

# 「基於區塊鏈技術的組裝合成建築電子化質量檢測2.0： 從新冠時代的權宜之計到後疫情時代的通行做法」 新聞發佈會

Press Conference on “Blockchain-Enabled e-Inspection 2.0 for MiC:  
From a COVID-19 Expediency to a Post-Pandemic Common Practice”

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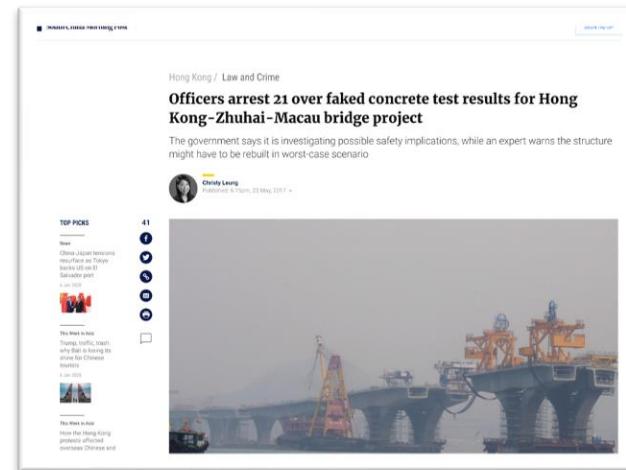
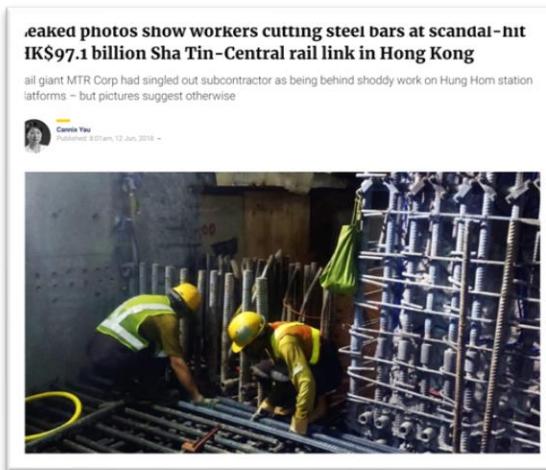
# Outline

- Background – Inspection in Modular integrated Construction (MiC)
- The pilot project – HKU Wong Chuk Hang (WCH) student hostel project
- Digitalization of the MiC project
- Introduction of e-inStar
- Prospects and challenges

# **Part I: Inspection in Modular integrated Construction (MiC)**

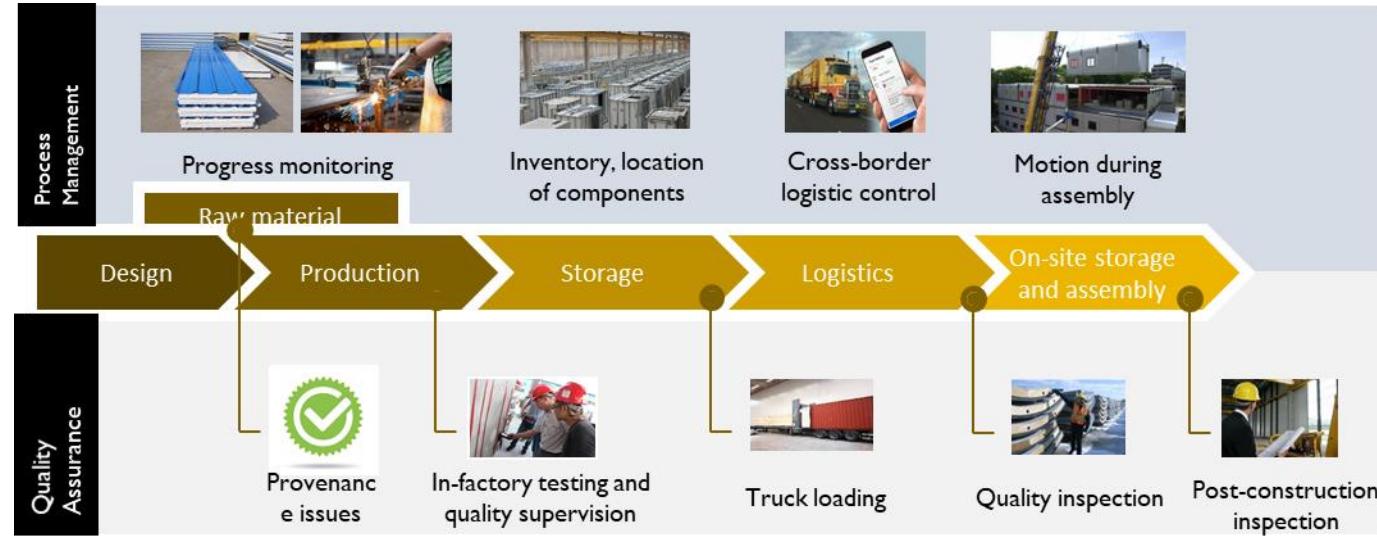
## Quality Assurance in MiC Logistic and Supply Chain

- There are many quality scandals in cast in-situ construction. For offsite or even offshore construction, quality assurance is even more concerned by clients.



(Photo source: SCMP)

# Quality Assurance in MiC Logistic and Supply Chain



## Quality Assurance in MiC Logistic and Supply Chain

Because of COVID-19, no one from HK can be dispatched to Mainland for inspection.



