



# Internet of Things in Real Time Cargo Monitoring and Facilitation

Jaching Chou

Co-Chair of APEC TPTWG GIT

Senior Transportation Analyst, Institute of Transportation, MOTC  
Chinese Taipei

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# Outline

- Internet of things (IoT) and logistics
- IoT practices in logistics and shipping industries
- Cargo monitoring and facilitation by Customs
  - India
  - Chinese Taipei
- Cargo export at cargo freight stations (CFS) terminal
- AIoT/blockchain on cargo monitoring and facilitation



# Internet of Things and Logistics

- IoT is not an entirely new concept, and nothing new in supply chain or logistics.
- “Internet of Things in Logistics”<sup>1</sup> highlights
  - The logistics industry is a key player, benefit from the IoT.
  - Use cases - warehousing operations, freight transportation, last-mile delivery.
  - Key success factors
    - Standardized unique identifiers or ‘tags’ used on a global scale.
    - Seamless interoperability for exchanging sensor information.
    - Establishment of trust and ownership of data and overcoming.
    - Reference architecture for the IoT, and IoT business mindset.
- “The Digital Supply Chain will be the Logistics Technology Concept of the Year” and “Machine Learning Enhancement Will be Widespread”.<sup>2</sup>
  - IoT data can be used to extract insight, trends, and to predict.



# IoT Practices in Logistics and Shipping Industries <sup>1/2</sup>

- **United Cargo** uses temperature-controlled containers which features special insulation, rechargeable cooling technology and IoT sensors that monitor temperature, humidity and other.
- Air France–KLM–Martinair Cargo (**AF–KLM**) improves pharmaceuticals logistics by introducing containers which equipped with IoT sensors customers to check on the status of their shipments at any time.
- The process workflows of the **Cathay Pacific Cargo Terminal** at Hong Kong is optimized by using IoT applications and advanced data analytics to prevent expensive downtime of conveying systems.
- **SkyCell, AirBridgeCargo (ABC), ....**



# IoT Practices in Logistics and Shipping Industries <sup>2/2</sup>

- A.P. Møller—**Maersk** A/S and **PT TKSolusindo**
  - Investing in IoT technology and believe monitoring shipments more closely will help them to make better decisions about their goods.
- **DHL Supply Chain** launches a smart warehouse which integrates IoT technology with data analytics.
- **Kerry Logistics** adopts IOT sensors-based solution for cargo across all modes of transportation that provide real-time data on location, temperature, pressure, tilt, shock and humidity across the supply chain.
- **Hellmann Logistics** to launch track-and-trace system, called “Smart Visibility,” using IoT technology to the status of goods and for customers to access.



# Cargo Monitoring and Facilitation

## – India Customs <sup>1/2</sup>

- Drawbacks of **mechanical container seals**: no proper standards, not considered fool-proof, no visibility on the movement of a shipment.
- In 2017, require trusted traders to affix RFID e-seals to containerized cargo at export.
  - **RFID e-seals** transmit container information.
  - The e-seals are **tamper-evident**. The scheme is open to **AEOs** and to exporters operating under a “self-sealing” procedure.



# Cargo Monitoring and Facilitation

## – India Customs <sup>2/2</sup>

- For transit, electronic cargo tracking system (ECTS), a **GPS-based e-sealing** system.
  - The ECTS allows Customs administrations to **monitor the position, movement and speed of a cargo vehicle** as well as the integrity of the seal during transport from origin to destination.
  - In addition, the ECTS automatically issues “**time stamps**” that enable cargo evacuation times to be measured.



