

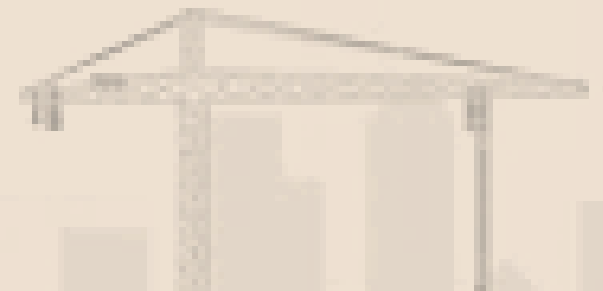
ConsMa 2023

Construction Trends in Hong Kong

10th – 11th April 2023

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Covid-90 in Hong Kong

- ❖ A pandemic across over the world
- ❖ Global economy affected
- ❖ Unimaginable on challenge of normal social activities
- ❖ People to reconsider variety of usual practices



Covid-90 in Hong Kong

Isolation

- ❖ Stage home
- ❖ Quarantine centres



Impact in the Construction Industry

- ❖ Insufficient of labour and human resources
 - Compulsory isolation
 - Work from home
 - On-site inspections and approval tasks delayed
- ❖ Shortage of construction materials
 - Factory closed
 - Disruption of the global supply chain
 - Halting of site work
- ❖ Cash flow of contractors were hampered



Construction industry response to the pandemic

- ❖ Government Anti-epidemic Fund
- ❖ Extension project time for the government contracts
- ❖ Use subsidies to help the industry
- ❖ Speed up to adopt new construction methods and technologies for the industry



Traditional Construction Methods

- ❖ Complicated process of coordination
- ❖ Disharmonized sequence of works for different trades
- ❖ Many Installations within limited space
- ❖ Poor working environments
- ❖ Site accident
- ❖ Waste generation



Modular Integrated Construction (MiC)

- ❖ Free-standing volumetric modules
- ❖ Manufactured off-site
- ❖ Time saving
- ❖ Better quality
- ❖ Lower risk
- ❖ Higher sustainability
- ❖ Less accidents



The InnoCell Residential Institution is located on a 2,825 sq.m site at the Hong Kong Science and Technology Park (HKSTP).

Multi-trade Integrated Mechanical, Electrical and Plumbing (MiMEP)

- ❖ Integration of multi-trade building services components into a single assembly
- ❖ Manufactured in factory
- ❖ Connection of modules to complete various trades of building services on site



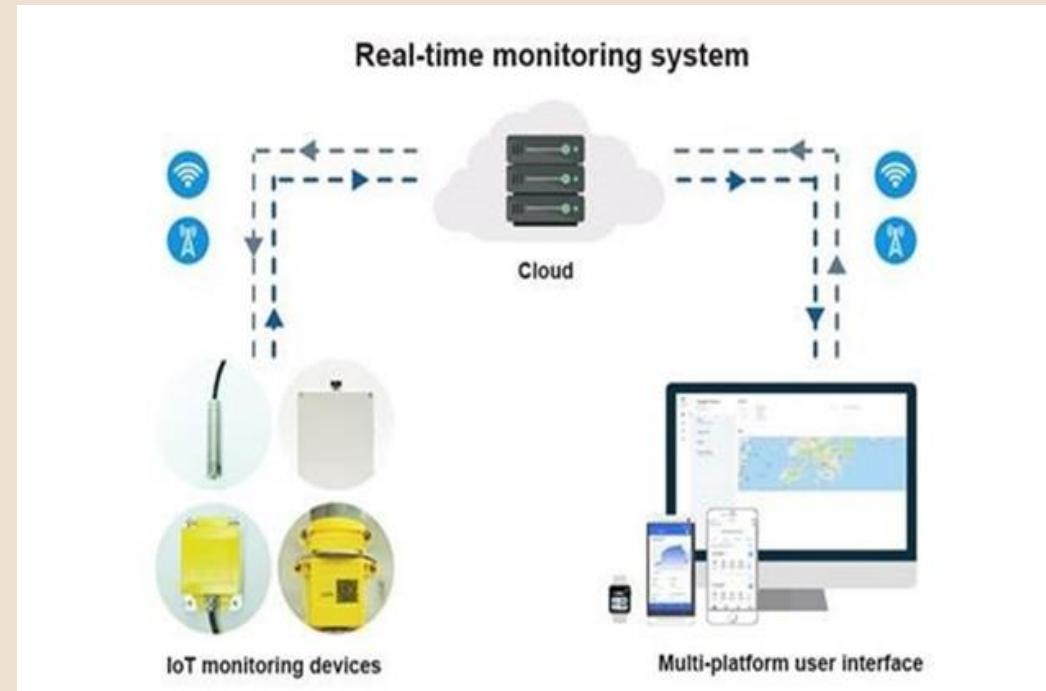
Modular cooling tower & condensing water pipework system



