

Leveraging emerging technologies for efficient trade facilitation

An example of Blockchain and Tradelens

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Customs authorities are faced with conflicting goals of **Facilitation** and **Control** in the midst of an increasingly challenging environment

Facilitation

Promoting economic growth by accelerating pace of legitimate trade



Technology helps resolve the tension

Control

Protecting safety, security and financial interests of the country by maximizing compliance

Increasingly heavy workload and service expectations

Increasingly complex network of government and private sector partners

Increasingly sophisticated and global threats

Yemen mail bomb 'could have detonated over eastern US'

© 10 November 2010 | US & Canada

Share

Tests on a failed parcel bomb sent on a US-bound cargo flight last month show it could have been designed to detonate over the eastern US, say UK police.

The bomb was found in a printer cartridge on a plane in a UK airport, after being posted from Yemen.

A second printer bomb, also sent from Yemen, was intercepted in Dubai.



The bomb was hidden inside a printer ink cartridge.



NARCO-DRONES: The Cartels' Newest, Tech Savvy Smuggling SOP Spooks Security Experts

Big Data creates an even greater challenge

>750M container movements (TEU) p.a. to support global trade

The Zettabyte Era
180 Zettabytes by 2025
(current ~60 Zettabytes)

>2 Billion users of mobile, social media, and streaming

Customs Agencies must master three strategies to thrive...

1. Customer oriented processes



Facilitation
Control
Efficiency



2. Intelligence led risk-based supervision



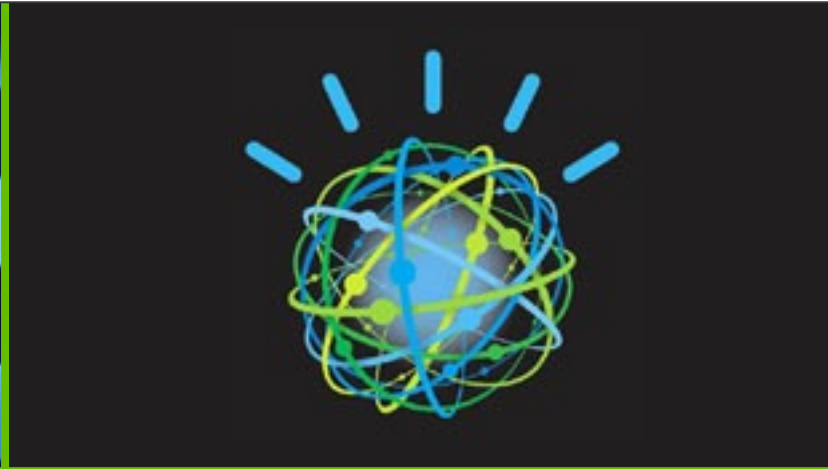
3. Co-ordinated digital clearance processes

Emerging technologies can supercharge these strategies



Blockchain

Trusted, distributed ledger
Shared business processes
Trade and Finance Networks
Mutual recognition



Big Data and AI

Understand | Reason | Learn
Cognitive Object Detection Assistant
Rulings Assistant

