Blockchain for trade: becoming real
Lessons from real world implementations

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A private sector overview of relevant blockchain initiatives

- IBM, Maersk and others in the trade logistics domain
  - Tradelens, Bill of Lading (PIL, TradeTrust), Global Shipping Business Network (CMA CGM etc)
- Payments
  - Ripple, SWIFT, Stellar (Worldwire)
- Trade Finance
  - R3 Voltron, we.trade, eTradeConnect
- Food supply chains and agricultural commodities
  - ADM-Bunge-Cargill-Dreyfuss for commodity markets, IBM Food Trust with Walmart

BLOCKCHAIN: WELL SUITED FOR SUPPLY CHAINS

Blockchain addresses the underlying challenges inherent in collaborating across a distributed, fragmented supply chain ecosystem

SHARED LEDGER

Append-only distributed system of record shared across business network

A network of industry participants maintains a distributed, permissioned ledger with copies of document filings, relevant supply chain events, authority approval status, and full audit history; every change results in a new, immutable block

SMART CONTRACT

Shared business logic governing what transactions may be written to the ledger

Cross-organizational business processes, such as cargo title transfer, are pre-programmed and built into Blockchain and distributed to and executed on the network, preventing any member from changing the business logic

PRIVACY

Ensuring appropriate visibility; transactions are secure, authenticated and verifiable

Cryptography enables permissioned access so only the parties participating in a specific shipment can submit, edit or approve related data

TRUST

Transactions are endorsed by relevant participants

Information such as documentation filings and authority approvals can only be changed if endorsed by the parties taking part in the shipment; full audit history maintained on the Blockchain

TRADELENS

An open and neutral blockchain-based platform that is digitizing the global supply chain and transforming trade

- The platform empowers faster and more efficient, transparent and secure global trade
- TradeLens is built for the industry and offers benefits to trade participants from across the supply chain ecosystem
- IBM and Maersk are developing the platform under a joint collaboration, with significant input from and participation by the industry
- An Advisory Board is being formed to help shape the platform and drive standards
- TradeLens is live in production today, processing millions of transactions per day

OUR JOURNEY

September 2016
Maersk and IBM agree to invest in a blockchain prototype to assess feasibility and value

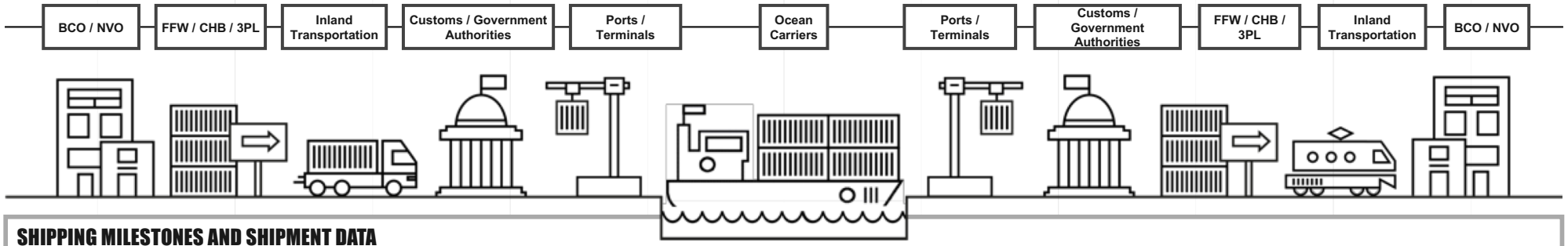
March 2017
Initial pilot assessing impact on shipments of avocados from Mombasa to Rotterdam confirmed viability and value of blockchain platform; Maersk and IBM agree to pursue

January 2018
Beta release of the platform and launch of Early Adopter program; trials underway

August 2018
Formal launch of the TradeLens platform
92 participants signed on

September 2018
TradeLens Limited Availability Release

December 2018
TradeLens General Availability Release
1.5 million events per day published to the platform



