2022
LSCM
LOGISTICS SUMMIT
物流高峰會
創科跨越挑戰
締造無限可能
Rise Above the Challenges
with Innovation

Innovation and Technology Commission, The Government of HKSAR
香港創新政府科技署

Funding
資金

Automotive Parts & Accessory Systems R&D Centre (APAS)
香港汽車零部件研發中心

Hong Kong Applied Science and Technology Research Institute (ASTRI)
香港應用科技研究院

LSCM
Logistics and Supply Chain MultiTech R&D Centre
物流及供應鏈多元技術研發中心

Nano and Advanced Material Institute (NAMI)
香港納米及先進材料研發院

Hong Kong Research Institute of Textiles and Apparel (HKRITA)
香港紡織及成衣研發中心

Hosted by
協辦

香港大學 THE UNIVERSITY OF HONG KONG

香港中文大學 The Chinese University of Hong Kong

香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

**1600+** Industry Members

**60+** Industry Associations

**400+** University R&D Personnel

**250+** Licensing, Contract and Sponsoring Partners

# Logistics and Supply Chain MultiTech R&D Centre

- *"Applied Research"* Focused
- Develop *"hubs" and "platforms"* to facilitate ecosystem development.
- *"Domain knowledge"* centers of excellence COE
- *"Proof of Concept"* and *"Prototype"* Generation Engine

*Fully committed to Drive Modernizing and Reindustrializing Hong Kong, Building Smart City and Promoting GBA cooperation and collaboration!*

# Directions from our SITI

- 完善創科生態圈
- 豐富創科人才庫
- 建設智慧城市
- 深化與內地的創科合作

→奮力推進香港的創科發展

## Our Efforts:

- **Help build the Innovation and Technology Ecosystem in Hong Kong**
- **Help groom Innovation and Technology talents**
- **Help construct Smart City in Hong Kong**
- **Cooperate with other entities in Greater Bay Area**

# Technologies Rise Above the Challenges

## Building Ecosystem and Nurturing Talents

# Universities Collaboration since 2011

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THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

CityU 香港城市大學 City University of Hong Kong

香港浸會大學 HONG KONG BAPTIST UNIVERSITY

香港教育大學 The Education University of Hong Kong

In the past **10 years**, LSCM endeavours to work with various **local Universities** to **build up** the **ecosystem** of **INNOVATION TECHNOLOGIES**

**70 Projects were Conducted**

**Near $400,000,000 Total Project Costs**

**Over 30 Research Teams**

**Cooperating with over 50 SME and start-ups**

*True Partner of Universities*

Start Up's
Free
Service

Start Up's
Free
Service

# Technologies Rise Above the Challenges

## Smart Technology Building Blocks

# Satellite Navigation and Surveying

## Related Projects

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

- Beidou III Enhanced Hong Kong Positioning Infrastructure
  - (1cm accuracy for Real-Time Kinematic (RTK) positioning)
- GNSS Multipath Mitigation for crowded city areas
- DGNSS for real-time tracking system
- Hong Kong GNSS Signal Quality Monitoring (critical-infrastructure security)
- GEOID

*HK is the Satellite Technology Leader in the Region !*

## GNSS Multipath Mitigation for Crowded City Areas

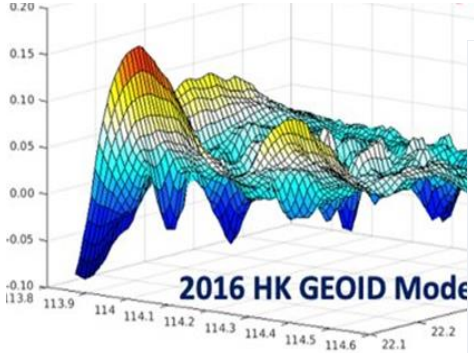
Mong Kong in HKSAR

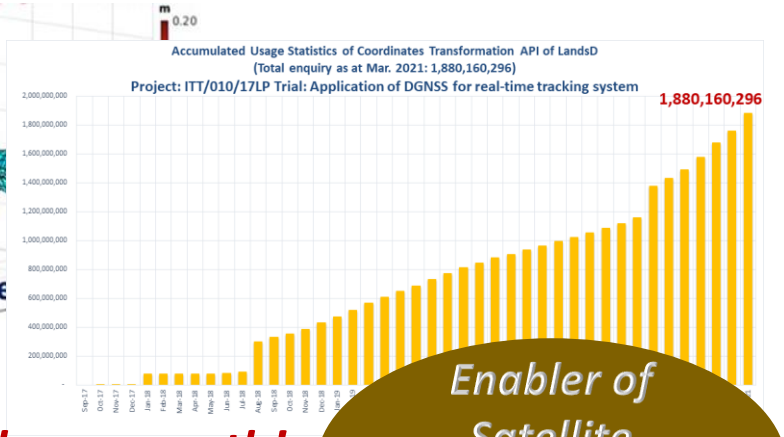
Wan Chai in HKSAR

| Site | Accuracy | Northing (m) | Easting (m) |
|---|---|---|---|
| Mong Kok | Smartphone result (Cyan) | 24.98 | 11.54 |
| | Our platform result (Blue) | **8.4** | **6.2** |
| Wan Chai | Smartphone result (Cyan) | 9.32 | 20.52 |
| | Our platform result | | |

*Solving Crowded Streets GPS accuracy problems*

## GNSS heighting
## Enable Hong Kong Survey with High Accuracy (1 cm)



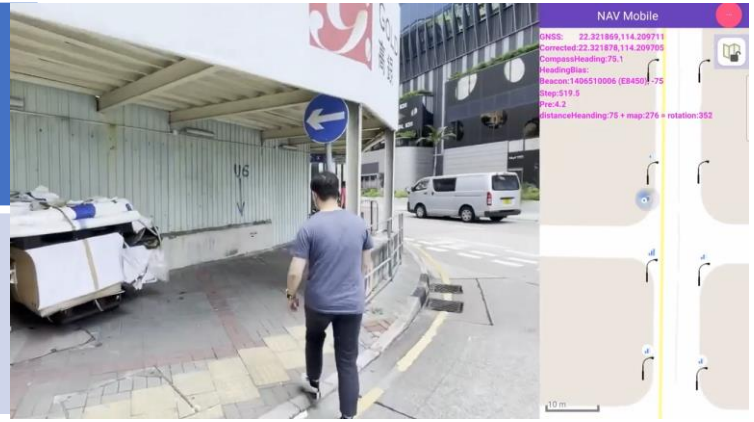

***80 million downloads per month!***

*Enabler of Satellite Surveying in HK*

## Smart Lamppost with BLE IoT Network

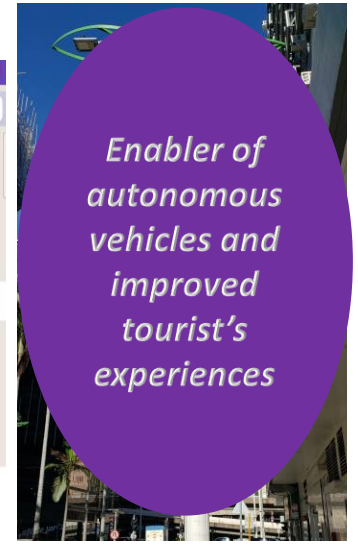
Provide Positioning Services for Pedestrians Even Without Satellite Coverage

| | Pure GNSS Positioning | BLE Corrected Positioning |
|---|---|---|
| Root Mean Square Error | 4.9m | **3.4m (even without satellite coverage)** |




Positioning Error Comparison Against Terrestrial Measurement (Trial at HKSTP)

*Enabler of autonomous vehicles and improved tourist's experiences*



## Differential Global Positioning System (DGPS) for Location and Surveying

*Improve Mobile Phone locationing accuracy*

# Satellite Remote Sensing

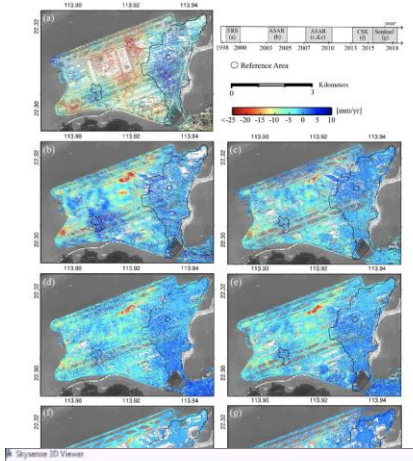
香港中文大學 The Chinese University of Hong Kong