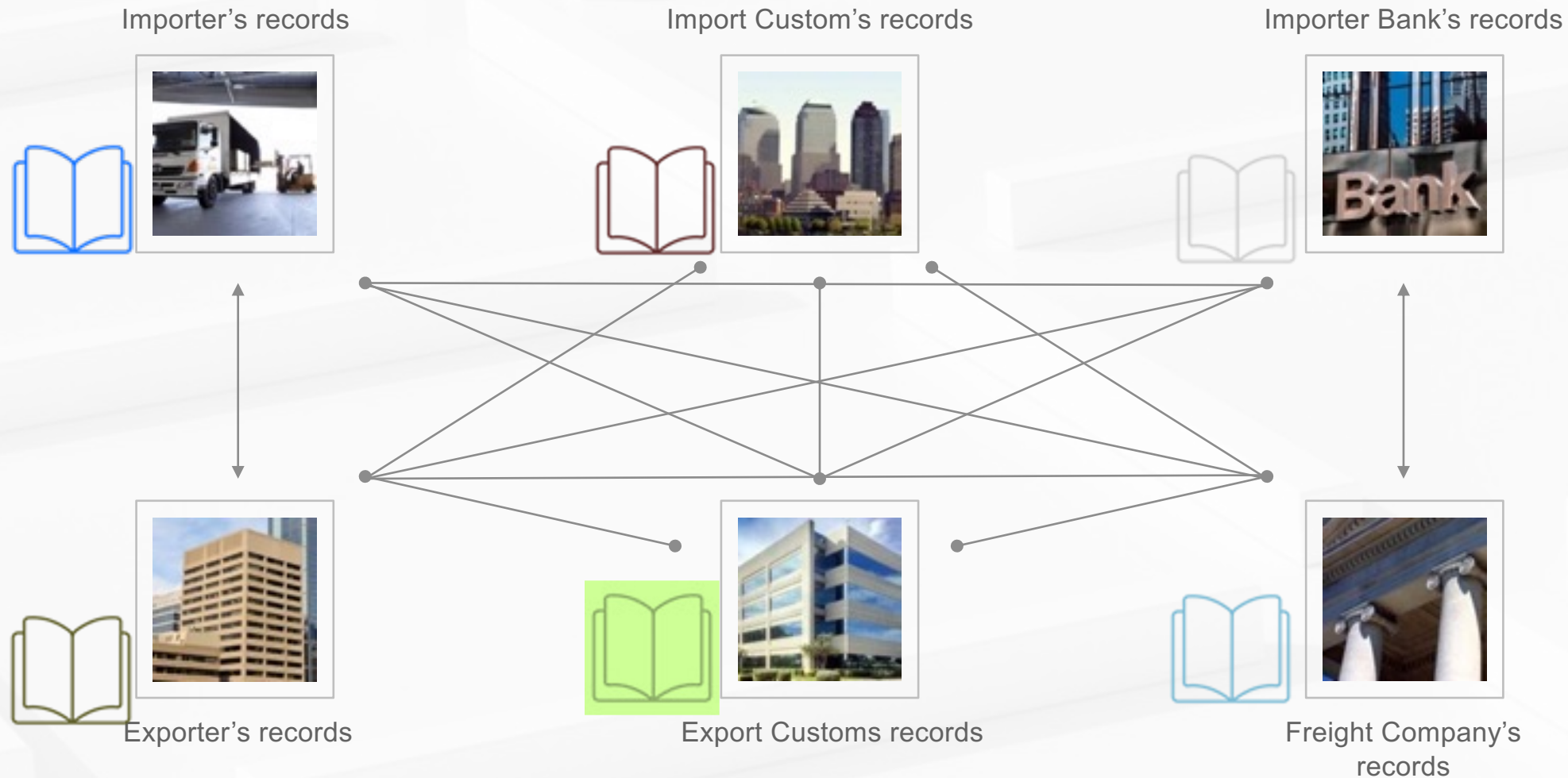


Crypto advances

Connected sensors
ZKPs and FHE
Customs Transit monitoring
Secure trade lanes

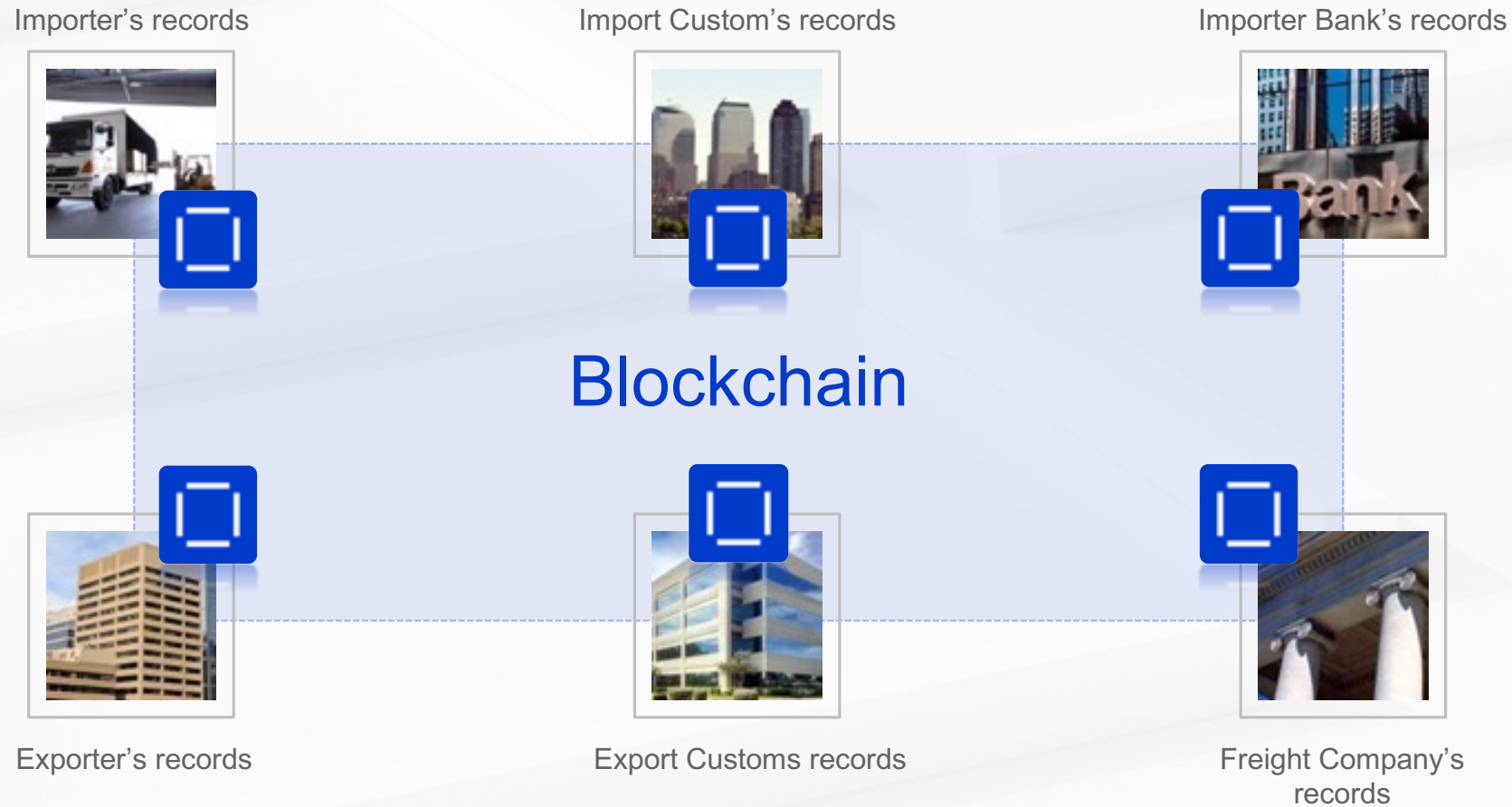
Cross-border supply chain problems of data visibility, process optimization, and demand management

inefficient, expensive, vulnerable



Solution

A shared, replicated, permissioned ledger with consensus, provenance, immutability



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

News from last month!

Blockchain for Banking · News · Supply chain

Citi pilots blockchain bill of lading for trade finance

7 hours ago · by Ledger Insights



Yesterday the blockchain trade platform **TradeLens** announced that Citi piloted a paperless trade transaction for client Syngenta Bangladesh. Agrochemicals were imported to Bangladesh from India with an electronic **bill of lading** (eBL) used to support the Letter of Credit for trade finance.

Using the eBL is estimated to have reduced the transaction by ten days, as well as paperwork costs, postage and charges for storing the container at the port (demurrage).

TradeLens was used to share and validate all the documents, including the eBL, invoice, packing list and certificate of origin. Digitally validating documents also reduces the risk of fraudulent bills of lading.

That's something that the World Trade Organization (WTO) and the International Chamber of Commerce (ICC) have addressed with the **Digital Standards Initiative** (DSI). And for bills of lading, the Digital Container Shipping Association (**DCSA**), backed by several major container shipping firms, has developed the eBL standard recommended by the DSI.

