



Fire Safety Strategy for Whole District Planning

Dr Young Wong PhD CEng FIFireE MHKIE RPE

7 May 2018

Agenda

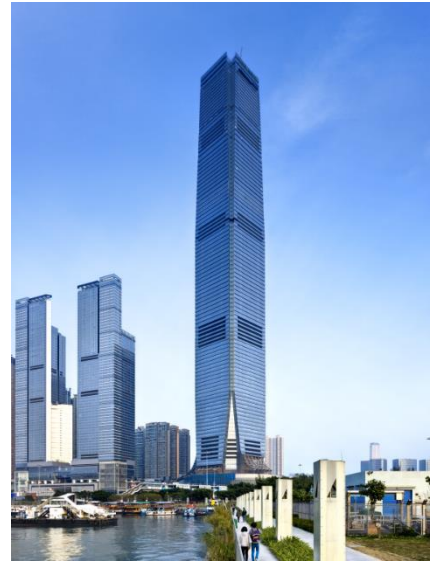
- District Development Project – West Kowloon Cultural District
- Common fire safety challenges in district development
- Fire Engineer's role
- Incorporating “Smart” Concept

Fire Engineering Approach on Buildings and Infrastructure in HK

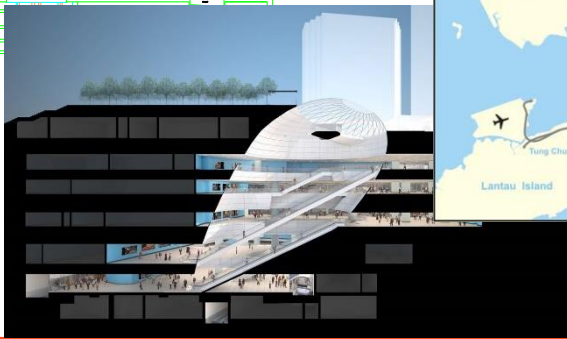
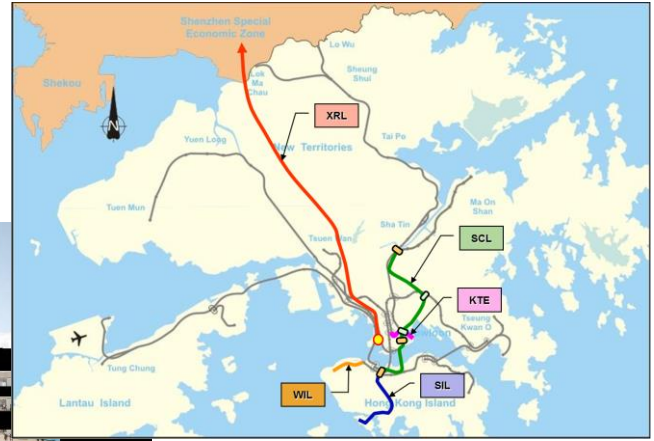
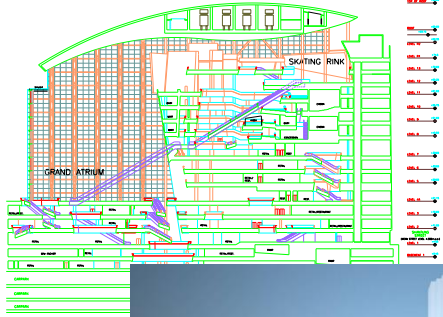
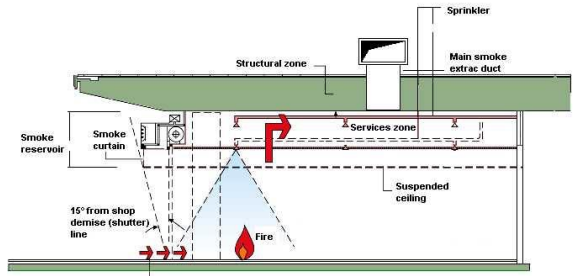
1990's



2000's



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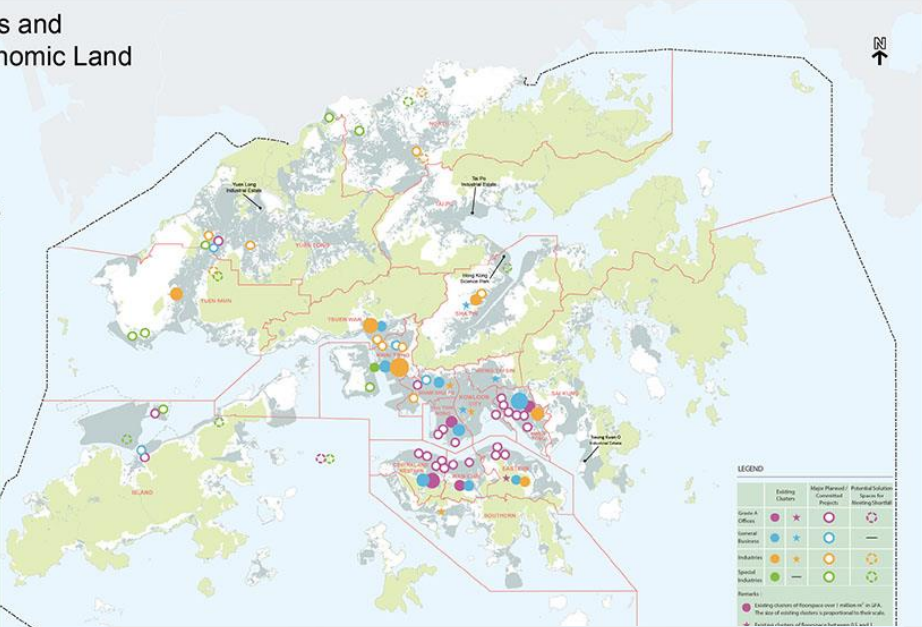
2010's

Major Planning for HK to create Land Supply

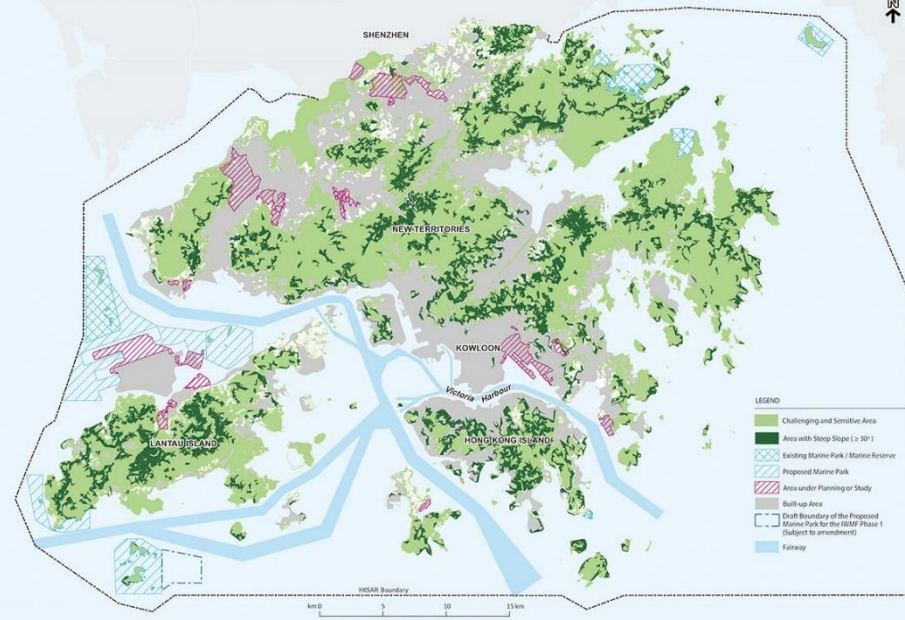
Major Planned/Committed Projects and Potential Solution Spaces for Economic Land

Major Economic Land Uses

- Grade A Offices**
(including CBD and Non-CBD Grade A Offices)
- General Business**
(including non-Grade A offices, and business activities involving no industrial production and having flexible floorspace requirements)
- Industries**
(including manufacturing, general logistics/warehousing and other industrial)
- Special Industries**
(including industries that have unique locational or operational requirements because of specific environmental or other considerations. They usually require purpose-built premises of more rigid specifications. Industrial estates, science parks, high-tier data centres, modern logistics and special types of research and development and testing and certification are in this category)



