Trade Facilitation using Blockchain Technology – Building Trust and Transparency

Susmita Majumder
Business Transformation Consultant
IBM India Ltd

Agenda

→ IBM Engagement with ADB on Trade Facilitation for Govt. of Maldives

→ Fundamentals of Blockchain Technology

→ High Level Blockchain Use Cases on Trade Facilitation

→ Key Recommendations to Blockchain Adoption in Customs Administration

→ Blockchain Pilot Implementation on Trade Facilitation for Govt. of Maldives

IBM Engagement with ADB on Trade Facilitation for Govt. of Maldives

IBM-ADB Engagement on Govt. of Maldives on NSW Initiative

IBM conducted Blockchain feasibility assessment on Maldives Trade Processes in March, April 2019:

- Blockchain use cases with suitable value drivers were proposed basis understanding of the pain areas in international trade processes in Maldives

- The envisioned Blockchain solution was proposed to facilitate seamless exchange of information among various participants, government and private entities alike, including cross border exchange of data between government agencies.

- A high-level roadmap for implementation of the Blockchain technology as NSW backbone was chalked out.

IBM built the Blockchain pilot platform for Maldives Sea Import Trade Process in 2020-21 & 2022-23:

- Under ADB's NSW initiative in mid 2019 IBM proposed to build a pilot Blockchain platform for Maldives import trade process to address their then current problems in domestic and cross border trade

- Between Sept 2020 and June 2023, in 2 phases, IBM developed the Blockchain pilot platform under this NSW initiative for Maldives import trade processes.

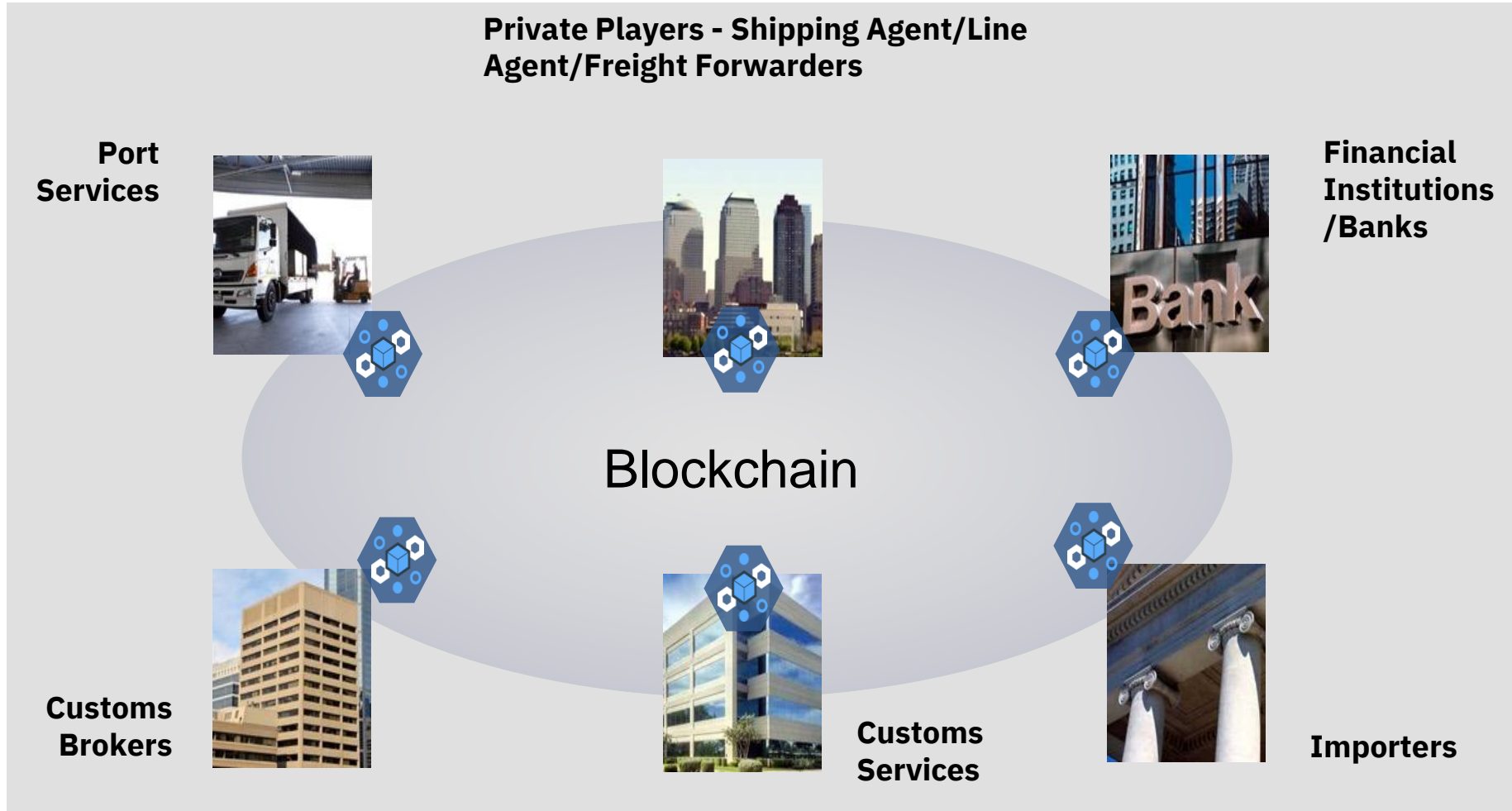| #	Pain Points	Importer	Exporter	Customs	Customs Broker	Ports	Airports	Shipping Agent	Freight Forwarders	Banks	Insurance	Regulators/ CBRA's
1	Risk of trade document fraud	✻		✻								✻
2	Multiple accounts lock-in	✻	✻		✻			✻				
3	Process Duplication	✻	✻	✻	✻	✻	✻	✻	✻			✻
4	Compliance Enforcement			✻								✻
5	Cross Border Collaboration			✻		✻	✻			✻	✻	
6	Trust & Reliability	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻
7	Standardization	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻
8	Security & Privacy			✻		✻				✻	✻	✻
9	Process Transparency	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻	✻
10	Manual Payments	✻	✻		✻	✻	✻	✻		✻		✻

