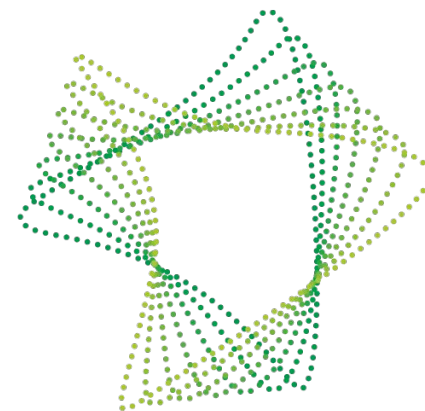# Verifiable Credentials and Cross-Border Trade with TradeTrust and OpenAttestation

W3C TPAC 2023
IMDA and GovTech

13 September 2023

## Outline

- Background
- OpenAttestation
- Digitalising Cross-Border Trade Documents with TradeTrust
- TradeTrust Demo
- Q&A

# What is OpenAttestation?

- OpenAttestation is an open-source document endorsement and verification framework created by GovTech in 2018

| Tamper-Evident Credentials | Selective Disclosure | Decentralised Rendering | Verified Issuer's Identity |
|---|---|---|---|

# Status

- At version 3.0, and on [GitHub](GitHub)
- More than 10M verification collectively globally in 2022
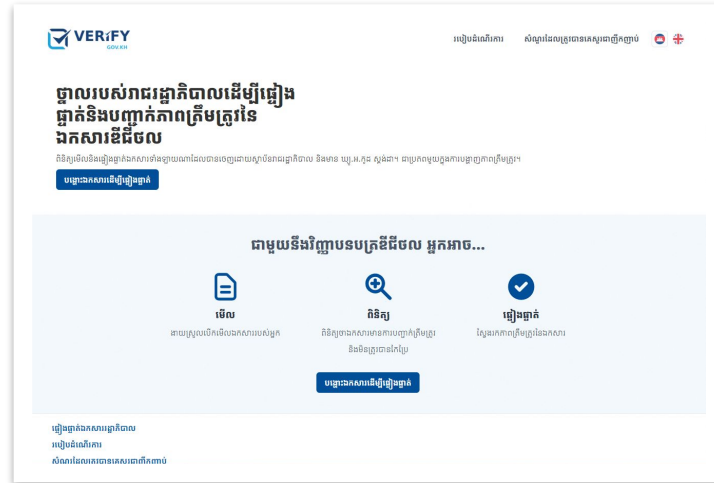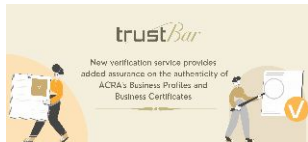
# Top 35 Countries by Verifications