Considerations for Land Supply in Hong Kong

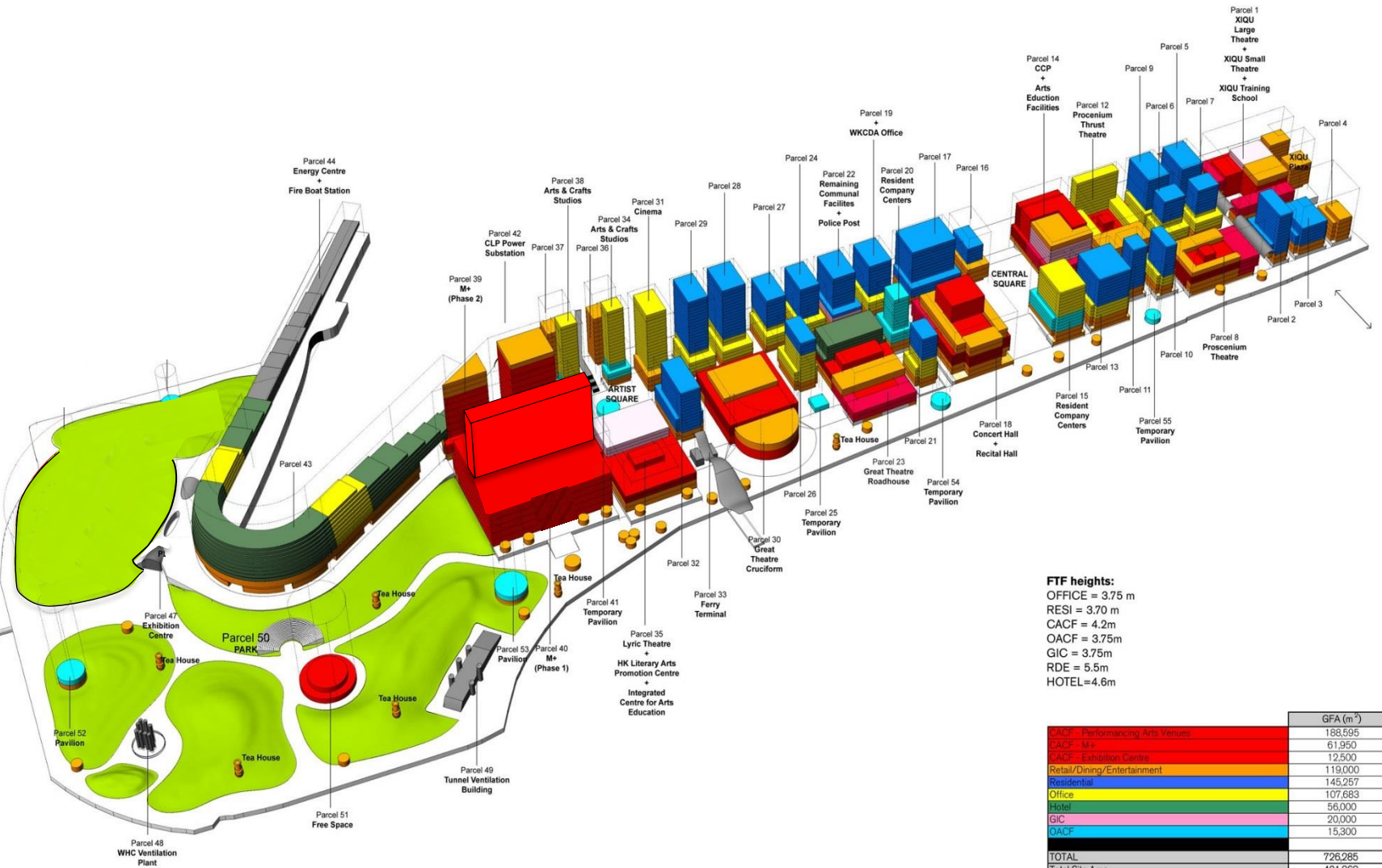


“District Scale” Project

- West Kowloon Culture District



WKCD is one single site with a mixed use



FTF heights:
 OFFICE = 3.75 m
 RESI = 3.70 m
 CACF = 4.2m
 OACF = 3.75m
 GIC = 3.75m
 RDE = 5.5m
 HOTEL = 4.6m

	GFA (m ²)
CACF - Performing Arts Venues	188,595
CACF - M+	61,950
CACF - Exhibition Centre	12,500
Retail/Dining/Entertainment	119,000
Residential	145,257
Office	107,683
Hotel	56,000
GIC	20,000
OACF	15,300
TOTAL	726,285
Total Site Area	401,262
Total Site Plot Ratio	1.81

Traffic Free Public Open Space (POS)



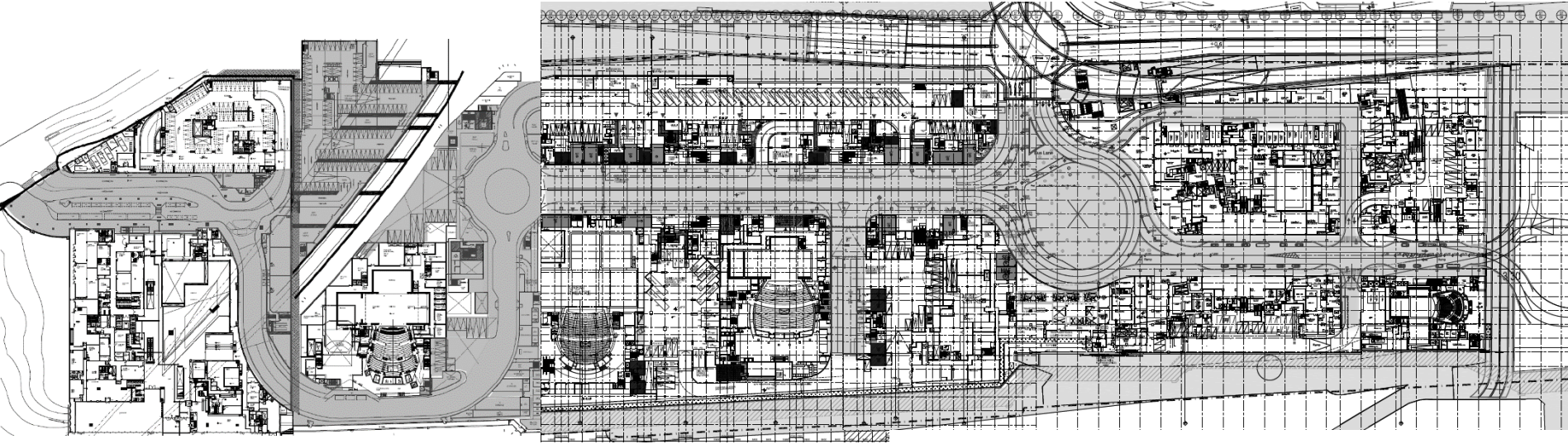
Pedestrians are kept separate from vehicles