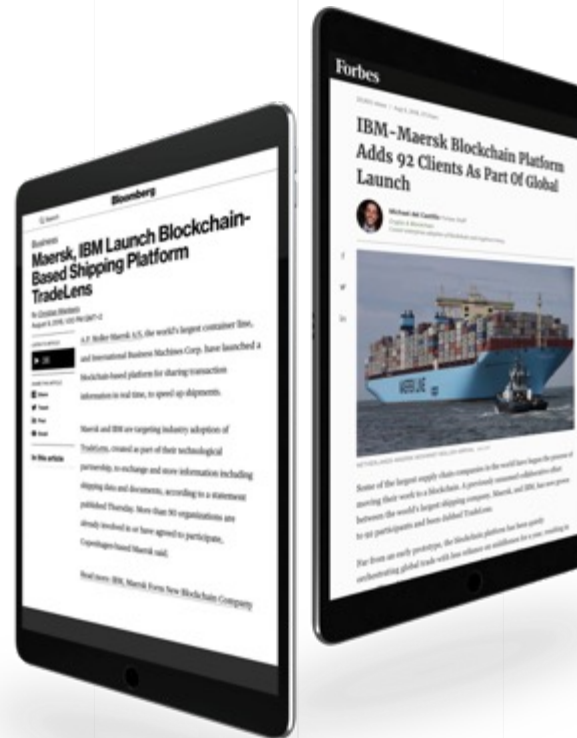
A private sector overview of trade blockchain initiatives

- Trade Logistics
 - Tradelens, Bill of Lading, Global Shipping Business Network, Open Trade Blockchain
- Payments
 - Ripple, SWIFT, Stellar (Worldwire)
- Trade Finance
 - R3 Voltron, we.trade, eTradeConnect
- Food supply chains and agricultural commodities
 - ADM-Bunge-Cargill-Dreyfuss-Cofco for commodity markets, Food Trust with Walmart and others