# Cargo Monitoring and Facilitation – Chinese Taipei Customs

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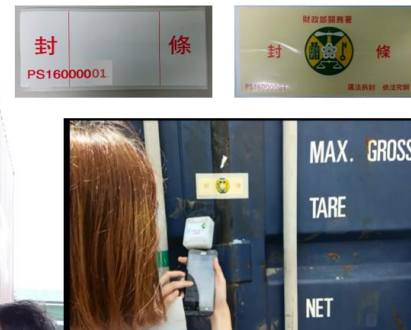
Passive RFID e-seal  
(2009~)



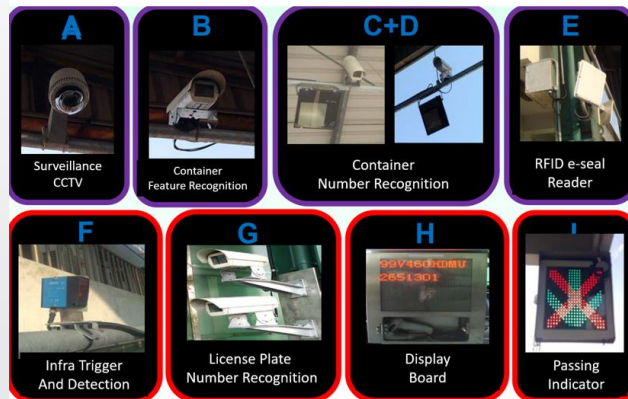
Active RFID e-seal  
(2012~)



Passive Paper RFID e-seal  
(2017~)



Monitoring Facilities in Container Yard



Fixed Passive RFID Readers at Check Point







# Cargo Monitoring and Facilitation – Chinese Taipei Customs

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Customs Check Point  
And Control Room

