



# Smart Airport – Transforming Passenger Journey and Experience

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# 20 Years of Strong Growth



\*Including air mail



# Cargo traffic: No 1 in the world since 2010

Rank	Airport	Total Cargo (Tonnes)
<b>1</b>	<b>Hong Kong International Airport (HKG)</b>	<b>5,049,898</b>
2	Memphis International Airport (MEM)	4,336,752
3	Shanghai Pudong International Airport (PVG)	3,824,280
4	Incheon International Airport (ICN)	2,921,691
5	Ted Stevens Anchorage International Airport (ANC)	2,713,230
6	Dubai International Airport (DXB)	2,654,494
7	Louisville International Airport (SDF)	2,602,695
8	Tokyo Narita International Airport (NRT)	2,336,427
9	Taiwan Taoyuan International Airport (TPE)	2,269,585
10	Paris Charles de Gaulle Airport (CDG)	2,195,229
11	Frankfurt Airport (FRA)	2,194,056
12	Singapore Changi Airport (SIN)	2,164,700

Note: Include airmail.

Source: ACI Preliminary 2017 World Airport Traffic Rankings (9 April 2018)



# International passenger traffic: 3<sup>rd</sup> in the world

Rank	Airport	International Passengers
1	Dubai International Airport (DXB)	87,722,023
2	London Heathrow Airport (LHR)	73,187,198
<b>3</b>	<b>Hong Kong International Airport (HKG)</b>	<b>72,462,116</b>
4	Amsterdam Airport Schiphol (AMS)	68,401,146
5	Paris Charles de Gaulle Airport (CDG)	63,697,227
6	Singapore Changi Airport (SIN)	61,574,000
7	Incheon International Airport (ICN)	61,520,572
8	Frankfurt Airport (FRA)	57,122,348
9	Bangkok Suvarnabhumi Airport (BKK)	48,811,600
10	Taiwan Taoyuan International Airport (TPE)	44,479,754
11	Istanbul Atatürk Airport (IST)	44,254,473
12	Kuala Lumpur International Airport (KUL)	42,354,534
13	London Gatwick Airport (LGW)	41,476,858

Note: Exclude transit passengers.

Source: ACI Preliminary 2017 World Airport Traffic Rankings (9 April 2018)

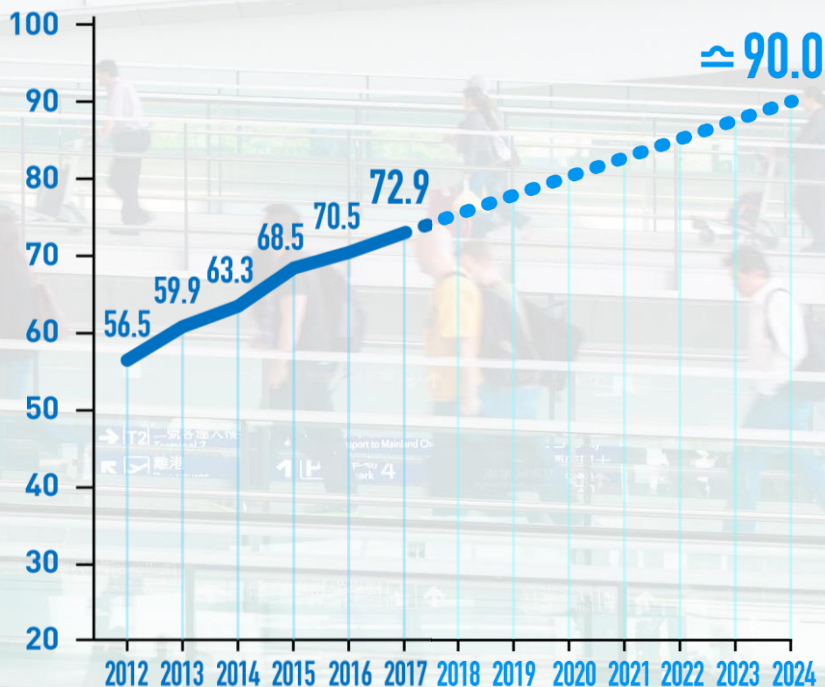


# Air traffic will continue to grow

## Passenger Traffic



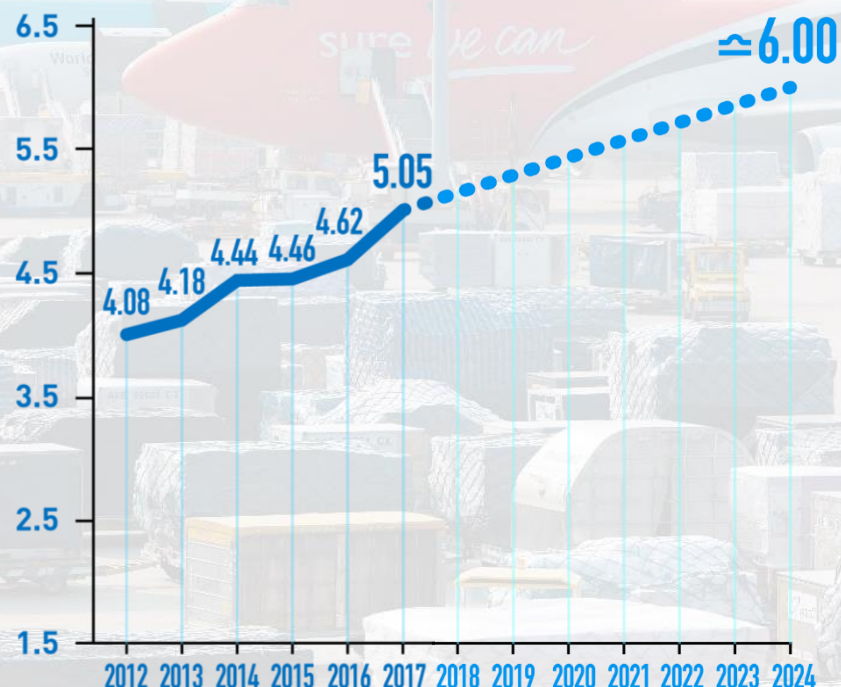
millions of passengers



## Cargo Throughput



millions of tonnes



Note: For 1998-1999, only airmail handled by Air Mail Centre is available. Airmail handled by Cargo Terminal Operators is not available at current stage.



# 3RS is much more than building a new runway



Third Runway Passenger Building

**57** parking stands 

New runway  
 **3 800 m**

Reclamation   
Around **650** hectares of land using non-dredge methods, including deep cement mixing technique