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

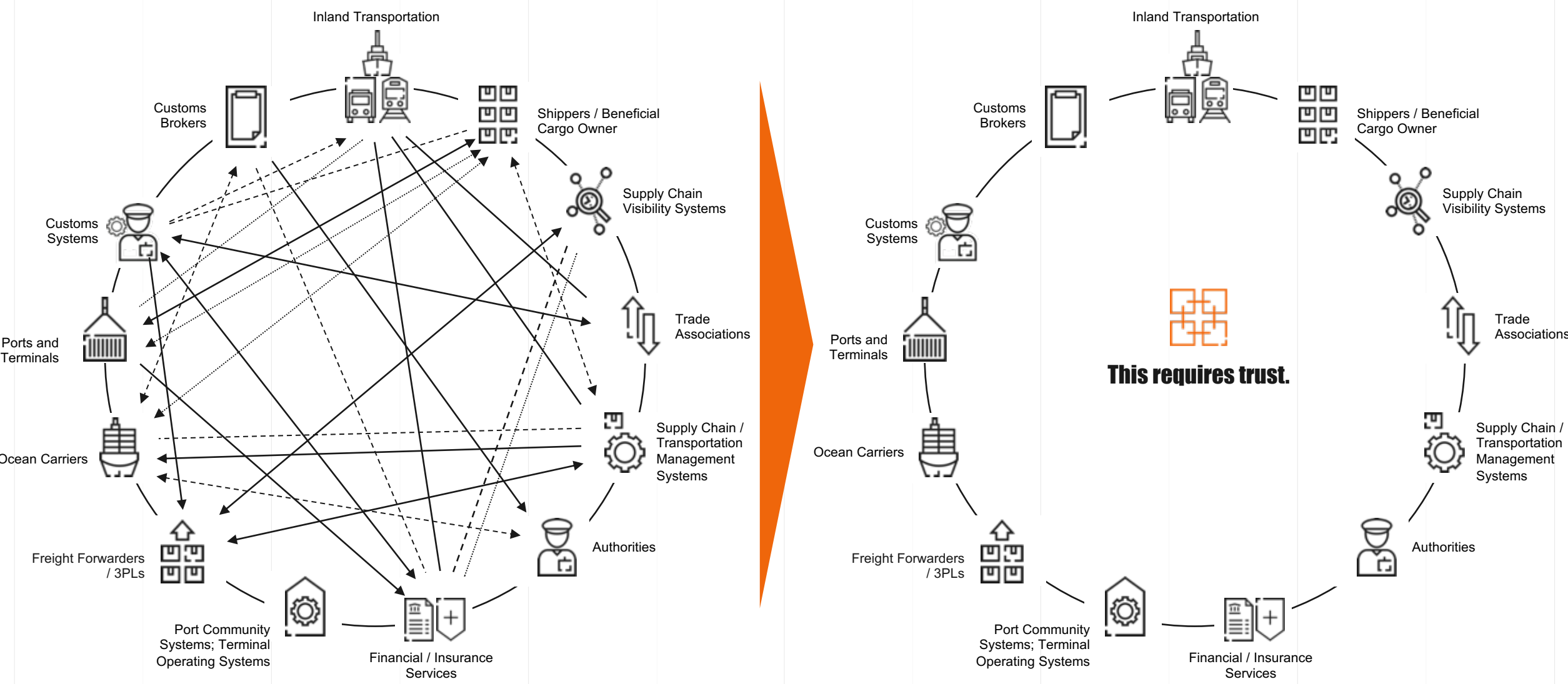
September 2018

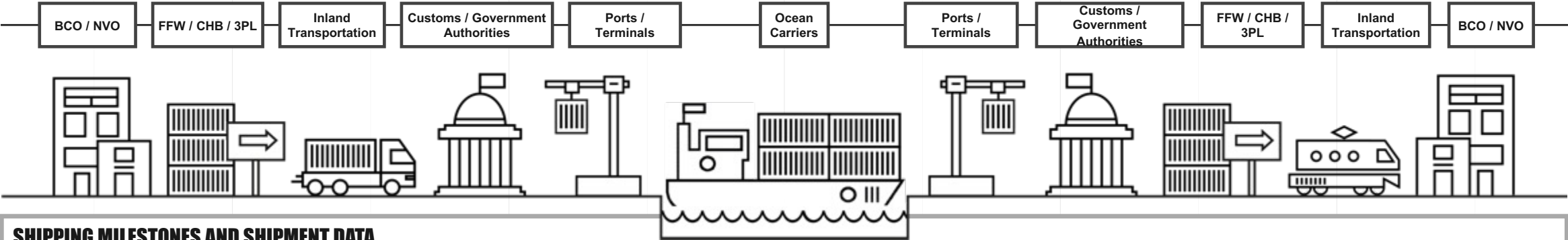
TradeLens Limited Availability Release

December 2018

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

SHIPPER-CENTRIC MODEL TO NETWORK MODEL



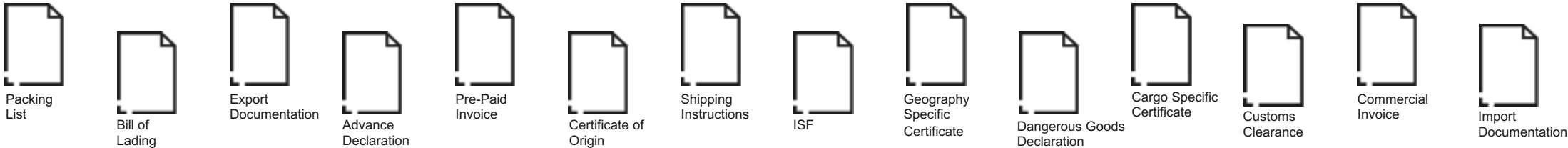


SHIPPING MILESTONES AND SHIPMENT DATA



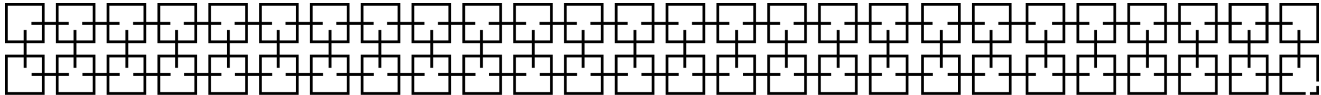
Not exhaustive list of milestones managed by platform