Afghanistan
Australia
Bangladesh
Cambodia
Canada
China
France
Germany
Greece
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Malaysia
Maldives
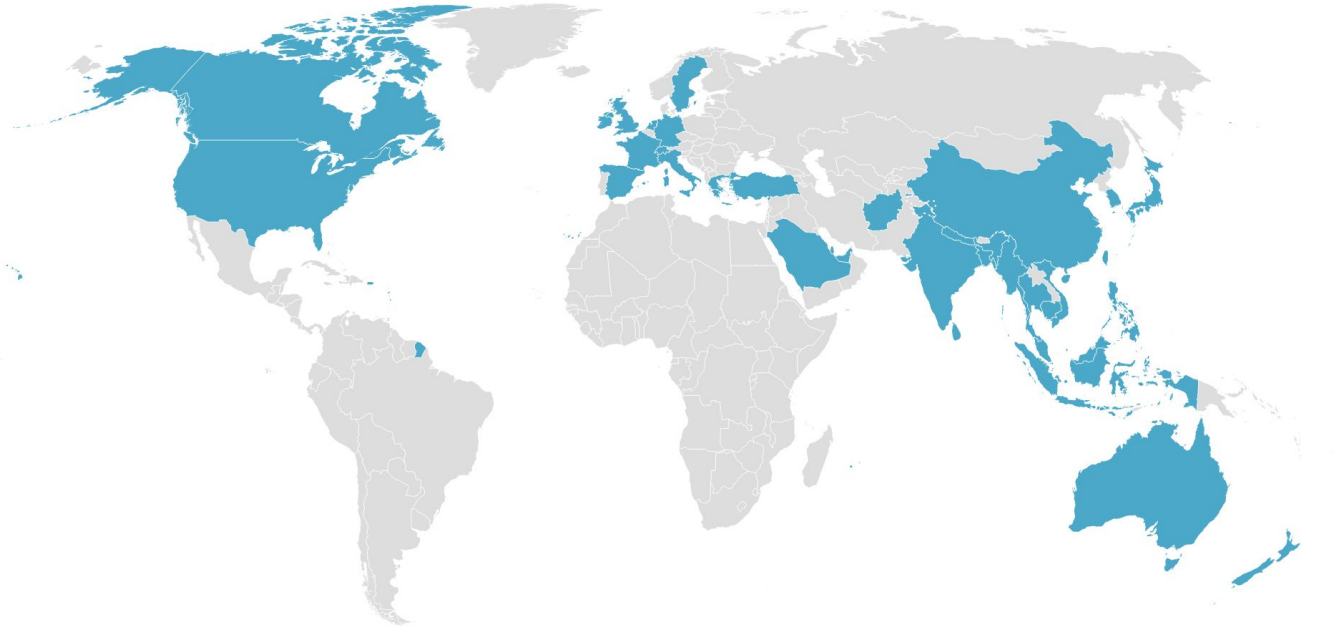
Myanmar (Burma)
Nepal
Netherlands
New Zealand
Philippines
Qatar
Saudi Arabia
South Korea
Spain
Sri Lanka
Sweden
Switzerland
Thailand
Turkey
United Arab Emirates
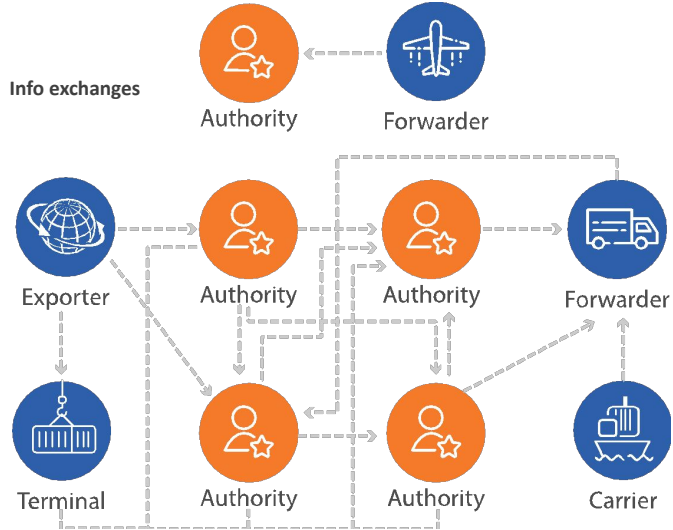United Kingdom
United States
Vietnam

Source: GovTech Singapore • Created with Datawrapper

# Digitalising Cross-Border Trade Documents with TradeTrust

# The challenges of cross-border trade documentation and the benefits of digitalisation

## Complexity of Cross-Border Trade

**Info exchanges**

Authority — Forwarder

Exporter — Authority — Authority — Forwarder

Terminal — Authority — Authority — Carrier

Just 1 shipment involves
- **Many parties** across different sectors
- **Many exchanges** of information
- **Many silo systems**
- **Up to 50 sheets of paper, exchanged up to 30 different stakeholders^**

### Inefficient
- Manual handling
- Vulnerable to fraud

### Fragmented Systems
- Costly connections
- No interoperability

### Shipping Cost

**20%**

**Cost of documentation is 20%* of cost of shipping**

This inefficiency is **costly**

## Benefits of Digitalisation^

**US$6.5bn**

Direct Costs Saving

**US$15.5bn**

Indirect Benefit to Shipping Ecosystem

**US$30bn-40bn**

New Global Trade through adoption of eBL in international trade

*Maersk and IBM's Paper Trail Research in 2014*
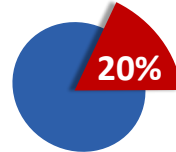*^McKinsey Study "The multi-billion-dollar paper jam: Unlocking trade by digitalizing documentation" in 2022*

# Why hasn't trade digitalisation taken off

## Existential Symptoms and Issues to Digitalisation

### Lack of Trust
- Transactions between companies with limited touchpoints
- Companies forced to adopt paper as the most interoperable medium but *struggle with* determining *authenticity* and *source* of documents

### Digital Maturity Varies Across the Cross-Border Trade Value Chain
- The entire ecosystem is at *various stages of development*
- If one part of the chain is paper, all other documents revert to paper