Quality inspections required at Mainland factories



Infeasible to dispatch now due to 14 + 14 days quarantines

(Photo source: Authors, SCMP)

# "BIM square": BIM and blockchain

## Quality Assurance in MiC Logistic and Supply Chain

### Process Management



Raw material supplies

**Cashed photos show workers cutting steel bars at scandal-plagued HK\$97.1 billion Sha Tin-Central rail link in Hong Kong**  
A giant MTR Corp had singled out subcontractor as being behind shoddy work on Hung Hom station informs – but pictures suggest otherwise

Carrie Yau  
Economic Edition 12 Dec 2018



Production of components

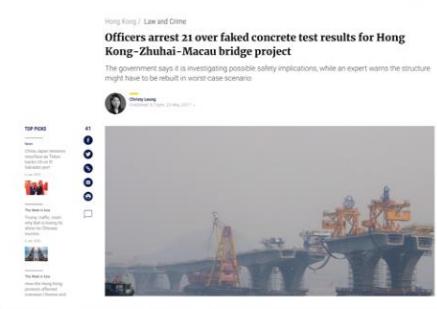


Cross-border logistic control

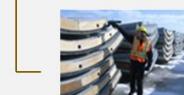


Motion during assembly

### Quality Assurance



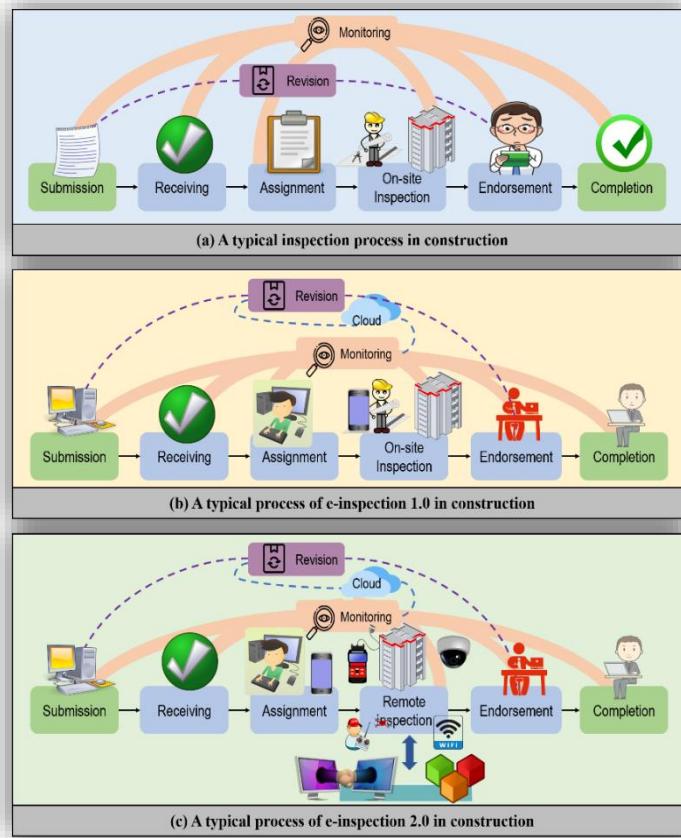
Factory testing  
Quality supervi



Quality inspection  
Post-construction inspection



# Different Generations of E-inspection Systems



## **Part II:** **The pilot project**

# "BIM square": BIM and blockchain

## Project Information



- A 3-storey non-residential podium with common space, canteen, support facilities and car-parking space
- Two 17-floor towers of student residences and staff accommodation
- 1,224 hostel places
- Site Area: 4306 m<sup>2</sup>
- NOFA: 14,277 m<sup>2</sup>
- CFA: 28,176 m<sup>2</sup>



## Project Information



### Student Hostels (MiC)

Two 17 storeys towers  
**1,224** student places.  
(952 Modules)

### Podium (RC Structure)

Three storeys of podium space

# **Part III:**

# **Digitalization of the MiC project**

# Digitalization of MiC



## Mobile Platforms for MiC



易檢達

### Off-Site Production

- **Digitalized** workflow procedures
- Detailed record of **inspection records** carried out by AP/RSE/RC streams
- **Test reports** uploads
- **Production progress** status



易轉達

### Cross Boarder Logistics

- **Real time tracking** of modules during transportation
- **Pin point** exact location of module
- Estimated **arrival time**