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

## Related Projects

- ENVISAT Remote Sensing Satellite Ground Receiving Station
- SAR Images for Deformation Monitoring (Airport runway, man-made island, etc.)
- InSAR Deformation Analysis
- Integration of DInSAR and SAR

*Satellite Remote Sensing to keep Infrastructure Healthy!*

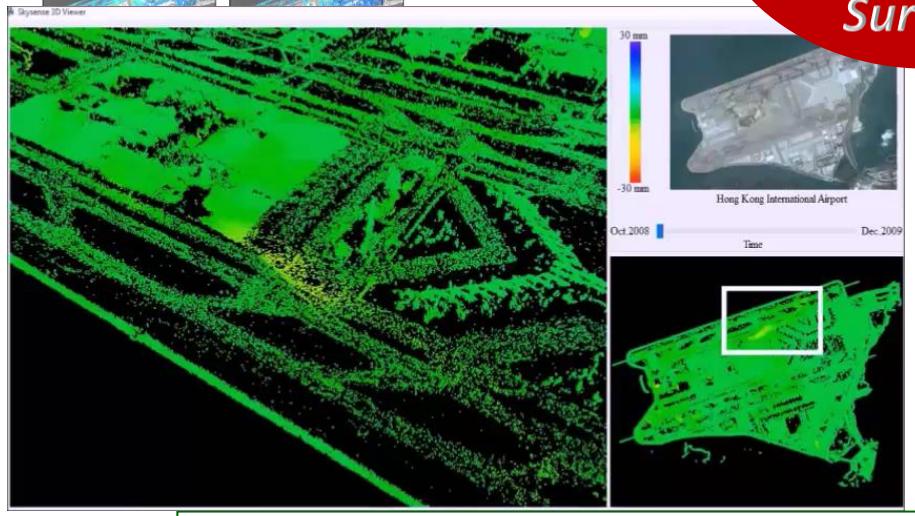


Example: Land Subsidence of Hong Kong International Airport

(a) ERS-2 descending (1998 – 2000)
(b) ASAR descending (2003 – 2005)
(c) ASAR descending (2007 – 2010)
(d) ASAR ascending (orbit 25, 2007 –
(e) ASAR ascending (orbit 297, 200
(f) CSK descending (2013 – 2017)
(g) Sentinel-1A ascending (2015

Test of the algorithms, hardwar
software developed will be carr
the 3rd Runway of the Hong Kong
International Airport

*Accuracy within 3mm Compared to Manual Survey!*




Hong Kong International Airport Runway 1

# Satellite Remote Sensing

香港中文大學 The Chinese University of Hong Kong

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

## Related Projects

- ENVISAT Remote Sensing Satellite Ground Receiving Station
- SAR Images for Deformation Monitoring (Airport runway, man-made island, etc.)
- InSAR Deformation Analysis
- Integration of DInSAR and SAR