Traffic is kept below ground



Pedestrians are kept separate from vehicles

Traffic is kept below ground



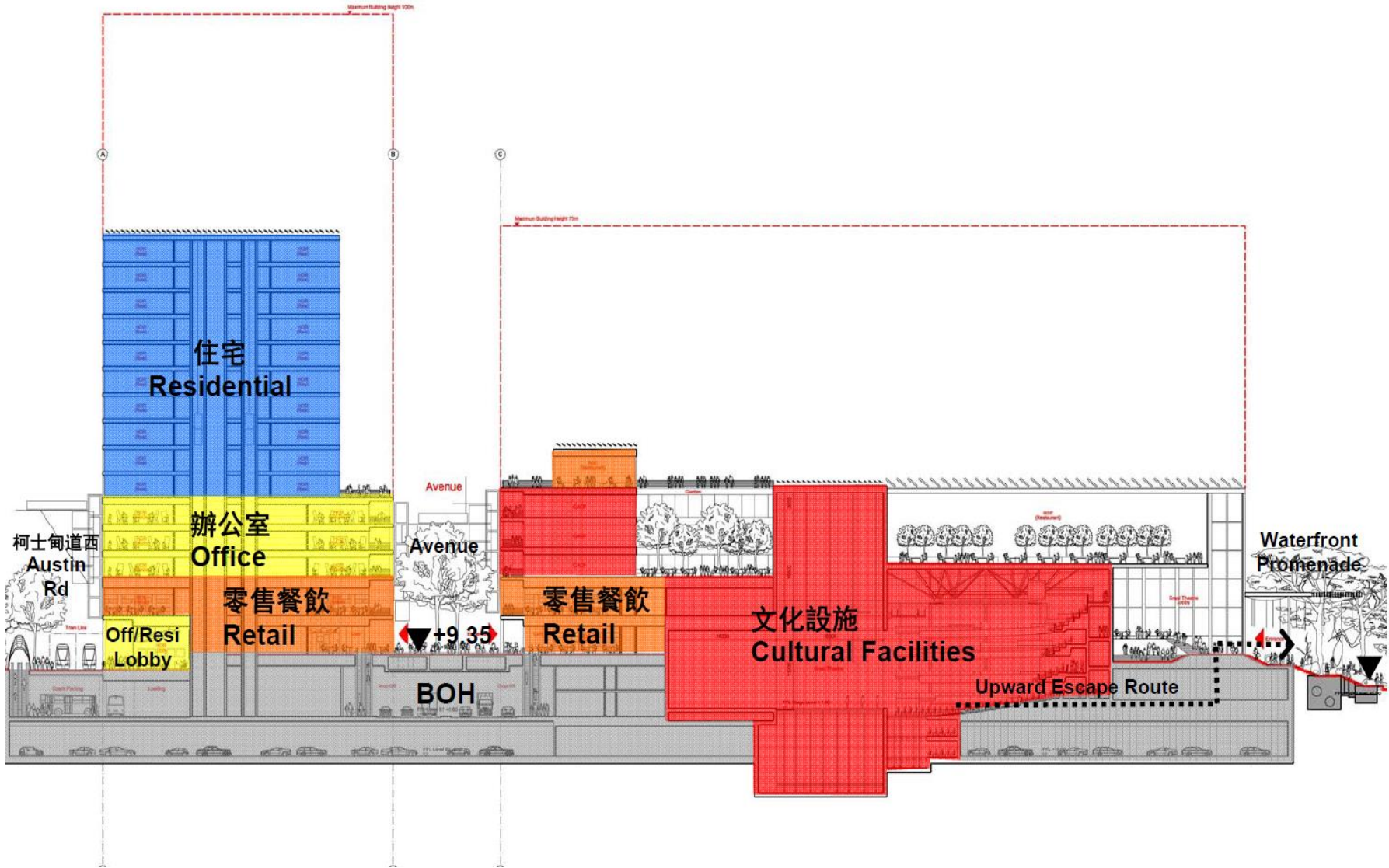
Fire Safety Challenges

What are the design parameters?

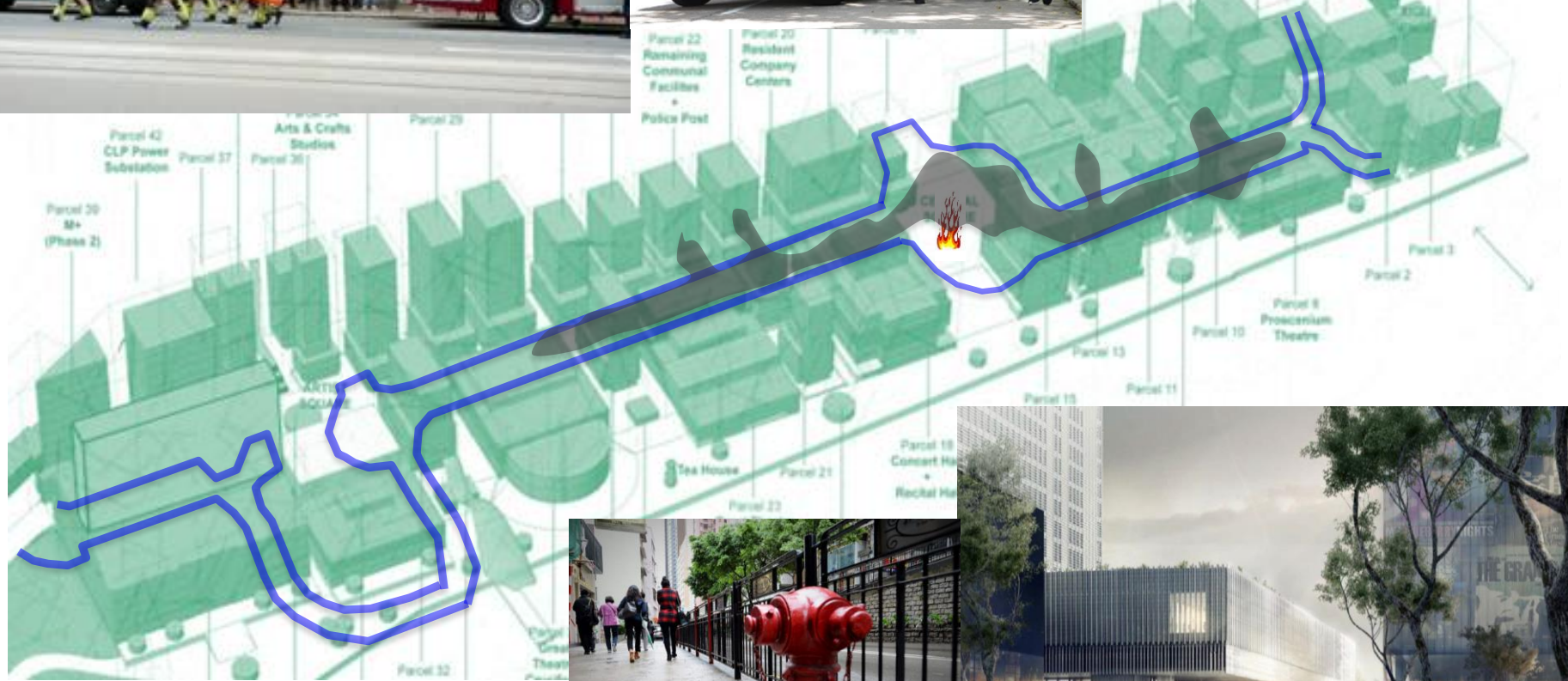
- Fire services
- Traffic
- Water, power
- Connection to public carriageway, street
- Interfaces with existing buildings
- Usage of surrounding buildings
- Pedestrian flow
- Density of buildings
- Geographic