Primary Design Considerations for the Blockchain Platform were:

- **Process and data standardization** to eliminate redundancies and reduce opacity of the process

- **Single source of truth** at any point of time

- **Process and system ownership with government agencies** to ensure credibility of the system and reinforce trust amongst stakeholders

- **Single window system for all interaction between all stakeholders** – state agencies, private organizations, brokers and individuals

- **Customer centric design**

- **Digital payments and smart digital contracts** as key catalysts for domestic and regional trade facilitation.

Fundamentals of Blockchain Technology
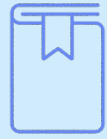
Fundamentals of Blockchain Technology

A shared, replicated, permissioned ledger …

Private Players - Shipping Agent/Line Agent/Freight Forwarders

Port Services

Financial Institutions /Banks

Blockchain

Customs Brokers

Customs Services

Importers
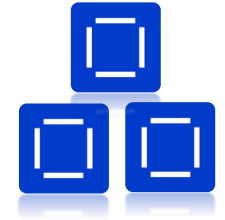
Blockchain follows the concept of distributed database deployed across **a network**

… with consensus, provenance, immutability and finality

Requirements of Blockchain for Business

SHARED LEDGER

Participants decide which assets to share

IDENTITY

Participants know who they are dealing with

ENDORSEMENT

Participants give provable endorsement

CONFIDENTIALITY

Information shared is need-to-know

Blockchains for business are generally <u>permissioned</u>, <u>private</u> and <u>prioritized</u> with <u>smaller no. of participants</u>

The business network decides what to share on the ledger...

- **Assets** - *anything of value*
- **Transactions** – *that change state of an asset and are recorded on the blockchain*
- *Transactions underpinned by* **smart contracts**

Identity - *knowing who you're dealing with, Identity allows transactions to be signed and encrypted*

Transaction Endorsement - *Provable endorsement by relevant participants*

Privacy and Confidentiality- *mechanism to make the blockchain private and confidential*

Key Value Drivers of the Blockchain Network

- Eliminates silos, **creates single source of truth**

- **Supports data encryption** and permission settings for network members, hence tamper proof system

- **Provides trust in source and provenance** of who did what when

- **Enforces consistent process** - reducing risk and ensuring compliance

- Network partners **collaborate with increased trust** through shared process and record keeping

- **No single point of failure**, higher levels of availability, highly scalable, Easy to integrate

- **With off chain DB facility** - capability for Cognitive Analytics

High Level Blockchain Use Cases

on

Trade Facilitation

High Level Blockchain Use Cases of Trade Facilitation

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#	Use-case Title	Use-case Description
1	**Single platform for digital trade document exchange with end-to-end visibility into trade process**	• **Single platform for trade registrations & certifications,** trade document exchange, common payments for trade, goods clearance and cross border trade collaboration. • **Common platform for all trade network participants -** Customs, Port, Air Cargo, Consignee, Customs Broker, logistics players to interact with each other. • **Improved risk management**. Invoices, PO and other price determination documents can be traced back to its source, reducing chances of document fraud improving confidence in the system. • **Single version of truth of all trade documents** like MBL, HBL, Manifest, Packing List, etc. the moment it gets uploaded/generated onto the network and gets available to all different agencies. • **Cross border collaboration between government agencies and port/airport operators.**
2	**Single platform for import permit processing and issue**	• **End-to-end transparent process for issuance of digital permits** from multiple government agencies - MED, MCS, MFMRA, MFDA, MoD. • **Improved process level transparency,** reduce cross collaboration with seamless workflow between multiple govt agencies along with automated payments mechanism.
3	**Single platform for CBRA's-clearance of goods**	• Delivery Order issuance by CBRA at the point of physical inspection can be inputted directly to the distributed ledger which can be viewed by other CBRA's, MPL/MACL, **eliminating physical stamping at gate pass process.**
4	**Online payments, single payments account, improved working capital.**	• **Near real time/real time settlement of accounts** between the participating bank, Customs/Port and the customer (trader, shipping agent, customs broker, etc.) using the Payment Gateway for online banking • **Ready availability of payment reconciliation reports** at any point of time
5	**Single platform for export permits and certifications**	• **Issuance of export permits and certifications on one single platform** where applicant can apply and pay the fee only one time. • **Certificates like catch certificate and health certificate issued by MFMRA & MFDA can be processed with proper workflow automation** for inter-organization or intra- organization collaboration on the platform eliminating multiple visits to the concerned offices.