*Satellite Remote Sensing to measure Deformation!*

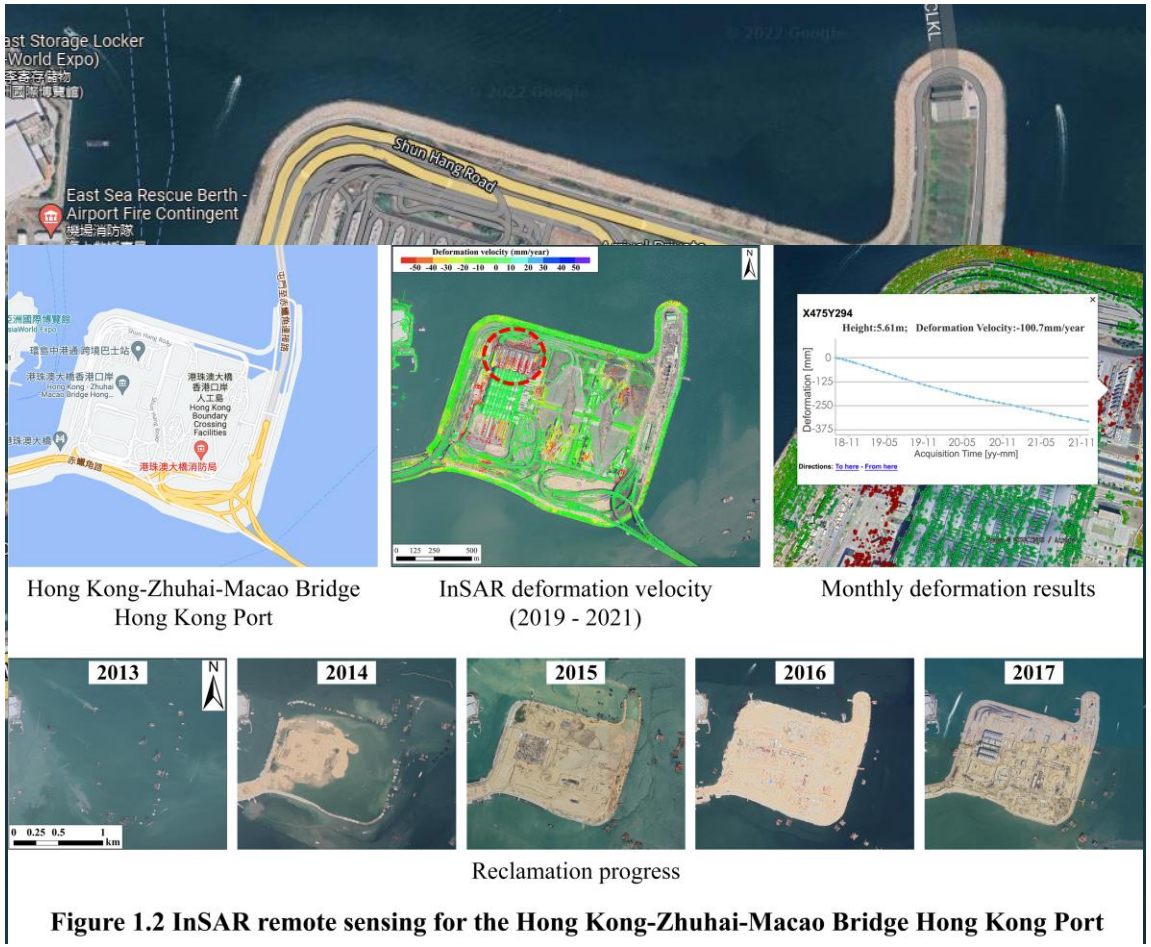



**Figure 1.2 InSAR remote sensing for the Hong Kong-Zhuhai-Macao Bridge Hong Kong Port**

HK Boundary Crossing Facilities Island

# Virtual Reality

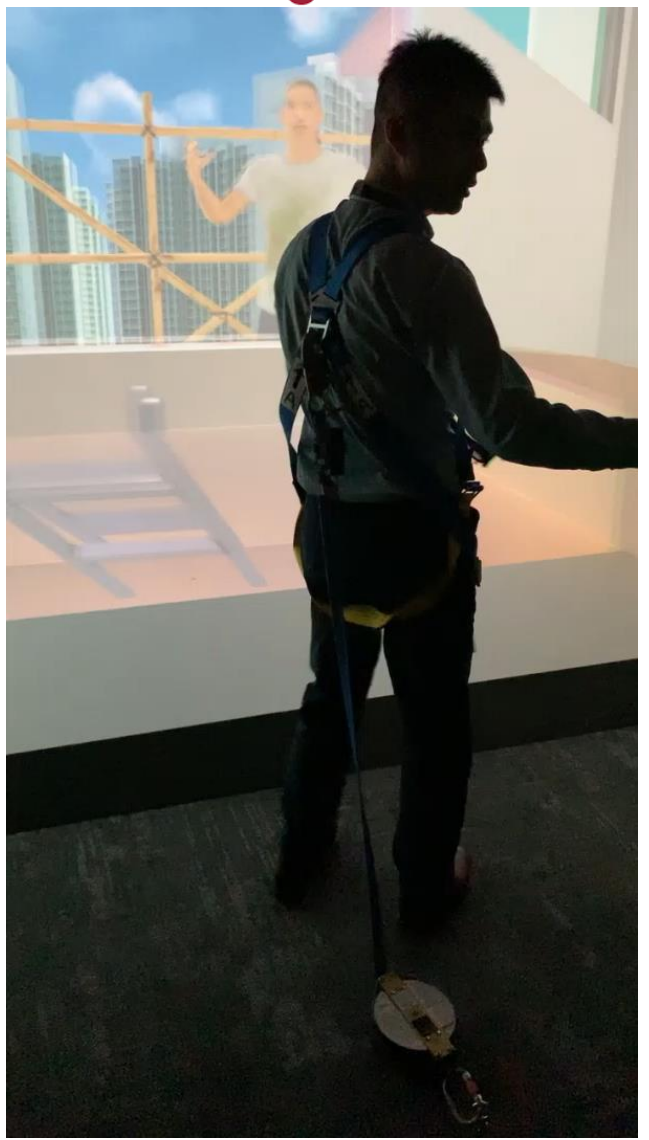
香港大學 THE UNIVERSITY OF HONG KONG

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

## Related Projects

- Strategic Operation Training
- Aircraft Maintenance Operations Training
- Work Safety Training Platform
- VR for Special Education Needs
- Construction Safety Training
- Virtual Content Creation

*Welcome to Metaverse!*



CPSL
CATHAY PACIFIC SERVICES LTD
國泰航空服務有限公司

Airfreight Ramp-side Training!

Aircraft Service Training!

Factory Construction Demonstration!

Slope work Training!

# Entry Gateway to Metaverse

- Virtual Reality Technology for Strategic Operation Training
- Virtual Reality Technology for Aircraft Maintenance Operations Training
- Virtual Reality Technology for Occupational Safety
- Virtual Reality Technology for Construction Safety Training
- Virtual Reality Technology for Education
- Virtual Reality Technology for Special Education Needs
- Virtual Reality Technology for Soil Nail & Cement Mixing Operation training
- Virtual Reality Cave Transforms BIM Collaboration
- Virtual Content Creation
- Virtual Reality Technology for Crime Scene Reconstruction
- Virtual Reality Cave with Mixed-reality Props for MTR Training
- Virtual Reality Technology for Rehabilitation Exercise

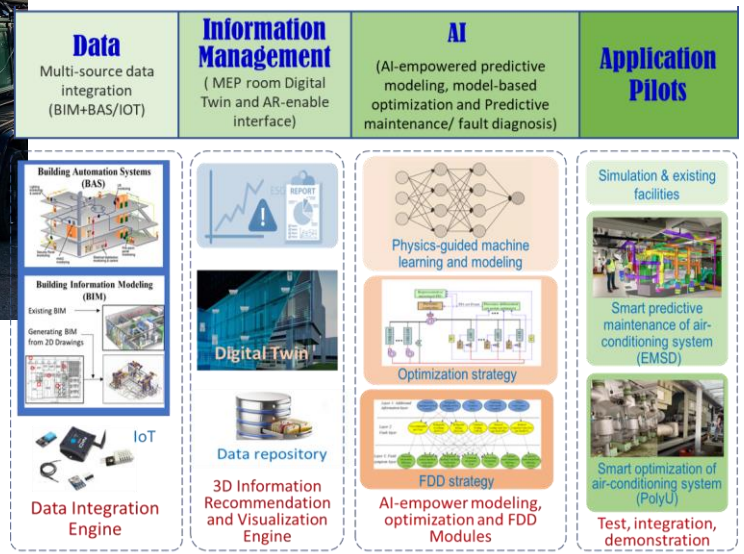
# Big Data & AI

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

CityU 香港城市大學 City University of Hong Kong

香港中文大學 The Chinese University of Hong Kong

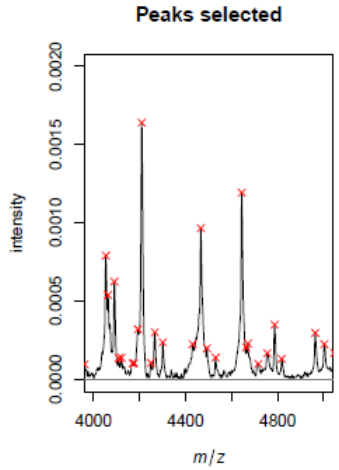
香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY




- Big Data-Driven Airport Resources Management (BigARM) Engine
- 3D Geodatabase Framework
- Video Analytics for airport trolleys
- Social Media Sentiment Analysis
- Smart Building analytics
- Smart Underground Pipe Diagnosis

*New Tool to solve (almost) Every Problem!*

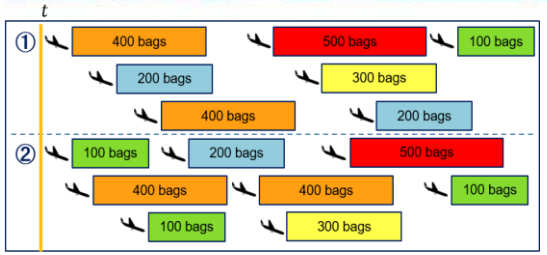
President Xi insists on 'strictest' controls in food safety



Big data-enabled Database for Detection of unknown Contaminants

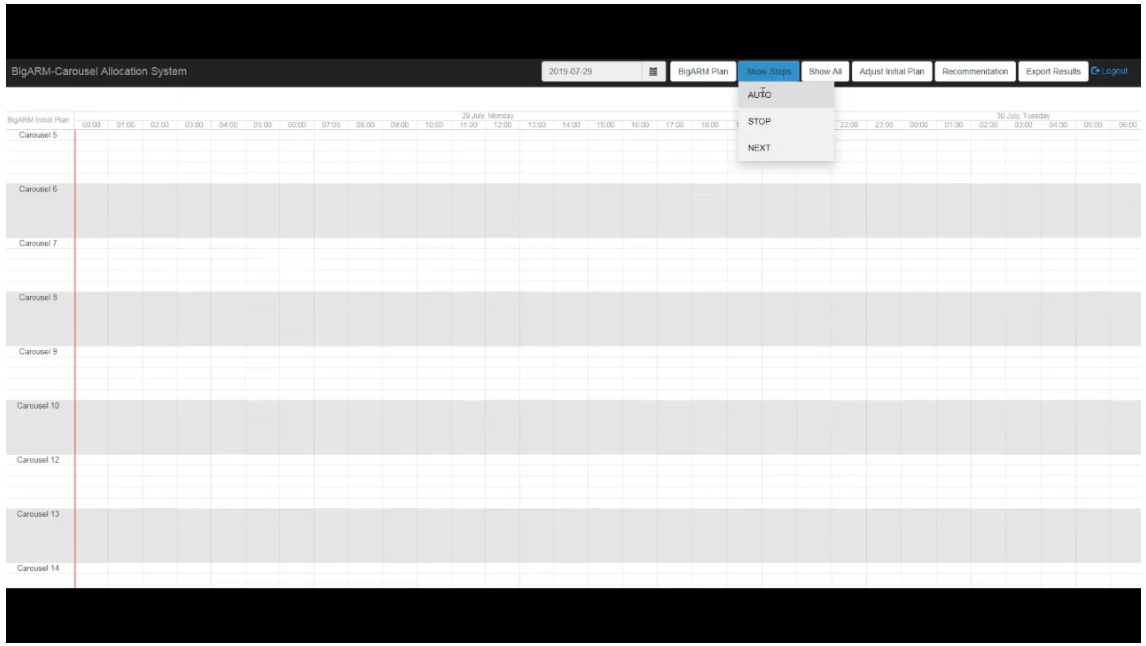
*Milk Ingredients Monitoring!*

**72.9 million passengers in 2017 (1150 flights daily)**




✔Automation ✔Improved plan ✔Load is balanced

**Application for reclaim belts allocation**




*AI to search for the ultimate excellent service!*

Big Data-Driven Airport Resources Management (BigARM) Engine

# Robotics & Automation

- 5G Warehouse Stackers
- Heavy Duty Autonomous Guided Vehicles
- Robo-9
- Deliverbot
- Smart Lifter
- Follow-me Robot

*Multiple Robots, Multiple Functions, to Form a family, to Form a Fleet!*

# Robotics & Automation

## Automated System for Concrete Cube Testing

Auto-Testing!

