

Accelerate Blockchain Adoption Across the Supply Chain with Sextant for Daml

Digital Asset



Contents

- 01: Complex operational environment for supply chains
- 02: Innovation in supply chain infrastructure
- 03: Sextant supports blockchain deployment and management
- 04: Daml smart contracts to support distributed applications
- 05: Introducing Sextant for Daml
- 06: Proposed solutions leveraging Sextant for Daml
- 07: Next steps with Blockchain Technology Partners



Complex operational environments for supply chains

Supply chains are extremely complex, involving multiple untrusted parties with little to no communication between each other, resulting in error-prone paperwork and long execution times to successfully deliver goods across various locations. A single supply chain operation can span over hundreds of stages and cross several international boundaries.

Disparate systems cause manual and error prone processes

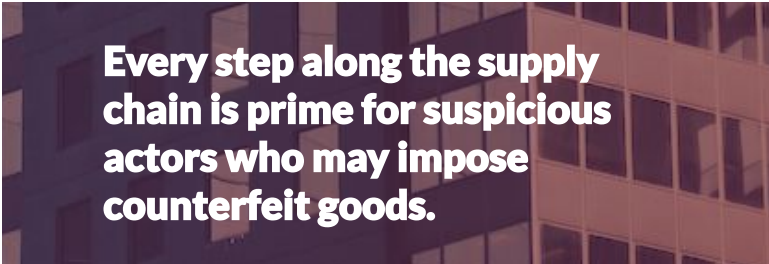
For example, a retail operation may order certain goods from an international manufacturer to supply stores with inventory based on consumer purchase data. The resource planning data that influences these orders must provide an accurate view of transactions within a given region to ensure successful sales within the store. The entire forecasting system is often run by Enterprise Resource Planning systems (ERP) that cover accounting, sales, procurement, customer service, production, and distribution for a single enterprise that engages with multiple external parties.

While the ERP communicates to parties internally, the external parties involved with the production and distribution of goods are international in scope and run on separate systems, causing gaps in data related to costs for supplies, manufacturing, and shipping, leading to drawn out manual processes for payments.

Inaccurate customer data and opaque track and trace

In addition to gaps in operational data, the purchase agreements between external parties usually involves global entities which create bottlenecks for the efficient transaction and delivery of goods. This is primarily caused by the various regulatory requirements per region. Suppliers must coordinate with manufacturers to produce the goods in different countries with different jurisdictions for exchanging funds and order details.

Once an order is placed by the business owner, there is no insight into the actual ingredients, authenticity of goods, or quality of production materials by the supplier and manufacturer. By the time goods are supplied, built, and shipped to the warehouse that stocks the stores, there is no view into what was actually used to create the goods being sold. Consequently, every step along the supply chain is prime for suspicious actors who may impose counterfeit goods.



Every step along the supply chain is prime for suspicious actors who may impose counterfeit goods.

The multiparty nature of supply chain is well-suited for blockchain adoption and must begin to digitally transform to ensure greater transparency for all supply chain participants.

Digital transformation required to improve revenue loss and overhead costs

Not only is the supply chain at risk for bad actors, it also fragments information and creates bottlenecks for data that should be readily available, visible, and trusted in order to efficiently transact and deliver goods. This lack of transparency and efficiency results in revenue loss and high overhead costs.

Additionally, more businesses are increasing the number of checks and balances to ensure proper traceability of goods, which is causing an increase in manual processes and reconciliation efforts. Customers are also demanding proof of origin, increasing the demand for traceability along the supply chain.

This is an oversimplification of an extremely complex process that nearly every business operation relies on to provide consumers with household products, life-saving medication, and materials. The multi-party nature of supply chains is well-suited for blockchain adoption and must begin to digitally transform to ensure greater transparency for all supply chain participants.

Current state of global supply chain operations





Innovation in supply chain infrastructure

To transact more efficiently between external parties, to provide more transparency into supply chain costs and consumer data, and to ensure the proper traceability of goods, a tamper-proof audit trail must be implemented. To date, supply chains run on centralized databases (ERPs leverage database technology), creating fragmented systems of record that must ensure trust between all participating parties.

Permissioned blockchain networks enable sensitive business transactions

The creation of permissioned (or private) blockchain networks enables businesses to exchange transactional data that would not be included in traditional ERPs due to data sensitivity and the lack of trust between parties, particularly competitors. This data may include consumer insight, inventory, and financials.