Future State with Blockchain Technology for Trade Facilitation

Key Recommendations to Blockchain Adoption

in

Customs Administration
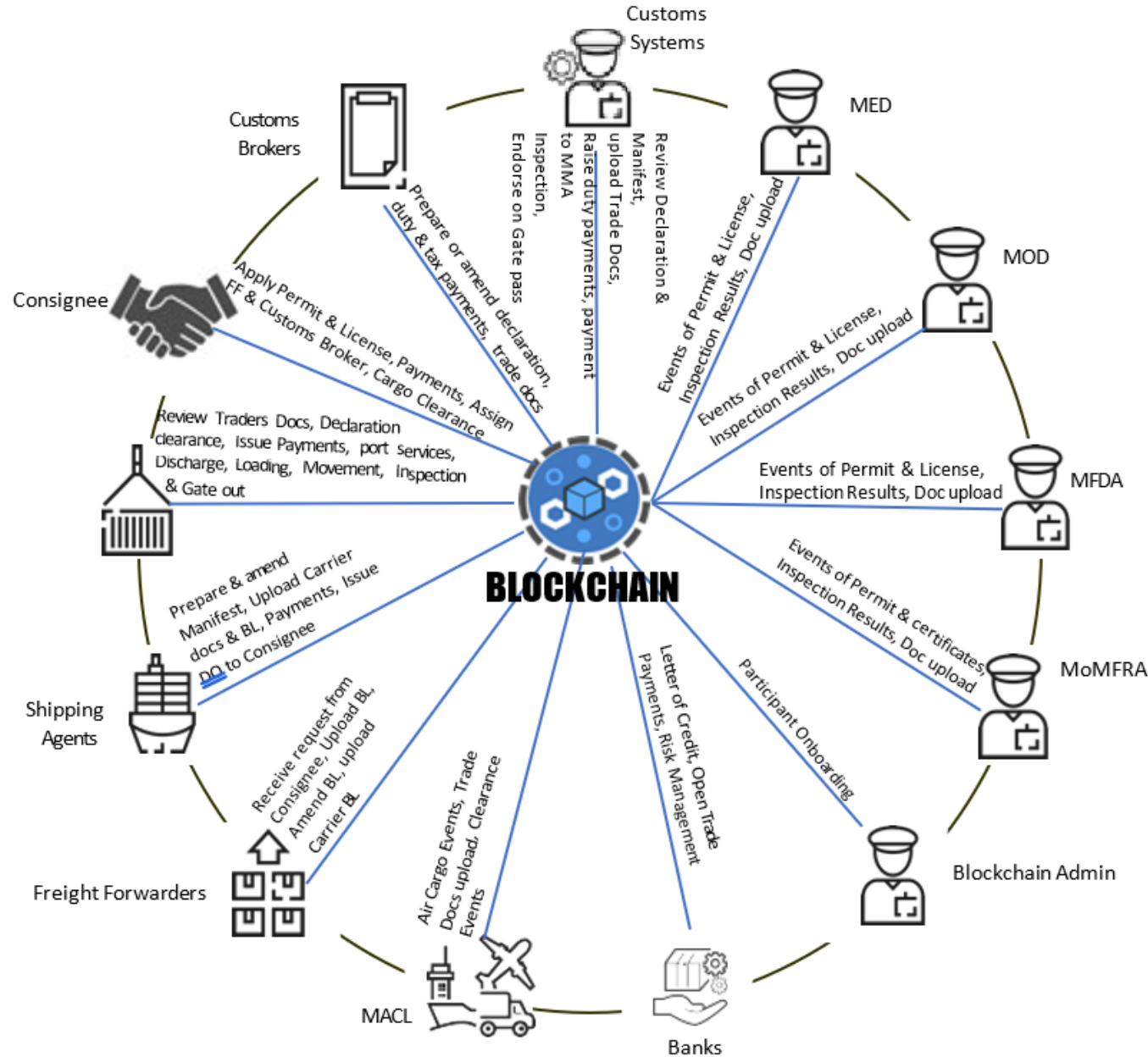
Key Recommendations to Blockchain Adoption in Customs Administration

❖ **Making Blockchain as the National Single Window backbone for both domestic and cross-border trade:**
Blockchain is a distributed network platform offering a single digital workflow across domestic organizations and network cross-border agencies. It can seamlessly integrate with existing NSW architectures across multiple countries providing a common platform to share data & documents and transact through its in-built ledger movements.