### Siloed Digital Ecosystems
- Existing technology solutions and platforms are generally *not interoperable*
- Fractured ecosystem. Parties forced to choose one or multiple systems
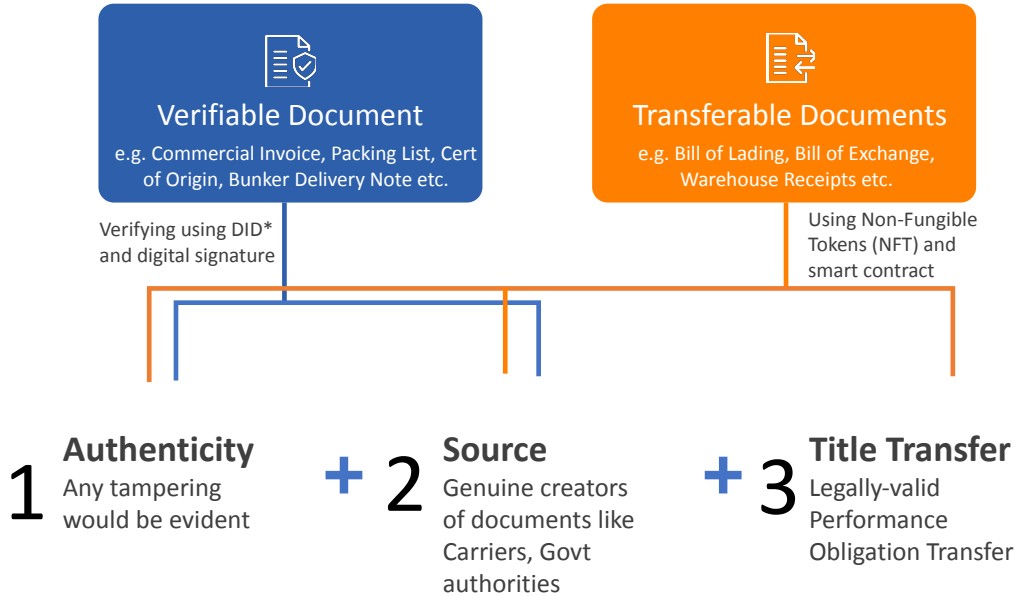
### Legal Uncertainty of Digital Transferrable Documents
- Until recently^, *only paper Transferable Documents were legally valid* under statute law
- Therefore, transfers of title ownership via such documents could not be performed electronically

*^Singapore's 2021 amendment of its Electronic Transactions Act (ETA), one of the first few internationally, enables the creation and use of ETRs such as electronic Bills of Lading (eBLs), empowering practitioners to reap the benefits of digitalisation more easily.*

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# Tradetrust's 3 key functionalities: authenticity, source & title ownership for trade documents

TradeTrust is designed to provide industry the means to verify the **authenticity** and **source** of a document, as well as to create Electronic Transferable Records (ETRs) that are functionally equivalent^ to their paper versions (e.g. able to **effect title transfers).**

### Verifiable Document
e.g. Commercial Invoice, Packing List, Cert of Origin, Bunker Delivery Note etc.

Verifying using DID* and digital signature

### Transferable Documents
e.g. Bill of Lading, Bill of Exchange, Warehouse Receipts etc.

Using Non-Fungible Tokens (NFT) and smart contract

**1** **Authenticity**
Any tampering would be evident

**+ 2** **Source**
Genuine creators of documents like Carriers, Govt authorities

**+ 3** **Title Transfer**
Legally-valid Performance Obligation Transfer

## Core-Tech of TradeTrust

- Uses Decentralised Identifiers (DID) and digital signatures to verify the source and authenticity of documents.

- Uses Blockchain to create Non-Fungible Tokens (NFTs) to represent title ownership and enable transfers from one party to the next.

^Singapore's 2021 amendment of its Electronic Transactions Act (ETA), one of the first few internationally, enables the creation and use of ETRs such as electronic Bills of Lading (eBLs), empowering practitioners to reap the benefits of digitalisation more easily.

*Decentralized Identifiers (DID) are a new type of unique cryptographically verifiable identifiers that are designed to be decoupled from centralized registries, identity providers and certificate authorities

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# What is TradeTrust

**TradeTrust** is a framework that comprises **globally-accepted standards** that connect governments and businesses to a **public blockchain** to enable **trusted interoperability** of electronic trade documents **across digital platforms** AND it is offered as a **digital utility.**

## 4 Key Components of TradeTrust

### Legal Harmonisation

**1** *Provide legal validity for electronic negotiable documents through compliance to MLETR requirements*

### Accreditation Framework

**3** *Certify technical solutions meet the requirements of the law*

### Standards Development

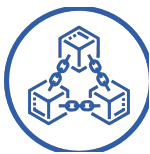**2** *Develop international standards that TradeTrust complies to*