SHIPPING MILESTONES AND SHIPMENT DATA

- Start transport equipment tracking
- Gate-out of empty container from depot
- Estimated gate-in of empty container at stuffing site
- Gate-in of empty container at stuffing site
- Container stuffing completed at inland location
- VGM submitted
- Container sealed
- Gate out of full container from stuffing site
- Planned gate in of full container at export terminal
- Gate in full at terminal export
- Planned vessel departure from export terminal
- Full container loaded on vessel
- Export documentation cleared
- Actual vessel departure at export terminal
- Temperature update
- Planned vessel arrival at import terminal
- Estimated vessel arrival at import terminal
- Import documentation cleared
- Actual vessel arrival at import terminal
- Full container discharged from vessel at import terminal
- Container selected for inspection
- Planned gate out of full container at import terminal
- Customs release
- Gate out of full container from import terminal
- Estimated gate in of full container at inland location
- Gate in of full container at inland location
- Seal removed
- Stripping completed of container inland location
- Empty container ready for pick-up
- Actual gate out of empty container from inland location
- Actual gate in of empty container at depot
- Transport equipment tracking ended

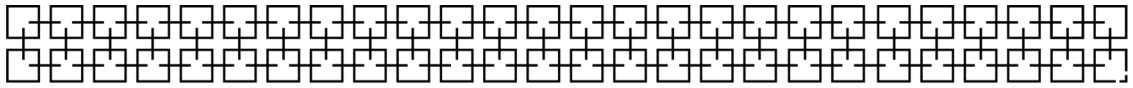
Not exhaustive list of milestones managed by platform

STRUCTURED AND UNSTRUCTURED DOCUMENTS

- Packing List
- Bill of Lading
- Export Documentation
- Advance Declaration
- Pre-Paid Invoice
- Certificate of Origin
- Shipping Instructions
- ISF
- Geography Specific Certificate
- Dangerous Goods Declaration
- Cargo Specific Certificate
- Customs Clearance
- Commercial Invoice
- Import Documentation

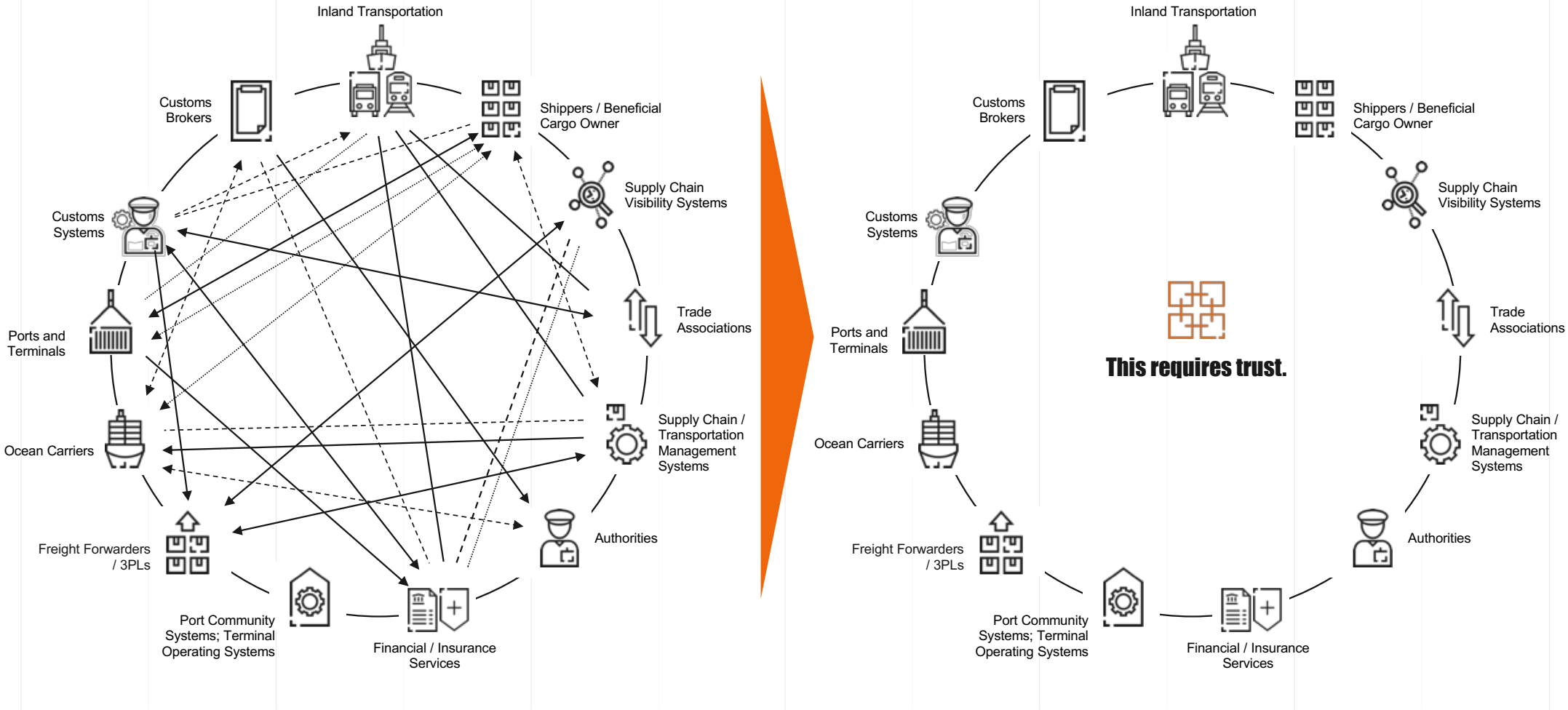
Not exhaustive list of documents managed by platform