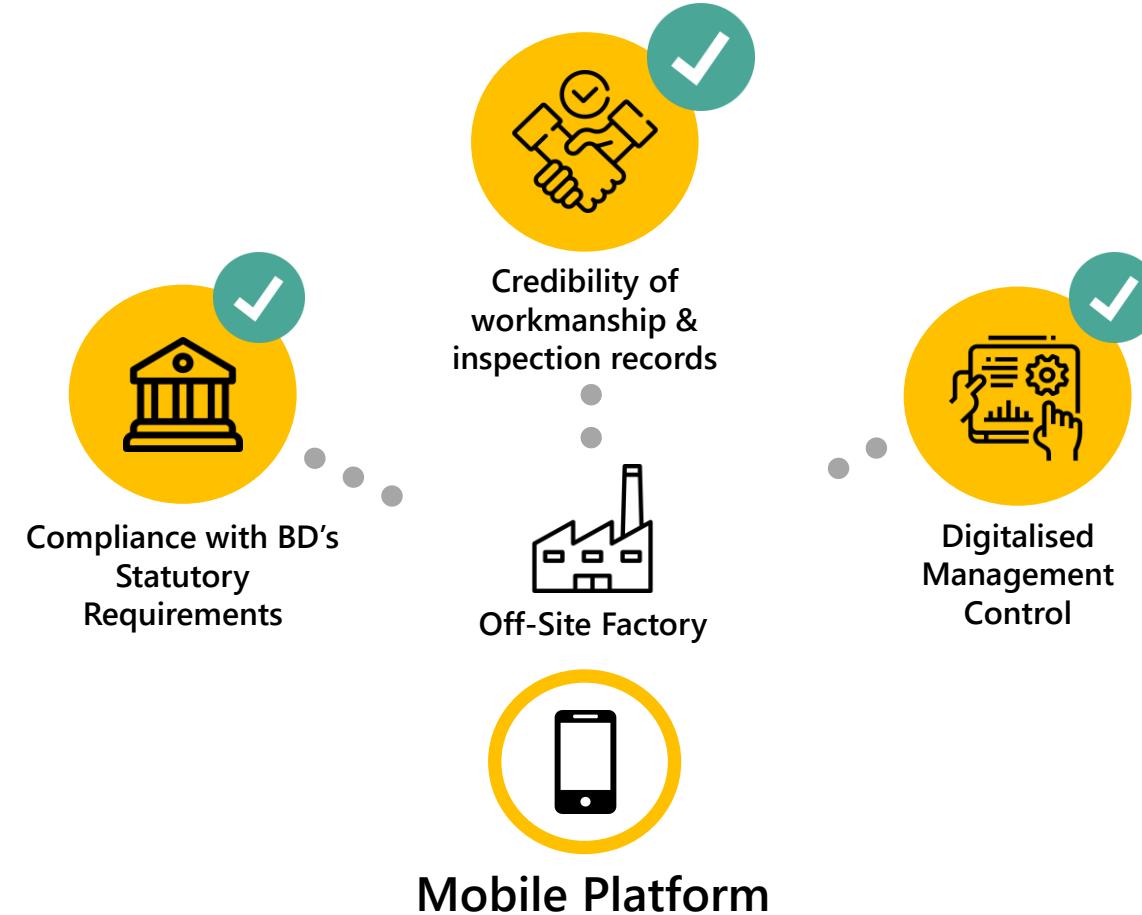


易建達

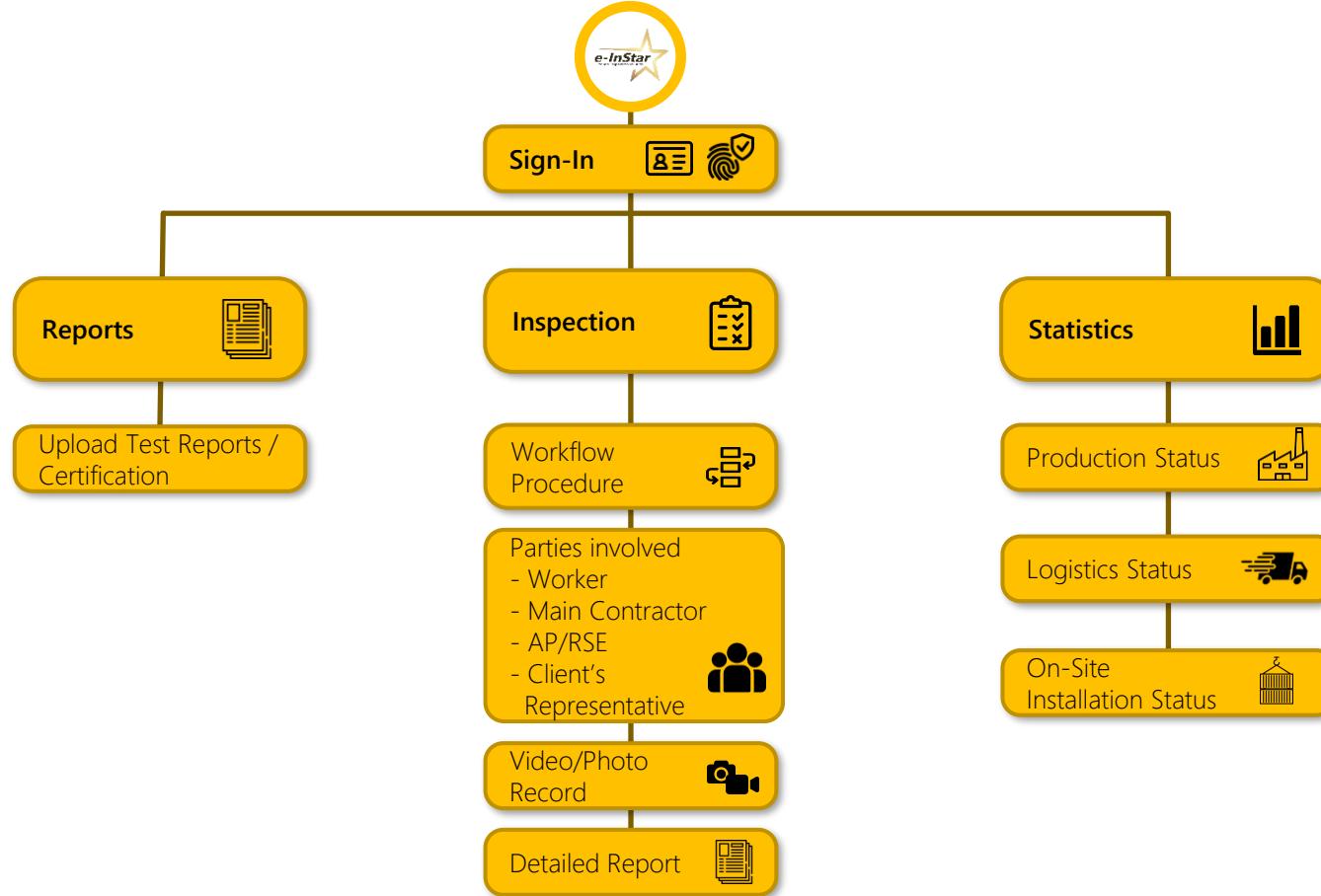
### On-Site Installation

- **Real time** update of installation progress
- **Positioning checking** for installed modules
- Recording of **installation time**

# Digitalization of MiC Off-Site Fabrication



# MiC Off-Site Production: E-inspection 2.0



# **Part IV:**

# **Introduction of e-inStar**

# "BIM square": BIM and blockchain

# E-inspection 2.0: Off-Site Production Workflow



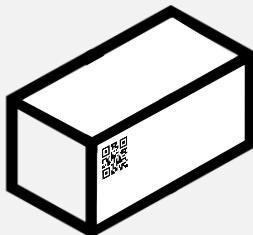
Workflow and Inspection and Test Plan (MIC Factory Process) Hostel Room									
Item	Workstage	Description	Inspection Periodicity	Test Periodicity	Test Method	Checklist	Notes	NC	Fair
0	Steel material in factory	Steel structure part selected to test	Asper BE requirement	H	C				Re-test
1	Round profile prefabrication and punching	Material check from Stock Check	Routine	H					Re-inspector
2	Element Hot Dip Galvanizing treatment	Hot Dip Galvanizing	Routine	H					Re-inspector
3	DF Part Assembly (Ball joint and Pipe, Weld inclusion)	DF Part Assembly	Routine	C					Re-inspector
4	DF Part Weld Test	DF Part Weld Test	100%	H					Reject
5	Assembly (including Insulation wall, Shear Stud, Shear Stud, Wall, ceiling and roof)	Wall insulation	100%	H	C				Reject
6	Tools & Equipment part (Door Lock Points)	Door lock points	Routine	H	C				Re-test
7	Apply the paint at structural member	Painting	Routine	H	C				Re-inspector
8	Door and window frame installation	Door and window frame	Routine	C					Re-inspector
9	Roof Ring and Fixing Concrete	Roof Ring and Fixing Concrete	100%	H	C				Re-inspector
10	Concreting	Concrete casting	Every hour	H	C				Reject
11	Vertical Column Anchoring	Vertical Column Anchoring	Routine	H	C				Re-inspector
12	Celing & Acoustic Insulation	Celing & Acoustic Insulation	Routine	H	C				Re-inspector
13	Roof Insulation	Roof Insulation	Routine	H	C				Re-inspector
14	Roof Insulation 2nd Test	Roof Insulation 2nd Test	Routine	H	C				Re-inspector

Transform 40+ workstage procedures into a digital platform

Item	Workstage	Description	Inspection Periodicity	Test Periodicity	Test Method	Responsibility				NC	Fair
						Inspection Test Method	Frequency	Responsible	Follow-up		
17	Paint	Coat primer painting (wall and ceiling)	Visual Inspection								
18	Paint	Coat primer painting (hostel room and corridor)	Visual Inspection								