### Software Components

**4** *A set of open-source software code that can easily integrate backend solutions to the TradeTrust network*

# TradeTrust's Key Design Principles

**Public Blockchain**
No central governance
authority

**Data Off-Chain**
Preserves data
confidentiality

**Payload Agnostic**
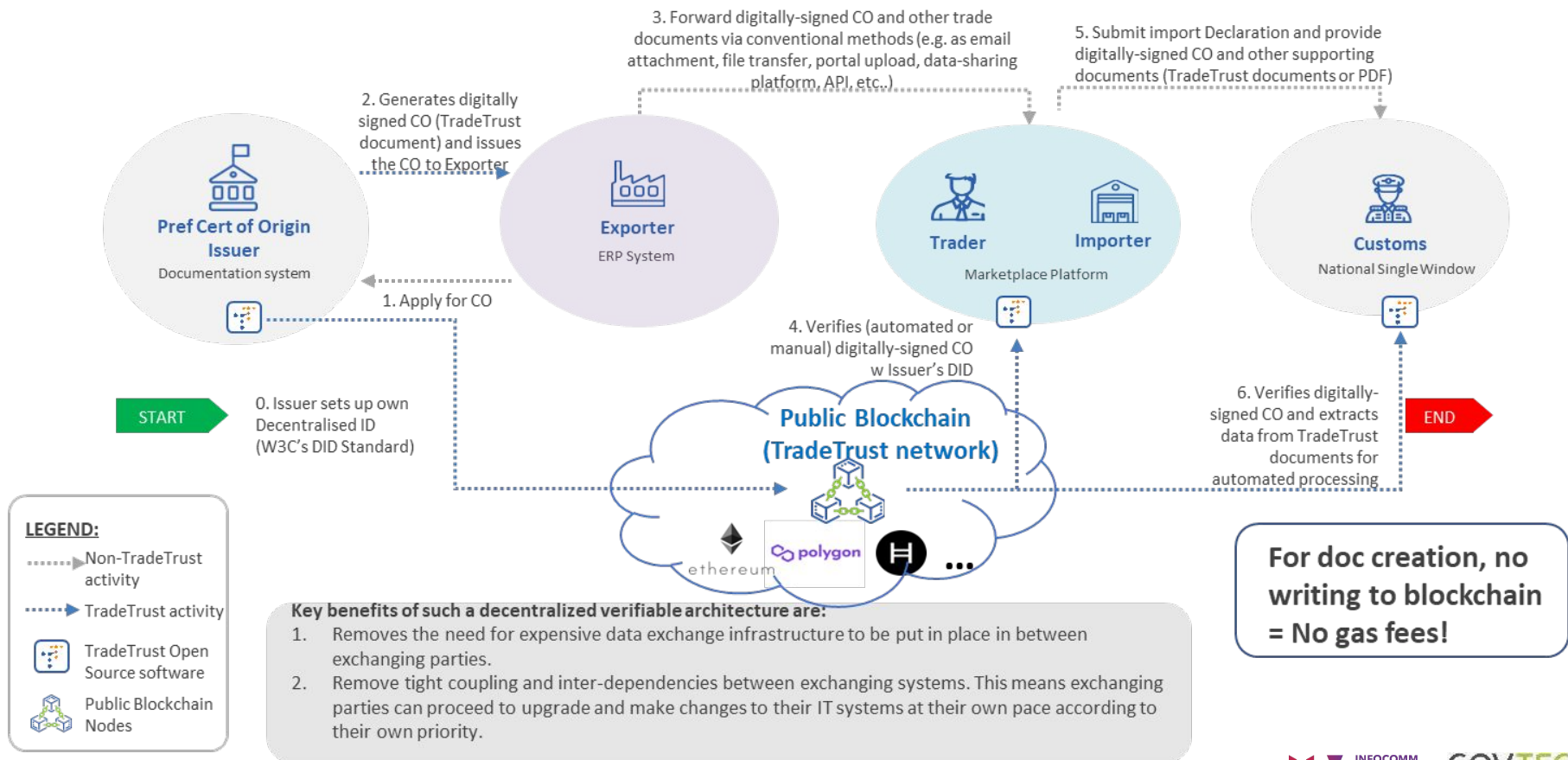No data format or
standards restrictions

**Open-Source**
Full transparency for
faster adoption

**MLETR-Compliant**
Meet the requirements of the law
(for electronic negotiable documents)

TradeTrust also aligns with the **9 Principles of Digital Development** - *https://digitalprinciples.org/*

# Verifiable documents' interoperability

3. Forward digitally-signed CO and other trade documents via conventional methods (e.g. as email attachment, file transfer, portal upload, data-sharing platform, API, etc..)

5. Submit import Declaration and provide digitally-signed CO and other supporting documents (TradeTrust documents or PDF)

2. Generates digitally signed CO (TradeTrust document) and issues the CO to Exporter

**Pref Cert of Origin Issuer**
Documentation system

**Exporter**
ERP System

**Trader**       **Importer**
Marketplace Platform

**Customs**
National Single Window

1. Apply for CO

4. Verifies (automated or manual) digitally-signed CO w Issuer's DID

6. Verifies digitally-signed CO and extracts data from TradeTrust documents for automated processing

START

0. Issuer sets up own Decentralised ID (W3C's DID Standard)

**Public Blockchain (TradeTrust network)**

ethereum     polygon     H     ...

END

**For doc creation, no writing to blockchain = No gas fees!**

**LEGEND:**
- - - ▶ Non-TradeTrust activity
······▶ TradeTrust activity
TradeTrust Open Source software
Public Blockchain Nodes

**Key benefits of such a decentralized verifiable architecture are:**
1. Removes the need for expensive data exchange infrastructure to be put in place in between exchanging parties.
2. Remove tight coupling and inter-dependencies between exchanging systems. This means exchanging parties can proceed to upgrade and make changes to their IT systems at their own pace according to their own priority.