Vertical mix uses with a communal basement



Facilities/ Infrastructure for emergency and rescue



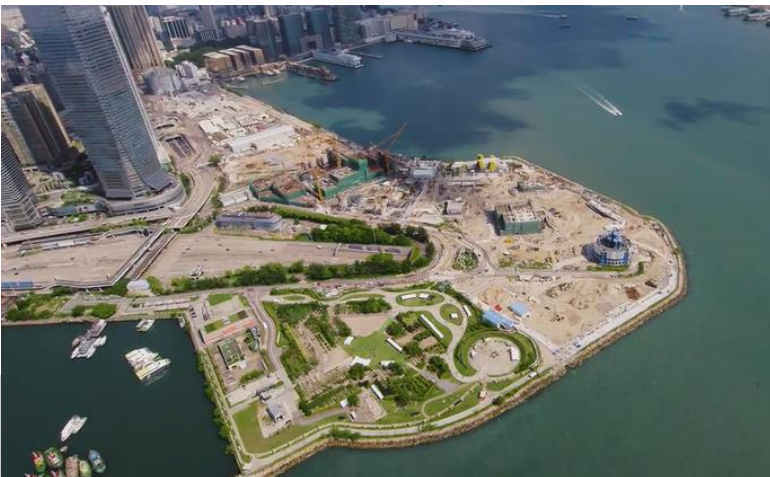
Changing Environment



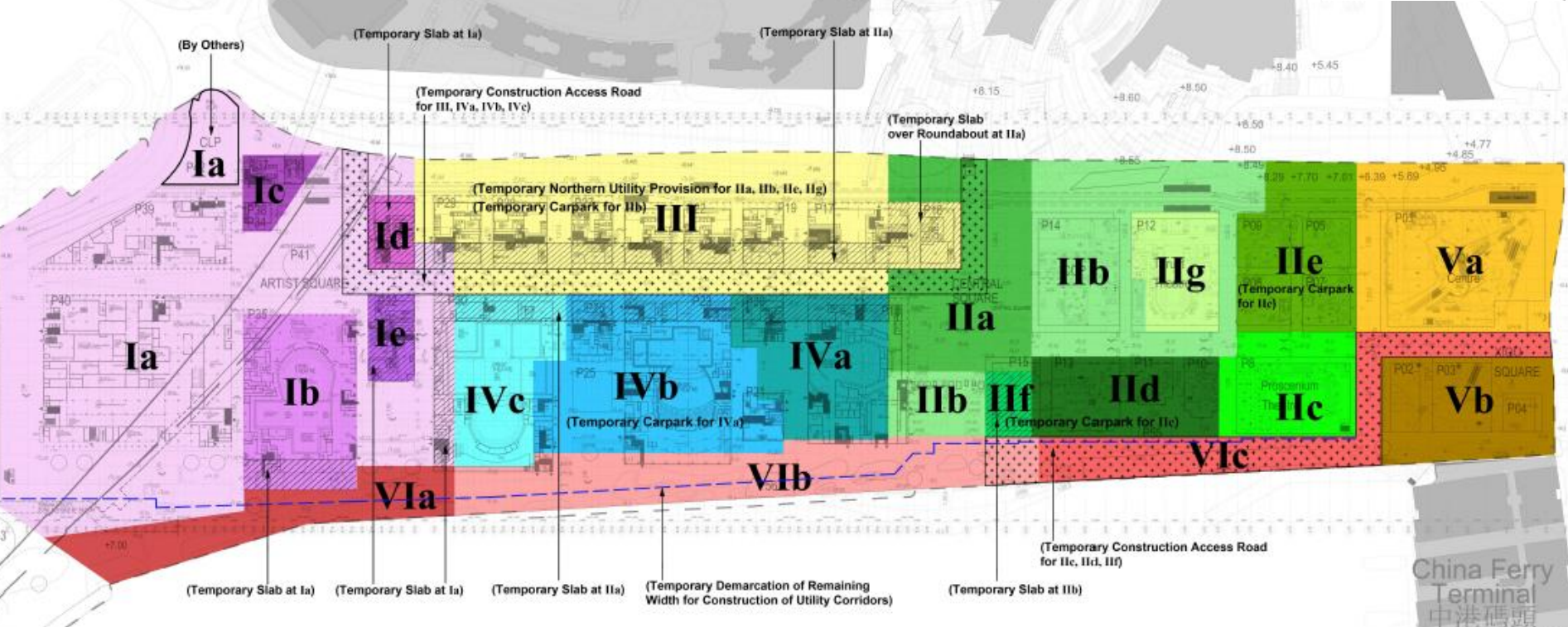
香港人口推算 Hong Kong Population Projections 2017-2066