Comprehensive road network and transportation facilities



New Automated People Mover System

Train service every **2.5** minutes on average 



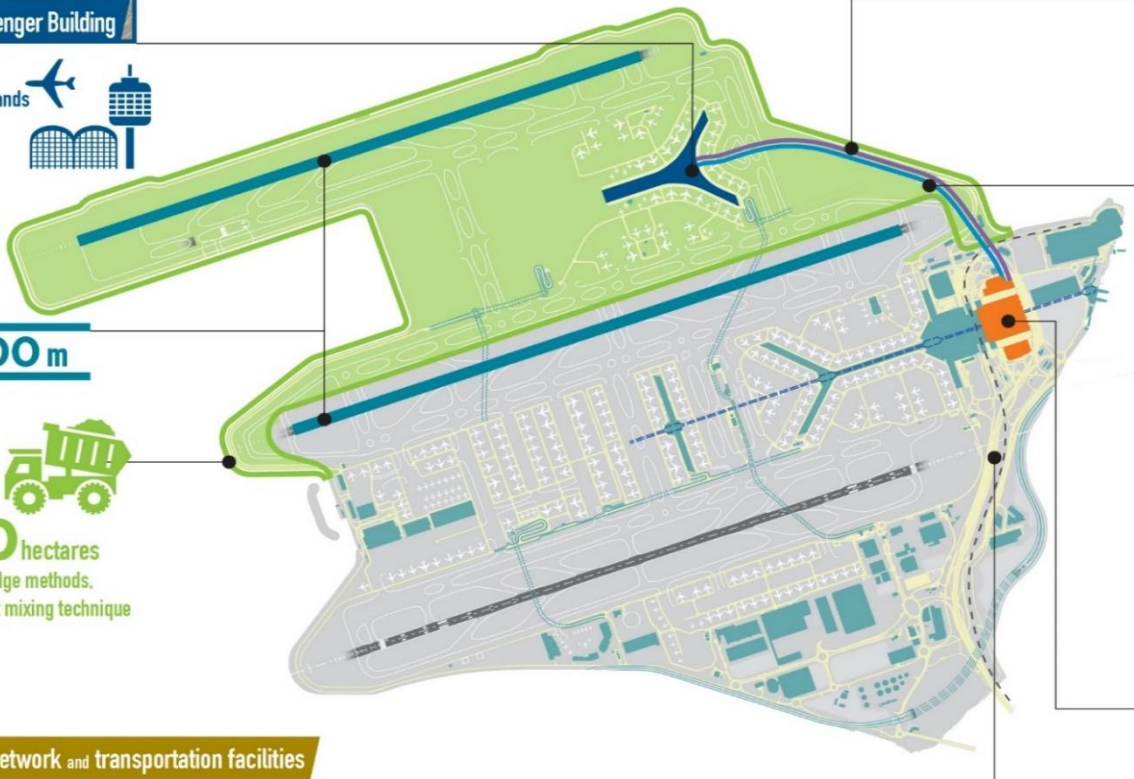
New Baggage Handling System

Hourly handling capacity of **9 600** bags 



Expansion of Terminal 2

Providing arrivals, departures and full-fledged passenger services 



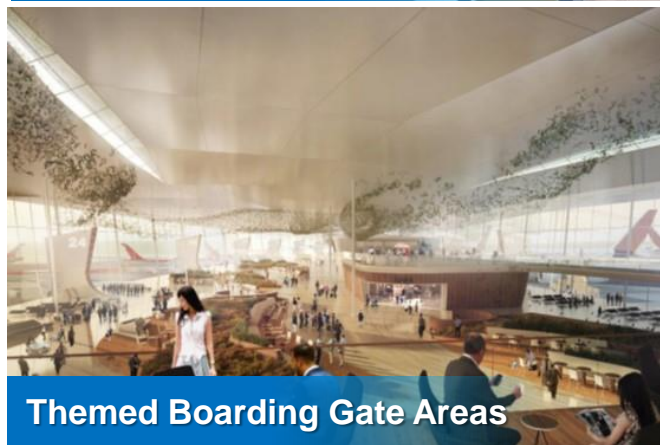
# Existing Facilities Also Under Expansion and Upgrading



New East Hall food hall



An additional check-in aisle with over 40 new counters, self-bag drop and other facilities