Integrated Air Handling Unit

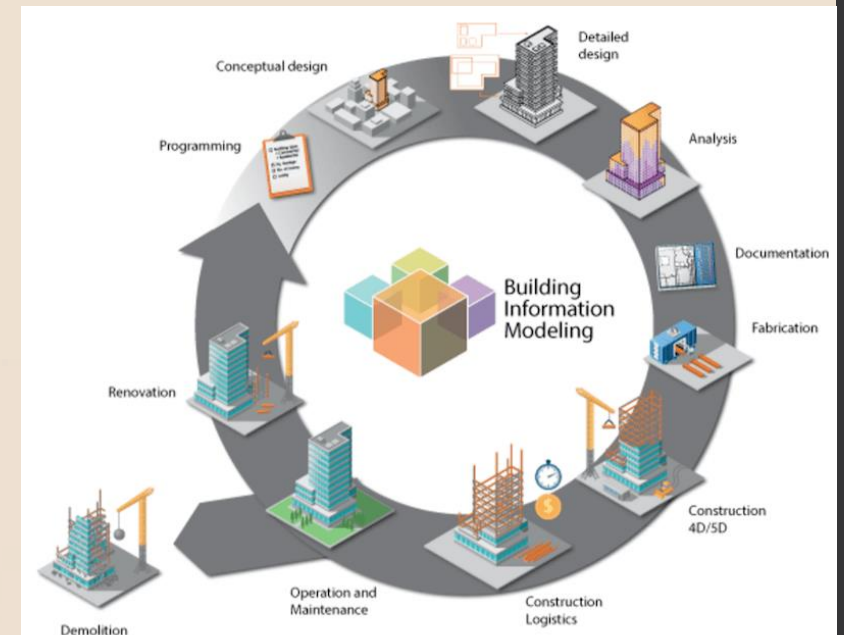
Innovation Technology

- ❖ Internet of Things
- ❖ Cloud
- ❖ Big data
- ❖ AI
- ❖ Robot
- ❖ BIM
- ❖ AR/VR/MR
- ❖ Drone
- ❖ Multi-platform interface



Building Information Modelling (BIM)

- ❖ Possible problems found in the design stage
- ❖ Real-time information sharing / exchange
- ❖ Predict the construction sequences
- ❖ Increasing efficiency on communication
- ❖ Increasing problem solving
- ❖ Minimize project risk
- ❖ Integrate with other technologies



Augmented Reality(AR) / Virtual Reality(VR)

- ❖ Improve productivity
- ❖ Streamline workflow
- ❖ Site staff training
- ❖ Site Inspection
- ❖ Compliance checking
- ❖ Construction management
- ❖ Safety & Health management
- ❖ Facility management



Integrated 5G mixed reality solutions

Works coordination

BIM Viewing vs Actual World

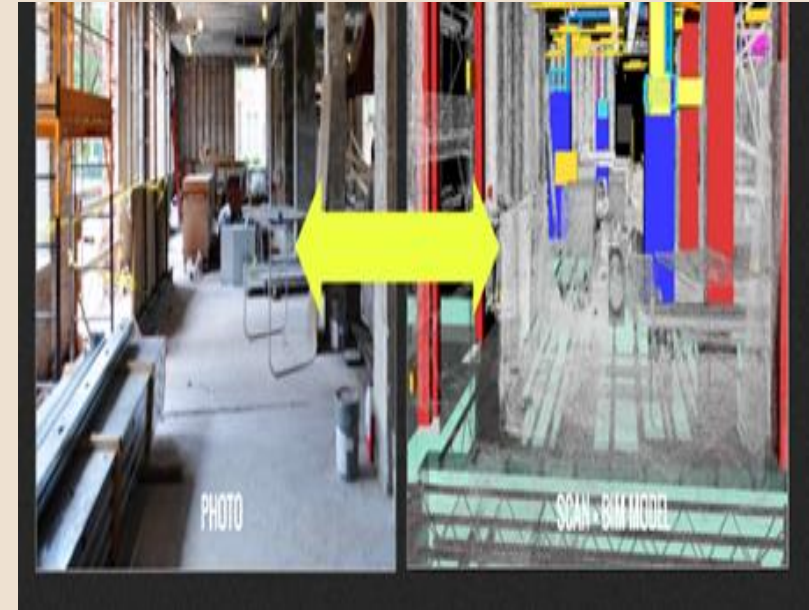
- Clear demonstration & visualisation
- Minimize design changes
- Avoid back-and-forth communications



