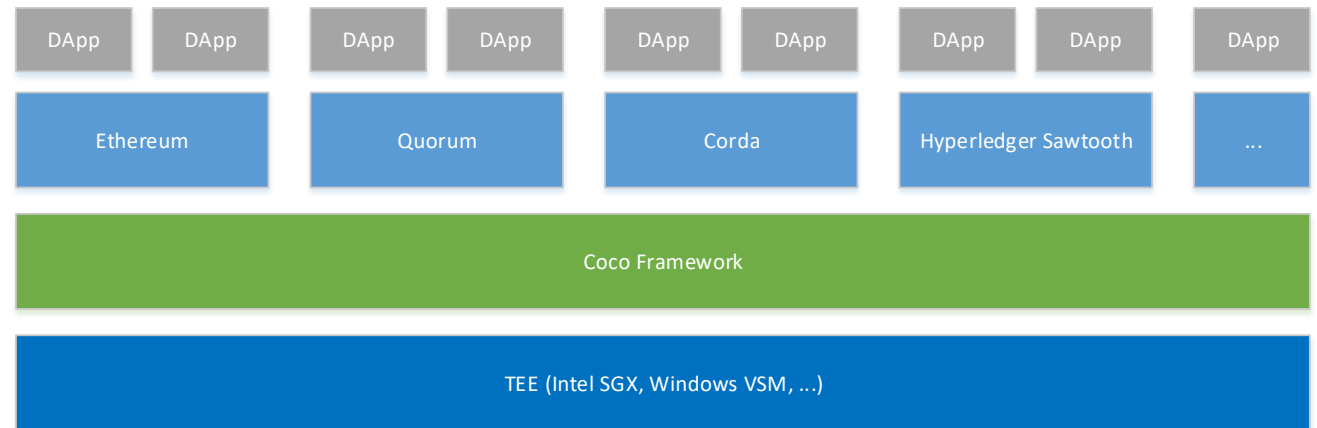
Introduction

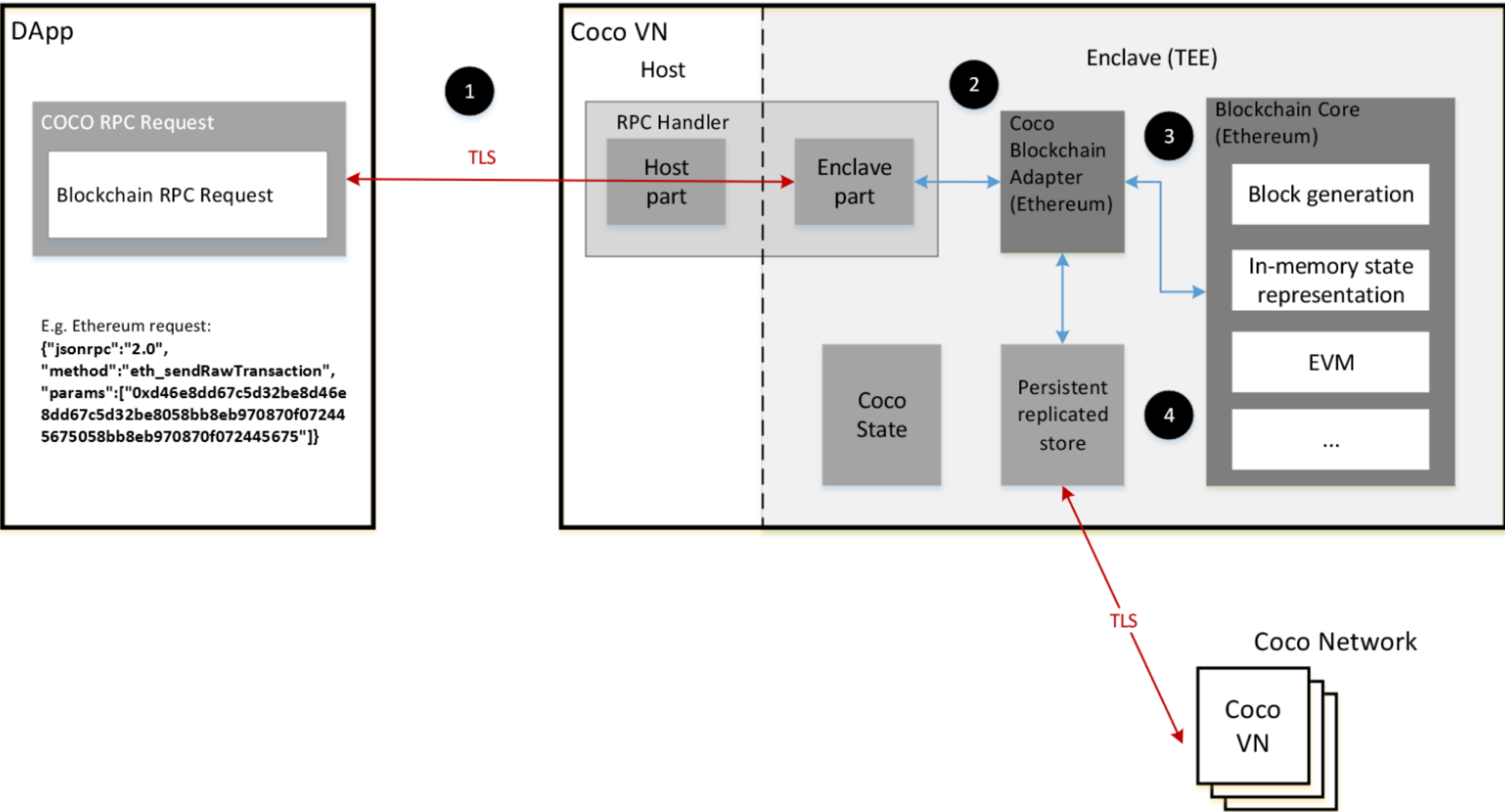
It has been a little over a year since we announced project "Bletchley" and since that time we have been working directly with our partners and customers trying to figure out what, "exactly" this all means? Most of us, when encountering blockchain for the first time are either trying to figure out the tech underneath or simply understand the hype. We usually don't get it, at first. It often takes several turns of the intellectual crank for it to soak in and the possibilities and opportunities to become obvious. This is due to the potential disruptive forces that could be unleashed by the implementation of what is actually off