19	Paint	Sound level painting	Visual Inspection								
20	Paint	Top coat paint (ceiling)	Visual Inspection								
21	Paint	Unsightful painting (Corridor Ceiling)	Visual Inspection								
22	Electrical	Electrical Cable Wiring	Visual Inspection								
23	Electrical	Electrical system inspection	Visual Inspection								
24	Electrical	Installation of sprinkler pipes (hostel room to corridor)	Visual Inspection								
25	Electrical	Sprinkler pipe pressure test	Visual Inspection								
26	Electrical	App point for MCP Services	Visual Inspection								
27	Electrical	MEP fire fitting: Window Type AC Installation	Visual Inspection								
28	Electrical	MEP fire fitting: Window Type AC Installation	Visual Inspection								
29	Electrical	MEP fire fitting: Window Type AC Installation	Visual Inspection								
30	Electrical	Flange Connected Water Pipe Ring	Visual Inspection								
31	Wall	Paint finish wall panel	Visual Inspection								
32	Wall	Instillation of Vinyl (corridor)	Visual Inspection								
33	Wall	Cabinet Wardrobe installation	Visual Inspection								
34	Wall	Door immorrigity and windows installation, water test on window	Visual Inspection								
35	Fixtures	Cladding panel Instillation: Top coat wall panel	Visual Inspection								
36	Cleaning	General Cleaning and Floor Protection	Visual Inspection								
37	Cleaning	Padding & Protection Furniture	Visual Inspection								
38	Cleaning	MEP fire fitting (AC, FS, Electrical)	Visual Inspection								
39	Cleaning	3D dimension check, Paint touchup and Final QC Inspection	Visual Inspection								
		3D laser scanning check.									
		Other checking by inspection									
		Labelling of MC module, packaging and protection MC module	Visual Inspection								
		Ready to transport from factory to HK	Visual Inspection								
		Delivery note to Subcontractor for verification or rework on site									
		Vehicle/ Vehicle tracking, Action Note to Subcontractor if no Improvement									
		Re-inspector to inspect the failed BIM until the BIM is ready									
		Stability Measurement (Surface report submission to BIM is required)									



## E-inspection 2.0: Module ID



- **Each Module** is given a **unique ID** using a naming convention system
- A **QR code** is generated from the ID
- The QR code is created as soon as the 3D module is formed and applied to the structure.