Remote inspection

Remote joint inspection

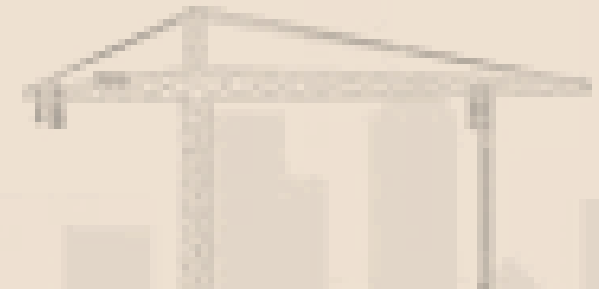
- Less resources for reporting & documentations
- Save time spent on repeated on-site visits



Remote support / meeting

via on-line meeting

- Communication from different destinations with visual aid/ interaction
- Provide real-time aids



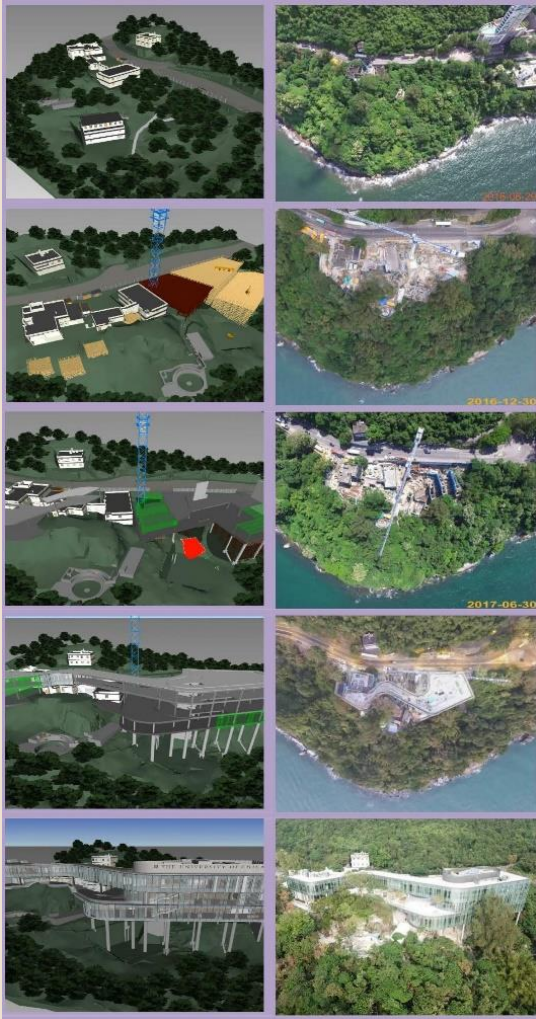
Drone in Construction

- ❖ Site survey/Measurements
- ❖ Construction Mapping/Modelling
- ❖ Progress Monitoring
- ❖ Inspection
- ❖ Access hard-to-reach areas