TRADELENS BLOCKCHAIN BUSINESS NETWORK



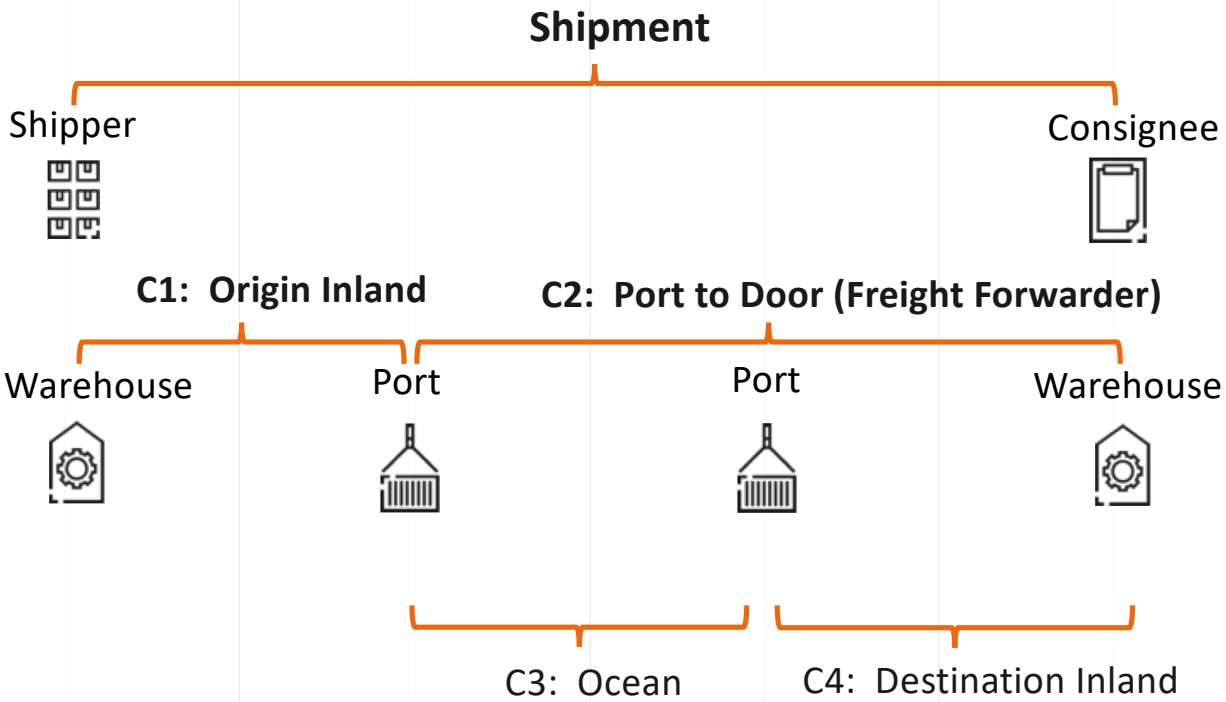
TRADELENS PLATFORM

SHIPPER-CENTRIC MODEL TO NETWORK MODEL



DATA SHARING MODEL

The supply chain ecosystem requires a common object model and vocabulary that supports the business models and relationships that exist in the business world.