Create a  
**Naming Convention System Standard**  
for all future MiC Module projects

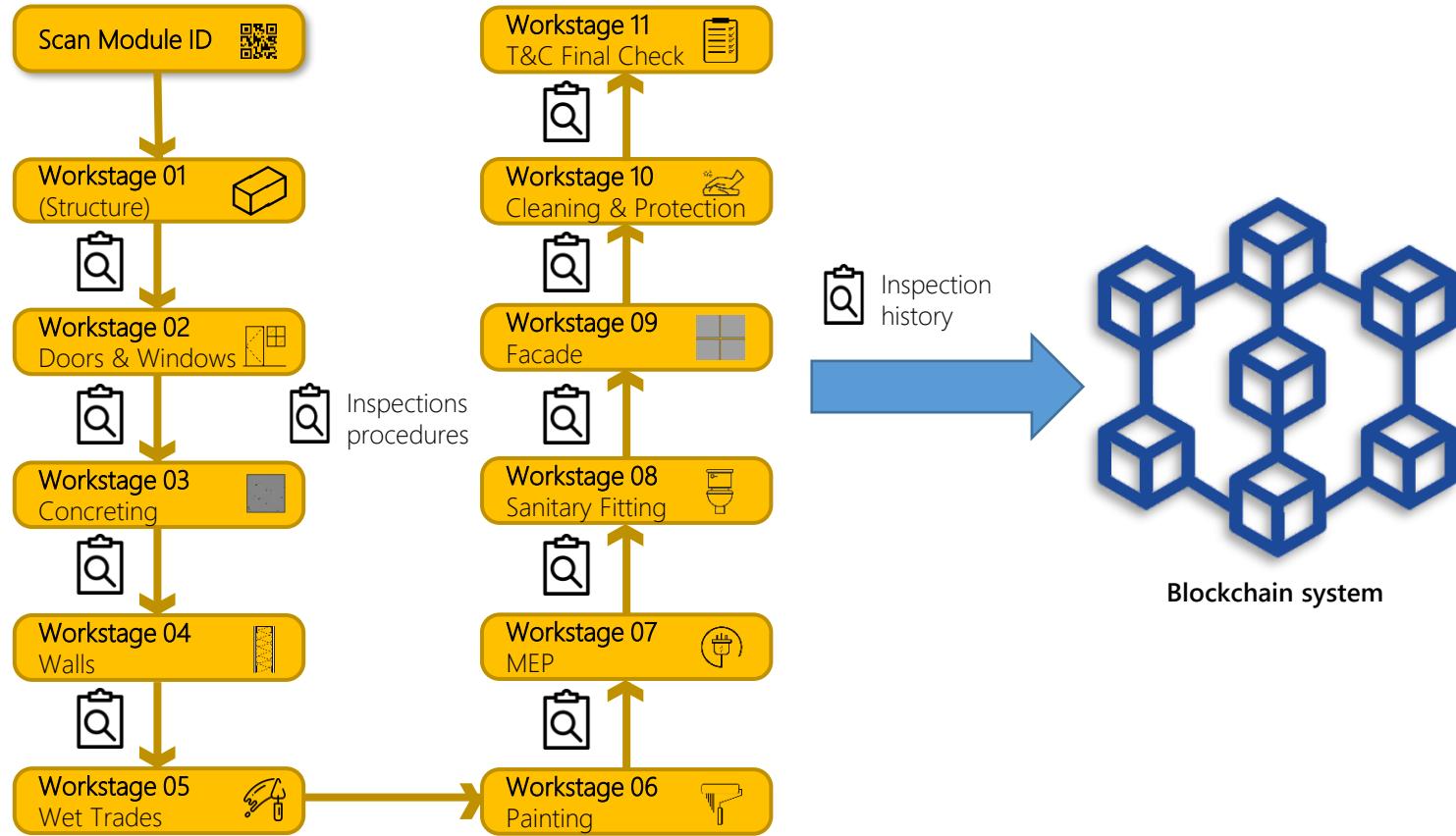


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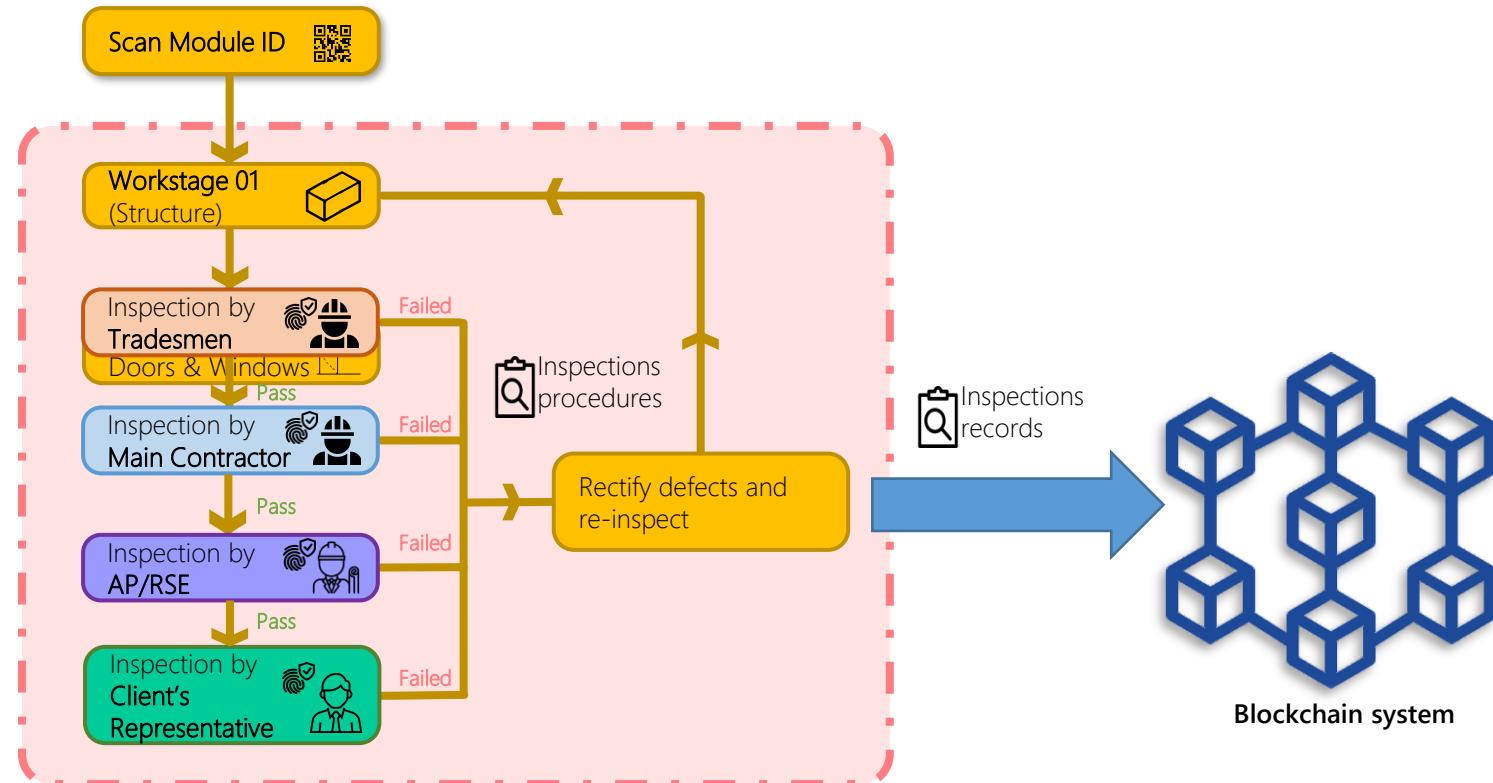
The **Naming Convention System** created for the modules allows us to identify the following information;