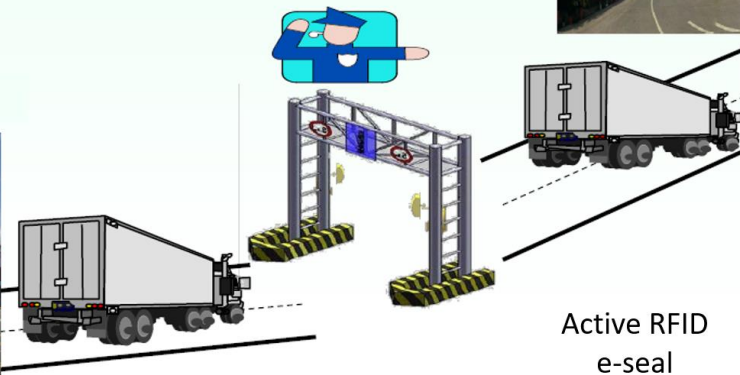
Port Security Check Point

Check List/Travel Time  
Outcome Display
**3U-427 (X)**  
**6H-683 (o)**

122 XY - Customs Check Point



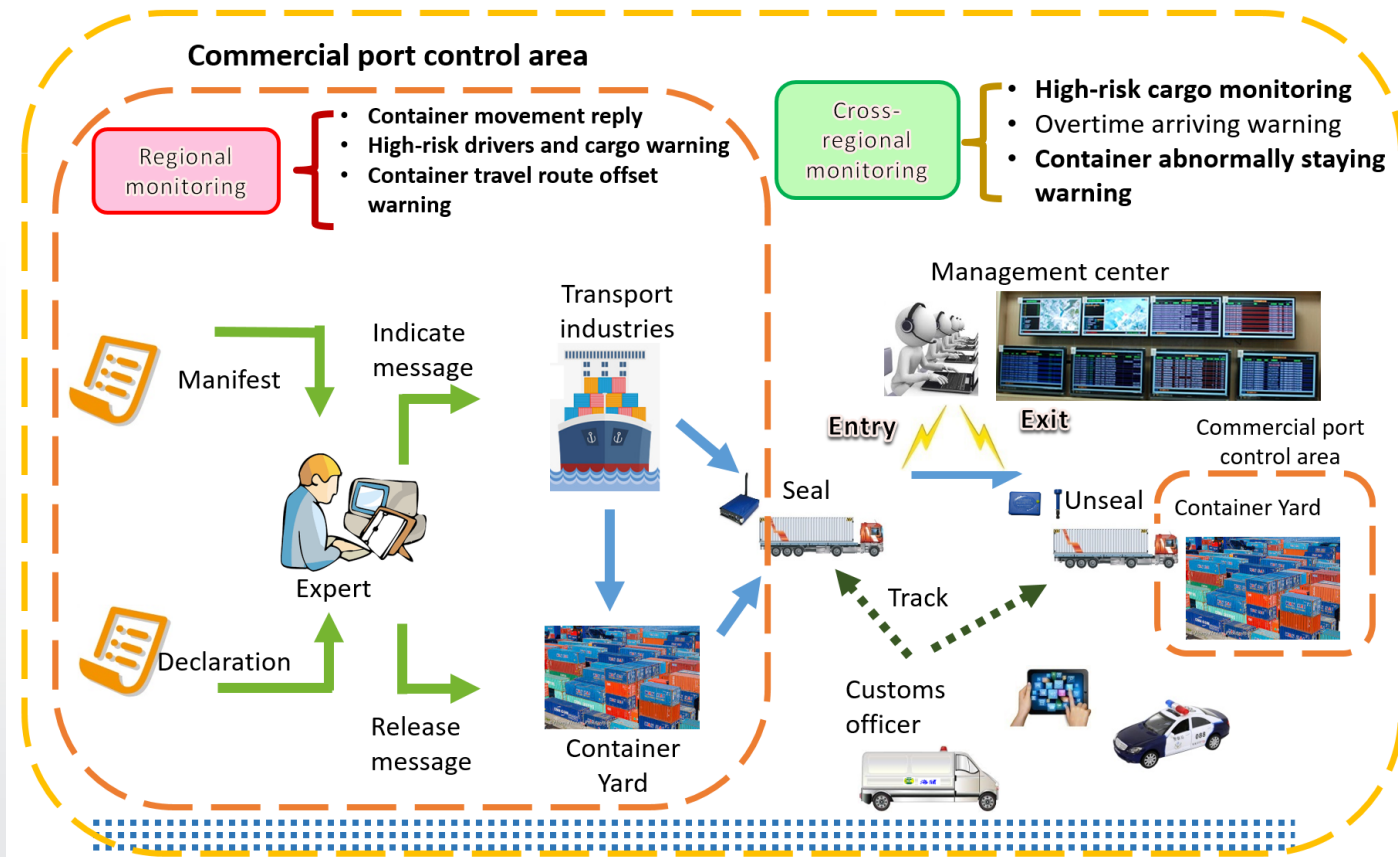
Container Yard

OBU with  
GNSS and  
WirelessActive RFID  
e-seal



# Cargo Monitoring and Facilitation – Chinese Taipei Customs

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# Cargo Export at Cargo Freight Stations (CFS) Terminal

## Needs

- **SOLAS (IMO)** : For loading a packed container onto a ship for export, and a verified of the packed container weight is requires. (**Verified Gross Mass, VGM**)
- A paperless environment for an export cargo operation at CFS Terminal to enhance logistics service providers (LSP) in terms of service ability, visibility and efficiency of export cargos.

## Users



Shipper/Exporter



Container Terminal



Customs Broker



Notary Party



Freight Forwarder



Marine Corp.

Documents and images integration   **Cargos confirmed, images recoded**   Cargo declared and confirmed   **Quantity and volume verified**   Electronic tally plan feasibility improved   **Ship Name/Voyage/ Container #/Images verification**

## Services and Functions



- 1.Auto-detection of cargos weight
- 2.Automatically compare documents and images