STRUCTURED AND UNSTRUCTURED DOCUMENTS



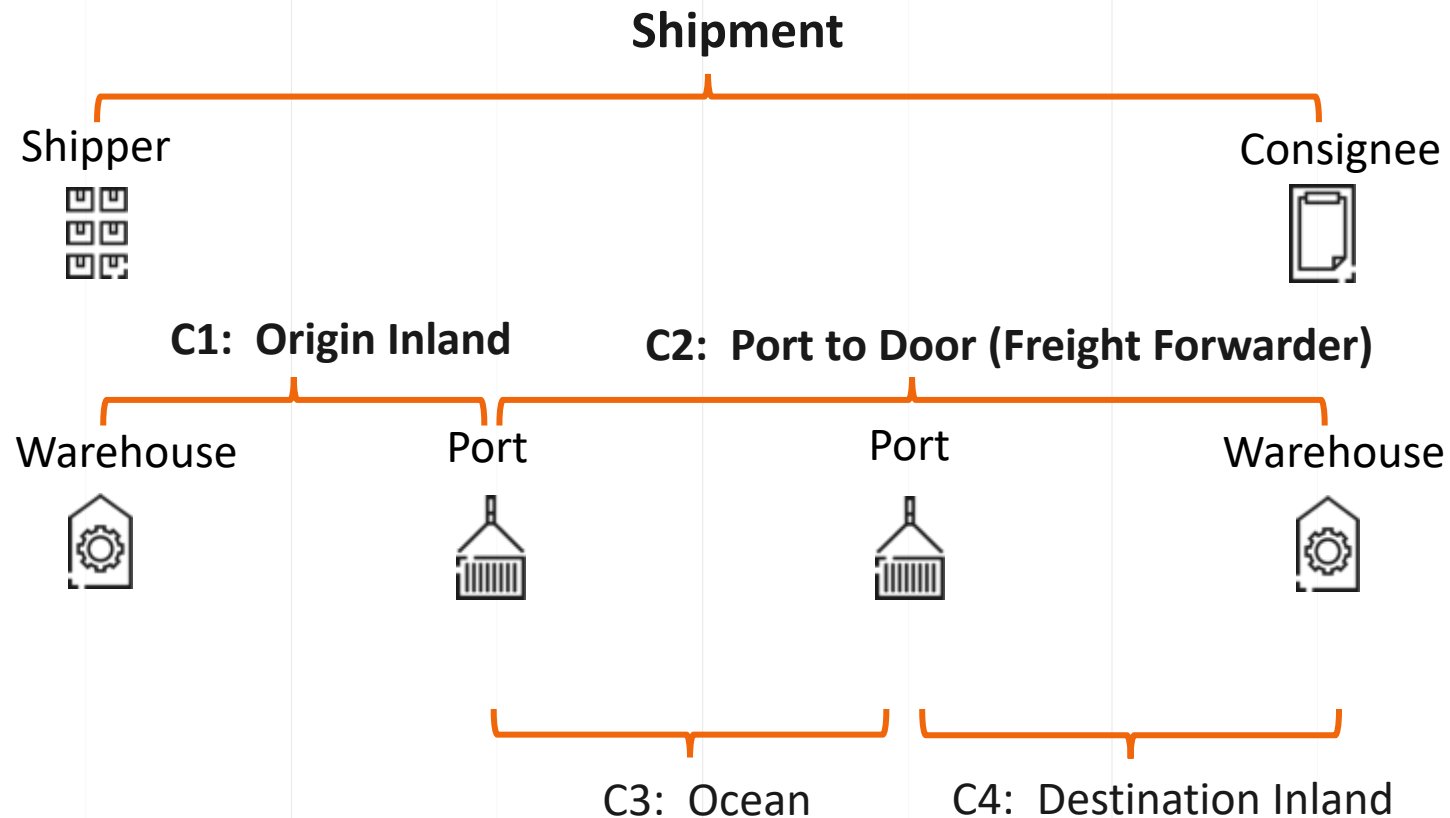
Not exhaustive list of documents managed by platform

TRADELENS BLOCKCHAIN BUSINESS NETWORK



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

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 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