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# Dealing with transferable documents (Bill of Lading as an example)

**Paper Transferable Instrument**

**Electronic Transferable Record**





**TITLE ownership**
**(On Public Chain)**

**+**

**BL Data**
**(In Business App Server)**

# Enabling transferable documents' interoperability across different digital ecosystems
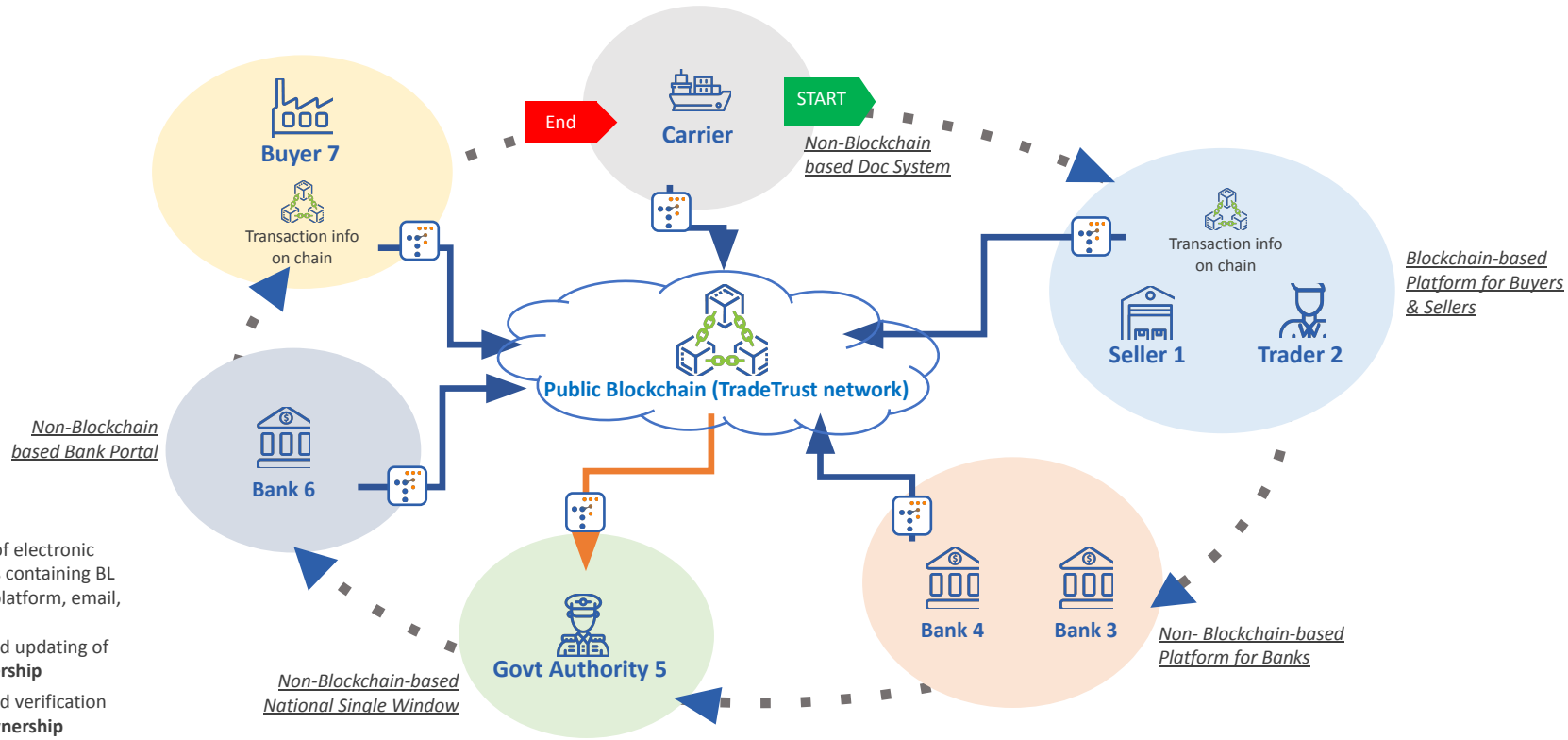
# Typical pilot use case: cross-border trade financing involving eBLs
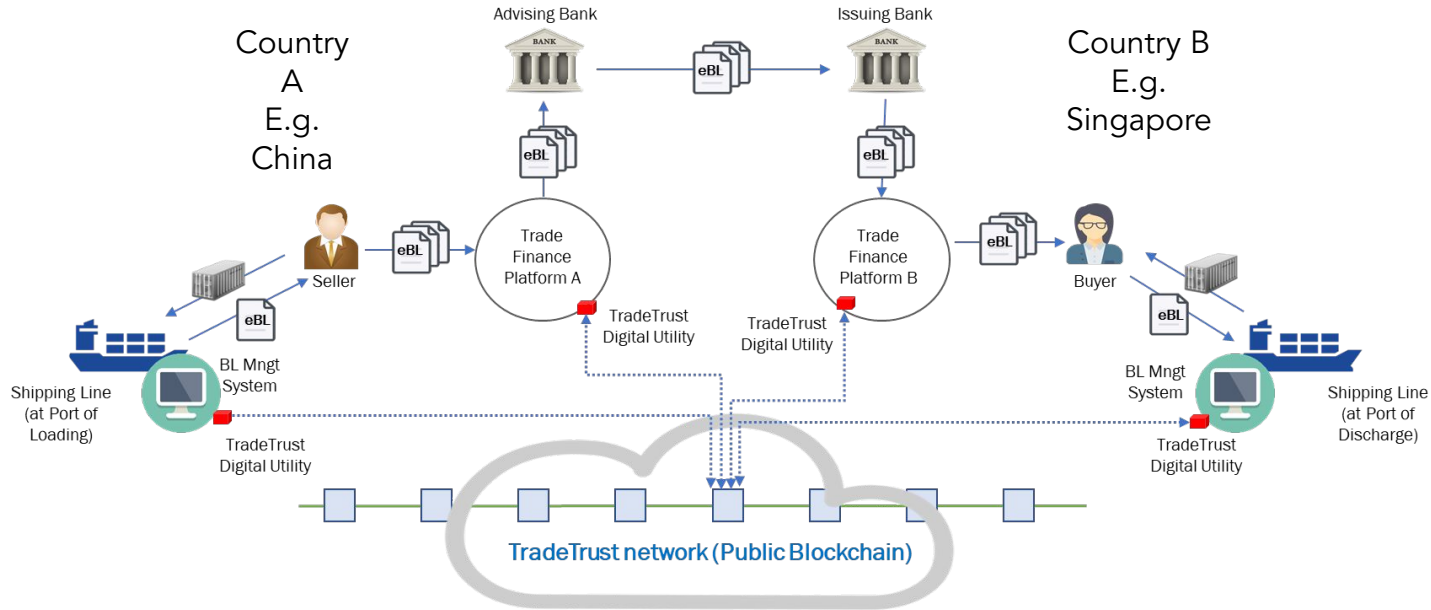