Themed Boarding Gate Areas



New roof garden



Redesigned seating area

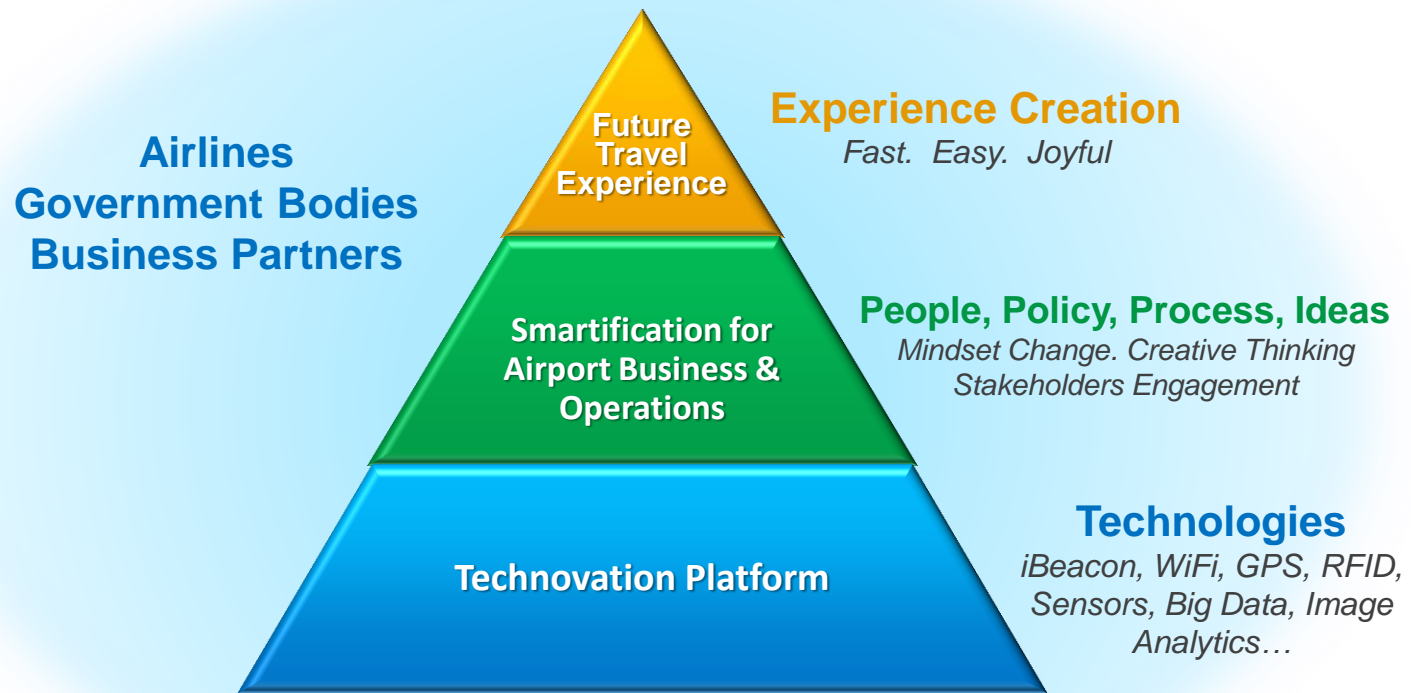


# Sky Bridge under construction

To connect Terminal 1 and North Satellite Concourse



# Physical and Smart Infrastructure to Build a Smart Airport for Transforming Passenger Experience

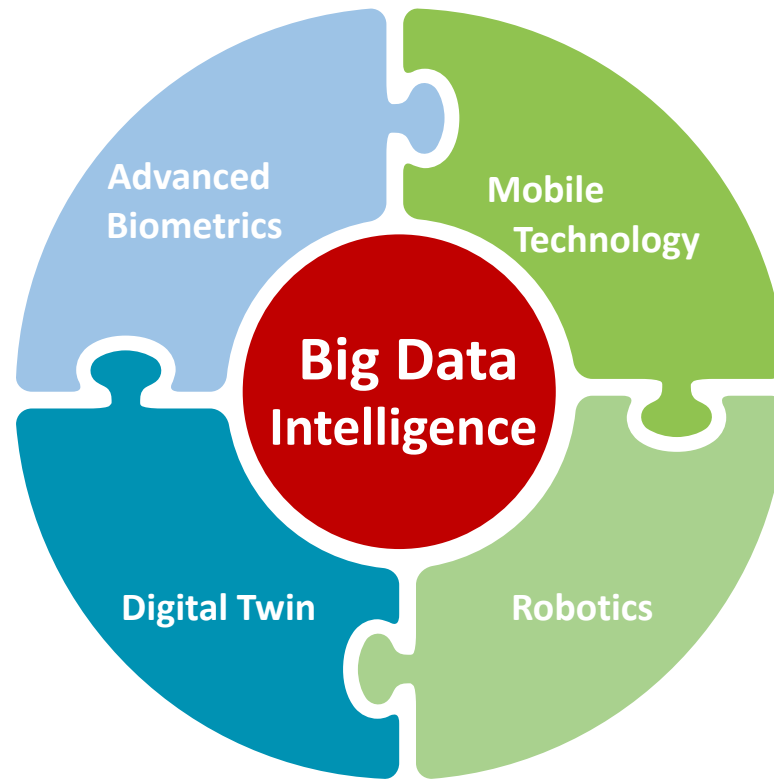


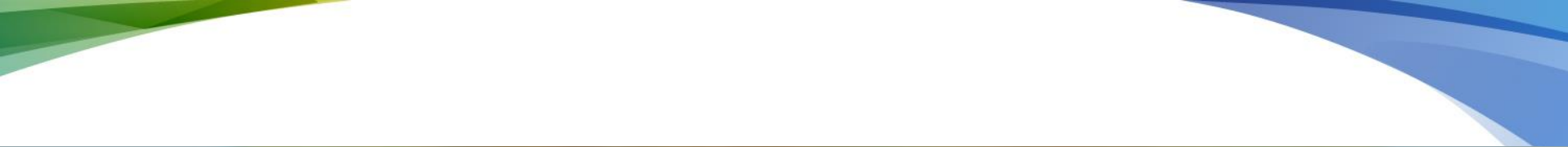
# Smart Airport Vision

***EXPERIENCE  
THE FUTURE*** AT HKIA



# 5 Key Enabling Technologies to Realize Smart Airport Vision



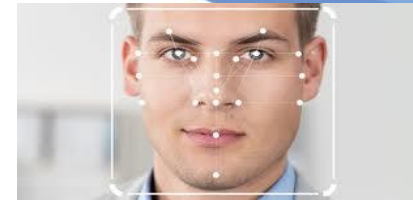


ID 8534569

# Advanced Biometrics



# Smart departure enhancing travel experience



## Checked once Single Token for Passenger Journey



Check-in



Self-Bag Drop



e-Security Gate



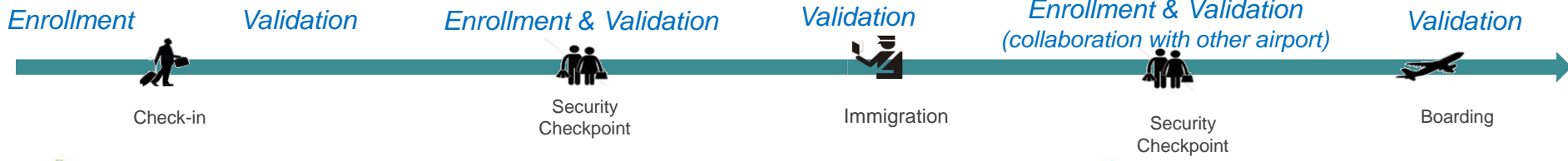
Immigration



Transfer Security Gates



Self-Boarding Gate



# Implementation of Biometrics e-Security Gate on Schedule



- Prototype system installed in April 2018
- First production trial of 4 x e-Security Gates and 2 x Manual Gates at South Hall in place
- Full installation will be completed by early 2019
- South Hall: 20 e-Security Gates + 8 Manual Stations
- North Hall: 24 e-Security Gates + 8 Manual Stations



# Multi-factor authentication for more stringent operational use cases



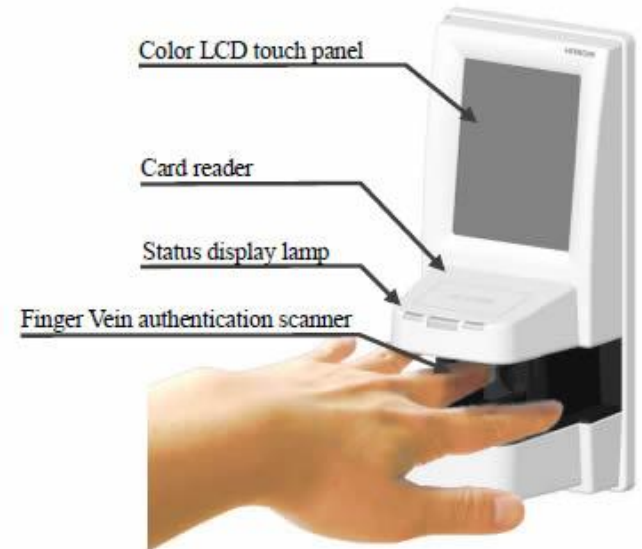
## Long Range Iris Scanning

- Detection up to 2 m distance
- Good to combine with Facial



## Palm Vein Scanning

## Finger Vein Scanning

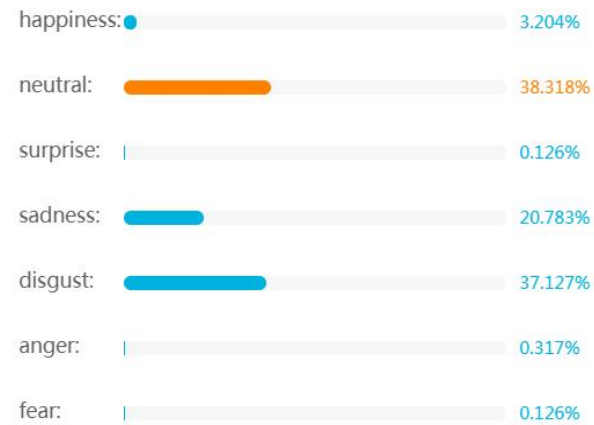
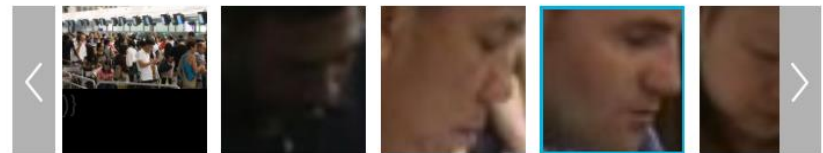


# Going deeper than Identification - Emotion Recognition

Analyze and identify emotion of detected faces via Smart CCTV. Analysis result of each detected face includes confidence scores for seven kinds of emotion : **anger, disgust, fear, happiness, neutral, sadness, and surprise.**



## Results

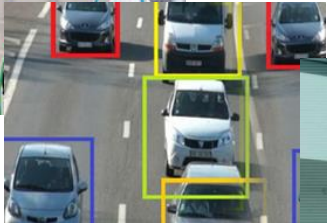


Emotion of this detected face is most likely to be **neutral**, with the highest possibility of **38.318%**