Addressing Private Consortium Needs

Confidential Consortium Framework

- Alternative approach to ledger construction
- Addresses consortium needs such as
 - Scalability
 - distributed governance
 - enhanced confidentiality
 - security and immutability
- Leveraging the power of existing blockchain protocols, trusted execution environments



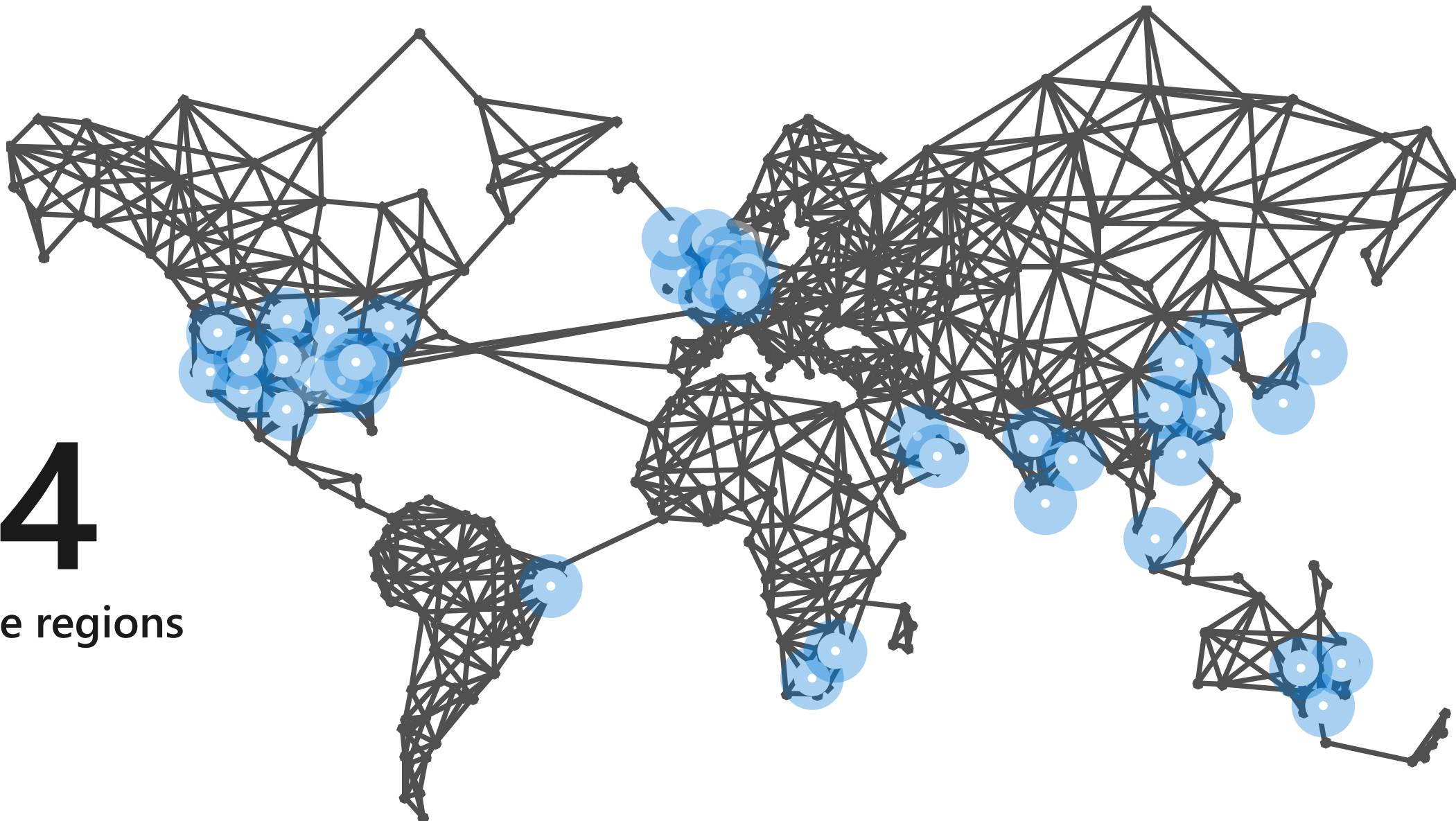


Notable things to pay attention to ...

- **Digital Uniqueness**
 - Value/Code linkage opportunity
 - Digital Scarcity
 - Incentivization of ecosystem and network participation
- **Cross domain and cross organization complexities**
 - Write cryptlets in popular development languages
 - Re-use existing code
 - Common code base across multiple blockchain protocols
- **Identity, Key Management**
 - Custody services
 - Backup, derivation, restore, revocation
- **Multi-chain**
 - Communicate across blockchain protocols

54

Azure regions



The deepest and most comprehensive compliance coverage

Global

- ☑ ISO 27001:2013
- ☑ ISO 27017:2015
- ☑ ISO 27018:2014
- ☑ ISO 22301:2012
- ☑ ISO 9001:2015
- ☑ ISO 20000-1:2011
- ☑ SOC 1 Type 2
- ☑ SOC 2 Type 2
- ☑ SOC 3
- ☑ CSA STAR Certification
- ☑ CSA STAR Attestation
- ☑ CSA STAR Self-Assessment
- ☑ WCAG 2.0

US Gov

- ☑ FedRAMP High
- ☑ FedRAMP Moderate