A permissioned blockchain network enables a trust architecture where, unlike public blockchain, each participant is known and on-boarded onto the network according to set permissions. This means transacting parties can create an efficient system where known participants only see the data they are permissioned to see, while granting all parties access to the same source of truth.



Better information means better outcomes for all parties.

The successful outcome of transactions along a supply chain are critical to the enterprise. However, supply chains have been systematically stressed by the inefficient flow of accurate and insightful information. The trust architecture enabled by permissioned blockchain ensures the parties of these transactions have more actionable and accessible information, engendering closer integration while respecting each other's business interests. Better information means better business and better outcomes for all parties.

Moreover, ERPs are historically fragmented, causing data silos and gaps. This complicates the settlement of payments between external parties, which often rely on validating both digital and paper trails which creates inefficient, long-tail transactions that restrict cash flow. As above, implementation of a permissioned blockchain is a step towards unifying these disparate systems of record and sharing this data in real-time. Hyperledger Sawtooth is a leading open source blockchain framework that can be implemented to achieve these outcomes.

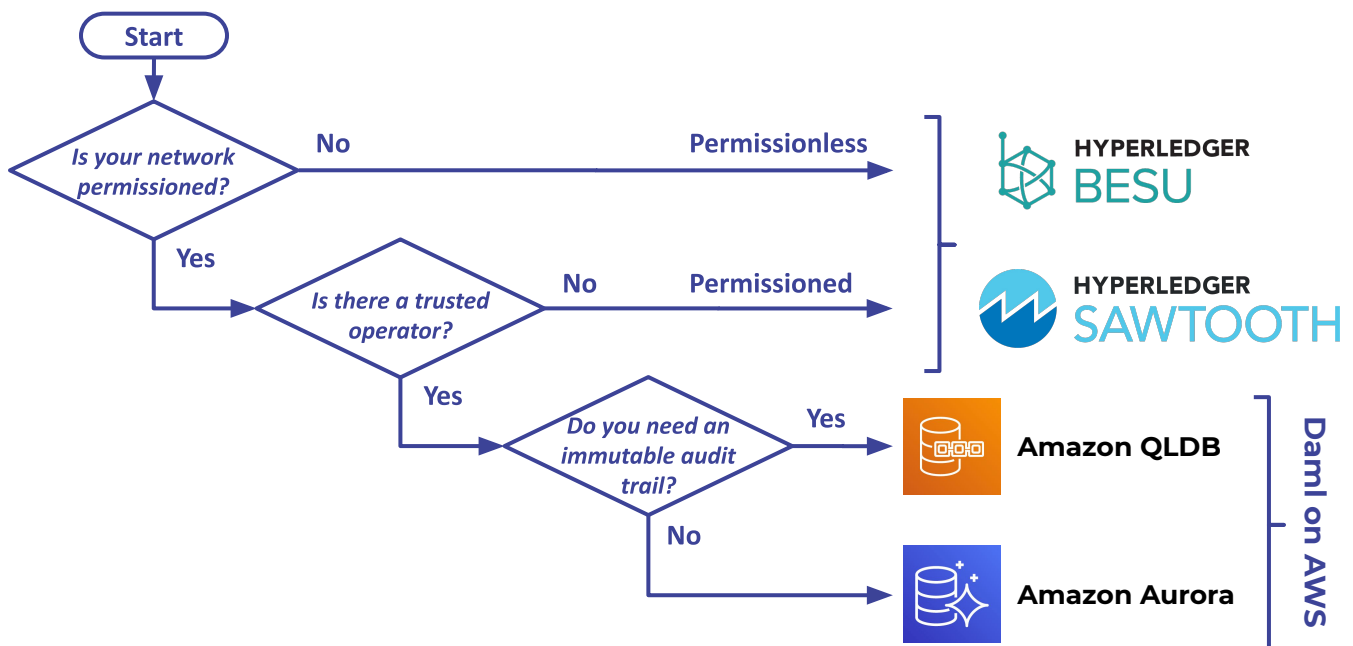
Leveraging Hyperledger Sawtooth for permissioned networks

Originally created by Intel, Hyperledger Sawtooth can be easily configured for a permissioned network. It features a highly scalable, modular architecture with a pluggable consensus-mechanism, which means that transacting parties can select from the broadest array of consensus algorithms according to their use case. This ensures the availability of a suitable privacy model for each party.

Sawtooth also has very clear separation between the network and the application layer which enables more efficient development according to software engineering best practices.