Key features of a Blockchain network to be the backbone for multiple NSW networks across different countries :-

- **It does not disrupt the national single window architecture** or any other domestic systems or processes that may be required to integrate with the backbone

- **Supports API endpoints for easy integration**, also supports file-based data transfers

- **Offers superior performance and data security.** Blockchain, with redundant node architecture, offers high fault tolerance with superior system durability and availability.

- **It is future proof.** Blockchain offers improved levels of network automation, immutability, and scalability features.

- **It improves overall trust in the system.** Blockchain as an NSW backbone improves overall trust and transparency in the international trade ecosystem.

- **Seamless onboarding onto the network.** Cross border participants from Southeast Asian countries can join the network seamlessly, without any friction arising from cross-border exchange of data.

❖ **Scaling up the Blockchain network to integrate with additional touch points for mobile interfacing, insurance processing, cross border payments, contact center, helpdesk, value added analytical reporting, advance search capabilities, GenAI Chat BOT facility…etc**

❖ **Adding more network players onto the Blockchain network like CBRAs, MACL, Cross border customs, Global insurers**
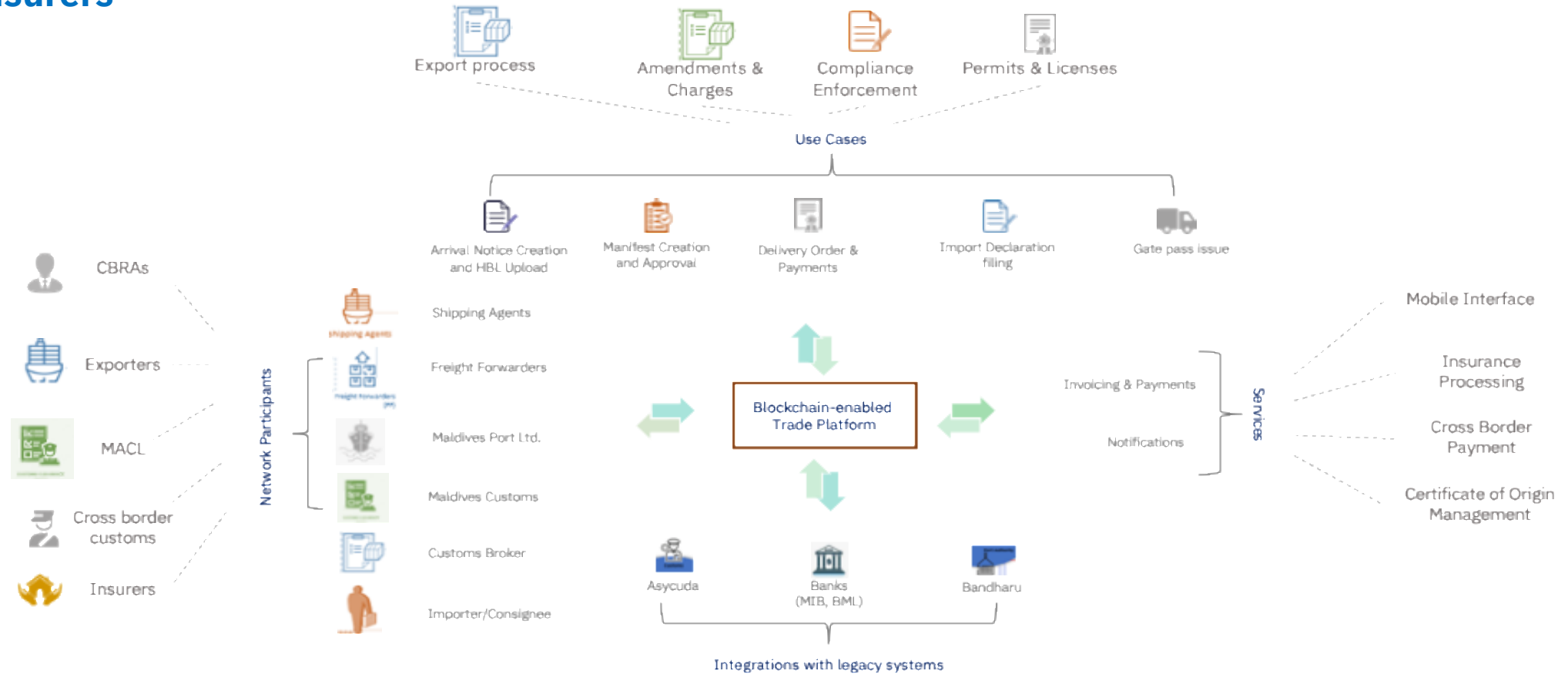
Blockchain Pilot Implementation on Trade Facilitation

for

Govt. of Maldives

Blockchain Pilot Trade Import Platform Implemented for Govt of Maldives

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Key Functionalities

- Arrival Notice Creation and HBL Upload
- Manifest Creation and Approval
- Delivery Order & Payments
- Import Declaration & Payments
- Gate Pass Issuance