- Model is based on UN/CEFACT Supply Chain Reference Data Model
- Shipments and consignments are related many-to-many
- Consignments are hierarchical
- Documents and milestones can be published at the shipment and consignment level
- An organization can have a role in a shipment or a consignment

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PARTICIPANT TYPES AND ROLES

Access rights are determined by organization role and resource type.

CARGO OWNER

- Seller
- Buyer
- Exporter
- Importer
- Consignor
- Consignee
- Transport Service Buyer

AGENT

- Origin 3PL
- Destination 3PL
- Export Customs Broker
- Import Customs Broker

OCEAN CARRIER

- Ocean Carrier
- Transport Service Buyer
- Consignor
- Consignee

TERMINAL OPERATOR

- Origin Marine Terminal
- Destination Marine Terminal
- Transshipment Terminal
- Inland Terminal

TRANSPORT SERVICE INTERMEDIARY

- Transport Service Intermediary
- Transport Service Buyer
- Consignor
- Consignee

INLAND TRANSPORT SERVICE PROVIDER

- Rail Operator
- Truck Operator
- Barge Operator
- Feeder

DATA AGGREGATOR

- PCS

CUSTOMS AUTHORITY

- Export Authority
- Import Authority

FINANCIAL SERVICES

- Buyer's Bank
- Seller's Bank
- Insurance Provider

DOCUMENTS SUPPORTED (TODAY)

Pro-Forma Invoice
Commercial Invoice
Packing List
Booking Confirmation
Shipping Instructions
Export Declaration
Bill of Lading
Sea Waybill
Arrival Notice
Import Declaration
Health Certificate
Phytosanitary Certificate
Veterinary Certificate
Fumigation Certificate
Inspection Certificate
Certificate of Analysis
Certificate of Origin
Dangerous Goods Declaration

STANDARDS AND INTEROPERABILITY

TradeLens is committed to the promotion and adoption of industry standards and interoperability of platforms

Information standardization
The shipping industry so far has been lagging in adopting standards for basic concepts like time, place, and identity. We will work closely with our Industry Advisory Board, TradeLens participants, and standards bodies to help the industry coalesce around the use of widely adopted codes and data models. The TradeLens data model and access control scheme will align with the UN/CEFACT model.

Interface standards
Industry standards around the exchange of information have also been lacking. TradeLens is committed to openness, with all functionality surfaced via non-proprietary, publicly available APIs that are designed specifically for consumability and ease of integration. TradeLens will also increasingly offer standard integrations with ERP, TOS, TMS, and WMS packages.

Blockchain interoperability
While Blockchain information exchange between ledgers today is generally achieved by integrations using middleware, that will change in the coming years. For example, Hyperledger Quilt, an implementation of the Interledger Protocol allowing for a cross-ledger namespace and transfers of information between ledgers, will be a standard TradeLens intends to follow. It is also the intention that the TradeLens platform follows Blockchain-based standards evolving in the industry.

STANDARDS INVOLVEMENT

Business networks function better when members can communicate using a common language. Some types of supply chain communications use well-developed and widely adopted standards, and communities have formed in recent years to address other areas where gaps exist.