## Luggage Automation

Auto-Storing!

## TCM Hospital

Auto-Distributing!

## Smart Follower- Stacker

Human-Robot Collaboration!

# Building Information Modeling (BIM)

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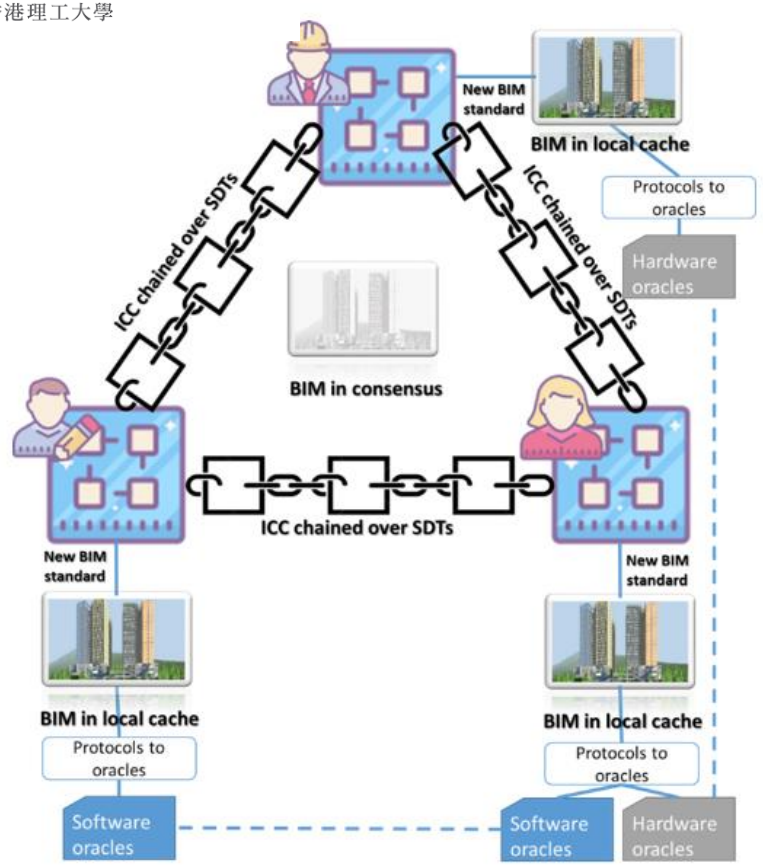
香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

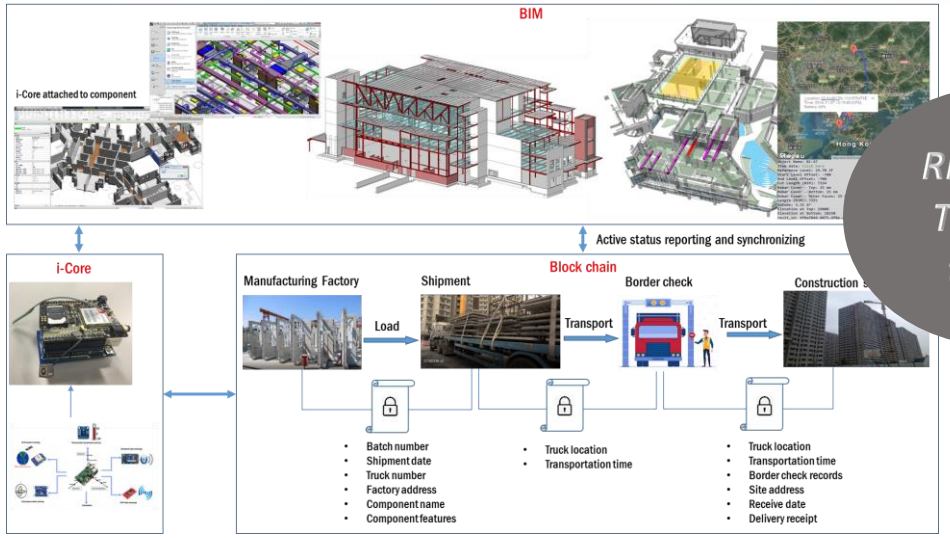
THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

> 10 years of BIM Promotion Efforts !

## Related Projects

- RFID-enabled BIM
- Building Life-cycle Management
- Computer Vision and Machine Learning for Quality Management
- Digital Twin for Construction Resource and Progress Management
- Construction Logistics Blockchain
- IoT-enabled Fit-out Construction

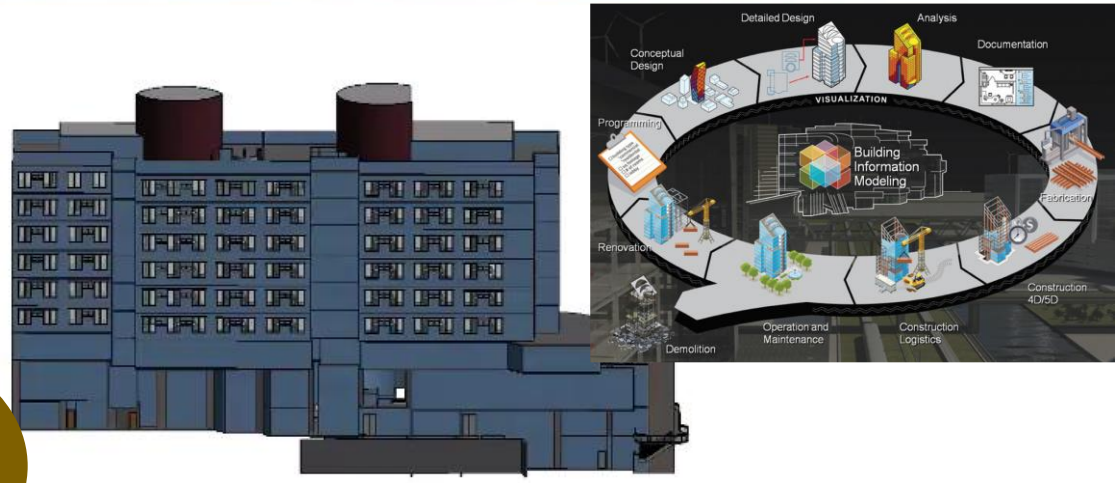





## Construction Logistics Blockchain

Rigorous Track & trace!