- ☑ EAR
- ☑ DoD DISA SRG Level 5
- ☑ DoD DISA SRG Level 4
- ☑ DoD DISA SRG Level 2
- ☑ DFARS
- ☑ DoE 10 CFR Part 810
- ☑ NIST SP 800-171
- ☑ NIST CSF
- ☑ Section 508 VPATs
- ☑ FIPS 140-2
- ☑ ITAR
- ☑ CJIS
- ☑ IRS 1075

Industry

- ☑ PCI DSS Level 1
- ☑ GLBA
- ☑ FFIEC
- ☑ Shared Assessments
- ☑ FISC (Japan)
- ☑ APRA (Australia)
- ☑ OSFI (Canada)
- ☑ FCA + PRA (UK)
- ☑ MAS + ABS (Singapore)
- ☑ 23 NYCRR 500
- ☑ SEC 17a-4
- ☑ CFTC 1.31
- ☑ FINRA 4511
- ☑ SOX
- ☑ HIPAA BAA
- ☑ HITRUST
- ☑ 21 CFR Part 11 (GxP)
- ☑ MARS-E
- ☑ NHS IG Toolkit (UK)
- ☑ NEN 7510:2011 (Netherlands)
- ☑ FERPA
- ☑ CDSA
- ☑ MPA
- ☑ FACT (UK)
- ☑ DPP (UK)

Regional

- ☑ Argentina PDPA
- ☑ Australia IRAP Unclassified
- ☑ Australia IRAP Protected
- ☑ Canada Privacy Laws
- ☑ China GB 18030:2005
- ☑ China DJCP (MLPS) Level 3
- ☑ China TRUCS / CCCPPF
- ☑ EN 301 549
- ☑ EU ENISA IAF
- ☑ EU Model Clauses
- ☑ EU – US Privacy Shield
- ☑ GDPR
- ☑ Germany C5
- ☑ Germany IT-Grundschutz workbook
- ☑ India MeitY
- ☑ Japan CS Mark Gold
- ☑ Japan My Number Act
- ☑ Netherlands BIR 2012
- ☑ New Zealand Gov CIO Fwk
- ☑ Singapore MTCS Level 3
- ☑ Spain ENS
- ☑ Spain DPA
- ☑ UK Cyber Essentials Plus
- ☑ UK G-Cloud
- ☑ UK PASF

Microsoft mission

Empower every person and every organization on the planet to achieve more