Standards / Master Data

- **Location Data**
  - UNECE – LOCODE Cities/Ports
  - SMDG – Terminals
- **Transport Data**
  - IMO – Vessel/Voyage ID's
  - NMFTA – SCAC Carrier Codes
- **Time**
  - ISO – ISO8601
- **Identity**
  - WCO Trader Identification Number (emerging)
- **Business Objects**
  - UNCEFACT SCRDM

Communities/Organizations

- **Openshipping.org**
- **Digital Container Shipping Association (pending regulatory approval)**
- **UN, WCO**
- **GS1**
- **ISO/TC 307**

IT LANDSCAPE: THE TRADE ECOSYSTEM

	CARGO OWNERS	AGENTS / INTERMEDIARIES	OCEAN CARRIERS	INLAND CARRIERS	TERMINAL OPERATORS	CUSTOMS AUTHORITIES
SYSTEMS OF RECORD	• ERP • SCM • TMS • Bespoke	• Forwarding Systems • Customs Declaration Systems • Document Mgmt Systems • TMS • Bespoke	• TMS • Bespoke	• TMS • Bespoke • Manual	• TOC • PCS	• National Single Window Systems • PGA/OGA Systems
COMMUNICATION MECHANISMS	• ANSI X12 • UN/EDIFACT • Spreadsheets • API	• ANSI X12 • UN/EDIFACT • Spreadsheets • API	• ANSI X12 • UN/EDIFACT • Spreadsheets • API	• Email • ANSI • UN/EDIFACT • Spreadsheets • API	• XML • UN/EDIFACT • ANSI X12 • API	• Bespoke EDI • UN/EDIFACT • API