- Block
- Floor
- Module Sequence
- High / Middle / Low Zone
- Module Type

## E-inspection 2.0: Inspection Record



## E-inspection 2.0: Inspection Record



# "BIM square": BIM and blockchain

## E-inspection 2.0: Inspection Record



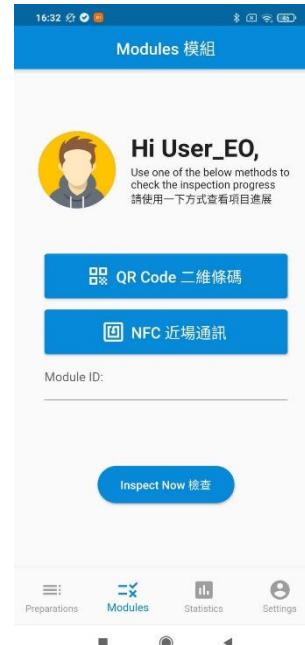
Two Factor Authentication



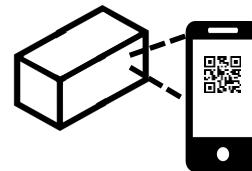
User ID



Fingerprint verification



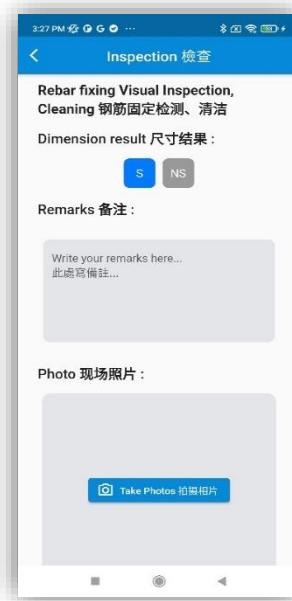