# Smart CCTV System



Revamp current CCTV infrastructure into fully digital at 4K resolution



**Video Analytics Applications**



# Phase 1 Video Analytics (VA) Project

## 11 Applications



Facial Recognition



Crowd / Queue Management



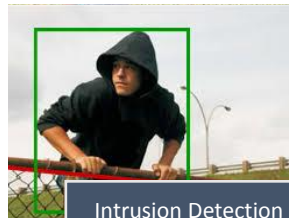
Retail Analysis



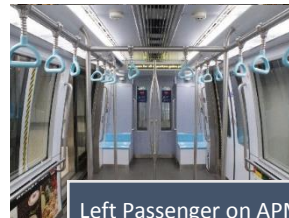
Aircraft Parking Clearance



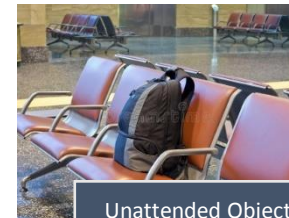
Tailgating



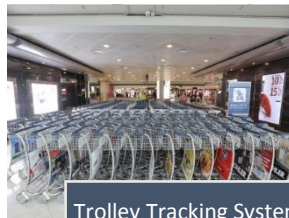
Intrusion Detection



Left Passenger on APM



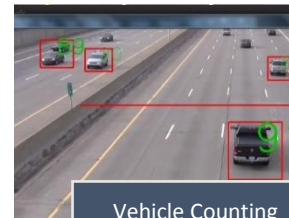
Unattended Object



Trolley Tracking System



License Plate Recognition



Vehicle Counting

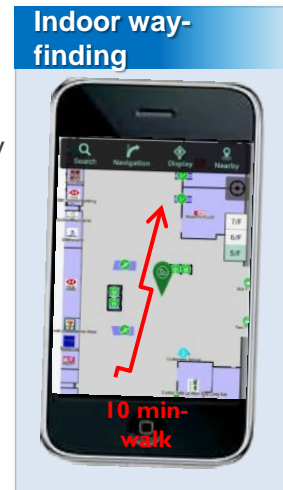
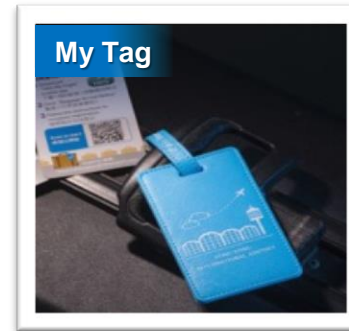




# Mobile Technology



# Personalized Services throughout the Journey at HKIA

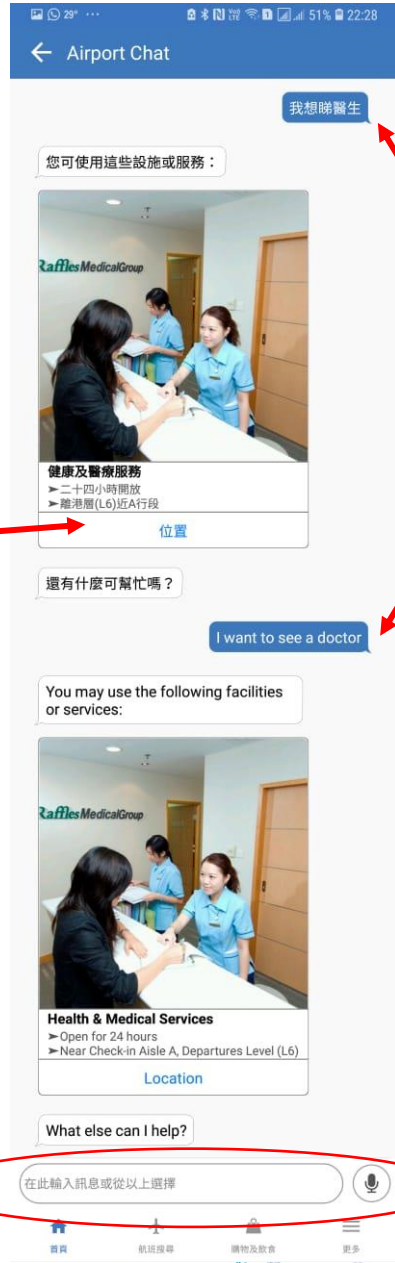


# Virtual Assistant Chatbot

Automate customer enquiry handling with artificial intelligence



Full coverage:  
Flight,  
Services &  
Facilities,  
Shop & Dine



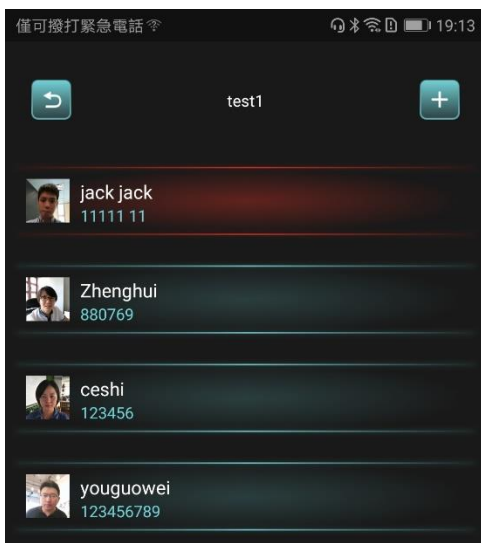
Link to My Flight Way Finding, if applicable

Chinese or English or even mixed

Type or speak your question



# Smart Glasses - VIP Recognition at Courtesy Channel



1. Guest recorded in  
VIP database



2. VIP process to airside via  
Courtesy Channel



3. Result will be shown on the glasses

## Benefits of Smart Glasses

- Operation anywhere
- Free hands during operation
- Augment human decision





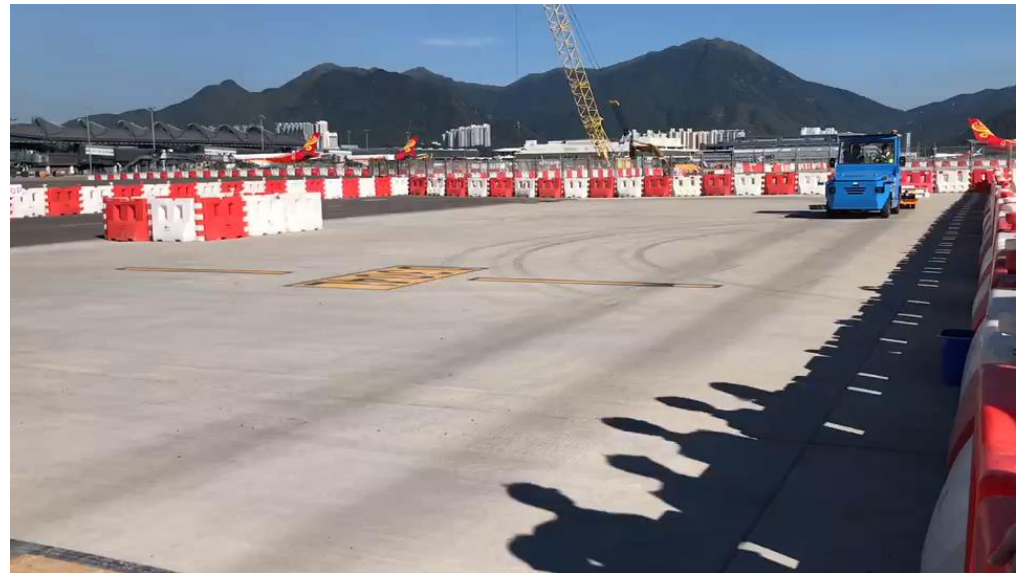
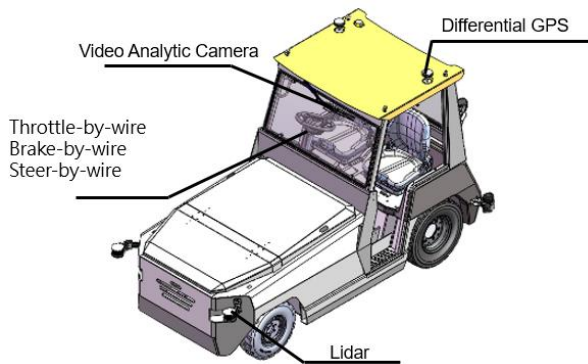
# Robotics