Drone Video / Photo

Progress Tracking



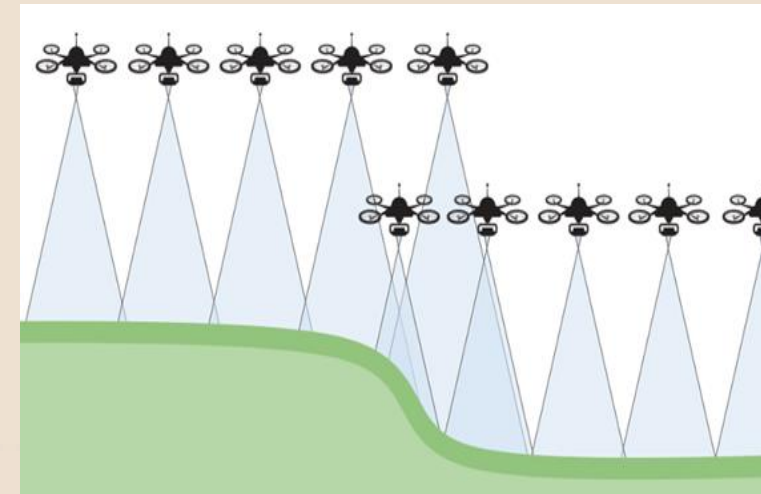
Planned vs Actual

Orthophoto



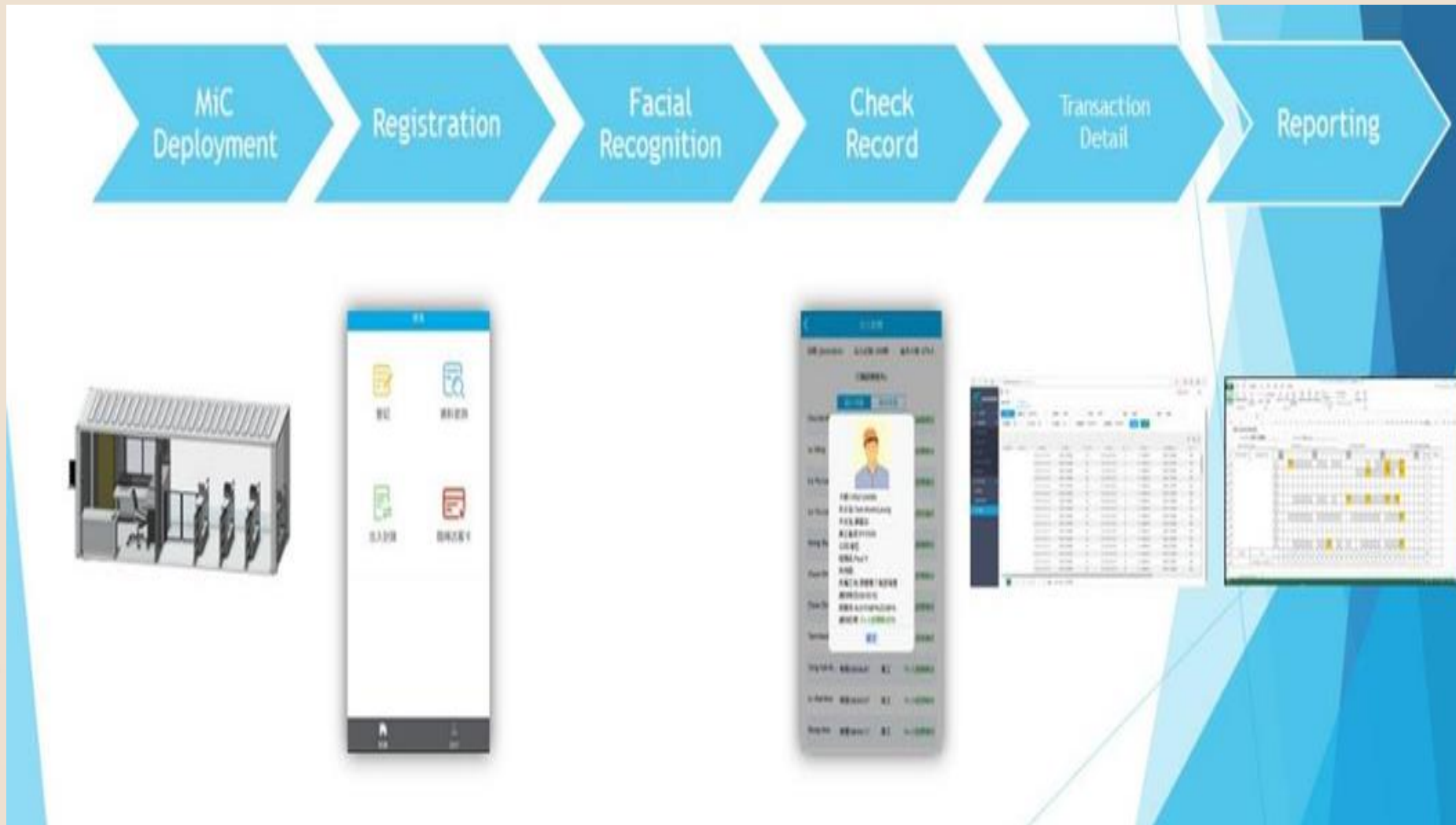
Visualization of Proposed Works

Point Cloud Profile

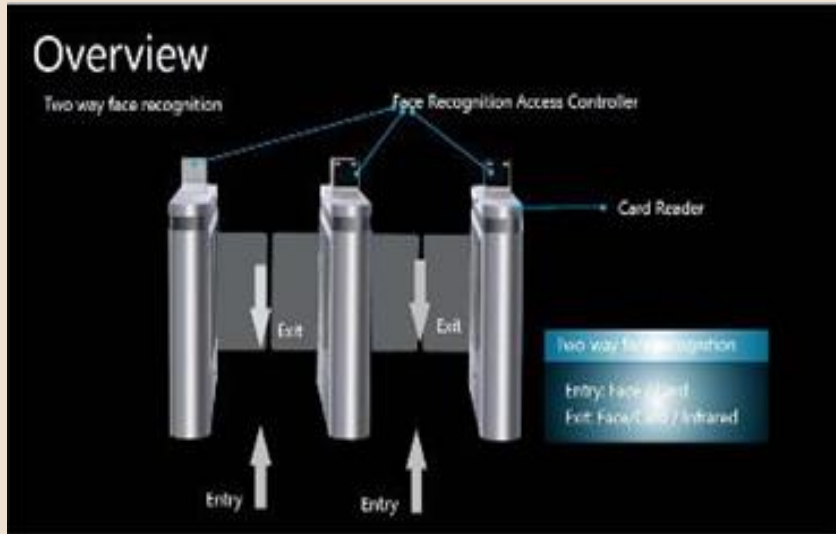


True Record of Topography

Access Control Recording System (ACRS)

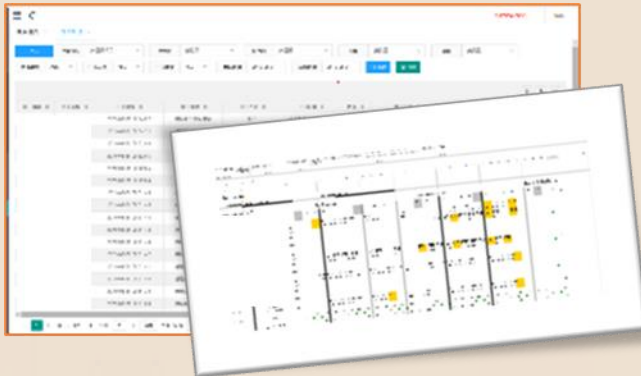


Access Control Recording System (ACRS)



Advanced facial recognition technology

- ❖ Time-saving processes
- ❖ Efficient human resources management
- ❖ Health monitoring



Real-time Access –
Workers' Attendance

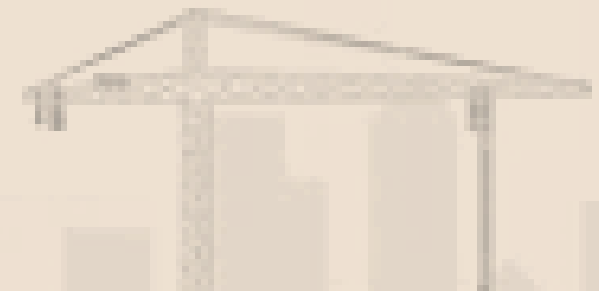


Health Monitoring

Automatic Wall Plastering Machine (Robot)



- ❖ Operates remotely, works automatically
- ❖ Plaster sections of wall up to a height of 5 metres above ground
- ❖ More safe
- ❖ Better quality
- ❖ More efficiency



Digital construction management (DCM Systems)

Third runway project



Contractor Site Management - Direct Labour & Plant Management (Use of Eco Technology and Innovation)

- ❖ Millimeter GPS precise positioning technology used in asphalt paver to control grading, trimming, profiling of runway pavement
- ❖ Digitization for site management
- ❖ Segmentation of site - Real-time monitoring system
- ❖ GPS location tracking technology in plants and equipment to monitor movement and performance
- ❖ “Worker’s Roll-Call” Apps
- ❖ Many others.....