1. Paperless operations and cargos data stored at cloud
2. Visualized operation environment

## Modules

Movable  
Scaling Module

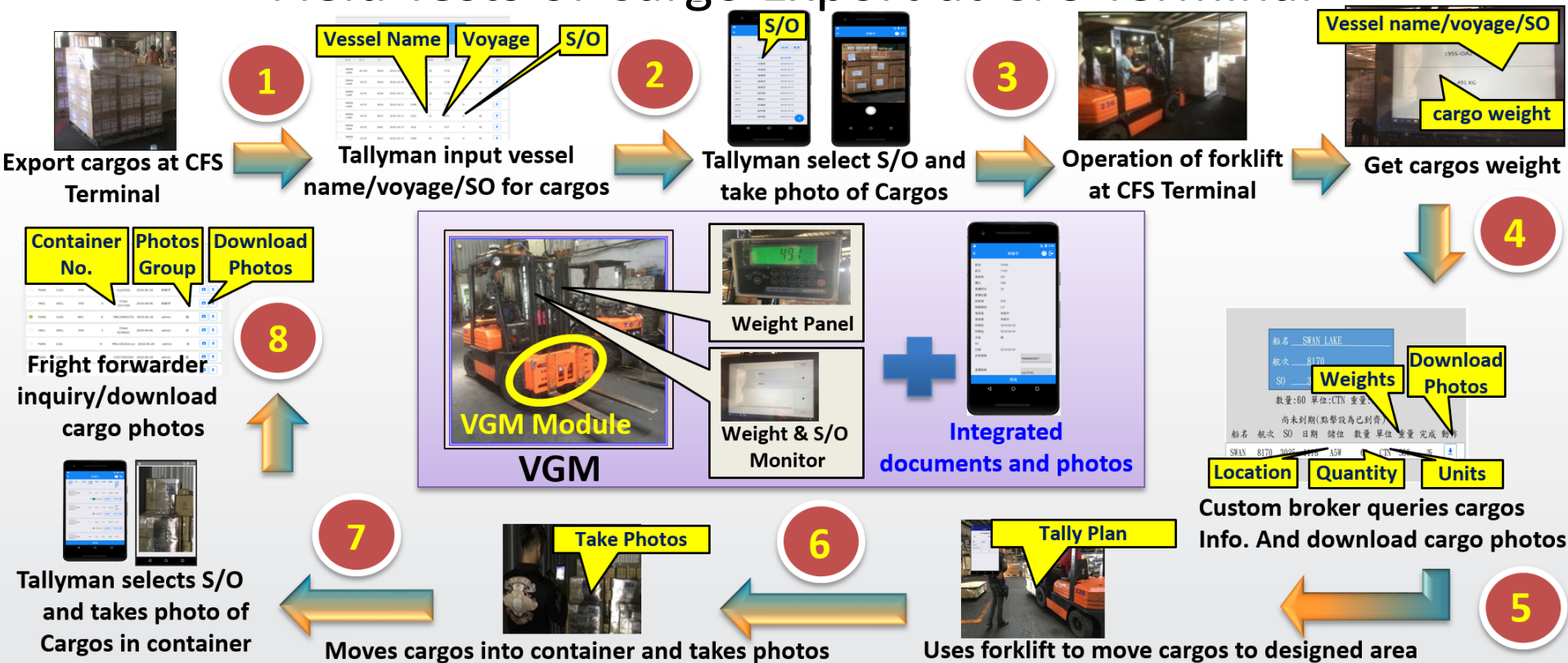
Mobile Module  
(Documents and Images Integration)

Export Cargo Management System  
(Cargo Images collect and Documents Consolidation)