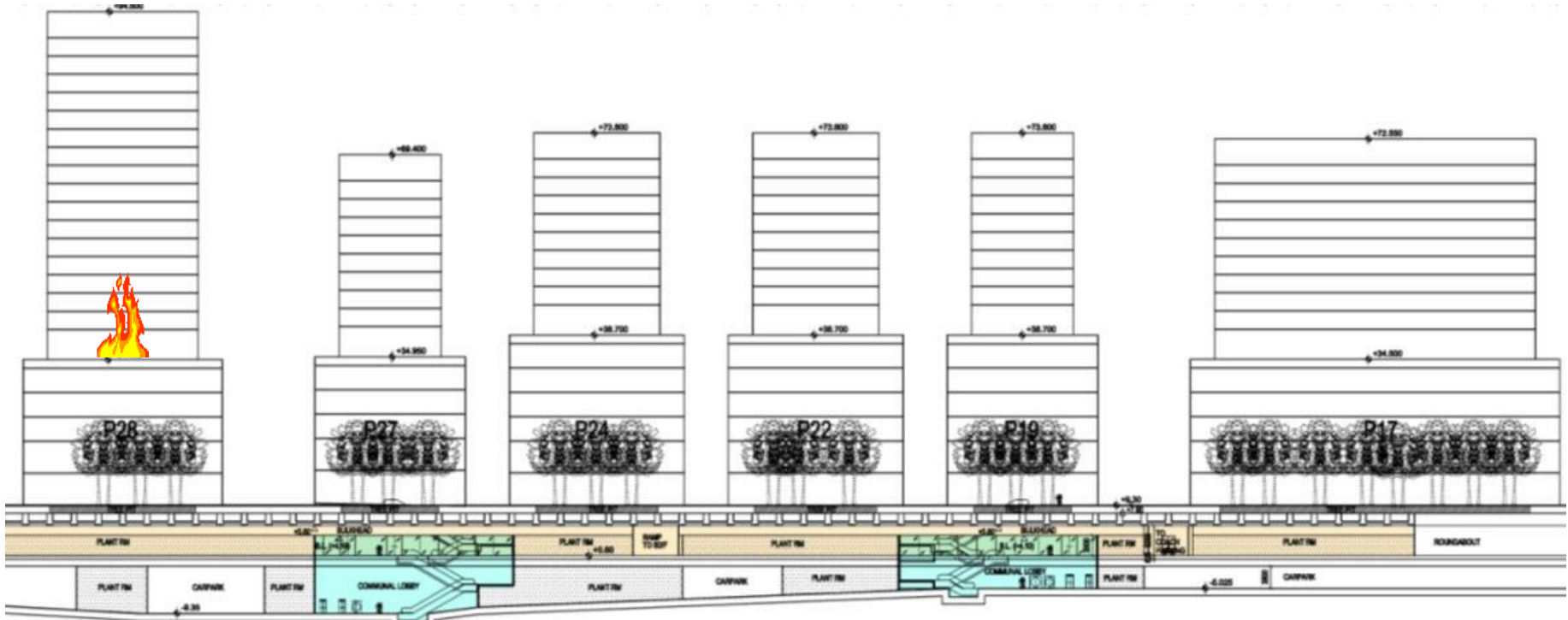
Phasing



- Phase I
- Phase II
- Phase III
- Phase IV
- Phase V
- Phase VI



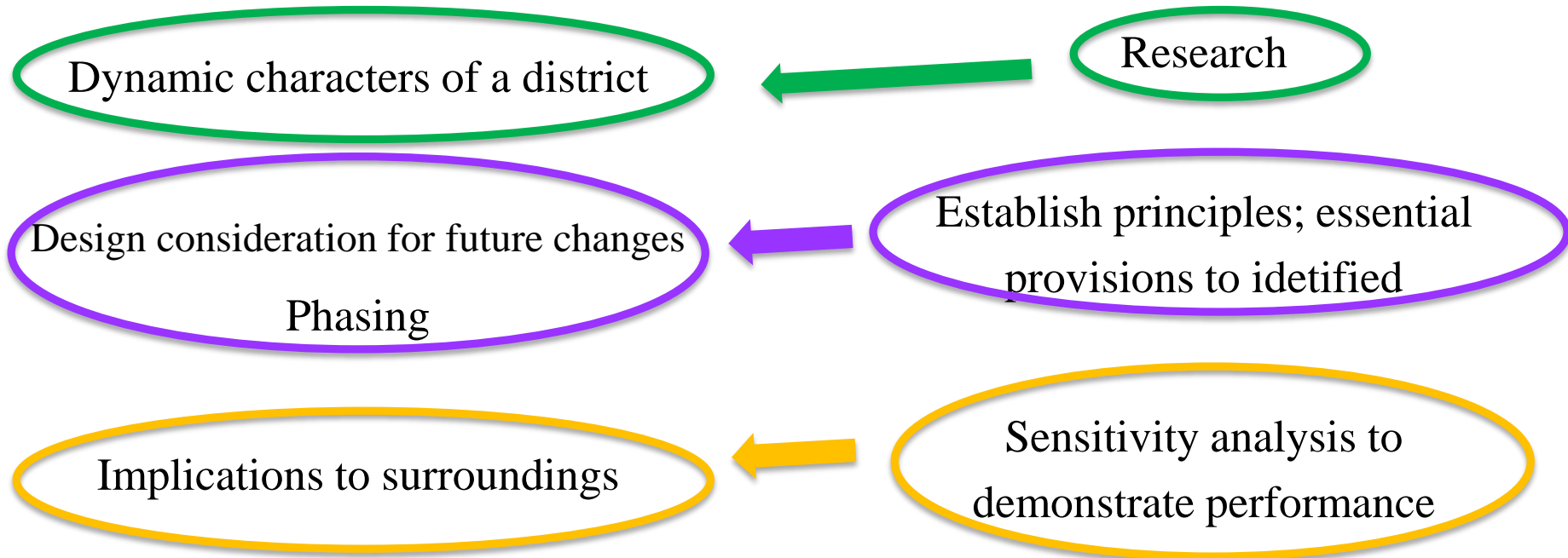
Large Number of People – Crowd Dynamics



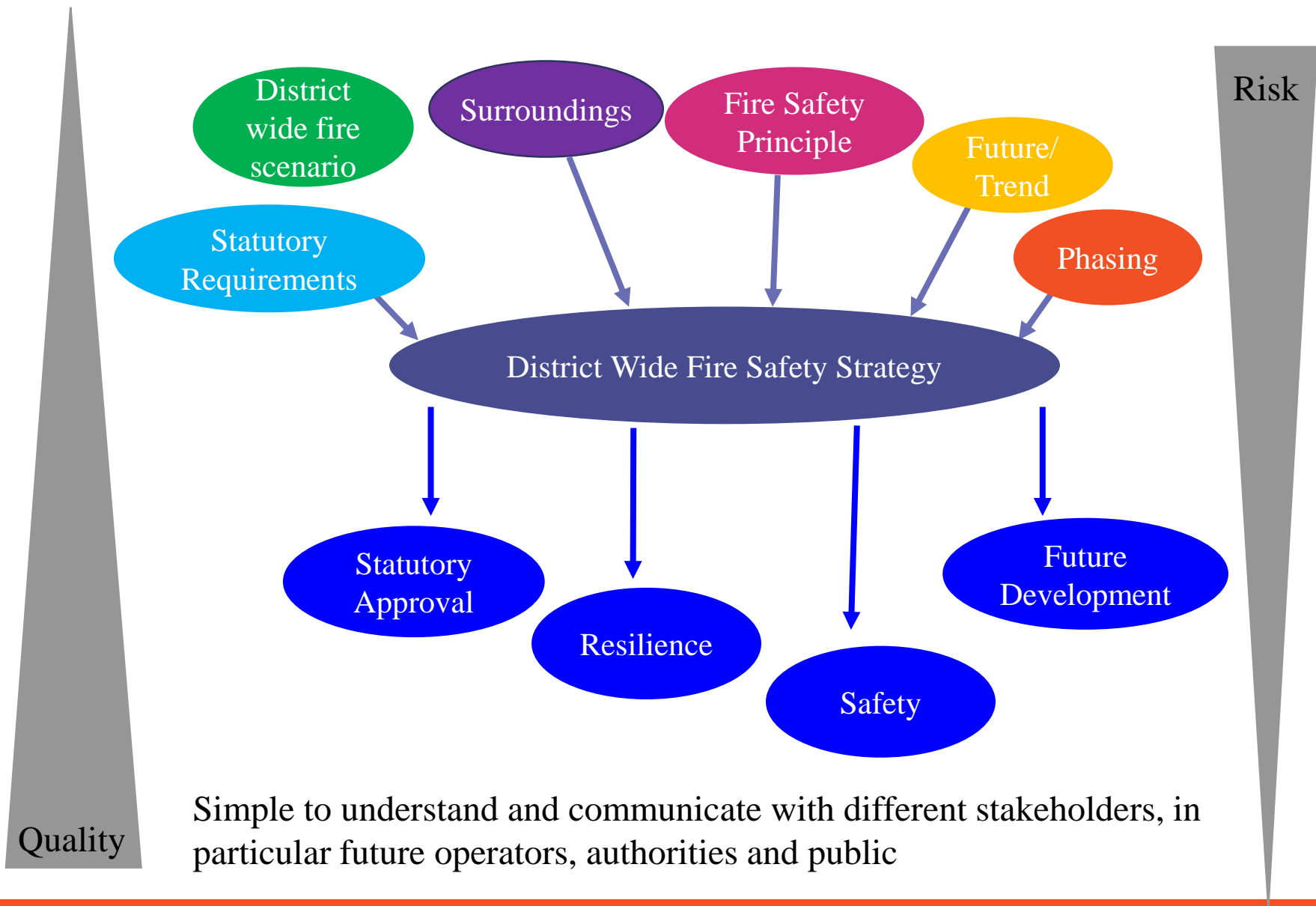
Fire Engineer's Role

Key Challenges for a District-scale Project

District Wide Fire Safety Strategy



District Wide Fire Safety Strategy



Simple to understand and communicate with different stakeholders, in particular future operators, authorities and public

District Wide Fire Safety Strategy

- Research

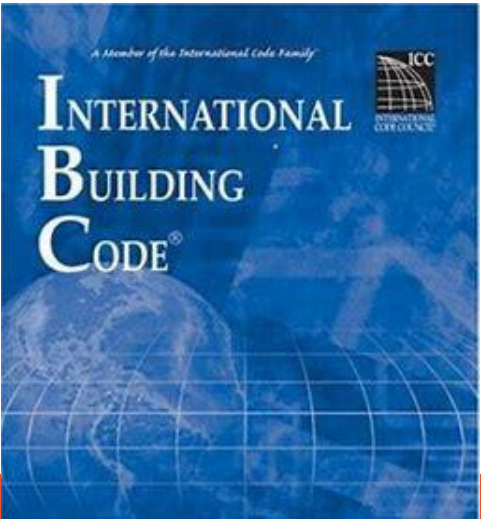
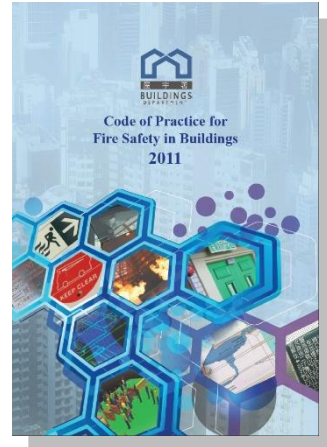
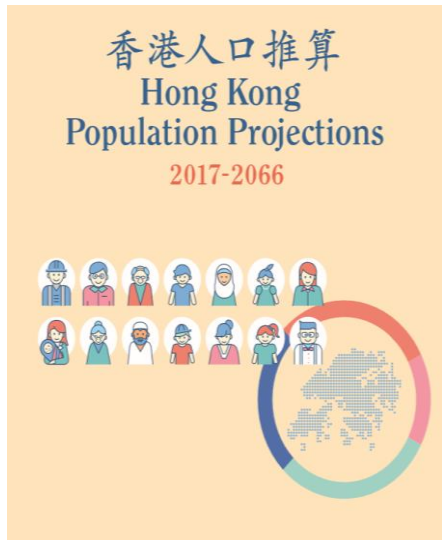
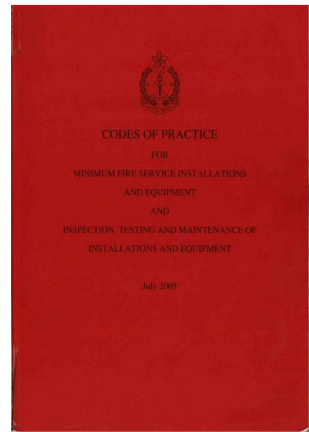