Auto Process Monitoring

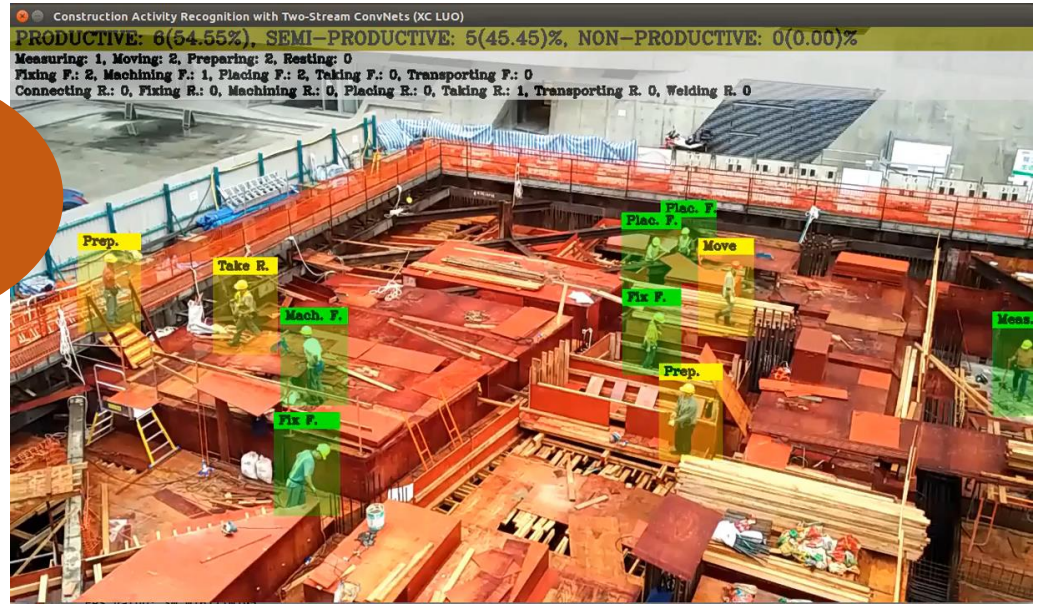



## Building Life Cycle Management

RFID-enabled BIM

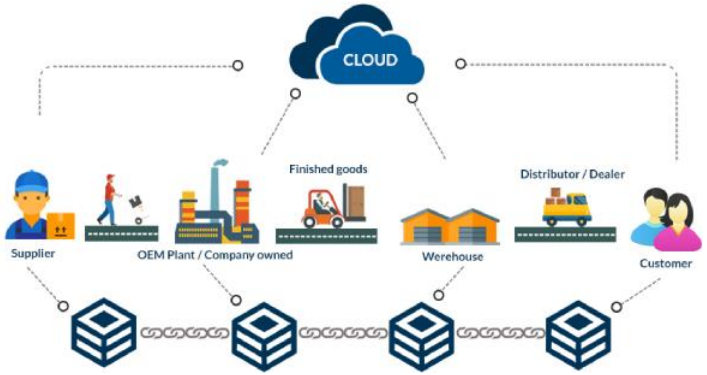
Supply Chain Management!

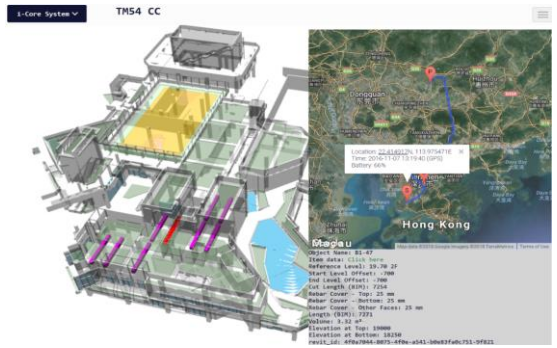
AI Video Monitoring!

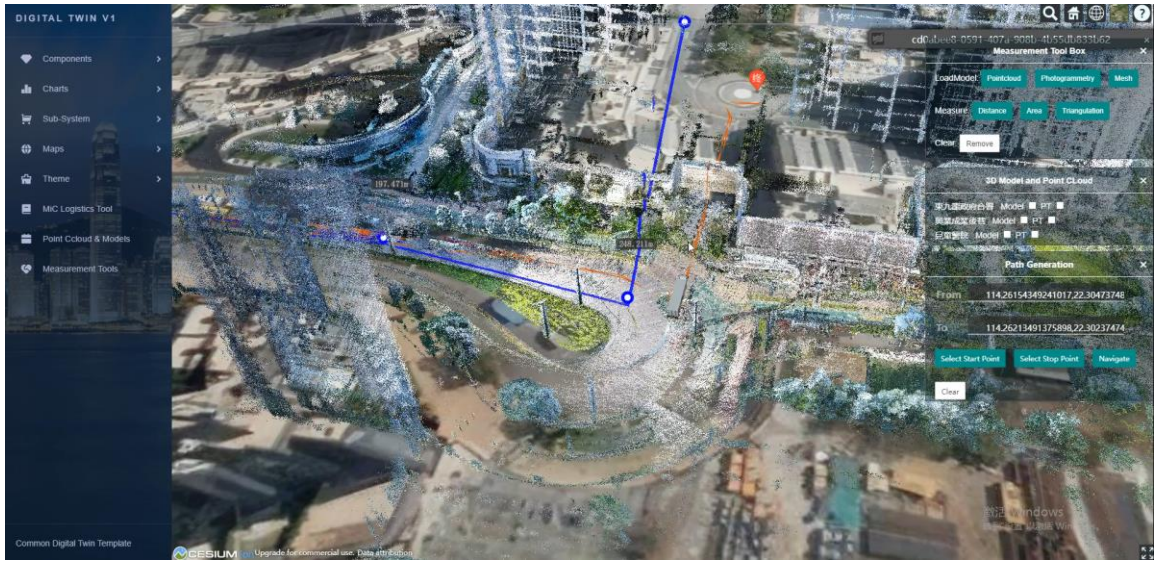



## Computer Vision Quality Management

# Modular Integrated Construction (MiC)




3D Spatial Data Platform for MiC

Blockchain for MiC Logistics

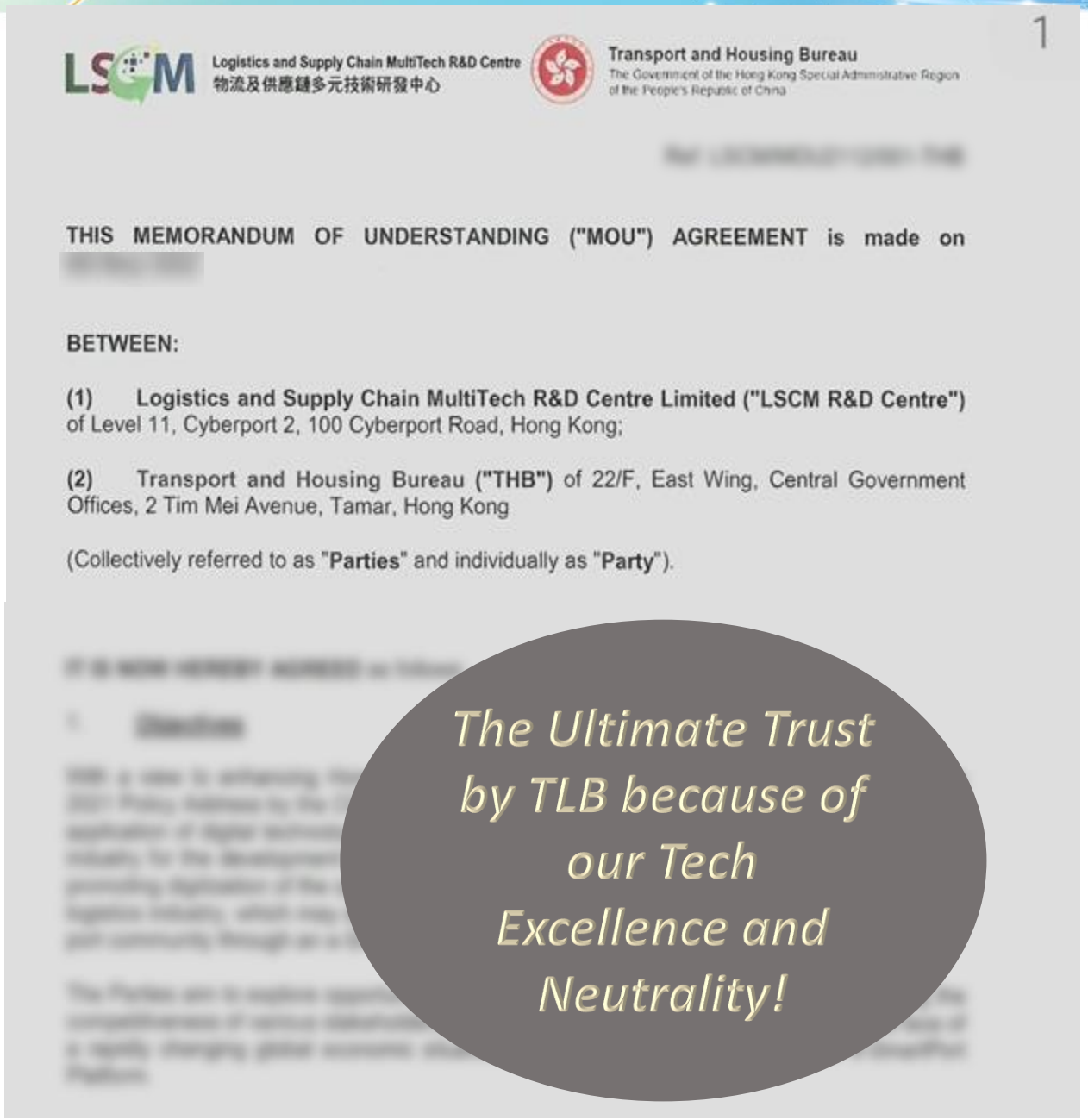
MiC Process Monitoring!