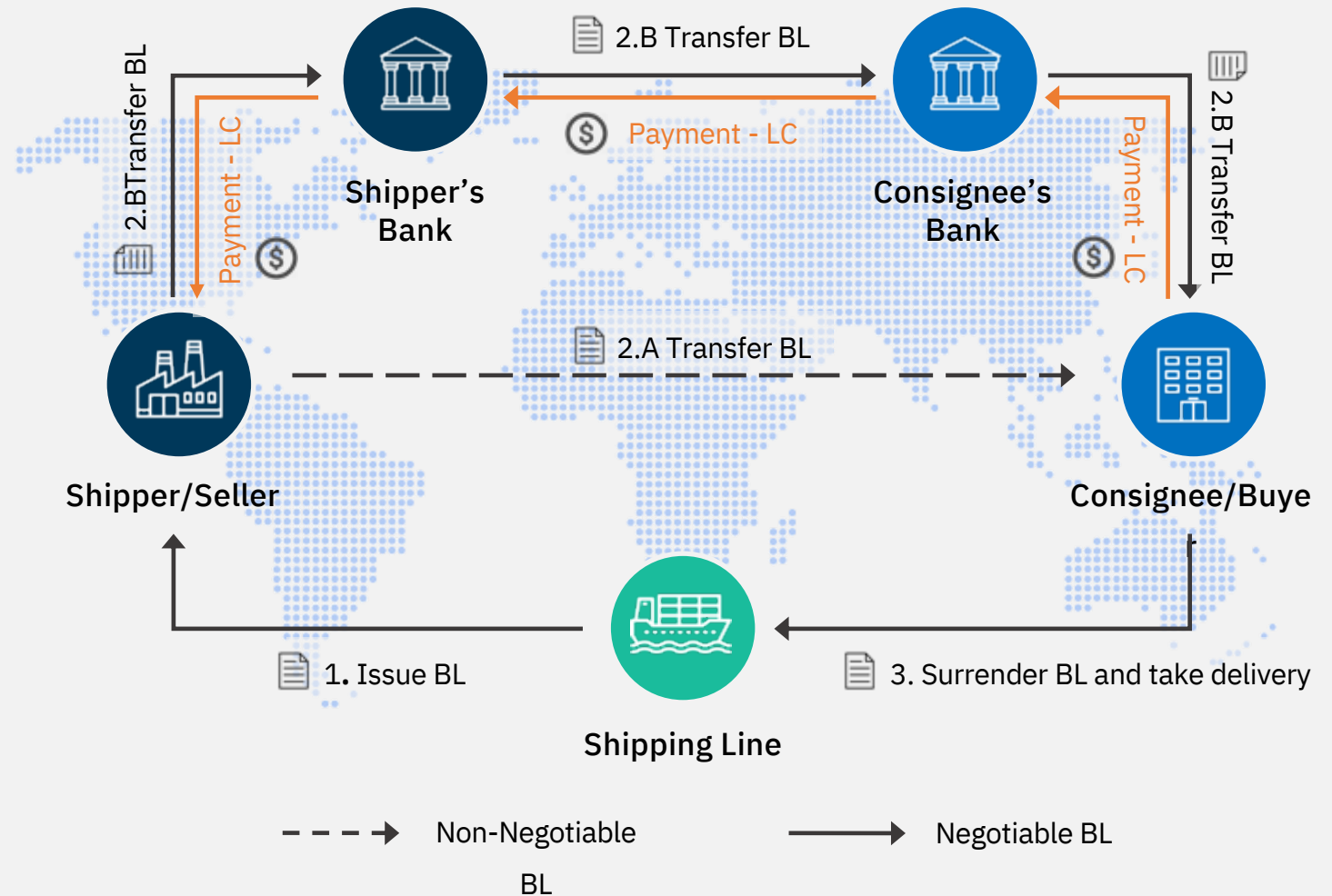
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COMMUNICATION MECHANISMS

- | | | | | | |
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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