Experience from other places



District Wide Fire Safety Strategy

- Research

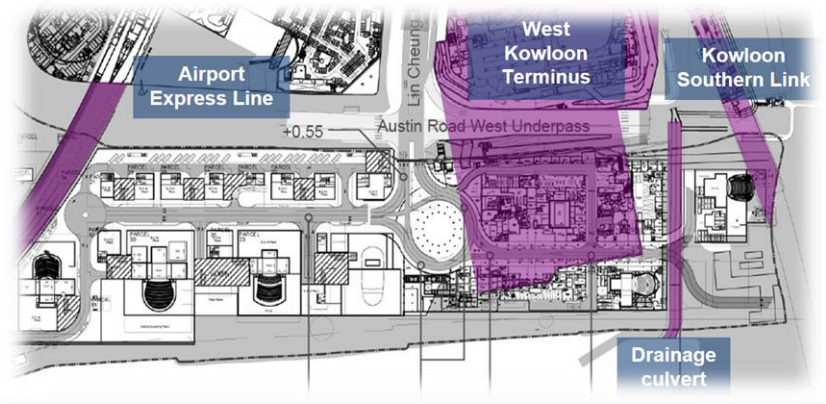


Literature Review



District Wide Fire Safety Strategy

- Generic Design Principle



Risk Rating		Frequency				
		A	B	C	D	E
Severity		1	2	3	4	5
I	1	H	H	H	M	M
II	2	H	H	M	M	L
III	3	H	M	M	L	L
IV	4	L	L	L	L	L

H : high risk; M : medium risk; L : low risk

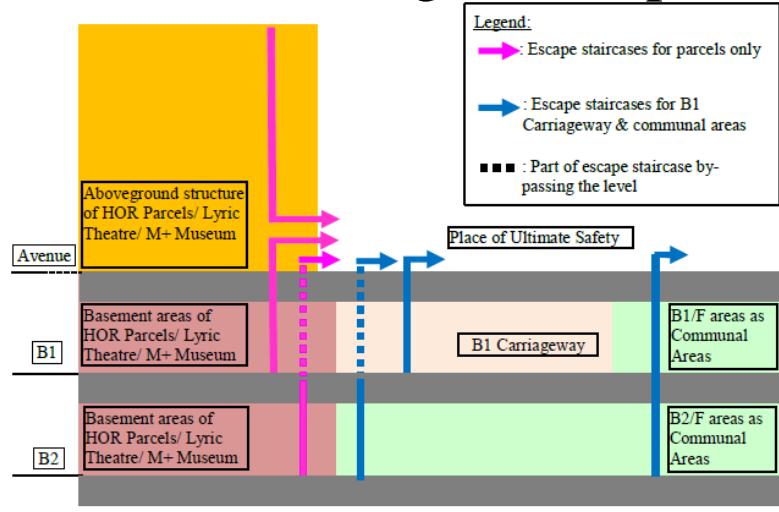
Required FSI (Road Tunnel Standard)	FSI Code 2012	NFPA 502	FIARC	BD 78/99	Proposed FSI in B1 carriageway
i. Automatic fixed installation other than water	●	○	○	●	●
ii. Closed circuit television system	●	●	●	●	●
iii. Dynamic smoke extraction system for tunnels	●	●	●	●	●
iv. Emergency generator	●	●	○	●	●
v. Emergency lighting	●	●	○	●	●
vi. Emergency power points	●	○	○	●	●
vii. Exit sign	●	●	●	●	●
viii. Fire alarm system	●	●	●	●	●

Tailor-made risk review & options comparison

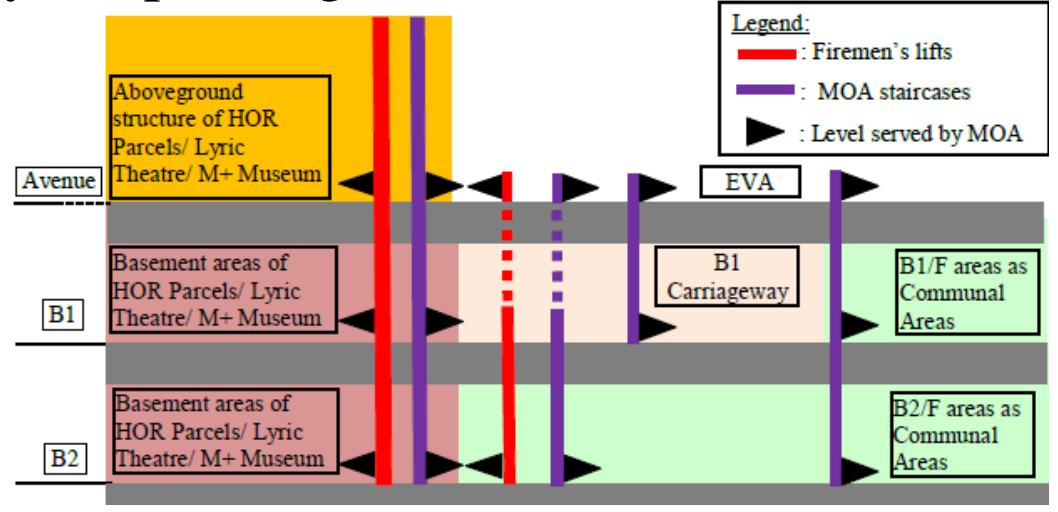


District Wide Fire Safety Strategy

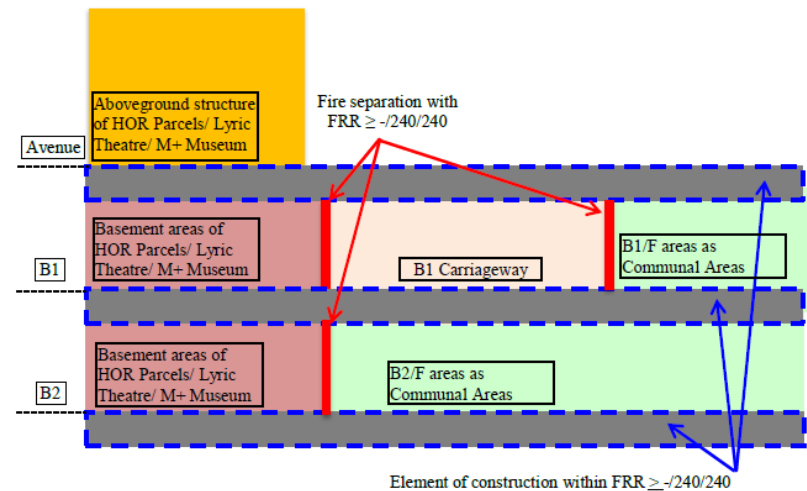
- Generic Design Principle – by simple diagram to communicate