# Field Testing of Autonomous Electric Tractor (AET) - On-going

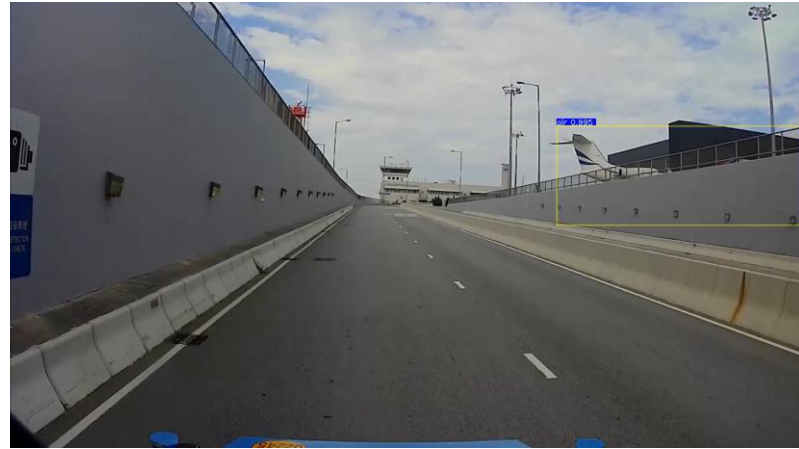


- Conducted **Phase 1** test at Parking Stand 304 (Cordoned off area) in May 2018

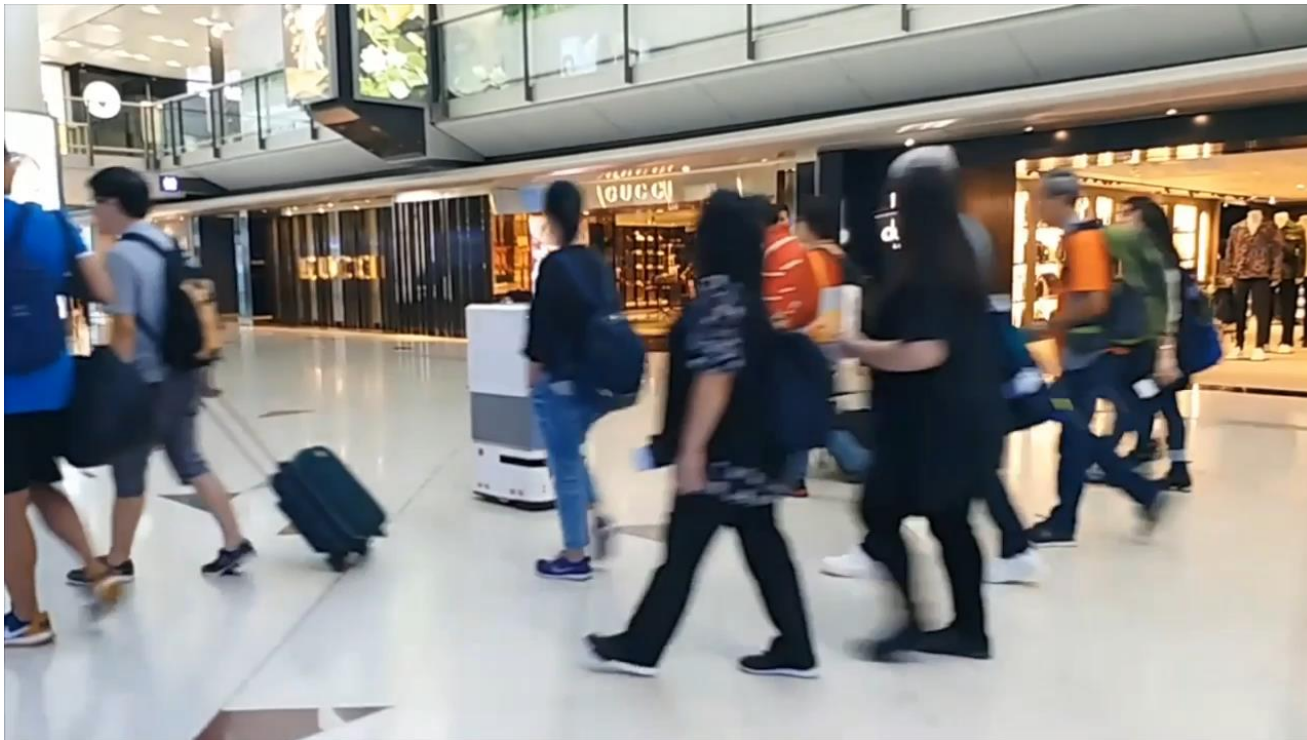


# AET enhances road safety, improves efficiency and replaces mundane tasks by Hi-Tech jobs

- **Phase 2** road test at designed route (X-stand via west tunnel) just on going

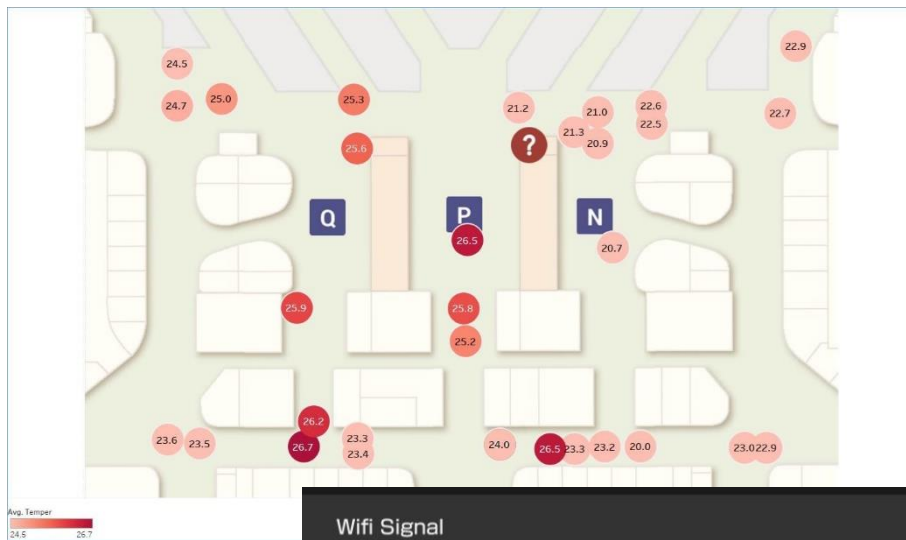


# Proof of Concept – Indoor Multi-function Robot



- Common autonomous platform + detachable functional unit on top
- Collaborative machine learning

# Business Insight Plus Actions in addition to Data Collection



- Temperature, Wi-Fi Signal, Beacon Signal, Wi-Fi roaming quality ...
- Business insight plus actions in addition to data collection
- M2M communication, if practical

Beacon Signal		
ID	Time	Status
Beacon #5	12/10/2018 13:30	Found
Beacon #4	12/10/2018 13:25	Found
Beacon #3	12/10/2018 13:20	Found
Beacon #2	12/10/2018 13:15	N/A
Beacon #1	12/10/2018 13:10	Found