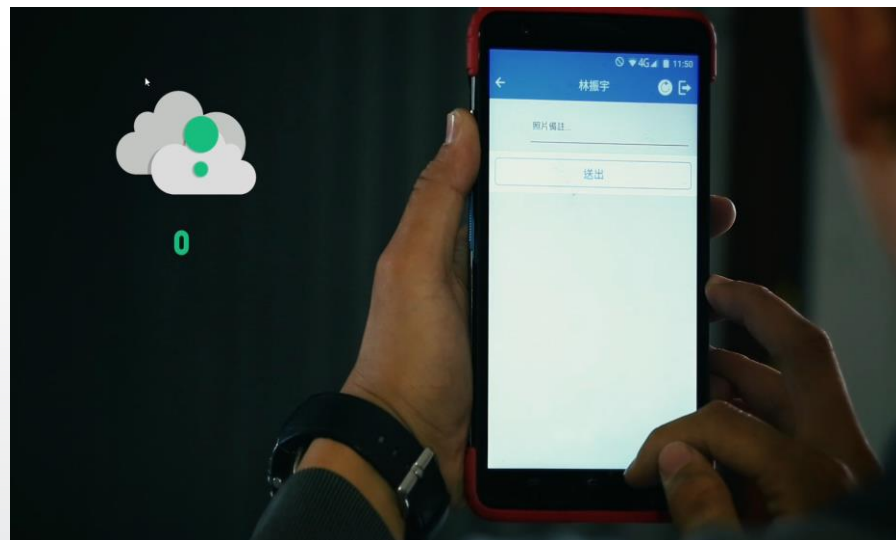
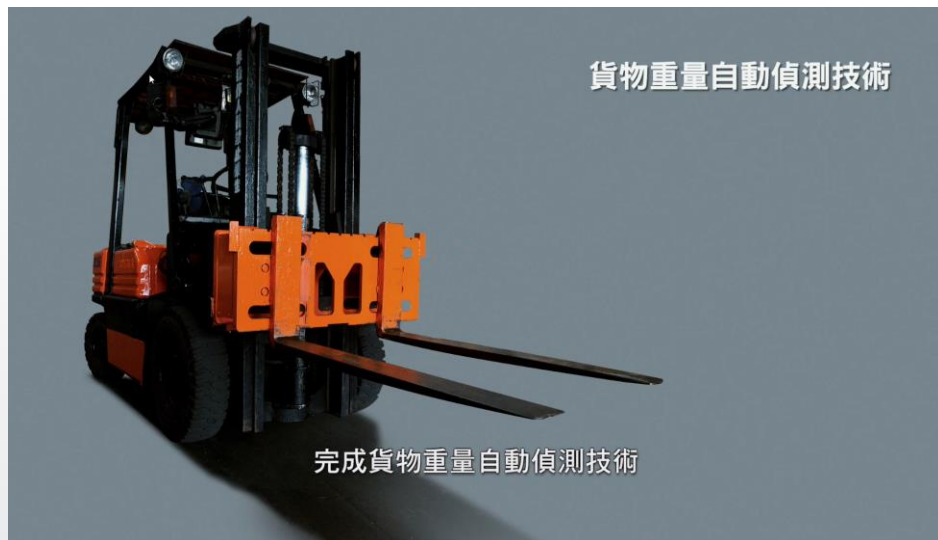


# Field Tests of Cargo Export at CFS Terminal





# Field Tests of Cargo Export at CFS Terminal





# Integrated Freight Forwarders Information and Operations

## Needs

1. Assist operators quickly arrange International cargo transfer, multinational cargo status tracking and collect/delivery and dispatch schedule plan.
2. Improve efficiency and provide value-added service of overseas goods In-transit at Chinese Taipei.

## Users

Freight Forwarder

Shipper/Receiver

Customs Broker

Overseas Agents

Data Inquiry  
(Single Window)Real Time Air and Sea Freight  
information and Tracking

## Services and Functions

### Integrated Operation and Data Exchange Platform

Airline flight Schedule

Air Cargo Tracking

Marine Shipping Schedule

Marine Cargo Tracking

## Modules

DATA  
TransferDATA  
Search

DATA Capture

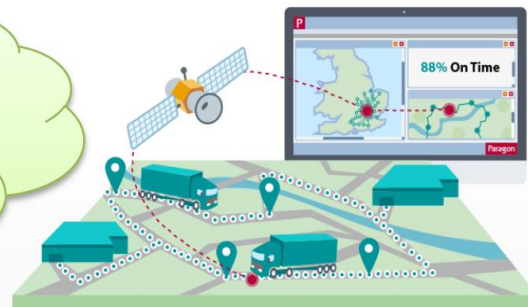
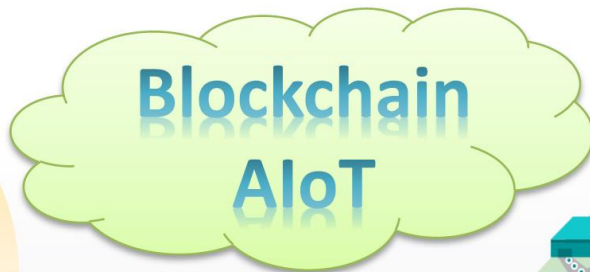
Authorization

Flight  
Scheduling





# AIoT/Blockchain on Cargo Monitoring and Logistics Operations



Fleet Management and Cargo Monitoring



On Board Unit (OBU)



Advanced Driver Assistance System / Connected Vehicle



IoT Sensors  
shock, motion, temperature, humidity



Traditional and Cable e-seal  
with Plug & Trust, M-IoT/BT,  
GNSS, G Sensor, ISO 17712, IP 67



# Thanks for your attentions