MiC Transportation Route Planning!

# Technologies Rise Above the Challenges

**Applications in Industrial Domain:**
**Building a Smart City !**

# Smart Port Initiative



1

Logistics and Supply Chain MultiTech R&D Centre 物流及供應鏈多元技術研發中心

Transport and Housing Bureau
The Government of the Hong Kong Special Administrative Region of the People's Republic of China

THIS MEMORANDUM OF UNDERSTANDING ("MOU") AGREEMENT is made on

BETWEEN:

(1) **Logistics and Supply Chain MultiTech R&D Centre Limited ("LSCM R&D Centre")** of Level 11, Cyberport 2, 100 Cyberport Road, Hong Kong;

(2) **Transport and Housing Bureau ("THB")** of 22/F, East Wing, Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong

(Collectively referred to as "**Parties**" and individually as "**Party**").

*The Ultimate Trust by TLB because of our Tech Excellence and Neutrality!*

# Smart-Port Initiative

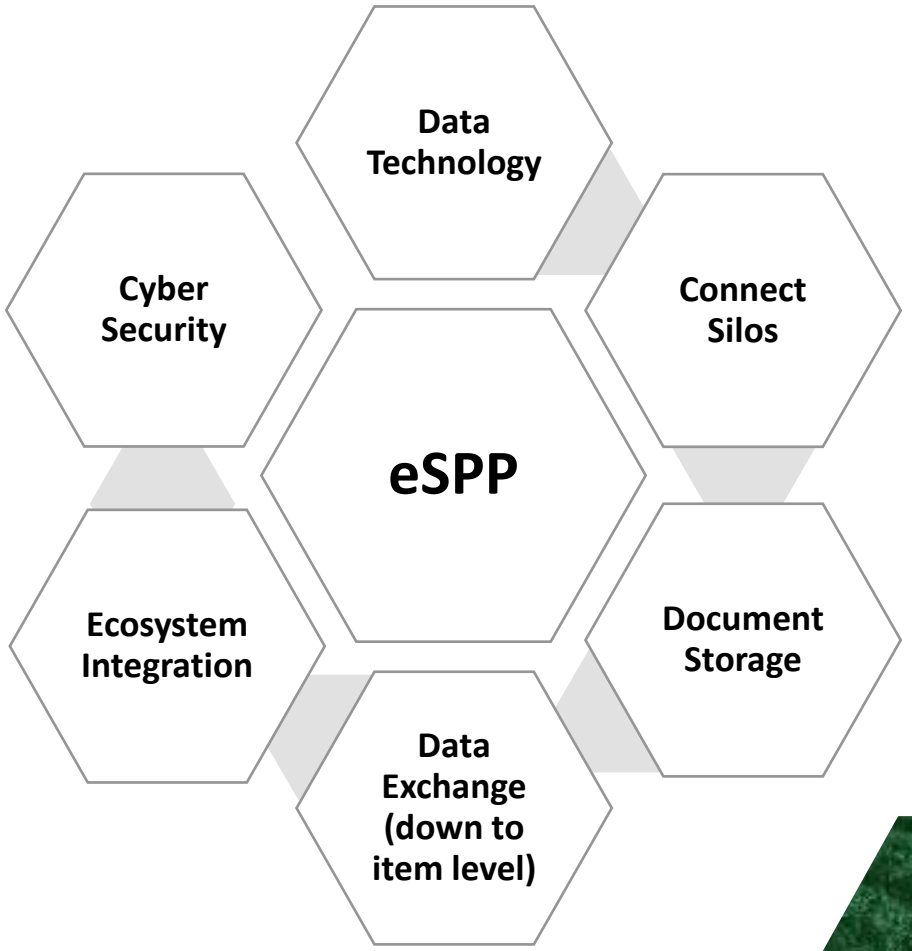
**National 14th Five-Year Plan**

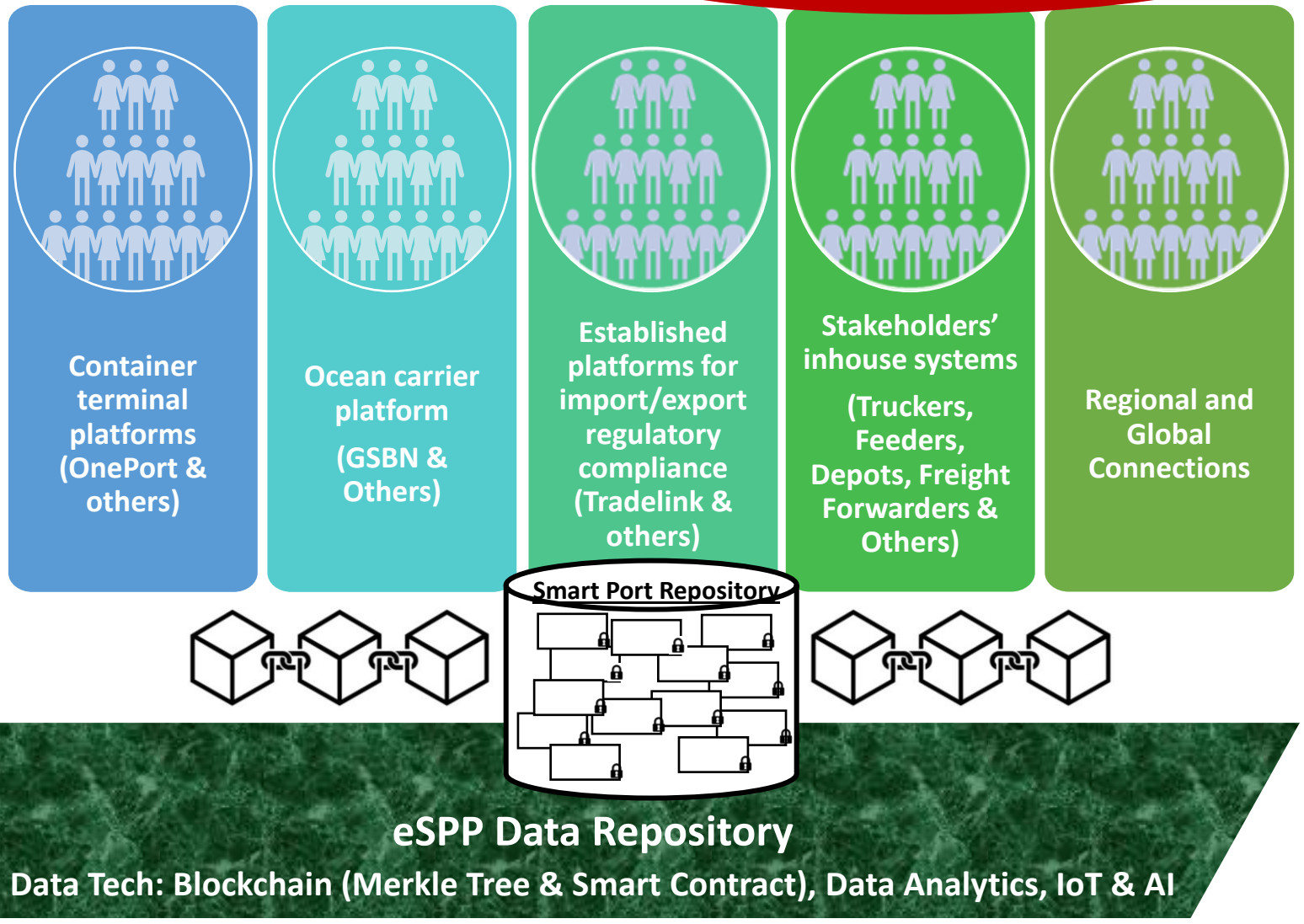
**CE' 2021 Policy Address**

→ MOU with TLB to explore the **e-SmartPort** technology to enhance HK's status as the international transportation center