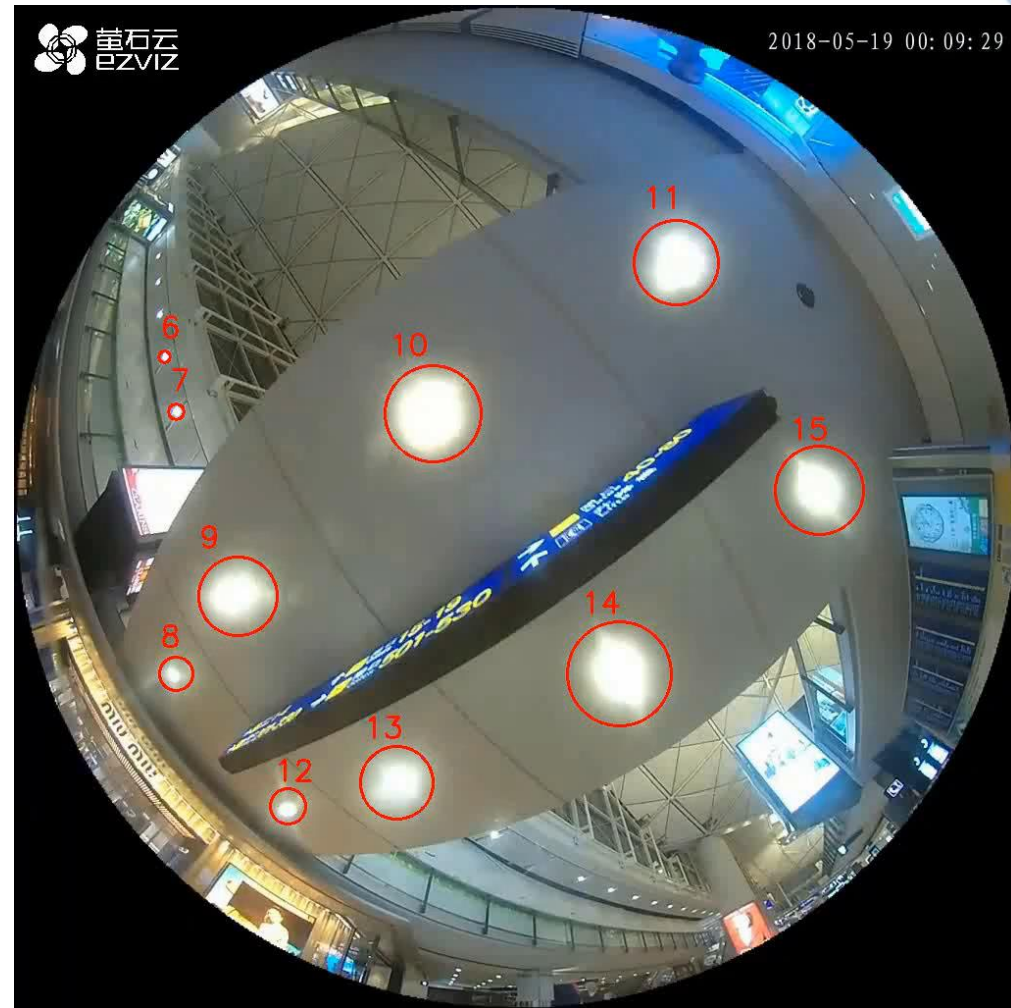
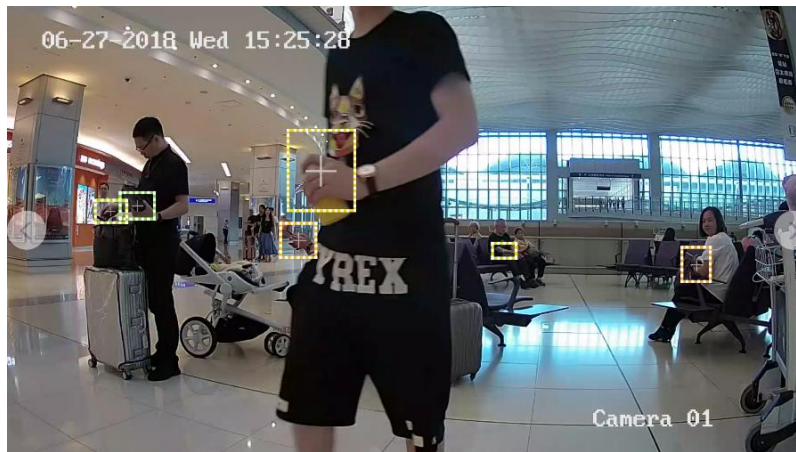
  

Wifi Signal		
Time	Status	
12/10/2018 13:30	Found	
12/10/2018 13:25	Found	
12/10/2018 13:20	Found	
12/10/2018 13:15	N/A	
12/10/2018 13:10	Found	



# AI Capabilities - Video Analytics

- Viewing angle different from fixed CCTV cameras
- Identifying Abnormalities (e.g. facility damage, unusual crowd, suspicious item ..etc.) or special object of interest

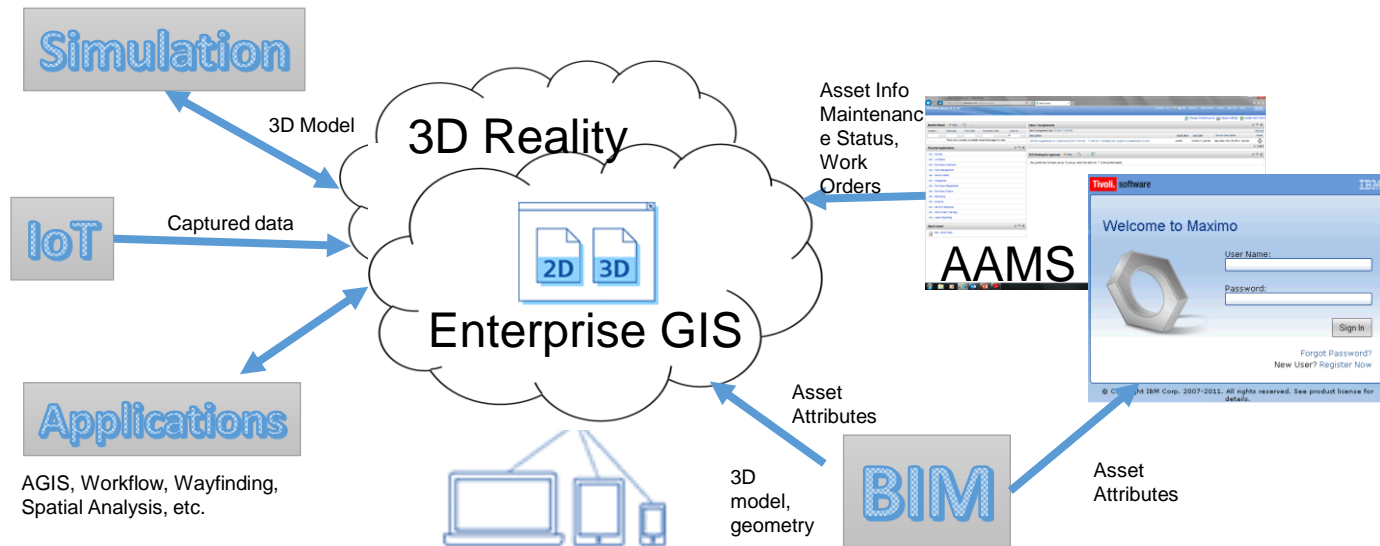


A man in a white turtleneck and blue shirt is shown in profile, looking towards a digital wireframe human figure. The wireframe figure is composed of blue and green lines and is positioned as if it is a virtual twin of the man. The background is dark with some digital patterns.