Using a public and permissionless blockchain network, TradeTrust enables all transacting parties such as Buyers, Sellers, Banks and Shipping Lines to validate and perform title transfers of eBLs that are commonly used in documentary trade financing (e.g. Letter of Credit) transactions, all in a decentralised manner

# 20 pilots with industry partners and overseas governments



UK - Singapore
Ongoing

Beijing, China - Singapore
Ongoing

Japan - Philippines
Mar 2021
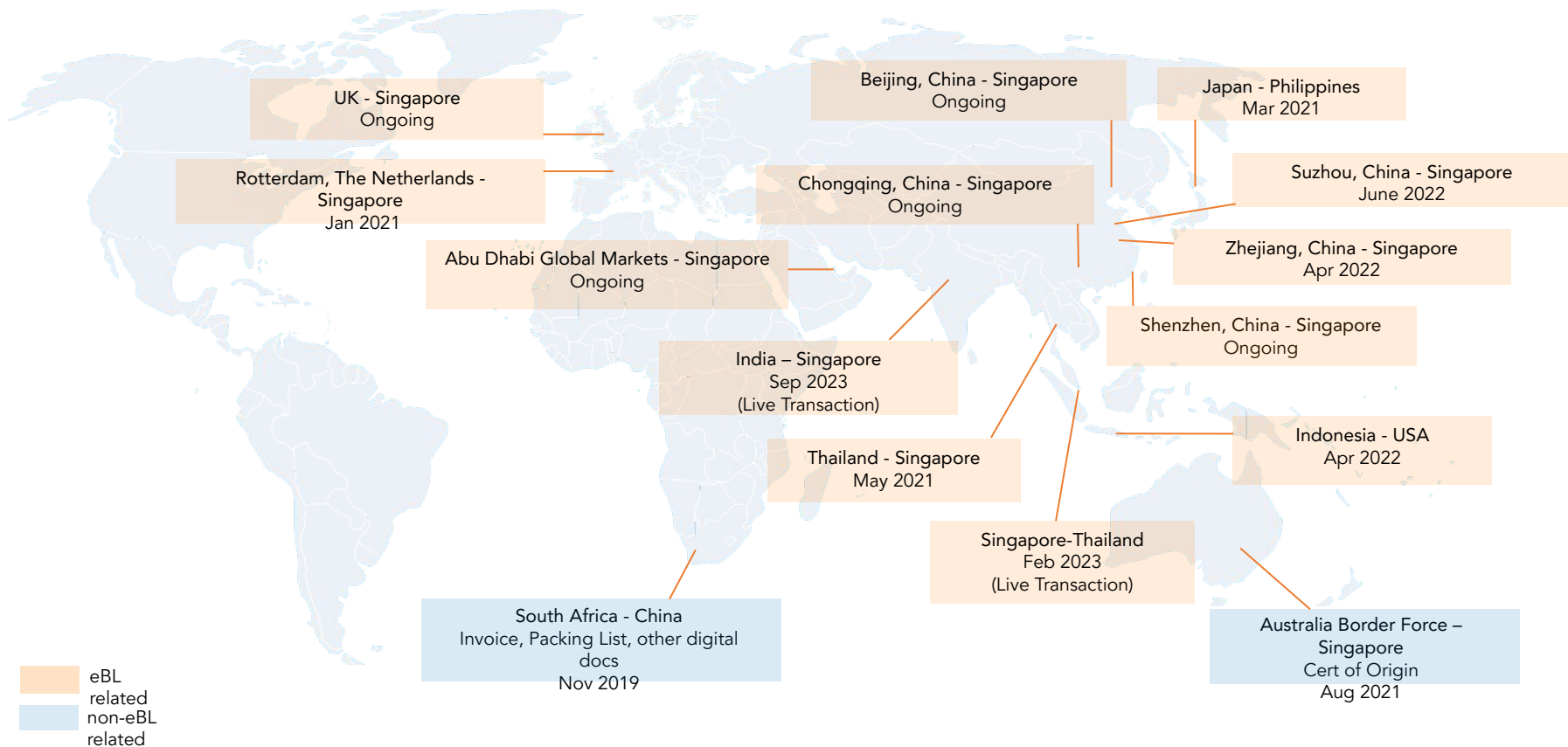
Rotterdam, The Netherlands -
Singapore
Jan 2021