# eSPP Port Community Platform

*"Weaving Out" a True Port Community!*



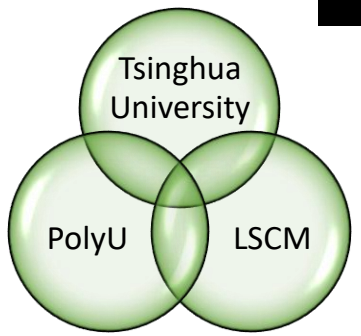



# Port Traffic – AIS-based Tracking and Analytics Platform

- Automatic Identification System (AIS) tracks transceivers on ships
- AIS data is publicly available from Marine Dept, maritime authorities, aishub.net consortium and other open-source projects

## Port Information System

- We shall develop a Port Information System as the Info Infrastructure for smart services of real-time port traffic analytics
  - ✓ Berth and anchorage identification
  - ✓ Port efficiency
  - ✓ Port congestion
  - ✓ Port connectivity Index




*Digital Port and Maritime Service-*
*The FUTURE of Hong Kong !*

# Opportunities – Port Connectivity Support

## CM Ports in SZ

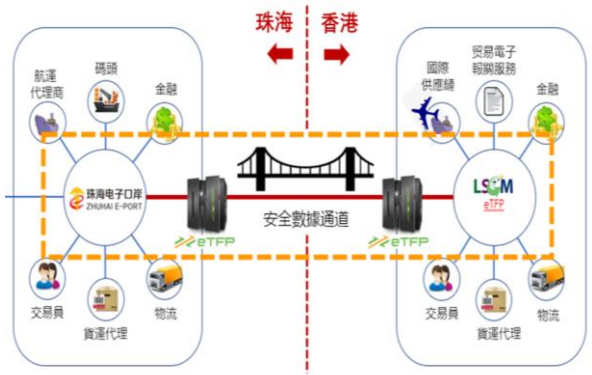
- Mawan / Shekou / Chiwan
- Create a smart port open platform to empower the logistics supply chain

## Nansha e-Port in GZ

With GZIS (Inst. Software App. Tech., GZ, CAS) to extend blockchain from Nansha to HK

## Zhuhai e-Port

Extend eTFP (Trade Fac. Platform) to facilitate cross-boundary trades through HK with GBA ports



粵港兩地海關合作推行「跨境一鎖計劃」

**LSCM 協助研發電子鎖 (E-lock) 技術**

為大灣區物流業打造快捷便利清關通道

**LSCM與香港海關合作 研發電子鎖(E-lock)技術**

**便利中港貨運 拓展多元用途**

▼香港海關陸路邊境口岸科總指揮官賴子榮指，使用E-lock可節省約2小時的清關時間，便利業界。

▼利用E-lock將貨車上鎖後，系統便可實時監控貨物運送流程，如出現異常情況，系統便會發出警報。

5日，E-lock系統已為逾6,800車次的疫苗運送提供監控，使一千萬劑疫苗安全送達各社區接種中心及公營醫院，供市民接種。

唐志鴻則指，除了用於貨物清關及疫苗運送外，

# Smart Mobility

# Smart Traffic

## Smart Traffic Control

- First to use video analytics to obtain real-time traffic data for controlling traffic signals
- Allocation of green time based on queue length

***With Smart Control***

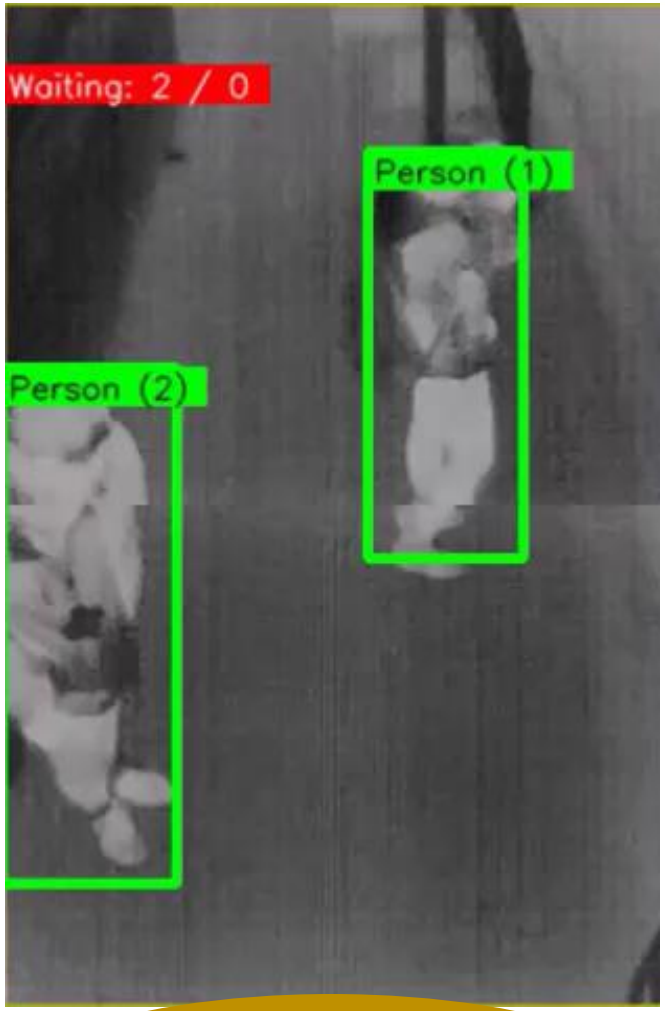
***Without Smart Control***

Waiting time reduces from 400 seconds to 145 seconds

## Pedestrian Detection

- First to use thermal cams for pedestrian detection
- Automatic activation and cancellation of crossing requests

*AI to Solve Traffic Jam Problem*



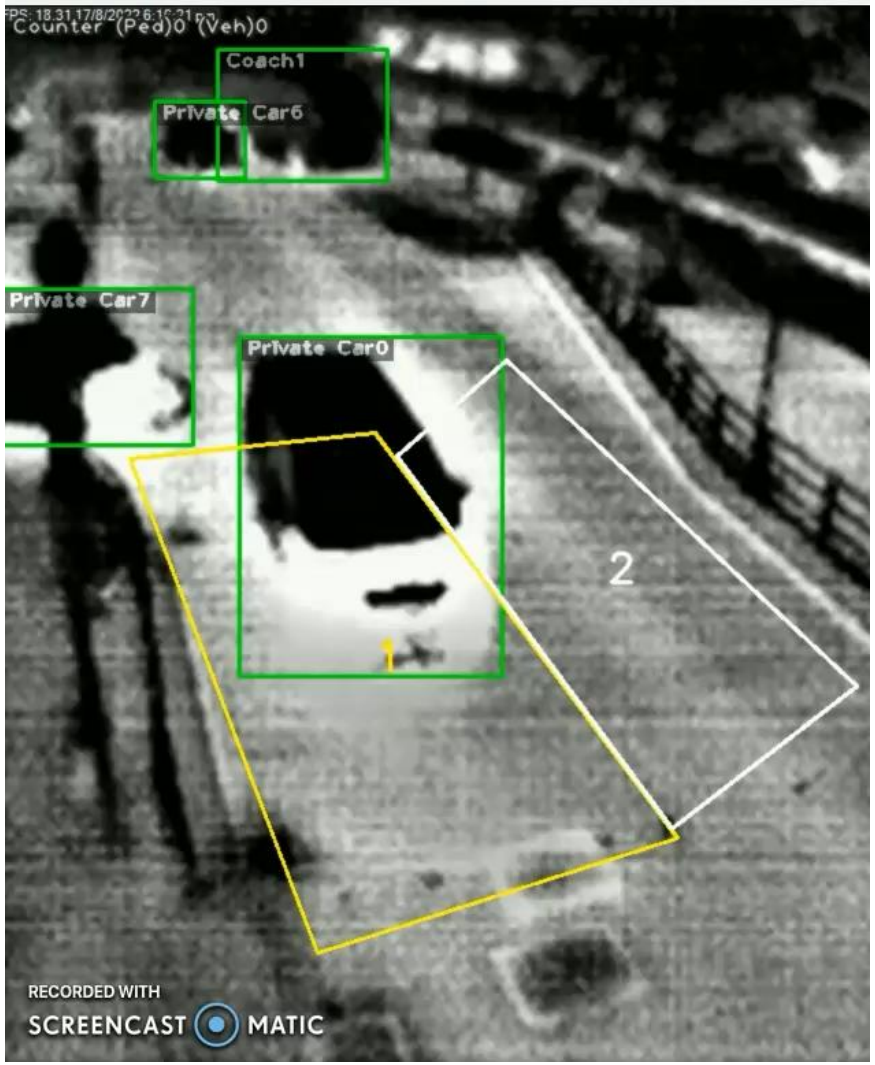

*AI to Protect Pedestrians' Safety , Speed Up Vehicle Traffic!*

# Smart Traffic

**Smart Area Wide Control**

- First to combine optical and thermal cams for pedestrian and vehicle detection
- First to coordinate multi-junction pedestrian and vehicle flows