Network Participants

- Shipping Agents, Line Agents
- Freight Forwarders
- Maldives Port Ltd.
- Maldives Customs
- Customs Broker
- Importer/Consignee

Blockchain Trade Platform

Services

- Invoicing & Payments
- Email Notifications
- Document upload/download facility

External Systems

- ASYCUDA WORLD
- BANKS – MIB, BML
- BANDHARU

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| I B M   C O N F I D E N T I A L

Key Functionalities - Blockchain Pilot Trade Import Platform

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Arrival Notice Creation
- Shipping agent to create arrival notice with ETA.
- Upload of Master Bill of Lading by Shipping Agent/Line Agent/Freight Forwarders

User on-boarding & registering on Blockchain platform
- On-boarding users from MCS, MPL, logistic players, Custom Broker organization
- Consignee/Importer registration

HBL Upload, Manifest Creation & Approval
- Uploading of House Bill of Lading (HBL) by the logistics players. Automatic generation of the complete complied Manifest document.
- Notification to MPL and MCS for download of the complete Manifest document.

Gate Pass Issuance to Importer
- Digital workflow to pre-approve cargo items by MCS
- Enable MPL to create new online gate pass for release of goods.
- Importer to download the gate pass document

Delivery Order Issue to Consignee
- Shipping Agent/ Line Agent to create new Master Delivery Order(MDO).
- Receive online payment from Freight forwarder against the MDO.
- Freight Forwarder to create House Delivery Order(HDO) and share delivery order with importer and receive payment against the HDO.
- Make delivery order available to MCS and MPL post approval from Shipping Agent/Shipping Line Agent.
- Allow importer to raise request for delivery order extension.

Online Payments
- Online payment for delivery order and import duties by the importer/consignee and customs broker.
- Capture payment done by cash or credit mode.

Import Declaration
- Importer and Customs Broker to create new, view and modify existing import declarations before assessment, make online import duty payments against a declaration.
- MCS to register, view, raise clarification, assess, post-entry modification (amendment after assessment)
- Receive online duty payments

Blockchain Trade Platform functionalities

Arrival Notice · User Onboarding · Manifest · Gate Pass · Delivery Order · Online Payments · Import Declaration
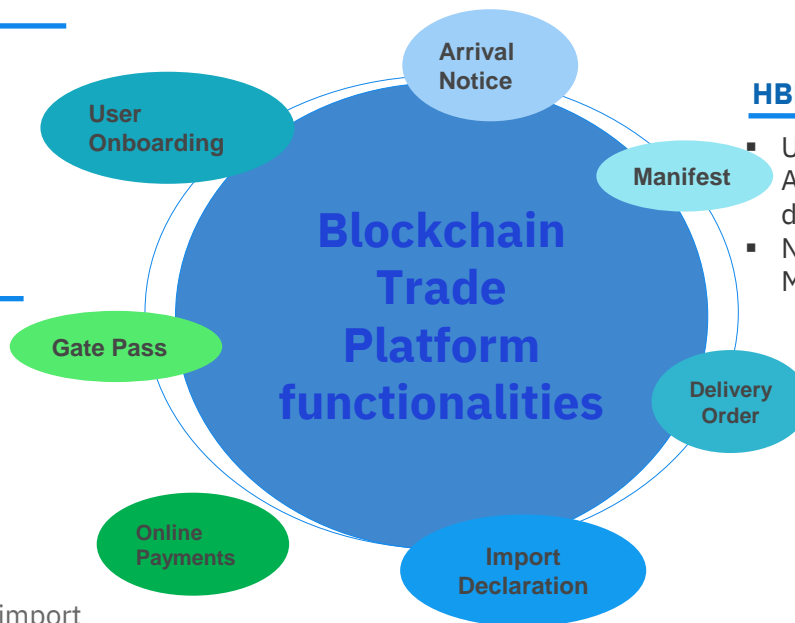
Overall Architecture, Technical Components & Network Details of Blockchain Pilot Trade Import Platform