Simultaneous localization and Mapping (SLAM) 3D Scanning

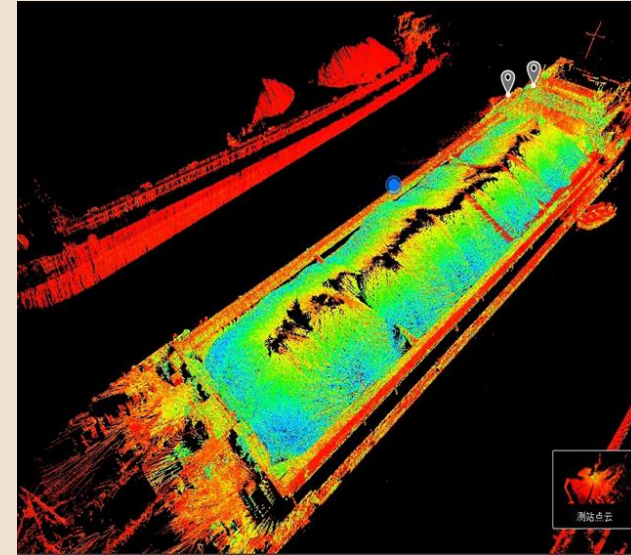
Green Survey Innovation



Traditional Survey



Single-handed Mobile Mapping



3D LiDAR-based SLAM

Compare with traditional survey, this contract used 3D LiDAR-based SLAM, significant turn round-trip time-saving of the trucks for every boat trip, also saving diesel

Simultaneous localization and Mapping (SLAM) 3D Scanning

Green Survey Innovation

Using 3D LiDAR-based SLAM, no need to take measurements on trucks

- ❖ **Saving truck waiting time**

Total vehicle time savings amounted to 3000 mins/boat trip

- ❖ **Reduces diesel fuel**

Fuel consumption reduced by approximately 5000L/boat trip

- ❖ **Reduce truck turn-round time**

Vehicle calls were reduced by approximately 250 trucks/boat trip



Environmental monitoring advance warning function



Nearby dispatch to solve the problem of dust

Using Mobile Apps, foreman sending position of the dusty site location to the back-up platform. 「DCM」 platform to send signal to nearest water browser to suppress the dusty air

Speed up the maintenance process



Nearby support



Avoid roadblocks



Coordinate traffic

Satellite positioning + AI, accelerate the maintenance process, when the operating status of the vehicle changes, the DCM platform can automatically identify the vehicle fault through AI algorithm, and recommend the shortest arrival path for maintenance personnel according to the on-site road conditions and other vehicle conditions

Dynamic tracing and intelligent management

- ❖ Know the historical operation status through
 - Equipment entry and exit record
 - Fuel volume
 - Mileage accrued on the day
 - Terminal electricity
- ❖ Task assign
- ❖ Man-hours accumulated
- ❖ Troubleshoot and prevent possible failures

Existing situation and future challenges in HK

Existing situation

- ❖ Growing and ageing population
- ❖ Shrinking labour force
- ❖ Large quantity of old building stock
- ❖ Imbalanced spatial distribution of homes and jobs

Future challenges

- ❖ Enhancing liveability
- ❖ Meeting long-term land requirement
- ❖ Responding to climate change
- ❖ Innovation and technology to enhance productivity
- ❖ Global and regional competition



Future Strategy and Plan

Hong Kong 2030+

- ❖ A strategic study to update the spatial development
- ❖ To provides a strategic spatial framework for the future planning, land and infrastructure development
- ❖ Key strategic directions:



Enhancing
liveability City



Embracing new
economic opportunities



Creating capacity
for sustainable

Hong Kong 2030+

Aims

- ❖ Satisfy the estimated land shortage
- ❖ Build liveable new communities
- ❖ Retrofit dense and old urban core
- ❖ Plan new employment nodes and bring jobs closer to homes
- ❖ Contribute to a “Climate-ready” and biodiverse city
- ❖ Improve overall connectivity within Hong Kong and the rest of the world