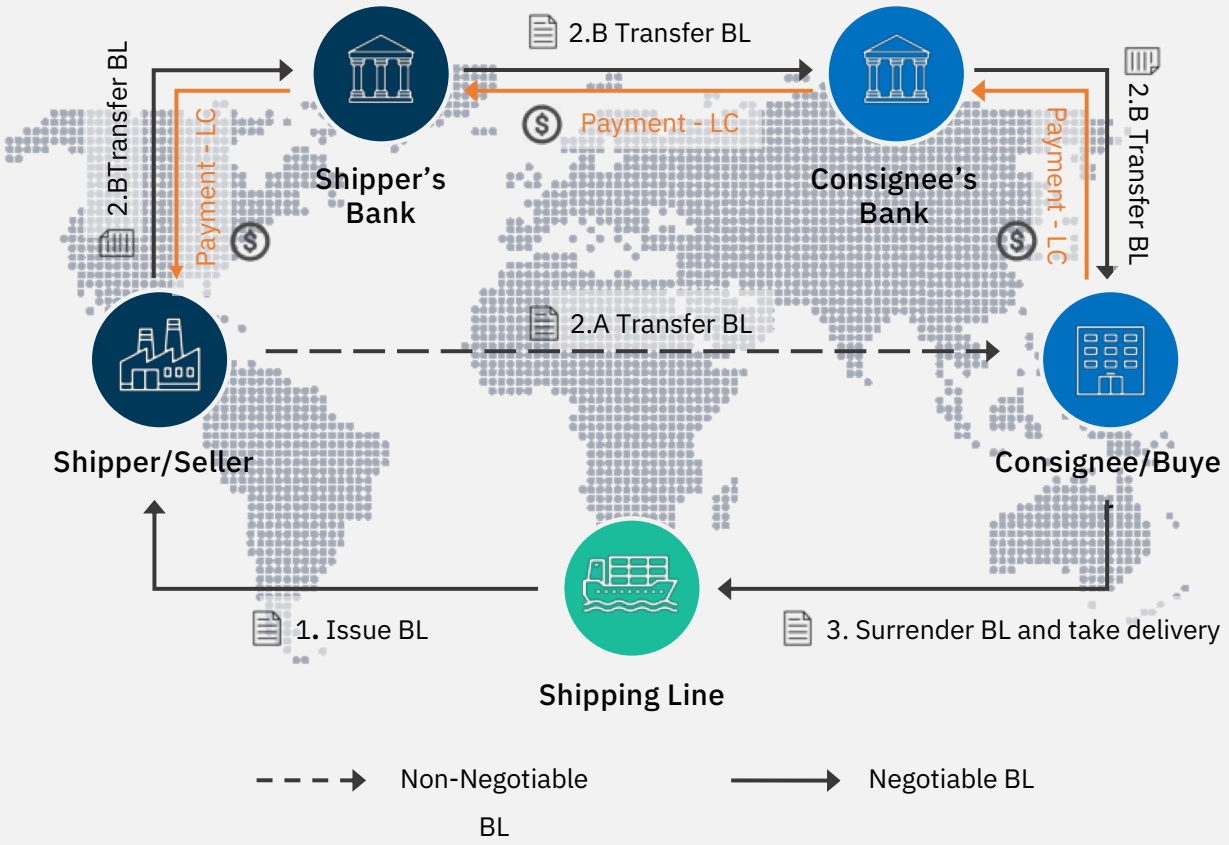
ECOSYSTEM FEEDBACK

From Early Programs and Two Releases

- **Clear definition of information sharing rules in participation agreements is critical to success**
  - It's not enough to define rules and permissions in the technology stack: this information needs to be clearly articulated for other business stakeholders
- **Agreements clearly state:**
  - Information to be published
  - TradeLens' rights to information published
  - Information available for consumption
  - Participant's rights to information consumed
- **Information sharing must be limited to entities with a legitimate need-to-know**
- **Preferences must be customizable at scale**

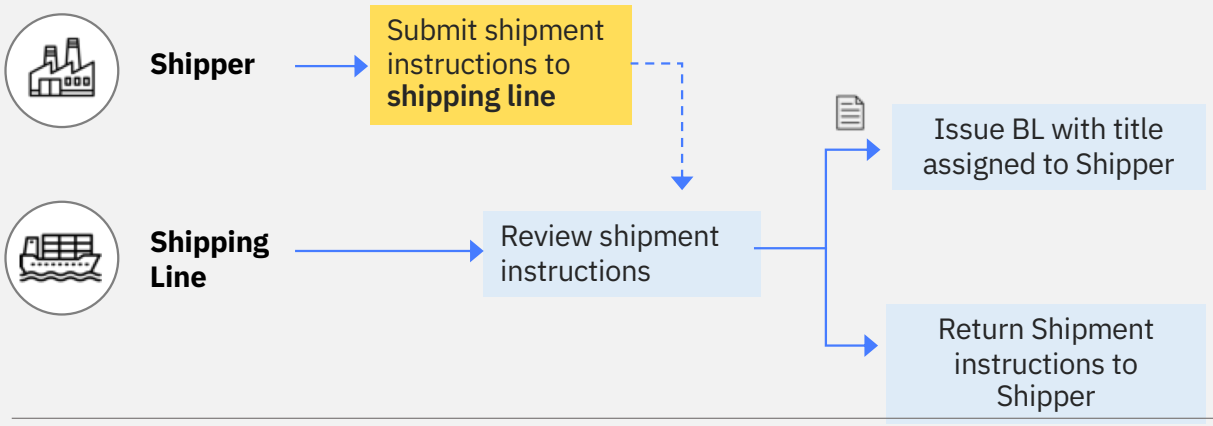
BLOCKCHAIN EBL PROJECT BACKGROUND

- **Bill of lading (BL) is in use since 16th Century**
- **Functionalities:**
  - Receipt of goods
  - Evidence of the carriage contract
  - Title to goods
- **Issued by Shipping Line**
  - Original paper BL (with endorsement) is used to establish ownership
  - Original paper BL is required to take delivery of goods
- **BL Types**
  - Negotiable and Non-Negotiable BL