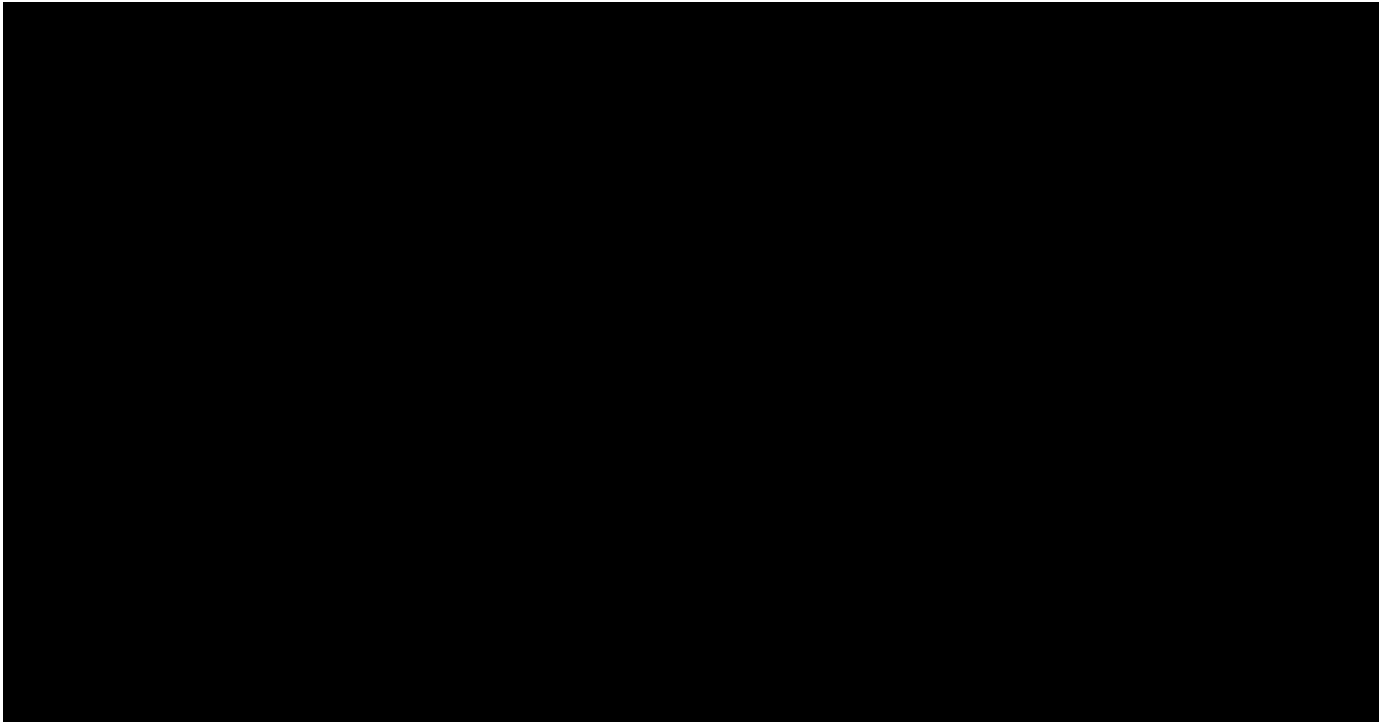
# Digital Twin



# Digital Twin facilitates Holistic Airport Management and Predictive Decision Making



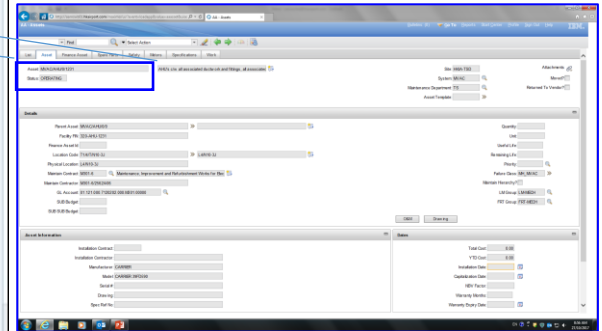
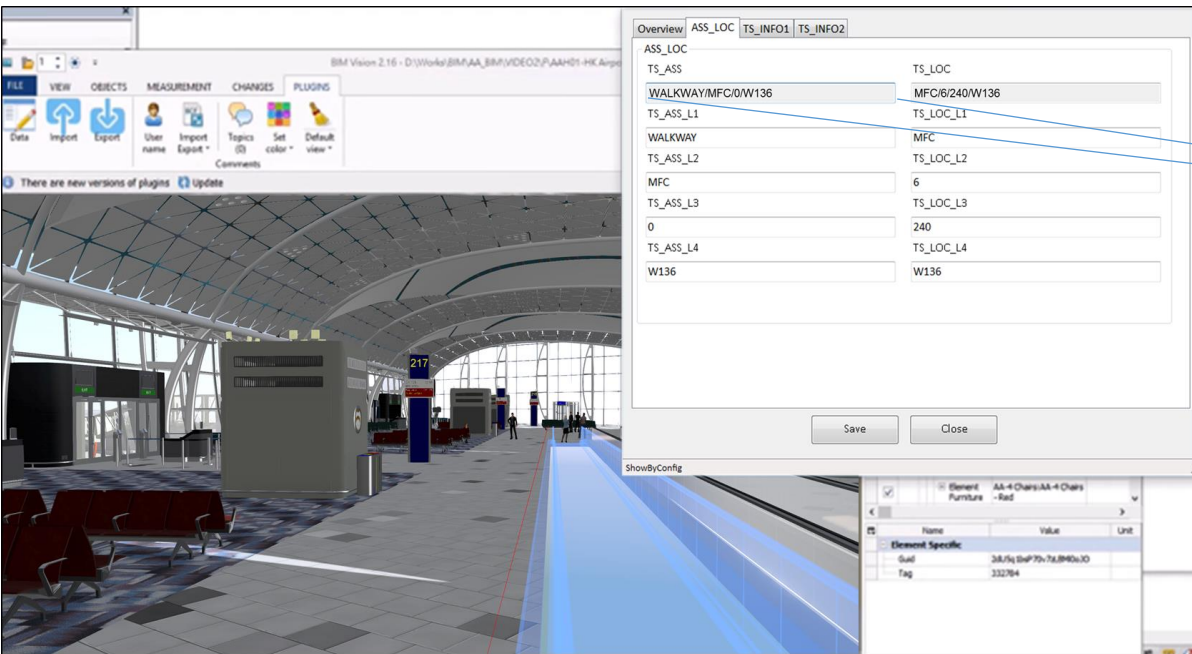
# Reality Modeling on Game Engine Platform



*\*Resolution reduced already*



# Asset Data Integration with Asset Management System



Asset data and record in the separated AAMS (Maximo)

- Manufacturer
- Model No.
- Installation Date
- O&M Manual
- Maintenance History