Selecting the right Sextant for Daml ledger implementation

This flowchart is a useful tool to determine the appropriate Sextant for Daml ledger implementation for any given use case.



Leveraging Hyperledger Besu and Amazon QLDB

In most cases, supply chain transactions are well-suited for permissioned blockchain networks. Where a permissionless or hybrid approach is preferred, Hyperledger Besu offers a solution. This open source framework is an Ethereum client which runs on the Ethereum public network but also supports permissioned networks.

However, the value of immutability does not wholly depend on implementing a blockchain infrastructure. In cases where enterprises prefer a more centralized approach, there are commercial options available. Amazon QLDB is a centralized database which also features transaction immutability.

In cases where immutability is not important but the ability to automate multi-party transaction workflows is, Amazon Aurora is a MySQL and PostgreSQL compatible relational database.



Sextant supports blockchain deployment and management

With blockchain still in its infancy from achieving global adoption, organizations are finding it difficult to secure large investment dollars for infrastructure deployment and management. Many IT organizations do not have the resources to build a production ready blockchain network for distributed applications.

What businesses need is a management platform that simplifies the deployment and ongoing management of distributed, multi-party applications and a smart contract language that abstracts away the complexity of the underlying infrastructure for speedy time to market builds of decentralized applications.



Businesses need a blockchain infrastructure management platform.

Sextant infrastructure management platform

To accelerate blockchain adoption, Blockchain Technology Partners has created Sextant, an infrastructure management platform that brings the benefits of blockchain to supply chains worldwide. Sextant automates the deployment and management of the underlying blockchain infrastructure ensuring that enterprises focus on business value through the development of multi-party applications.

With Sextant, each member of the supply chain will have zero concerns related to infrastructure management and smart contract deployment, as the platform completely manages both tasks.

Enterprise software available via subscription license

Sextant's primary goal was to create a blockchain platform that would seamlessly integrate with DevOps, agile software development lifecycles, and an enterprise's CI/CD pipeline. This meant standardizing on Kubernetes to enable enterprises the broadest choice of deploying Sextant on-premises and across multi-cloud systems.

Unlike SaaS blockchain solutions, Sextant is delivered as enterprise software backed by a software subscription license. This means each participant in a supply chain can use their own copy of Sextant on their own terms.

Sextant also features enterprise-grade distributions of Hyperledger Sawtooth and Hyperledger Besu that are maintained by BTP's core engineering team. This ensures the longevity and stability of the underlying open source blockchain technology, which is constantly patched, debugged and improved. Sextant also features integrations with Amazon QLDB and Amazon Aurora for enterprises who require a centralized use case or are not ready to migrate to a decentralized solution with blockchain.

Sextant user interface embodies simplicity for ease-of-use

Sextant | DAML

admin

Pods

Name	Ready	Status	Pod IP	Node IP
dob-network-daml-on-besu-0	1/1	Running	10.240.0.140	
dob-network-daml-on-besu-1	1/1	Running	10.240.0.25	
dob-network-daml-on-besu-2	1/1	Running	10.240.0.56	
dob-network-daml-on-besu-3	0/1	Pending		
dob-network-daml-on-besu-cert-bxm5	0/2	Succeeded	10.240.0.125	
dob-network-daml-on-besu-genesis-4cv7	0/1	Succeeded	10.240.0.10	
dob-network-daml-on-besu-rpc-0	2/2	Running	10.240.0.135	

Services

Name	Type	Ports	ClusterIP	ExternalIP
dob-network-daml-on-besu	ClusterIP	8545/TCP, 8546/ws/TCP, 8547/graphql/TCP, 30303/rpc/TCP, 30303/discovery/UDP	None	<none>
dob-network-daml-on-besu-rpc	ClusterIP	39000/TCP	None	<none>

Persistent Volume Claims

Name	Status	StorageClass
data-dob-network-daml-on-besu-0	Bound	default
data-dob-network-daml-on-besu-1	Bound	default
data-dob-network-daml-on-besu-2	Bound	default
data-dob-network-daml-on-besu-3	Bound	default
pgdata-dob-network-daml-on-besu-rpc-0	Bound	default

Tasks

Summary

Deployment Name:

dob-network

Namespace:

dob-rs

DAML GRPC Port:

39000

Sextant | DAML

admin

Cluster Details

Name

bit-idq-test-cluster

Enter the name of the cluster

API Server

https://tdqtestclu-tdqtestcluster-90d428-42b70f4b.hcp.eastus.azurek8s.io:443

Enter the URL for your API server

Access Token

Paste the base64 access token

Certificate Authority

Paste the base64 certificate authority

CANCEL

SAVE

Leverage Sextant to deploy Daml-driven applications across your persistence layer of choice.