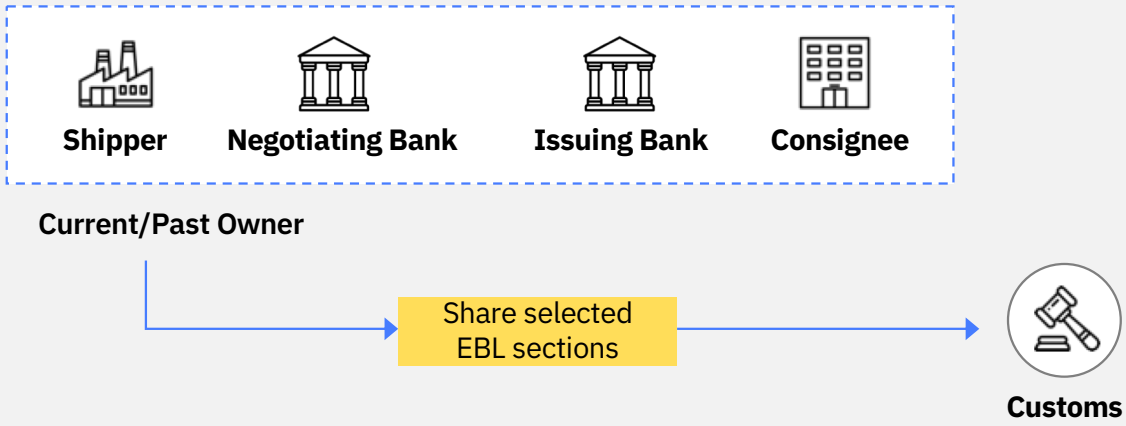


EBL PROCESS FLOW

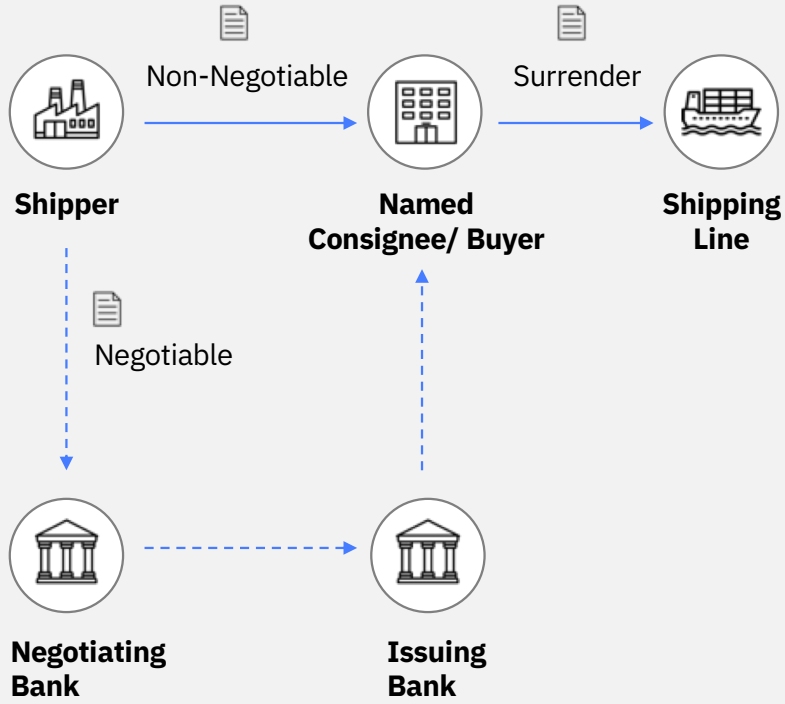
Issuing EBL



Sharing EBL (read-only)



Transferring & Surrendering EBL



SUMMARY OF EBL POC

FEATURES

- Issue EBL
- Retrieve & Share EBL
- Transfer EBL
- Surrender EBL
- Real -time visibility & Transfer History
- API-based Design

Document Transfer

Paper BL EBL on Blockchain

Traditional paper B/L
5-10 days
via courier service

With EB/L
in seconds
via blockchain network

Document Handling

Paper BL EBL on Blockchain

	Paper B/L	EB/L
Fraud	Yes	No
Can be lost	Yes	No
Speed	Slow	Instant
Security	Low	High

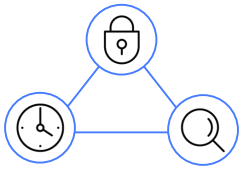
Digitization

Smart-form of Secure Data

- Traceable, tamper-proof flow of document/asset
- Real-time information sharing over the whole BL lifecycle

Control

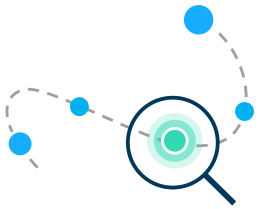
Real-time Title Visibility & Transfer History (for SL)



Permissioned Information sharing

Visibility to entire shipment lifecycle

Compliance



- Audit Trail
- Improved workflow management

Summary

Paper B/L EBL EBL on blockchain