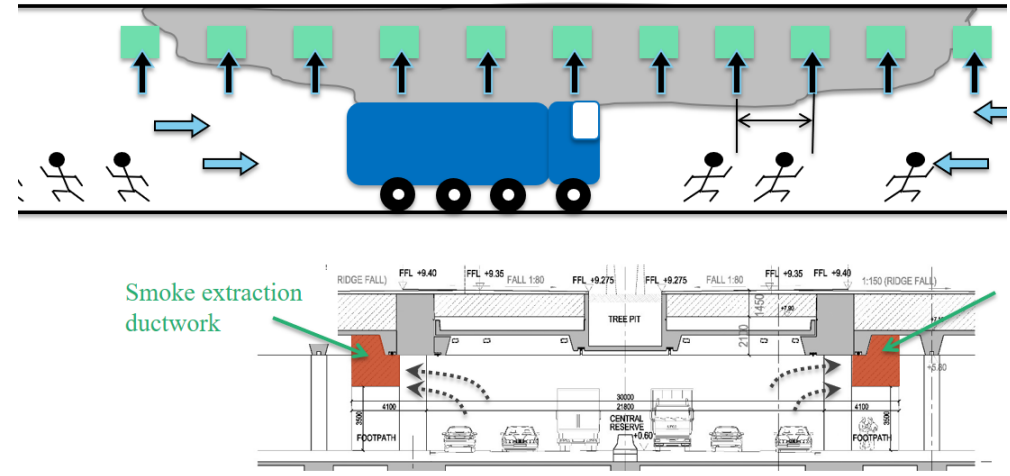
MOE



MOA



FRC

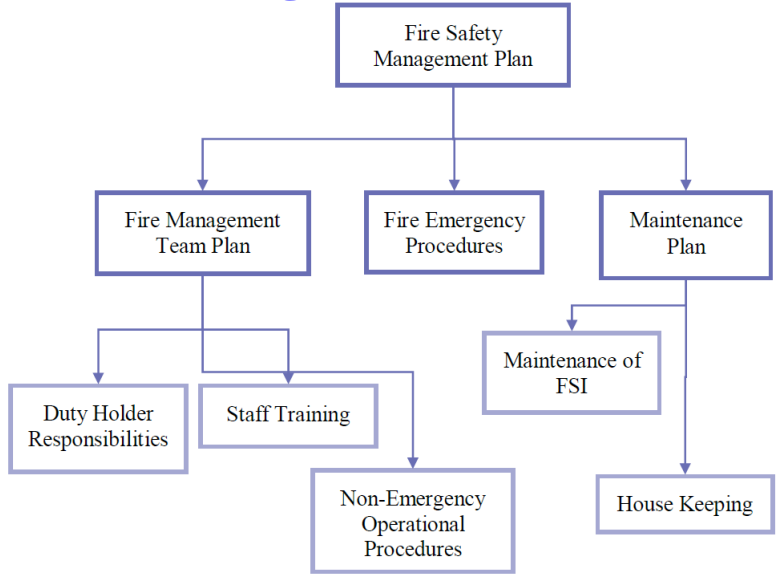


FSI

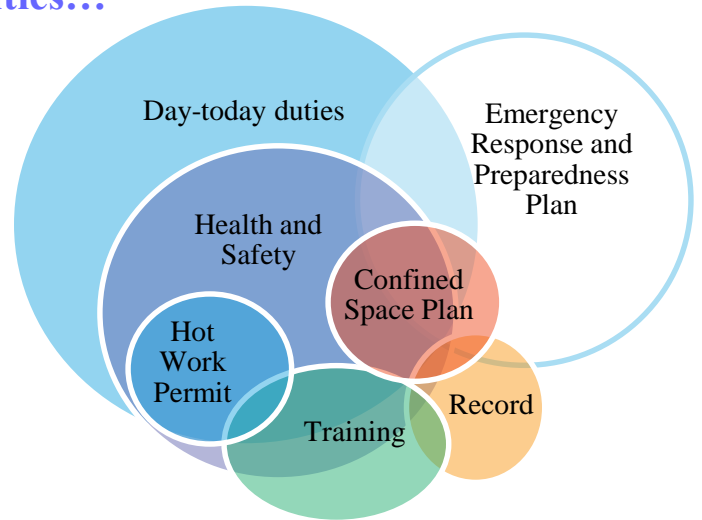
District Wide Fire Safety Strategy

- Fire safety management and operation impact – simple diagrams

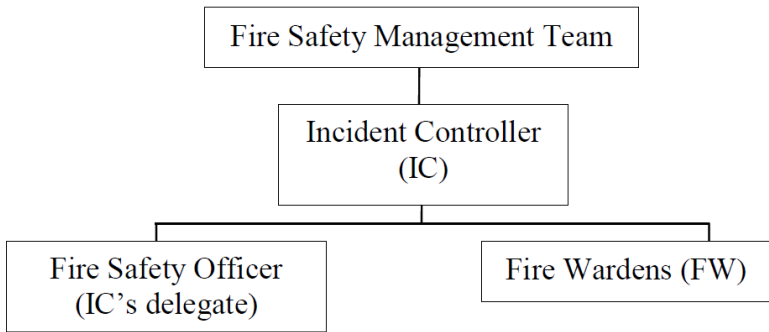
Structure of management



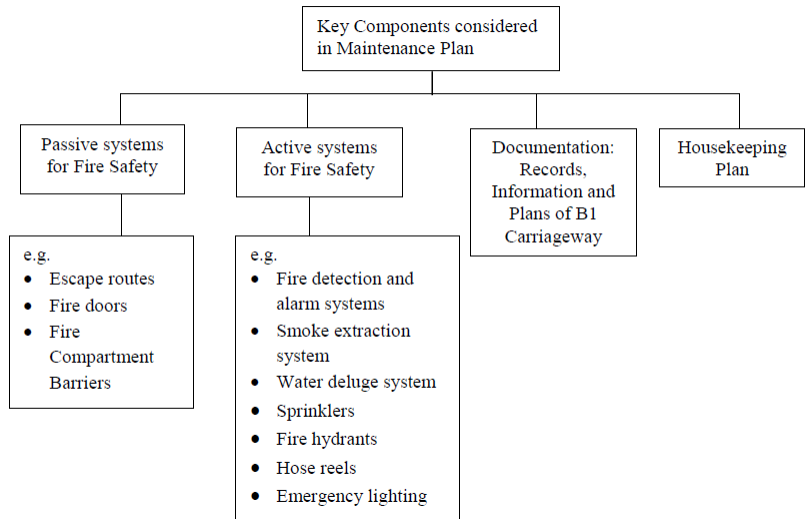
List of duties...