Chongqing, China - Singapore
Ongoing

Suzhou, China - Singapore
June 2022

Abu Dhabi Global Markets - Singapore
Ongoing

Zhejiang, China - Singapore
Apr 2022

Shenzhen, China - Singapore
Ongoing

India – Singapore
Sep 2023
(Live Transaction)

Thailand - Singapore
May 2021

Indonesia - USA
Apr 2022

Singapore-Thailand
Feb 2023
(Live Transaction)

South Africa - China
Invoice, Packing List, other digital
docs
Nov 2019

Australia Border Force –
Singapore
Cert of Origin
Aug 2021

eBL related

non-eBL related

# GLOBAL PARTNERSHIPS

## ADGM
AN INTERNATIONAL FINANCIAL CENTRE

World's first digital trade financing pilot between MLETR-harmonised jurisdictions

**Australian BORDER FORCE** · **INFOCOMM MEDIA DEVELOPMENT AUTHORITY**

### Media release

This is a joint media release between the Australian Border Force, IMDA Singapore and Singapore Customs

**Australia and Singapore's blockchain trial shows promising results for reducing transaction costs**

### SWIFT and Singapore's IMDA Join Forces to Drive Global Trade Digitalisation

TRADE, 6 OCTOBER 2020

*Collaboration combines the reach, scale and reliability of SWIFT with IMDA's efforts on technology and legal frameworks to accelerate trade digitalisation*

## UOB

**UOB leads IMDA's pilot on digitalising cross-border trade flows between Singapore and China using blockchain framework, TradeTrust**

*Successful pilot demonstrates significance of electronic bills of lading with turnaround time reduced from a few days to within an hour*

**Ministry of Communications and Information** — An Engaged and Connected Singapore · **INFOCOMM MEDIA DEVELOPMENT AUTHORITY**

### Media Release
EMBARGOED TILL 1300HR GMT+8, 18 October 2021

**Four New MOUs Signed at the 2nd Singapore – China (Shenzhen) Smart City Initiative Joint Implementation Committee Meeting To Accelerate Digital Economy Collaborations**
*Three Successful Digital Cross-Border Trade Trials Completed: Businesses Will Be Able To Benefit from Faster and More Secured Transactions*

**Port of Rotterdam** · **Olam** · **ONE OCEAN NETWORK EXPRESS**

### Singapore and Rotterdam successfully complete trial with electronic bill of lading

12 May 2021

Singapore and the Netherlands have collaborated since 2019 to explore electronic bills of lading (eBL) on the Europe-Far East trade lane where Singapore and Rotterdam are two major transhipment ports. This trial demonstrated that an eBL issued by one platform could be verified and processed by another digital trade platform.