Daml smart contracts to support distributed apps

While blockchain is the fundamental technology to enable data sharing and transactions between untrusted parties, the next step is the implementation of smart contracts to enable the delivery of blockchain's value. Business operations are inherently multi-party with machines and humans executing processes and workflows that use or modify data to achieve a certain business objective. These rules of business (processes and workflows) are typically expressed in legal contracts, agreed and signed by parties who must follow rules or expect legal action.

Leveraging smart contract technology across blockchain

Smart contracts are a digital expression of these contracts whereby the rules and conventions of multi-party transactions are programmatically enforced, using the data available to all parties according to the single source of truth. This means that with blockchain and smart contracts, transactions can be increasingly automated.

With each actor working with better information and a single source of truth, transactions can be executed and finalised with more transparency and faith. This will lead to improved cash flow, shorter deal cycles, and more accurate financial forecasting. Overall, these efficiencies have the potential to unlock immense value, across all elements of the supply chain.

Daml is a vendor agnostic and interoperable smart contract development framework that simplifies complex workflows.

Daml smart contracts unlock the power of blockchain

Daml is a smart contract development framework for creating networks of distributed ledgers and databases that securely connect business processes and data boundaries.

Daml was created for multi-party workflows that involve highly sensitive transactions as contracts (applications). These distributed applications are built solely on business logic with rights and obligations built into the language. Daml retains privacy, guarantees data integrity, and enforces strict authorization in the code. Applications built with Daml produce a shared source of truth with a single interface, simplifying business logic and reducing data replication across the enterprise technology stack.

Without Daml, developers only have access to traditional programming languages that do not automatically isolate business logic from systems code. Without a clean separation, developers must interweave infrastructure code within the application, resulting in fragile solutions that lack portability and system interoperability.

A smart contract framework focused on application development

The Daml suite of products include the open source smart contract language, runtime system, and integrations with various persistence layers. Daml specifies the kinds of data a distributed ledger or database can store and the rules that govern the data.

Daml also manages cryptographic signatures, transactions and addresses, along with high-level concepts such as data ownership, visibility, permissions, and write authorization. Developers simply have to define which entity receives what data in the business logic. The Daml runtime and Daml integration layer manages everything else.

When external counterparties want to store a copy of the data they are entitled to, developers can redeploy the Daml application onto a distributed ledger and enable users to run their own blockchain node - all without rewriting the application.

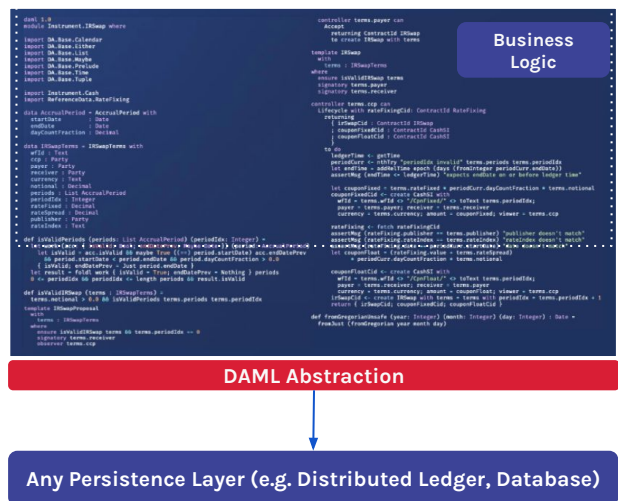
Platform agnostic and fully portable

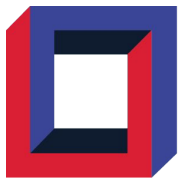
Since Daml is platform agnostic, the Daml code is completely decoupled from the underlying ledger, abstracting away the complexity of blockchain infrastructure code, ensuring developers are not burdened with learning new systems logic. This also means the same application running on a PostgreSQL database can be ported to a Hyperledger Sawtooth blockchain network with no code changes.

Daml is a privacy-first framework with sub-transaction level privacy at the API level.

A Daml-driven supply chain application would enable businesses to model complex workflows that eliminate manual processes and accelerate payment processing time across all parties. When paired with the powerful Sextant platform, businesses can easily deploy and manage the underlying infrastructure running those Daml-driven applications.