Major Conceptual Spatial Framework

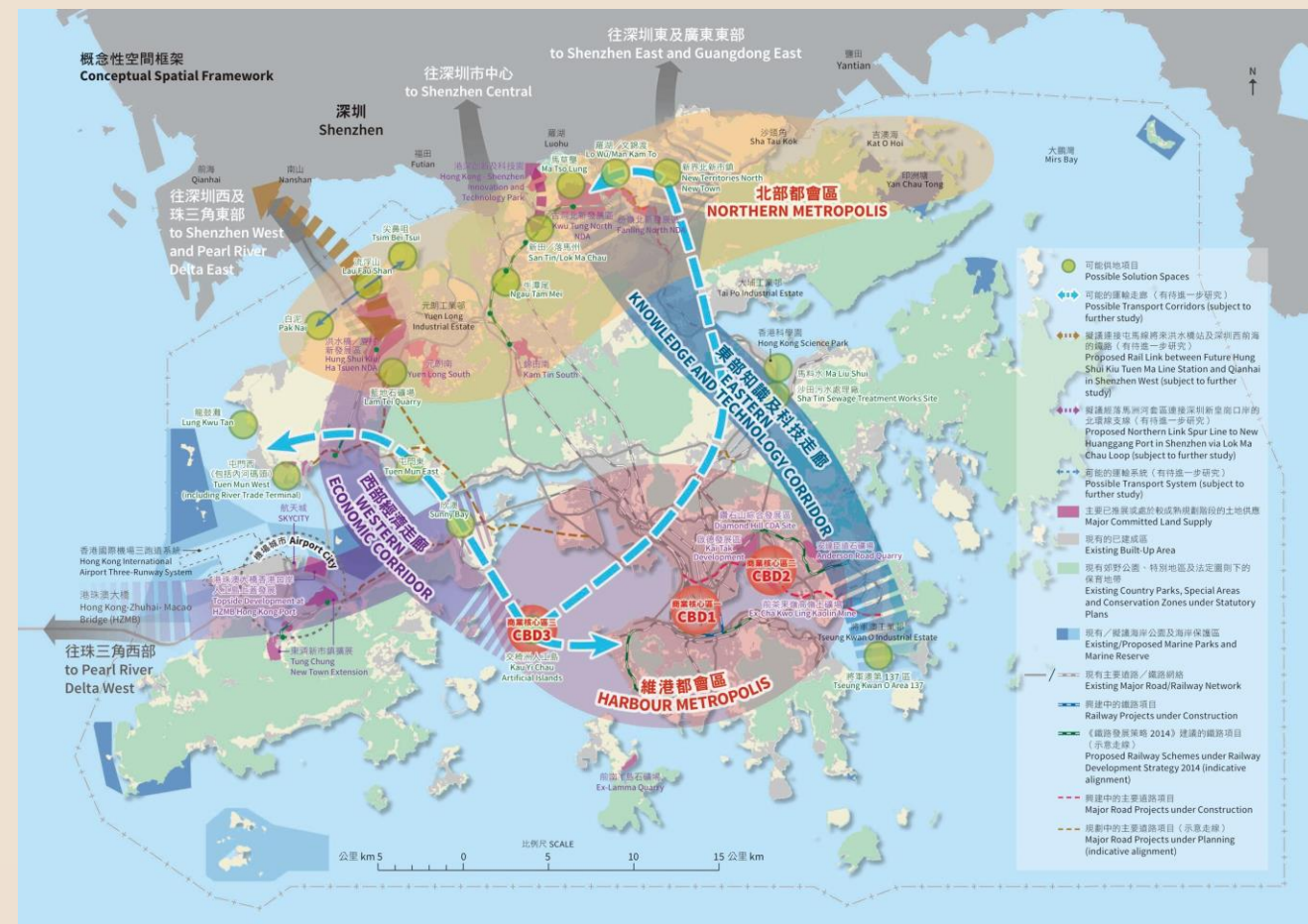


Two Metropolises

Existing Metro Area

Harbour Metropolis Existing Metro Area

- ☐ Redevelopment and rehabilitation of the ageing buildings
- ☐ Thinning out the population in the longer term
- ☐ Consolidating the traditional Central Business District (CBD1)
- ☐ Transforming Kowloon East into a dynamic Central Business District 2 (CBD2)



Artificial Islands in the Central Waters



- ❑ Create artificial islands
- ❑ About 1,000 hectares by reclamation in the Central waters near Kau Yi Chau
- ❑ The study commenced on June 2021
 - To be completed within 42 months
 - Detailed planning and engineering study for the artificial islands
 - Priority road link and rail link

Artificial Islands in the Central Waters

❑ Consist of 3 islands

- Islands A and B of about 380 hectares
- Island C about 240 hectares
- Provide 190,000 to 210,000 residential flats
- Provide four million square meters of business buildings

❑ 15 minute neighbourhood

❑ A 130 kilometers-long Link will pass through Island C, (scheduled for completion in 2033)

❑ A 30 Kilometres-long rail link

- Go through HK West, artificial islands, Sunny Bay and Tuen Mun East
- Will extend to Northern Metropolis