Component	Open-source tool used
Blockchain network	Hyperledger fabric 2.2.0
Database server	postgres:12.4
Smart Contract	GOLANG 1.14.9
UI	Angular 10
API	GOLANG 1.14.9 with gin framework
Identity Server	Keycloak
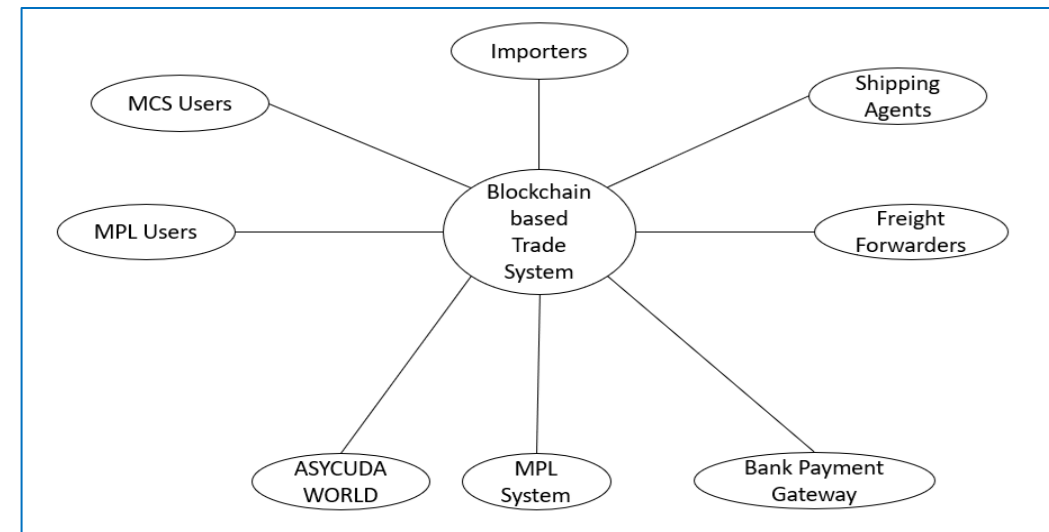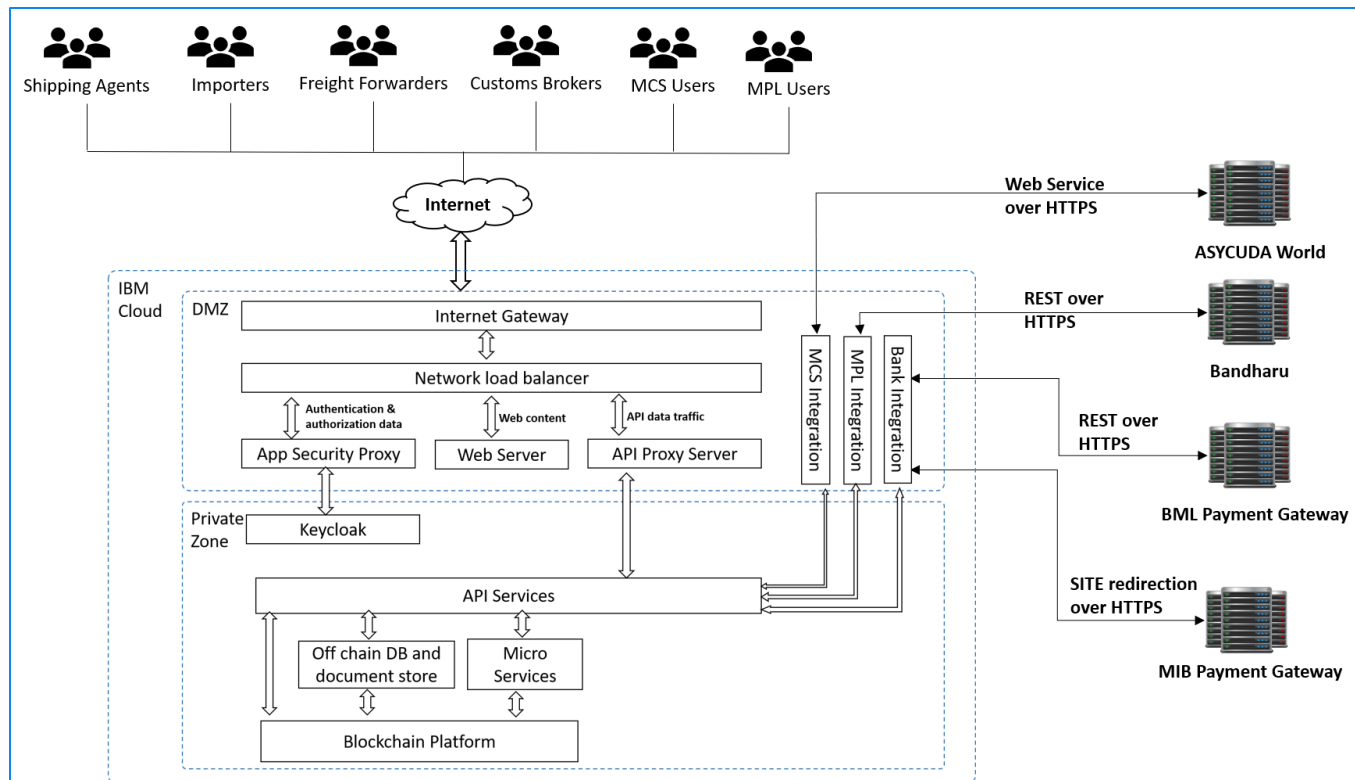
Network Details:

3 Peers:
- MCS
- MPL
- Other organisations (Logistic Players, Brokers)

4 Orderers:

2 Channels:
- reference data assets
- trade data assets e.g., Arrival notice, manifest, DO, Gate-pass etc.

2 Smart Contracts:
- Reference data management
- Trade data management

Elaboration on the Interactions within the Blockchain Network
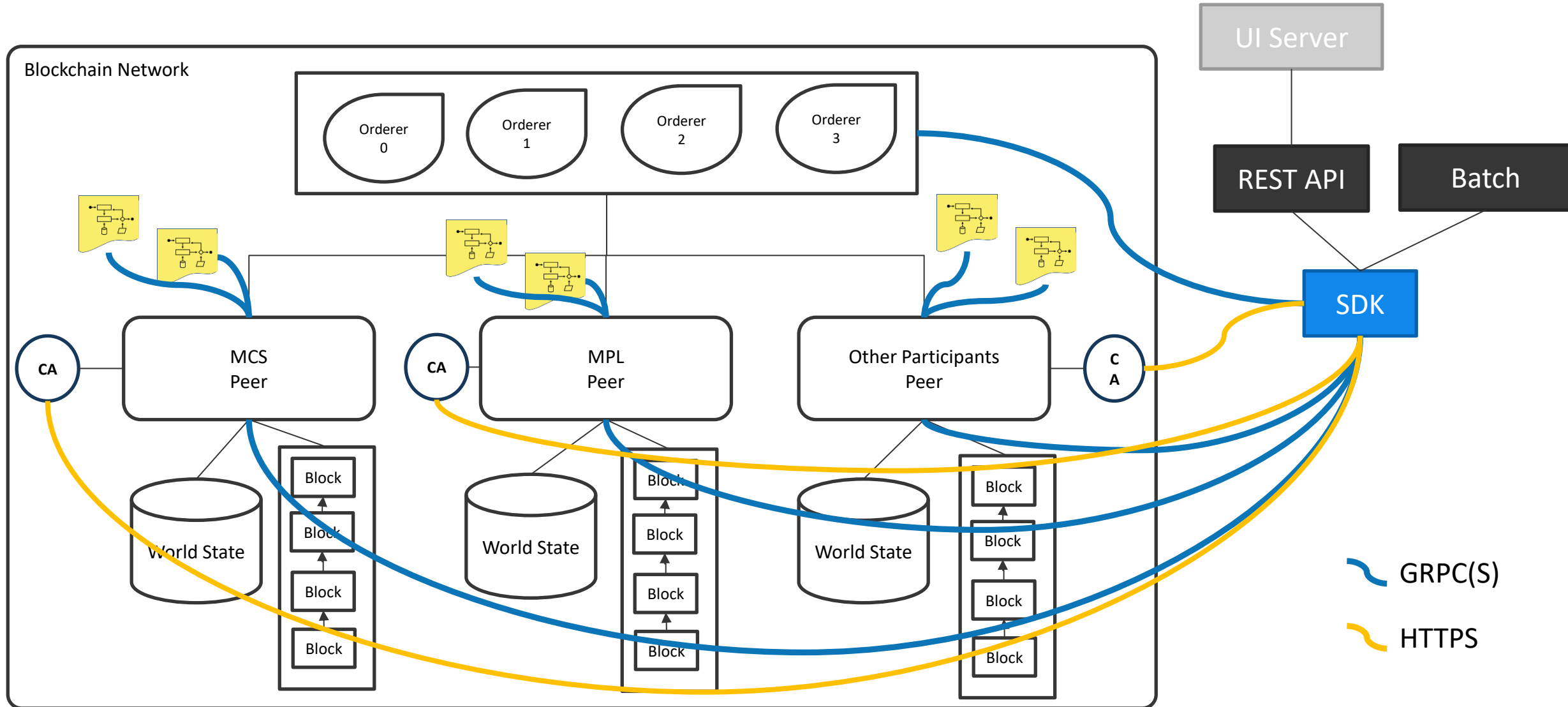
Key Pointers to Implementation Success of Blockchain Technology

Higher no. of use cases for domestic & cross border trade with many network participants - *to make the trade platform cost effective by on-boarding many participants onto the network, serving not only trade within its geographical boundaries but also onboarding other countries for cross border trade.*

Scaling up cloud infrastructure to maintain platform speed and performance for increased transactions on the network

High implementation cost - *Blockchain is costlier compared to traditional database, even when Hyperledger is an open source, it requires enough investment to pursue a Blockchain initiative.*

High storage cost - *Blockchain databases are stored permanently on all network nodes. As the volume of transactions increase, so does the size of its state databases and Blockchain ledgers become extremely bulky over time. Hence voluminous storage is required amounting to higher storage cost.*

Capacity building to manage Blockchain technology - *requires specific skills to build and maintain the network and to run it for ongoing use and on-boarding more participants. Hence skilled resources with technical expertise and business understanding are required for integrating Blockchain into processes.*