Scan Module ID



Inspection status of module



## E-inspection 2.0: Inspection Record



Comment box



Help button

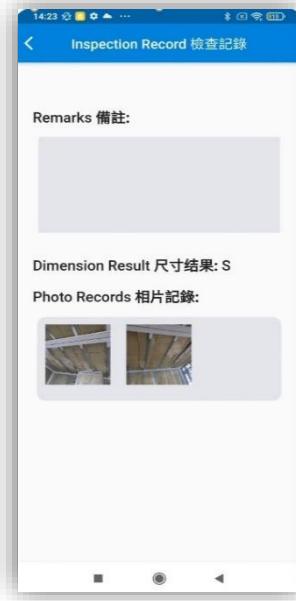
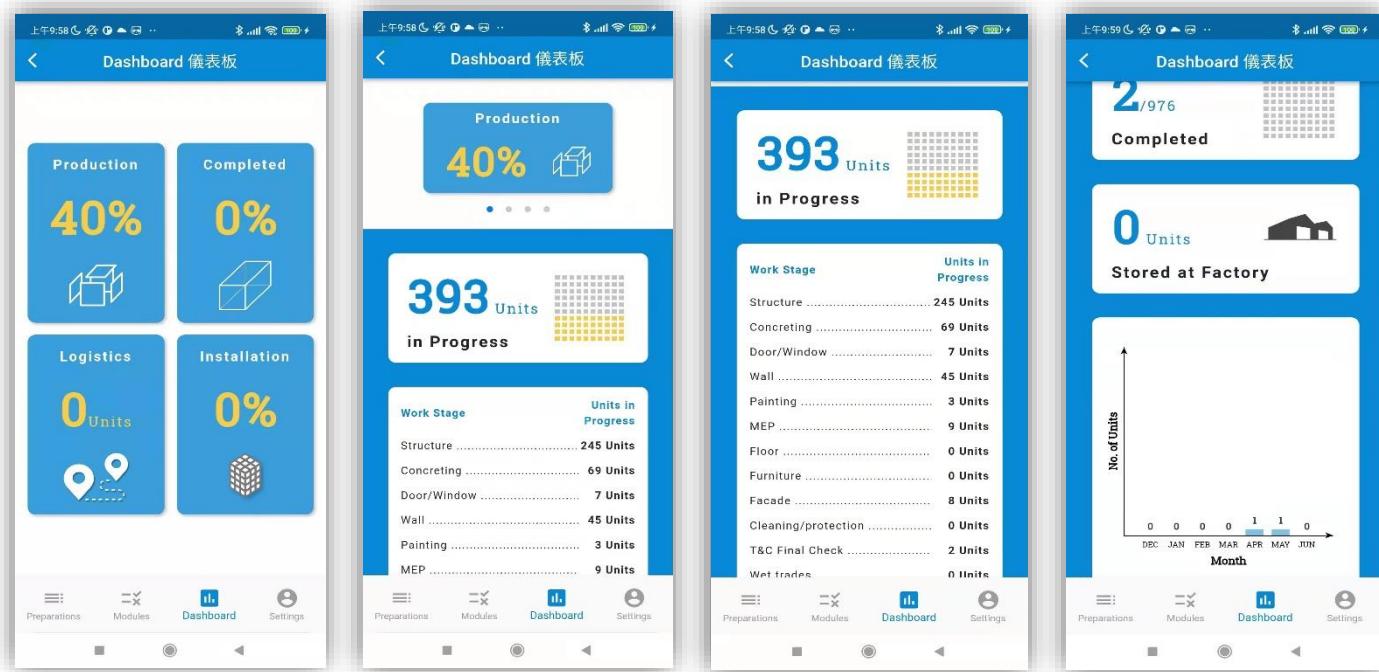


Photo upload function

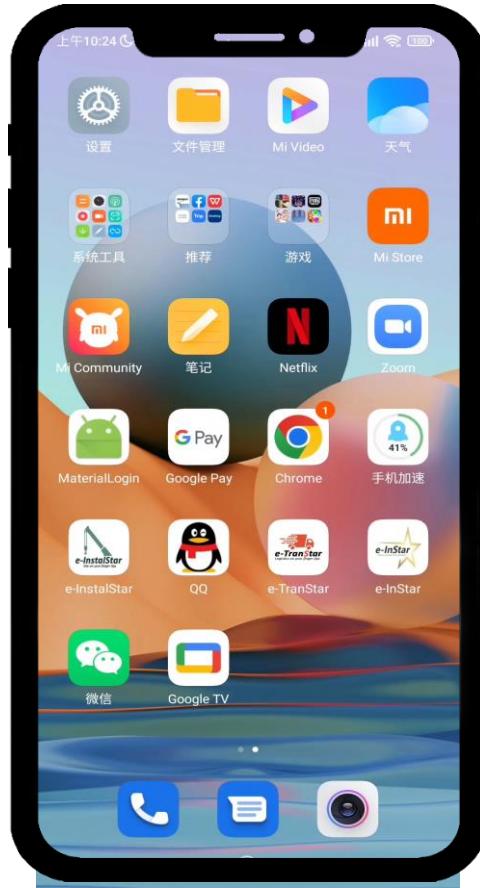


## E-inspection 2.0: Dashboard



Statistics for decision-making

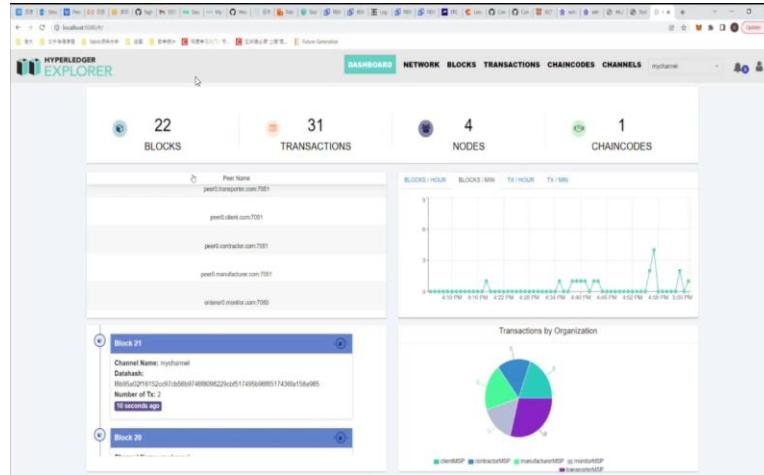
# E-inspection 2.0: Inspection APP - eInStar