## JAN 2020 MOI TO FURTHER DIGITALISATION IN TRADE



**INFOCOMM MEDIA DEVELOPMENT AUTHORITY** · **ICC INTERNATIONAL CHAMBER OF COMMERCE**

APRIL · DBS · Marubeni · mastercard · Mitsubishi Corporation · MUFG · MITSUI&CO. · MIZUHO · noble · NTT DaTa · PSA · Standard Chartered · Sumitomo Corporation · SMBC · YOKOHAMA · TRAFIGURA

**ExxonMobil** · **ULK** · **BUNKER CHAIN**

**IMDA partners industry to conduct world's first live electronic transferable record (ETR) cross-border trade, supported by statutory law framework.**

PRESS RELEASES

| PUBLISHED ON: 11 APRIL 2023 | 5 MINS READ

**SINGAPORE - 30 MARCH 2023** – Singapore pushes the boundaries of digitalisation for global trade as the Infocomm Media Development Authority (IMDA) partnered industry players and successfully executed a live shipment from Singapore to Thailand during Q1 2023. This fully paperless, live cross-border trade involved the use of an ETR, that is functionally equivalent to a paper Bill of Lading (BL) using Singapore's TradeTrust[1] framework.
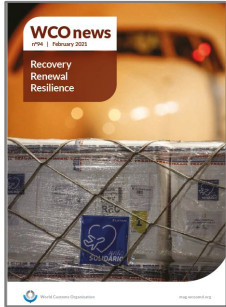
## Platform Providers

**ANGSANA TECHNOLOGY** Make IT Simple · **banco** · **BUNKER CHAIN** · **CrimsonLogic** Solutions. Simplified. A member of the PSA Group · **DIMUTO** · **dlt ledgers** · **DOCKLAB** · **FUIX LABS.** · **GUUD** BUY SHIP PAY

**Jed** · **JUPYTON** · **Linklogis** · **MORPHEUS.NETWORK** · **Red Date Tech** · **sgtradex** · **Tradego** · **TRAMES** · **veriTAG**
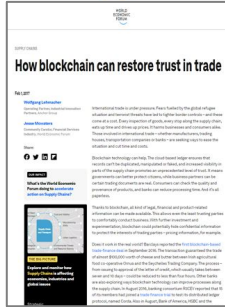
# INTEREST FROM NOTABLE INSTITUTIONS GLOBALLY



WORLD CUSTOMS ORGANIZATION

https://mag.wcoomd.org/magazine/wco-news-94/tradetrust-accelerating-the-digitalization-of-international-trade

WORLD TRADE ORGANIZATION

www.wto.org/english/res_e/publications_e/wcotech22_e.htm

WORLD ECONOMIC FORUM

www.weforum.org/agenda/2017/02/blockchain-trade-trust-transparency

ICC

https://iccwbo.org/publication/standards-toolkit-for-cross-border-paperless-trade

TRADE FINANCE GLOBAL

www.tradefinanceglobal.com/posts/imda-tradetrust-interoperability-framework-road-to-achieving-cross-border-paperless-trade

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

unece.org/sites/default/files/2022-06/010_Verifiable-Credentials-CBT.pdf

ESCAP 75 MOVING FORWARD TOGETHER
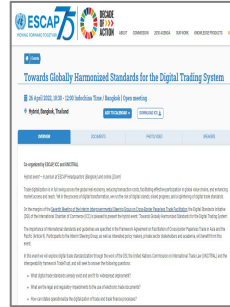
www.unescap.org/events/2022/towards-globally-harmonized-standards-digital-trading-system
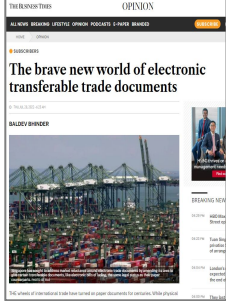
THE BUSINESS TIMES

www.businesstimes.com.sg/opinion/the-brave-new-world-of-electronic-transferable-trade-documents

THE BUSINESS TIMES

www.businesstimes.com.sg/opinion/singapore-at-the-helm-of-digital-trade

FINANCIAL TIMES

www.ft.com/content/05504fcb-11e6-47a0-8860-7d156d1d82ab

BLACKSTONE & GOLD

www.blackstonegold.com/bt-the-brave-new-world-of-electronic-transferable-trade-documents

WORLD TRADE ORGANIZATION

www.wto.org/english/res_e/publications_e/tradtechpolicyharddigit0422_e.htm

TradeTrust

IMDA INFOCOMM MEDIA DEVELOPMENT AUTHORITY

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# Demo

- Redactable eBL
  - From a supplier, eBL can be reused for downstream supplier to its' buyer.
- Renderer in this case is hosted by the original issuer.
- QR code allows a simple way to take part in the digital trade.

# W3C Verifiable Credentials Interoperability

- V4.0: OpenAttestation data model to be compatible with W3C VC
- OpenAttestation proof method
- Decentralised Renderer
- Paper-Friendly Verifiable Credentials using QR Code

# Wrap Up

- Make OpenAttestation and TradeTrust successful
- Participate in the W3C Verifiable Credentials Working Group
- Website: https://www.openattestation.com/
- GitHub: https://github.com/Open-Attestation
- Contact: openattestation_support@tech.gov.sg