Screenshot Snippets - Blockchain Pilot Trade Import Platform

Pilot Home Page
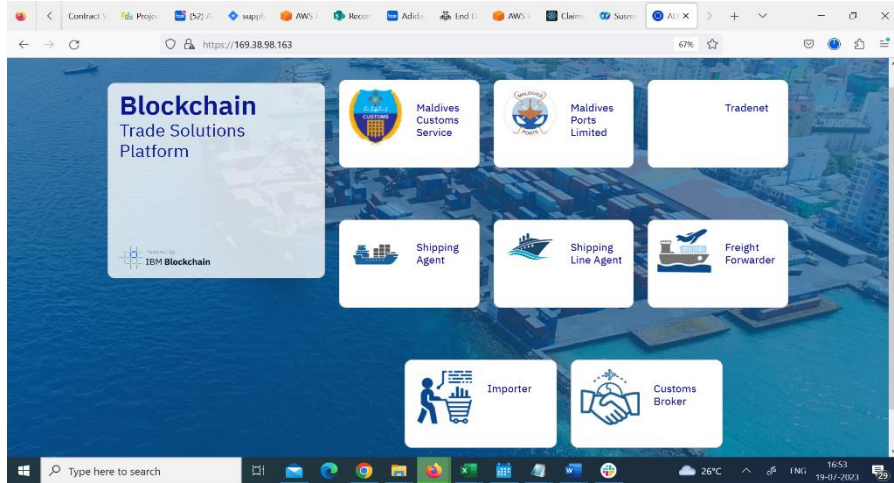
User Login Page
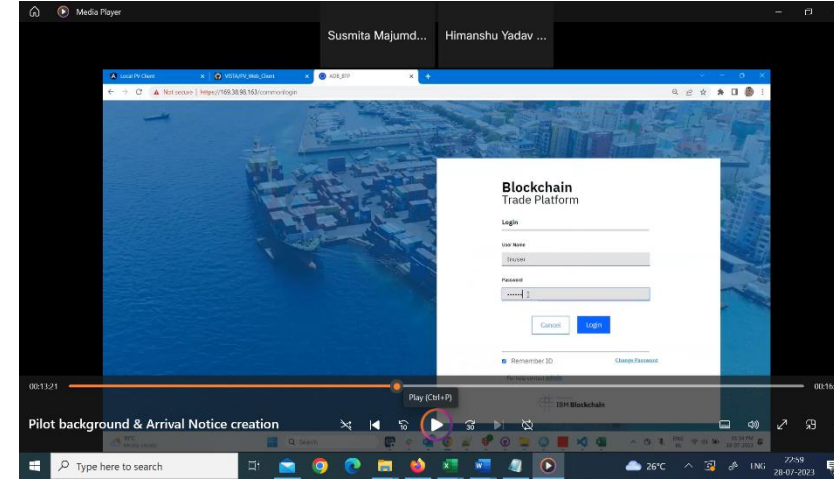
User On-boarding & Registration Page
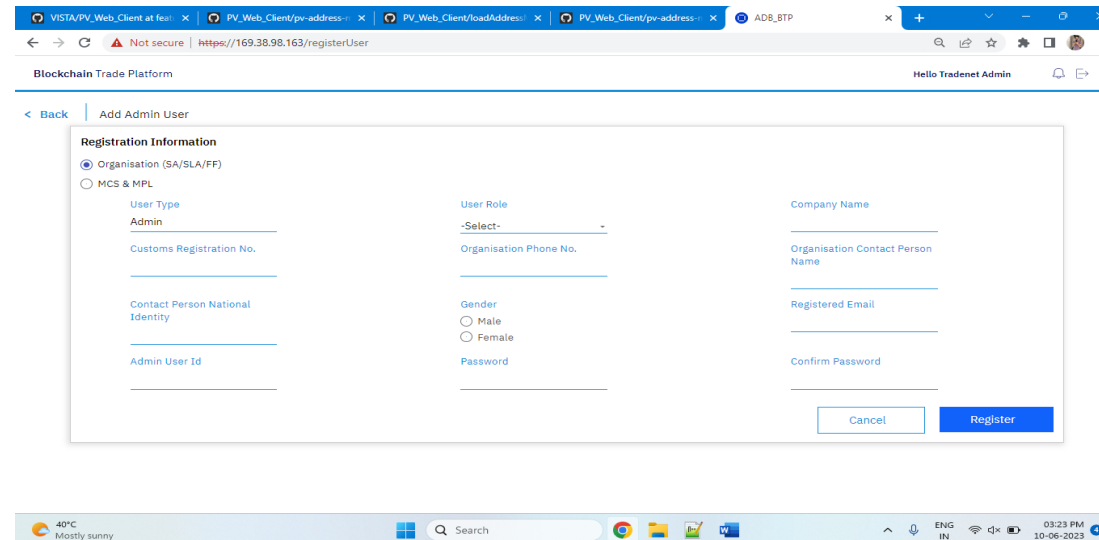
Screenshot Snippets - Blockchain Pilot Trade Import Platform

Create Arrival Notice screen

Multiple MBL Upload using Excel facility

List all Arrival Notices created by the Shipping Agent

Screenshot Snippets - Blockchain Pilot Trade Import Platform

HBL xml & Cargo xls upload before HBL cut-off

HBL details against MBL

Screenshot Snippets - Blockchain Pilot Trade Import Platform

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List of Manifest

View Manifest with download option

Manifest Compliance Report Screen for MCS

Amend Manifest

Screenshot Snippets - Blockchain Pilot Trade Import Platform

Create Master Delivery Order by Shipping Agent/Line Agent

List Master Delivery Orders released to Freight Forwarders

Create House Delivery Order

List House Delivery Orders released to Consignee

THANK YOU