## E-inspection 2.0: The Blockchain System



Transaction  
(Inspection record)



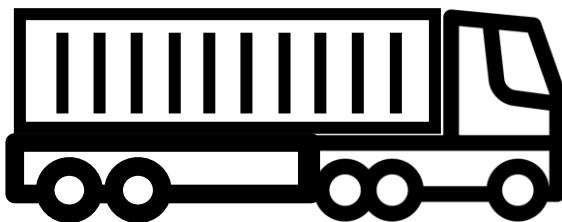
# **Part V:**

# **Prospects and challenges**

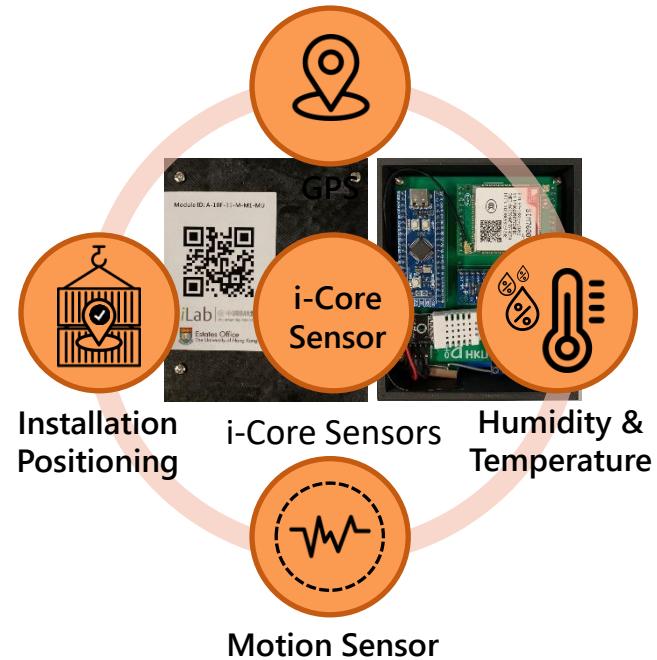
## What's Next: Logistics



The **i-Core sensors and smart address systems** are one of the development tools with multi-functions to monitor both the logistics and installation of MiC modules



**i-Core sensors and smart address plates** are installed in the MiC modules



# "BIM square": BIM and blockchain

## What's Next: Logistics



The image displays four screenshots of the e-TranStar mobile application interface, illustrating its features for logistics management:

- Welcome Screen:** Shows the app's logo and slogan "Logistics on your finger tips". It includes fields for "User\_PY" and "Remember Login", and a "Login" button at the bottom.
- Link to i-Core Screen:** Displays a user profile icon and the message "Hi User". It prompts the user to "Pick a category and start checking materials" and "告诉每一个领则然后开始检查". It shows the "Module ID: A-3-N-1" and "i-Core ID: 12-A".
- Monitor Screen (Module A-3-N-1):** Shows a 3D floor plan of a building section. Below it is a map of the University of Hong Kong Main Building area, with specific locations labeled: 山道花园, 海光大厦, 银紫楼, 圣保禄书院, 徐应, HKU, and 荷李活道. It also displays the "i-Core ID: A-11F-09-M-M2-MU", Latitude: 22.2739, Longitude: 114.1445.
- Monitor Screen (Module A-3-N-3):** Shows a 3D floor plan of a building section. Below it is a map of the same area, with specific locations labeled: 半环路, 太平山顶, 环云里, 梅子和山道, 三面街, and 荷李活道. It also displays the "i-Core ID: A-11F-09-M-M2-MU", Latitude: 22.2739, Longitude: 114.1445.

# "BIM square": BIM and blockchain

## What's Next: Logistics



The screenshots show a mobile application interface for logistics management, likely using BIM and blockchain technology.

- Screenshot 1:** Dashboard showing production status. It has four cards:
  - Production: 40% (with a factory icon)
  - Completed: 0% (with a cube icon)
  - Logistics: 0 Units (with a location pin icon)
  - Installation: 0% (with a cube icon)
- Screenshot 2:** Logistics overview screen showing a total of 86 units. It includes a map of the Shenzhen-Hong Kong-Macau region with markers for Shenzhen, Hong Kong, and Macau. A search bar at the top says "Search Unit ID".
- Screenshot 3:** Detailed route planning screen showing a map of Shenzhen and Hong Kong with a red line indicating a delivery route. A search bar at the top says "Search Unit ID: A-3-N-3".

Common UI elements include a header with a back arrow and the word "Dashboard 儀表板", a bottom navigation bar with tabs for "Preparations", "Modules", "Dashboard", and "Settings", and a bottom toolbar with icons for home, search, and user profile.

**Thank You**