*First Ever Attempt to Solve a Regional Traffic Jam Challenge!*



# Smart Traffic

**Traffic Flow Monitoring**

- Enhance road traffic safety for drivers and pedestrians
- Handle immediate incident or emergency management

***Minimizing Traffic Offenses***

# Gerontechnology

# LSCM Gerontechnologies

2012 2013 2015 2018 2019 2021 2022

*Over 10 years of Caring for Elderly!*

## I. Protective Living Environment & Community Infrastructure

**R&D Projects and Deliverables**

- GPS Tracking Platform/ iBao (Outdoor Anti-wandering)
- RFID Blind Cane & Navigation System
- RFID Gatedoor (Indoor Anti-wandering)
- Thermal Sensing System
- Toilet Flush Sensor
- Ultra-Wideband Elderly Movement Monitoring
- Living Behavioral Anomaly Detection System using Deep Learning AI Models
- 3D LiDAR Technology for In-Bed Monitoring Applications
- Robo-9 with Multi-Sensor Fusion Technologies for Visually Impaired

## II. Workplace Productivity Gain & Process improvement Infrastructure

**R&D Projects and Deliverables**

- Information/ Service Kiosk
- RFID Asset Management
- RFID-Enabled Training Kiosk
- Smart Communication Cards
- Service Logging System
- AI Enabled Elderly Call Caring System
- Robotic Kitchen for Elderly
- Smart Service Robot for Elderly
- Smart Lifter for Elderly
- IoT Platform Infrastructure for Tele-practice Applications of HKCSS

RFID Gatedoor System

無線射頻識別閘門系統

# Tele-practice Platform System

## Supporting Organizations

基督教靈實協會 HAVEN OF HOPE CHRISTIAN SERVICE

匡智會 Hong Chi Association
匡扶智障 FOR people with intellectual disabilities

聖雅各福群會 St. James' Settlement

三東院華 TUNG WAH GROUP OF HOSPITALS SINCE 1870

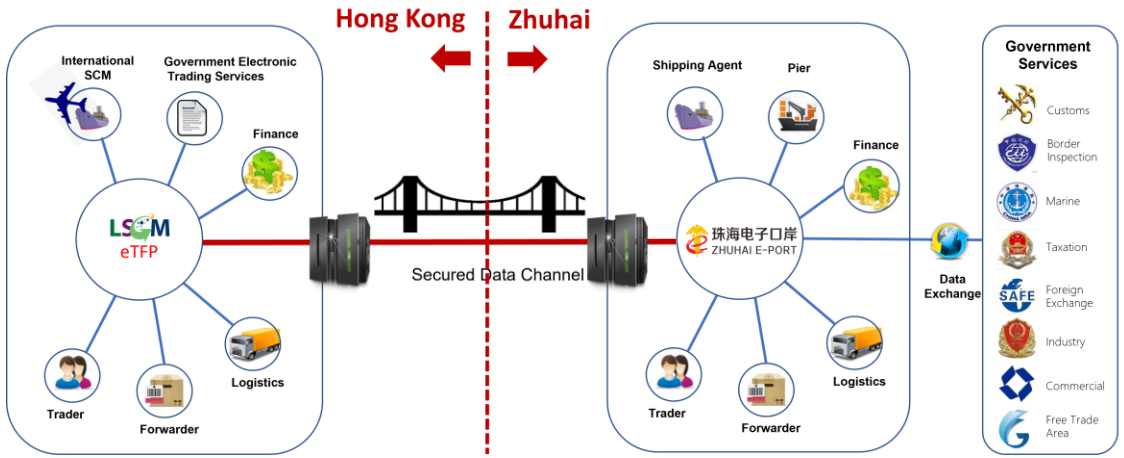
懷智 WAI JI

In collaboration with HKCSS

# Technologies Rise Above the Challenges

## Facilitate Greater Bay Area (GBA) Cooperation

# LSCM – ePort: eTFP




**LSCM Technologies: In collaboration with Zhuhai e-Port, logistics association, logistics company and IT services providers**

# Cross-boundary Pharmaceutical Track & Trace

Hospitals in GBA

HK/GBA Pharma Distributor

Pharmaceutical Management Blockchain Platform

GD

Data Cross-chain Channel

HK

Pharmaceutical Track & Trace Blockchain Platform

HK/GBA Pharma Distributor

GDMPA
广东省药品监督管理局
Guangdong Medical Products Administration

ISCAS 中国科学院软件研究所 Institute of Software Chinese Academy of Sciences

广州软件应用技术研究院

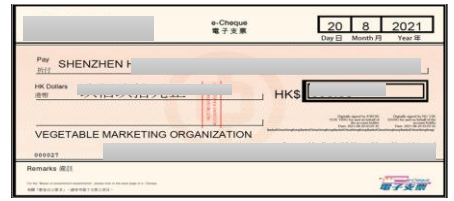
# Cross-Border: e-Cheque Deposit

Boundary

SZ Company

3 Send e-Cheque by email

VMO




11 Settlement Completion Notification

4b Submit transaction supplementary documents

4a Deposit e-Cheque through platform

2 Issue e-Cheque

1 Request e-Cheque

SZ Bank

10 Settlement

5 Initiate cross-boundary clearing

SZ e-Cheque Portal

9 T+1 cross-boundary settlement

6 Cross-boundary collection

HKICL

8 Payment

7 Request Payment

HK Bank

Bill flow

Cash flow

Boundary

蔬菜統營處
Vegetable Marketing Organization

# GBA Food Safety

- AI in assisting crop pest and disease control
  - Mobile app to analyze the crop images taken by farmers for crop pests and disease diagnose
  - Detect the severity of the damage
  - Link the damage to possible cause and suggest controlling methods
- Collaborate with 广东省农业科学院植物保护研究所
- Show case of AI technology in cultivation under the National Policy of **Vegetable Basket Plan**

# Summary

# Directions from our SITI

- 完善創科生態圈
- 豐富創科人才庫
- 建設智慧城市
- 深化與內地的創科合作

→奮力推進香港的創科發展

*It is Just the Beginning!*

## Our Efforts:

- **Help build the Innovation and Technology Ecosystem in Hong Kong**
- **Help groom Innovation and Technology talents**
- **Help construct Smart City in Hong Kong**
- **Cooperate with other entities in Greater Bay Area**

# Relevant Funding Schemes for Industries:

- Enterprise Support Scheme (ESS)
- Technology Voucher Programme (TVP)
- Fund for Better Living (FBL)
- Social Innovation and Entrepreneurship Development Fund (SIE)
- Innovation and Technology Fund for Application in Elderly and Rehabilitation Care
- Pilot Subsidy Scheme for Third-party Logistics Service Providers
- Smart Traffic Fund

*Ask For Details!*

# Asian Logistics, Maritime and Aviation Conference 2022

**Organisers:**

香港特別行政區政府
The Government of the Hong Kong Special Administrative Region

HKTDC 香港貿發局

**In association with:**

LOGSCOUNCIL 香港物流發展局 Hong Kong Logistics Development Council

HONG KONG MARITIME AND PORT BOARD 香港海運港口局

**An event of:**

HONG KONG 香港海運週 2021 MARITIME WEEK

# Thank you!

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