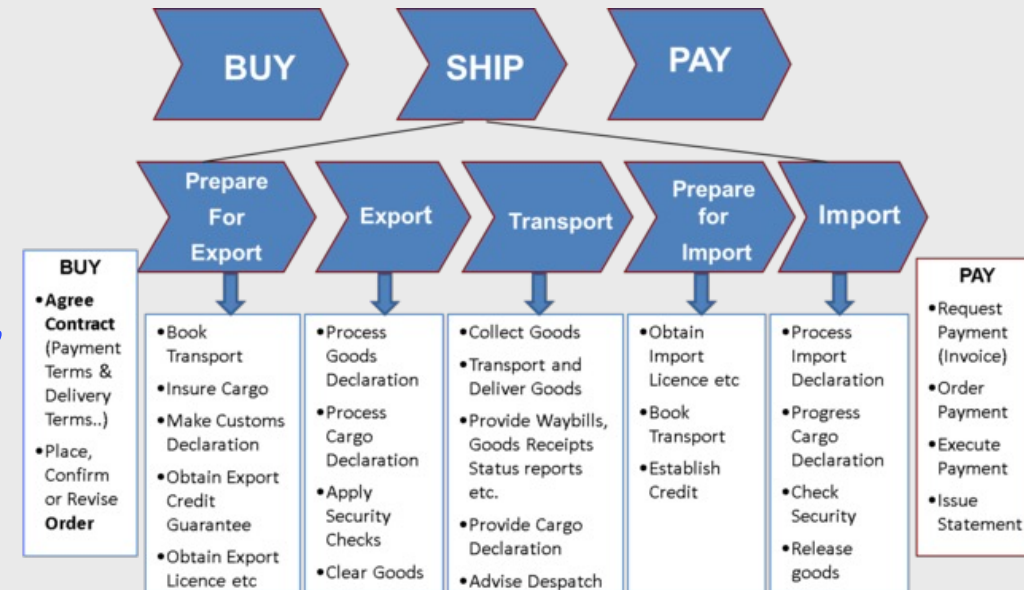
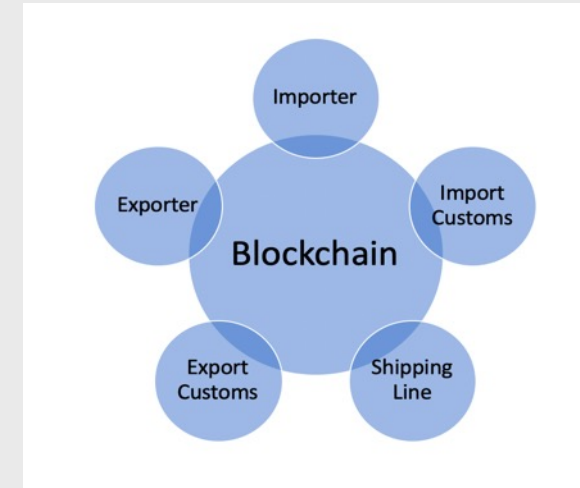


Objective of studying Blockchain for Mutual Recognition

- This work builds upon the findings of the UNESCAP community document *“Mechanism for cross-border mutual recognition of trade-related data and documents in electronic form”*
- The document studied existing mutual recognition approaches like:
MRA of AEO, APEC TEL, PAA MR of PKI, EEU PKI MRA, etc.
- It found commonalities in them including:
governing stakeholder, legal instrument, requirements ownership, implementing bodies, **object and executing method for recognition, mechanism to maintain trust, technical standards, public private co-op**
- In this work we explore the potential of blockchain technology to act as one potential unifying framework/mechanism addressing some mutual recognition requirements like:
 - Objects and execution methods for mutual recognition, Maintaining Trust, Technical standards
 - We also present a case study on a large private blockchain effort (Tradelens) in trade logistics

Objects and execution method for mutual recognition

- We consider trade documents and associated events as objects for cross-border mutual recognition
- We first describe a basic example blockchain network that will be our running example
- We also take a sample trade event from the Buy-Ship-Pay* model like *issuing a purchase order* (or other similar) that gives rise to one document and one event that we will persist and be recognized on the blockchain
- Critical characteristics:
 - Identity, Endorsement, Smart Contract, Authentication, Authorization, Immutability



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**



Summary

- Significant technological advances are being made in the area of digitalization of trade and making it sustainable
- Many of these are in step with regulatory and legal changes that have started to happen
- The technical and regulatory, legal, and technical communities must work collaboratively to digitalize trade and make it sustainable