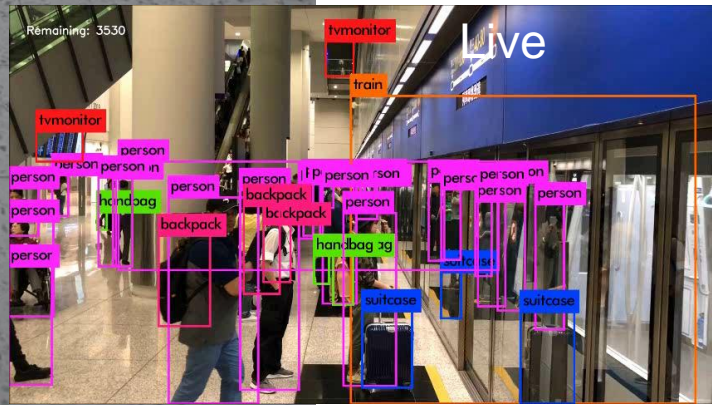
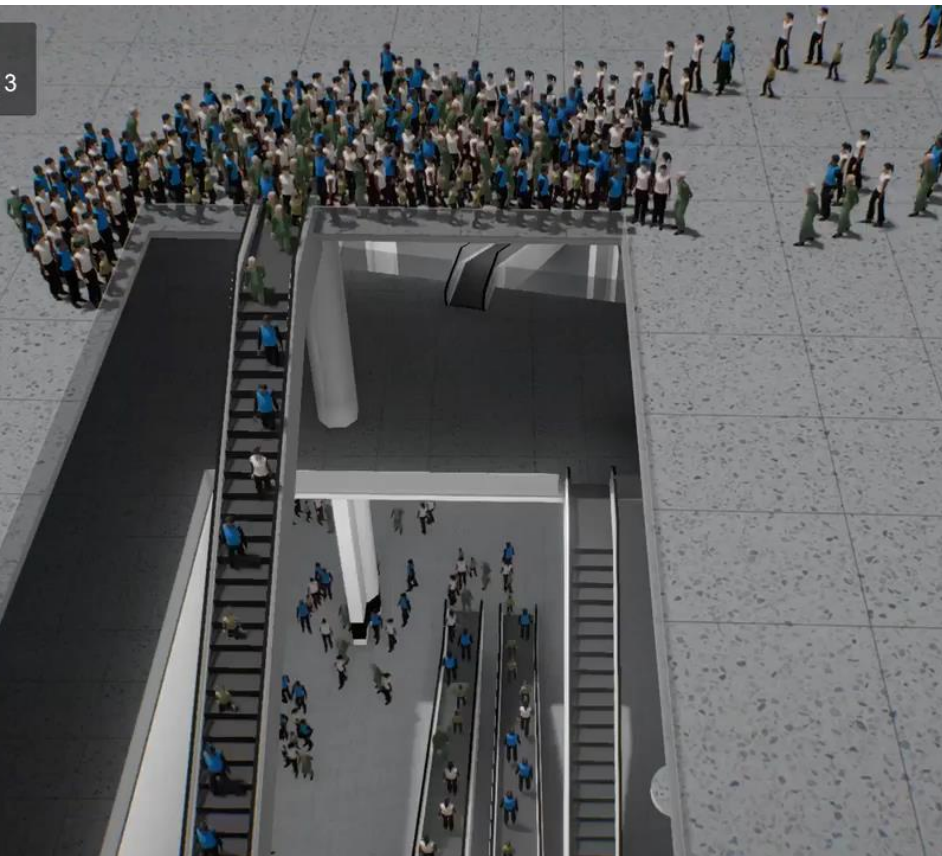
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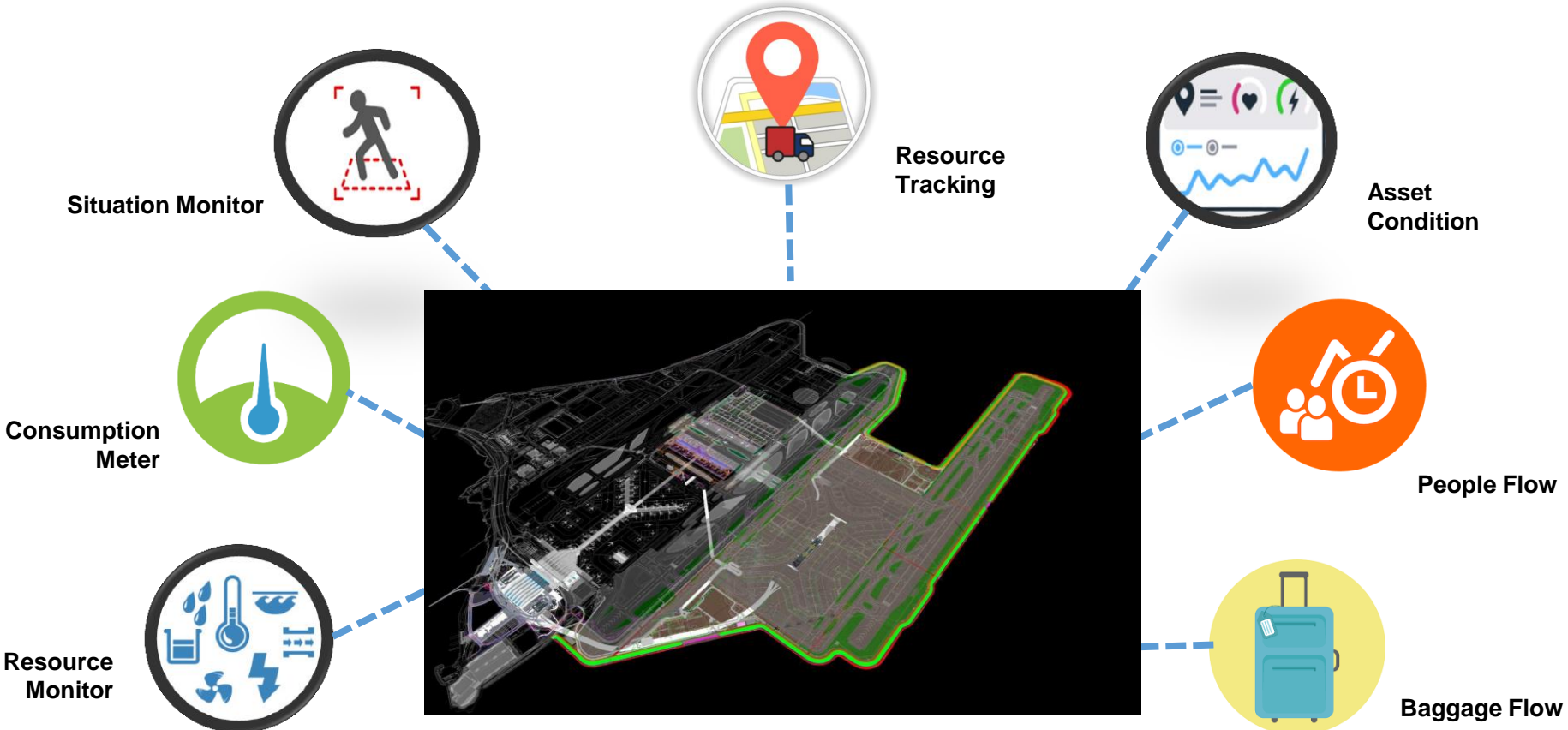
# Traffic & Passenger Flow Simulation

using Video & Passenger Flow Data

Time: 00:01:10  
Number of people: 1313



# Integration with IoT – A Living Digital Twin



# Collaboration with the Industry

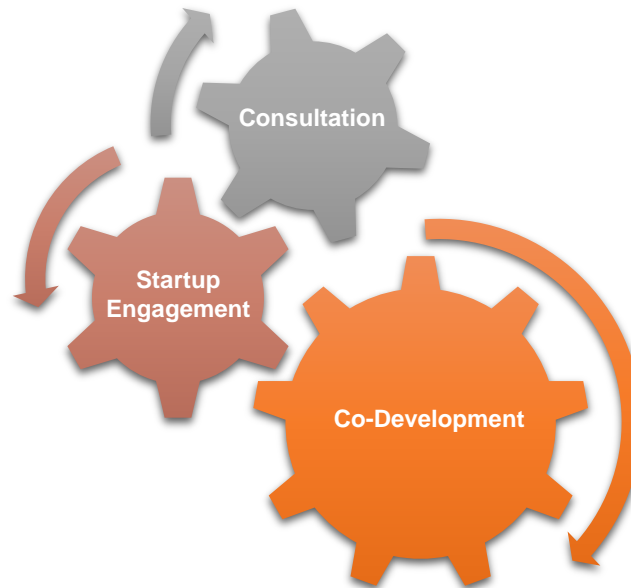
Collaborate with the Airport Community and Business Partners



HKIA Technovation Conference



Collaborate with the Research Community



A member of LSCM R&D Centre  
香港物流及供應鏈管理應用技術研發中心成員



Hong Kong Productivity Council  
香港生產力促進局





# *Together, we create a smarter airport for Hong Kong*

**Biometrics ■ Mobile Technology ■ Robotics ■ Digital Twin ■ Big Data Intelligence**