Daml would enable track and trace solutions that guarantee the quality of goods with the ability to trace those goods back to the place of origin. This would substantially decrease counterfeit goods/ingredients across the supply chain. Additionally, payments, customer insight, and more would be automated across permissioned parties, simplifying each step of the supply chain operation.





Introducing Sextant for Daml

Digital Asset and Blockchain Technology Partners (BTP) have joined forces to bring the powerful Sextant infrastructure management platform with the privacy-first Daml development framework to supply chain operations on a global scale.

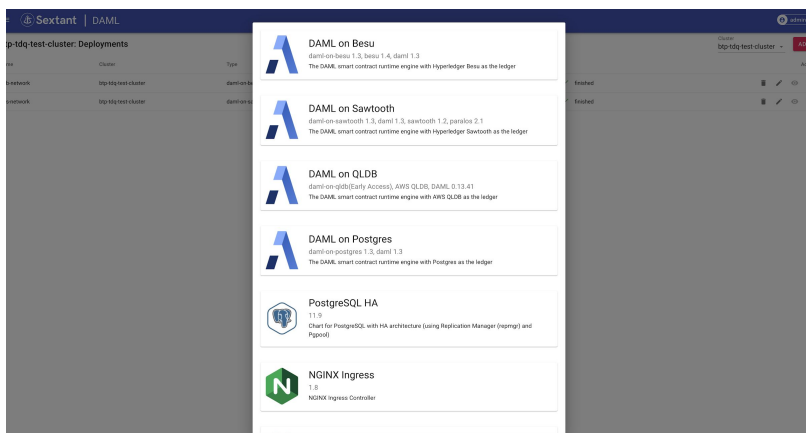
Sextant deploys and manages the Daml runtime and integration layers

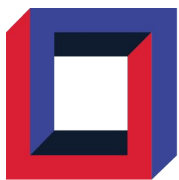
Sextant for Daml automates the deployment and management of the Daml runtime and Daml integration layers onto blockchain and centralized ledgers. By using Sextant for Daml, enterprises can focus on developing multiparty applications, rather than using valuable resources on the infrastructure management. By combining both the infrastructure management platform with Daml smart contracts, enterprises are able to develop multiparty processes that improve collaboration and tear down data silos.

Sextant for Daml maintains and tests Daml applications to ensure optimal performance.

Free up resources to work on revenue generating activities

Supply chain operations are now able to build custom applications and deploy those across a blockchain network where permissions to external supply chain participants is expressed in the business logic, ensuring the right data is shared at the right time with the right business party. This not only de-risks processes, it also frees up resources to focus on revenue generating activities outside of reconciliation and infrastructure management.





Proposed solutions leveraging Sextant for Daml

Digital Asset created a Daml-based supply chain application for generic use cases between buyers, sellers, suppliers, warehouses, and transport companies. When paired with Sextant for Daml, businesses are able to quickly deploy and manage the underlying ledger upon which the Daml smart contract runs.

Automated quote calculation and payment for supply chains

Digital Asset's Daml-driven supply chain application outlines the rights and obligations for each supply chain entity in a transaction. The logic ensures the right information is shared with the right party in real-time and honors privacy between business entities. It also supports an algorithm for quote calculation so warehouses and suppliers can quickly send prices to sellers.



**Use Sextant for Daml to
deploy Daml-driven supply
chain applications.**

Example supply chain application leveraging Daml

The following workflow outlines the Daml-driven application and business logic:

1. Buyer requests trade quote from Seller for the price and delivery date for a quantity of goods.
2. Seller notifies Supplier and Supplier starts the quote collection process by selecting Warehouses to fulfill the product order request.
3. Warehouses use an automated algorithm optimized for best price to calculate and finalize delivery. The algorithm computes quantities to be delivered from the Warehouses and calculates the amount of goods Transportation needs to deliver.
4. Seller reviews the quote details and adds margin to price before sending to buyer.
5. Transport company is notified and picks up product from Warehouse.
6. Successful delivery results in acknowledgement and automated payment from Buyer to Seller.

Next steps with Blockchain Technology Partners

Experience the power of Sextant for Daml and start optimizing supply chain operations today.

Sextant for Daml is available on the AWS Marketplace, operating under a Pay-Go basis, so you can test out key features with full BTP support.

If you are ready for a demo, reach out to daml@blockchaintp.com for more information.



Copyright © 2021 Blockchain Technology Partners. All rights reserved.