Artificial Islands in the Central Waters – The studies

The study profiles

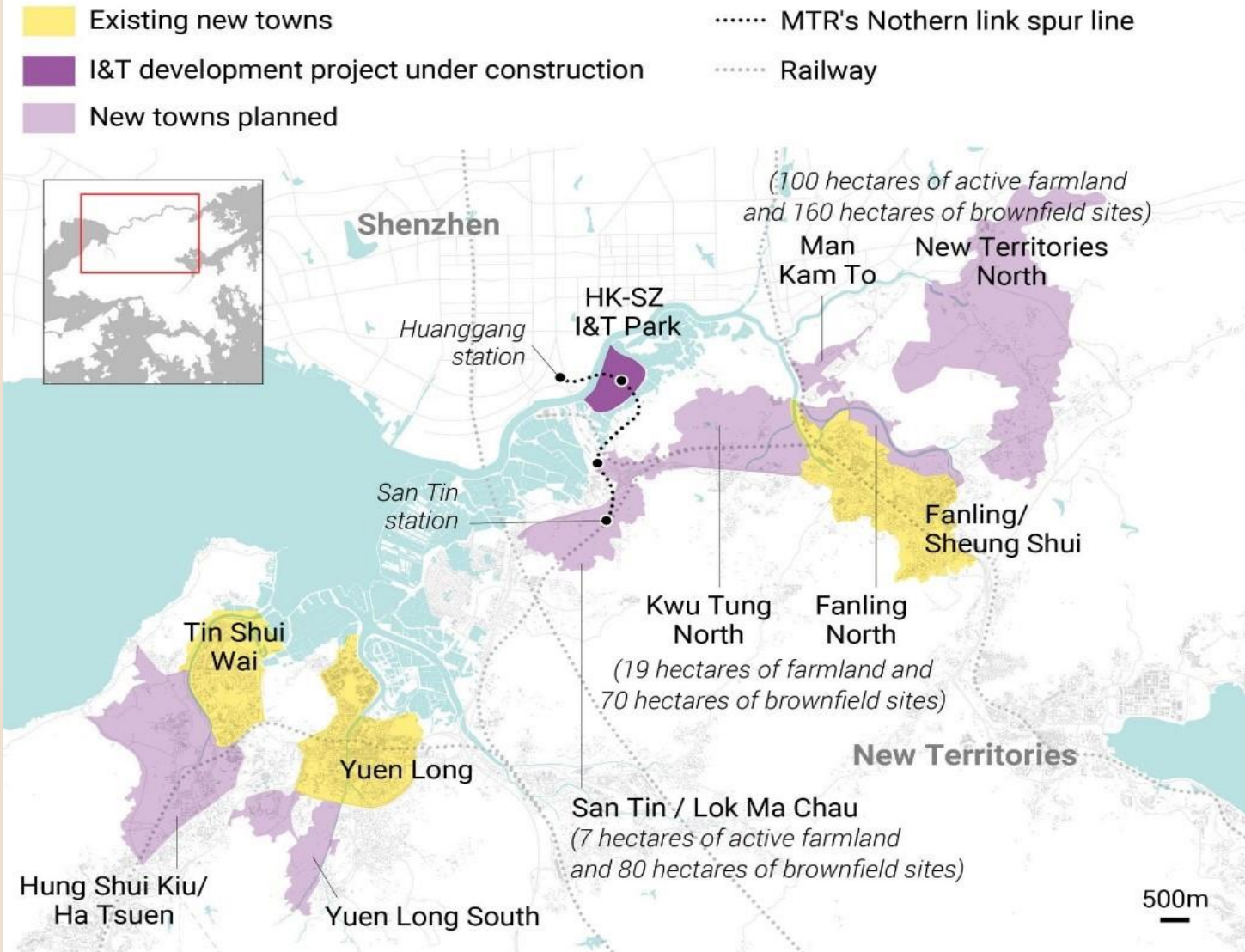
- Reclamation for Artificial Island
- Artificial Islands development
- Hong Kong Island – Northeast Lantau Link

Major designated projects to be covered

- All the mentioned road types
- A railway and its associated stations
- Breakwaters
- Dredging operation
- Water treatment works
- Submarine water supply pipelines
- Sewage treatment works
- Electricity substation
- Sporting facilities
- Urban development projects

Future Northern Metropolis

Core Areas Identified in the Northern Metropolis



Source: Hong Kong government

SCMP

- Area: 30,000 hectares
- Residential Units: 926,000
- Population: 2.5 million
- Job opportunities: 650,000 positions
- Fully completed: 15 – 20 years

Thank You

