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 the pace of legitimate trade

**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
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
2. Intelligence led risk-based supervision
3. Co-ordinated digital clearance processes
Emerging technologies can supercharge these strategies

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Cross-border supply chain problems of data visibility, process optimization, and demand management are inefficient, expensive, and vulnerable.
Solution

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

- Importer’s records
- Import Custom’s records
- Importer Bank’s records
- Exporter’s records
- Export Customs records
- Freight Company’s records
Blockchains are well suited for supply chains because they address the underlying challenges inherent in collaborating across a distributed, fragmented supply chain ecosystem. 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.

**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!

Citi pilots blockchain bill of lading for trade finance

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 1.5 million events per day published to the platform
- **December 2018**
  TradeLens General Availability Release
SHIPPER-CENTRIC MODEL TO NETWORK MODEL

This requires trust.
SHIPPING MILESTONES AND SHIPMENT DATA

STRUCTURED AND UNSTRUCTURED DOCUMENTS

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.

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<th>Standards / Master Data</th>
<th>Communities/Organizations</th>
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<tr>
<td>• <strong>Location Data</strong></td>
<td>• Openshipping.org</td>
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<tr>
<td>• UNECE – LOCODE Cities/Ports</td>
<td>• Digital Container Shipping Association (pending regulatory approval)</td>
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<tr>
<td>• SMDG – Terminals</td>
<td>• UN, WCO</td>
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<tr>
<td>• <strong>Transport Data</strong></td>
<td>• GS1</td>
</tr>
<tr>
<td>• IMO – Vessel/Voyage ID’s</td>
<td>• ISO/TC 307</td>
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<tr>
<td>• NMFTA – SCAC Carrier Codes</td>
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<tr>
<td>• <strong>Time</strong></td>
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<tr>
<td>• ISO – ISO8601</td>
<td></td>
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<tr>
<td>• <strong>Identity</strong></td>
<td></td>
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<tr>
<td>• WCO Trader Identification Number (emerging)</td>
<td></td>
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<tr>
<td>• <strong>Business Objects</strong></td>
<td></td>
</tr>
<tr>
<td>• UNCEFACT SCRDM</td>
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</table>
## IT Landscape: The Trade Ecosystem

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<tr>
<th>Cargo Owners</th>
<th>Agents / Intermediaries</th>
<th>Ocean Carriers</th>
<th>Inland Carriers</th>
<th>Terminal Operators</th>
<th>Customs Authorities</th>
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<tr>
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<td>SCM</td>
<td>TMS</td>
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<td>TMS</td>
<td>Bespoke</td>
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<td>PCS</td>
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<td>Bespoke</td>
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<td>National Single Window Systems</td>
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<td>PGA/OGA Systems</td>
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### Systems of Record

- ERP
- SCM
- TMS
- Bespoke
- Forwarding Systems
- Customs Declaration Systems
- Document Mgmt Systems
- TMS
- Bespoke
- TMS
- Bespoke
- Manual
- TOC
- PCS
- National Single Window Systems
- PGA/OGA Systems

### Communication Mechanisms

- ANSI X12
- UN/EDIFACT
- Spreadsheets
- API
- Email
- ANSI
- UN/EDIFACT
- Spreadsheets
- API
- XML
- UN/EDIFACT
- ANSI X12
- API
- Bespoke EDI
- UN/EDIFACT
- API
**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

* https://communities.unescap.org/cross-border-paperless-trade-facilitation/working-documents
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

* http://itfig.unece.org/contents/buy-ship-pay-model.htm
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