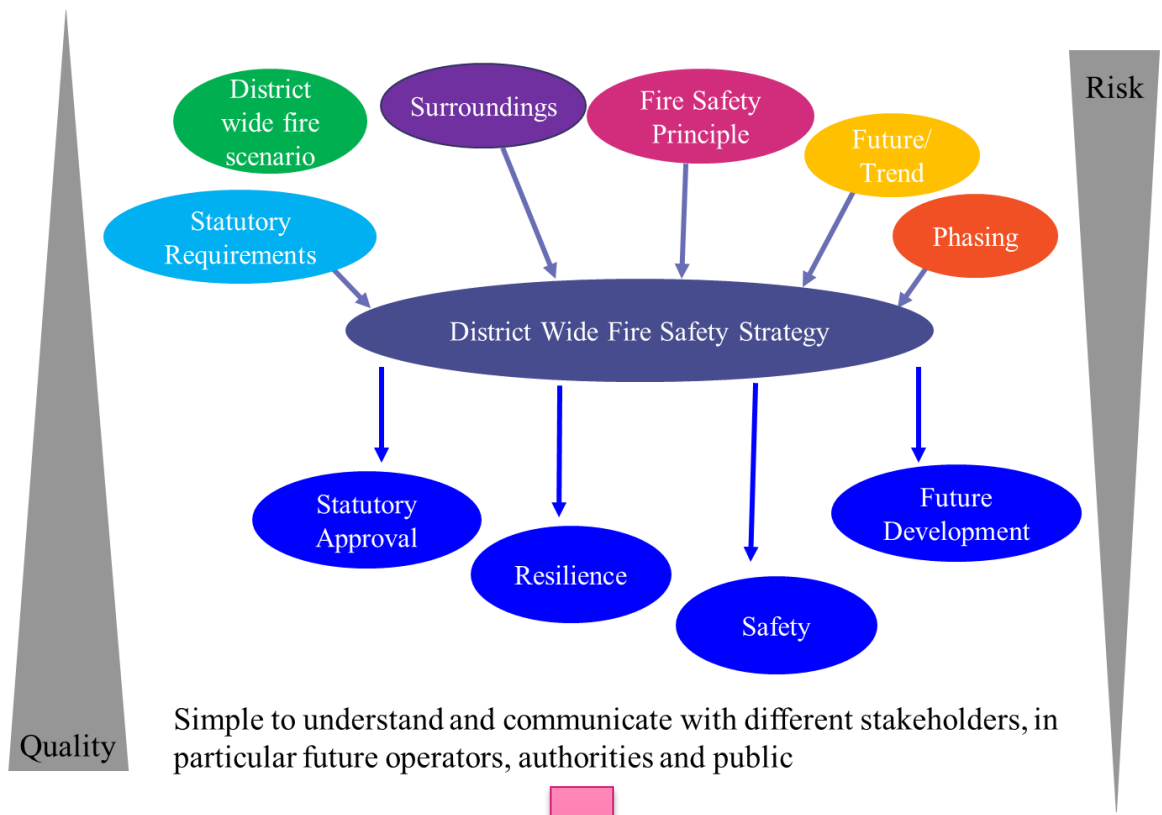
Key personnel/ Staff planning



Maintenance responsibilities



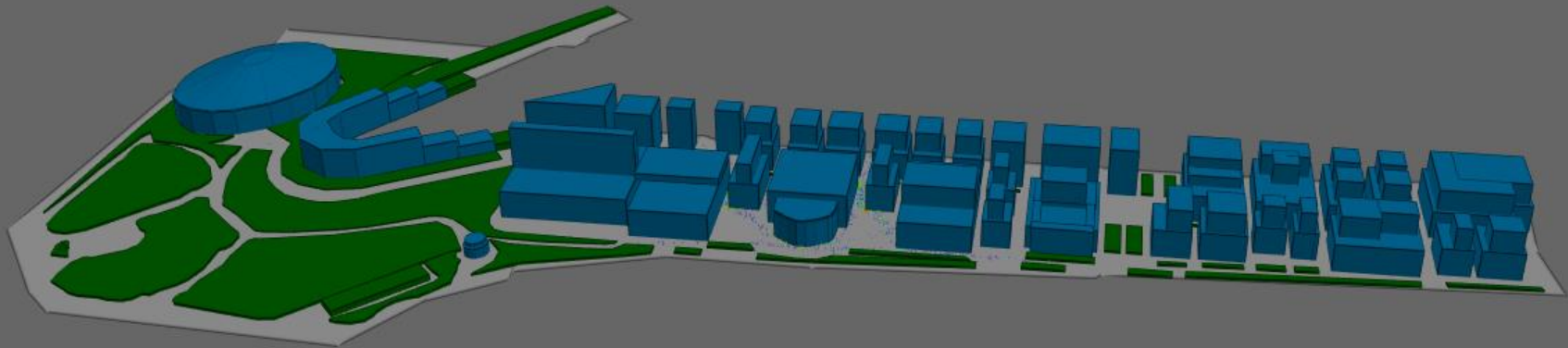
District Wide Fire Safety Strategy



Testing and demonstration

District Wide Fire Safety Strategy

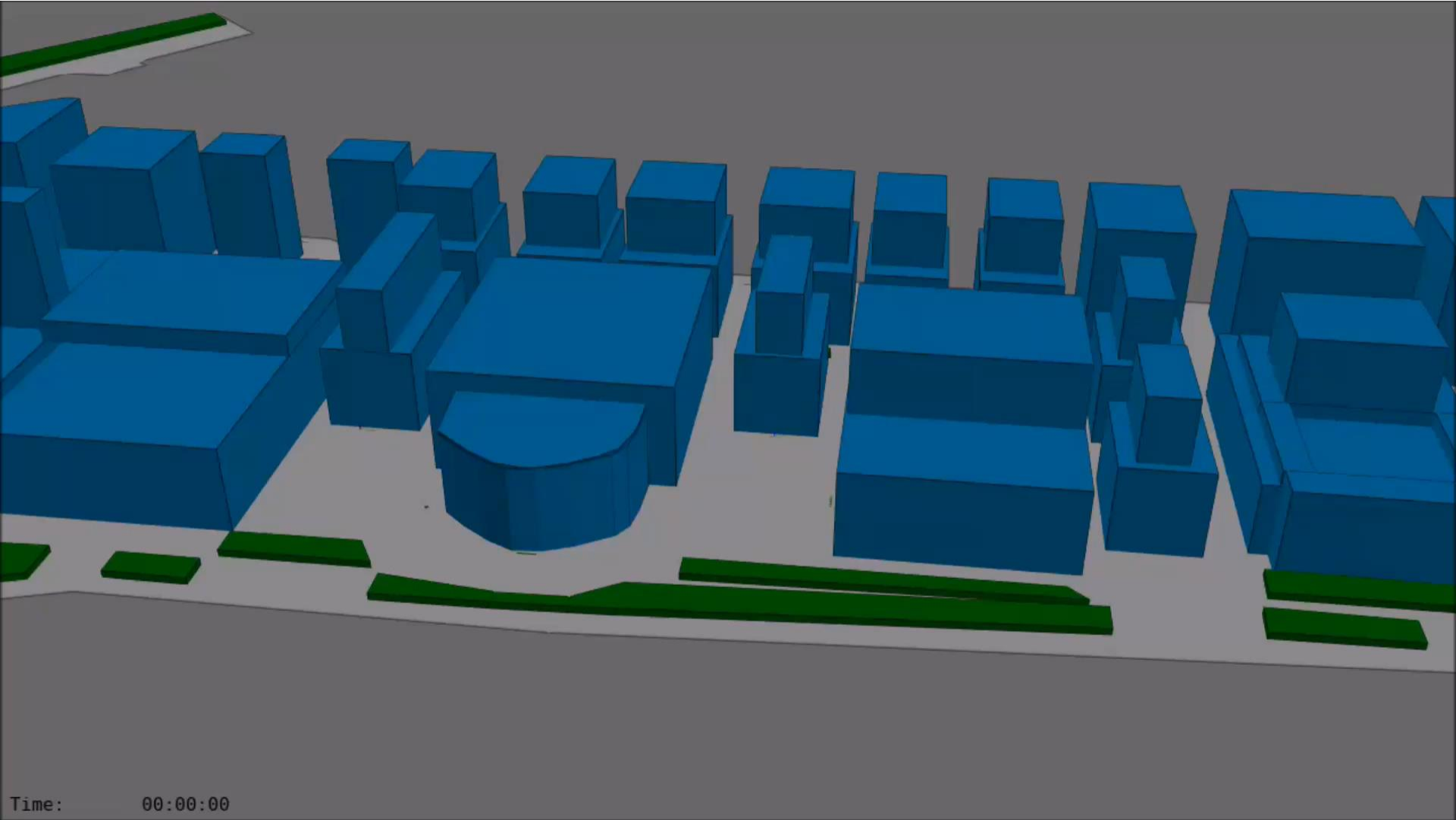
- Performance analyses with sensitivity study



Time: 00:01:50

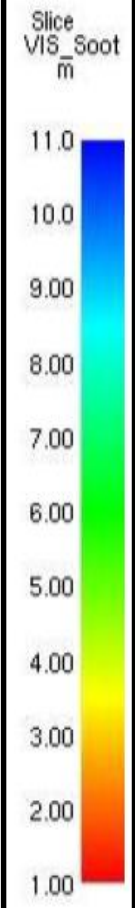
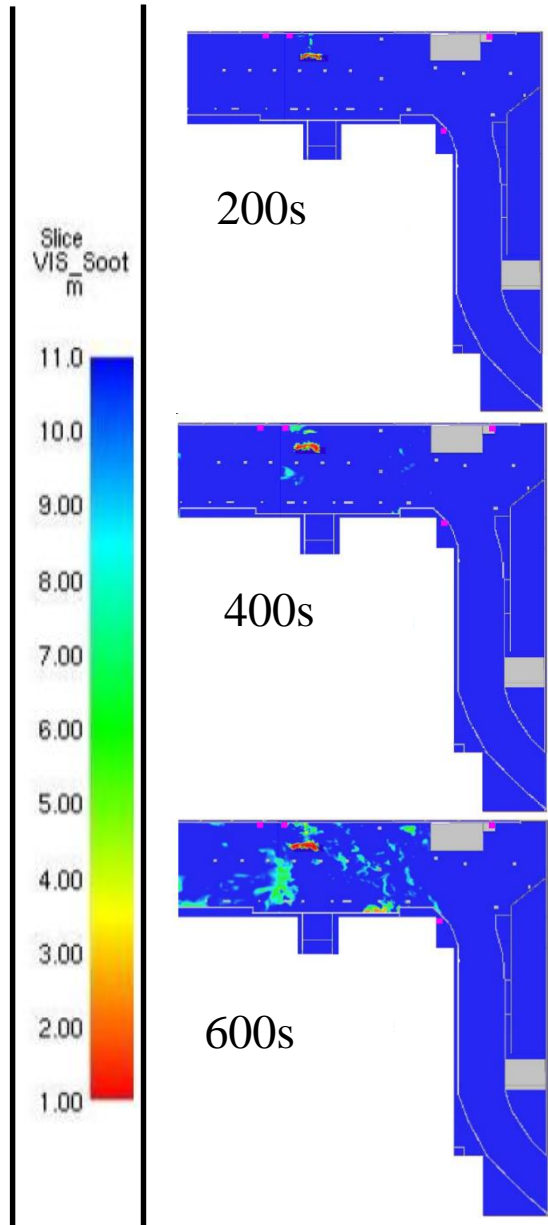
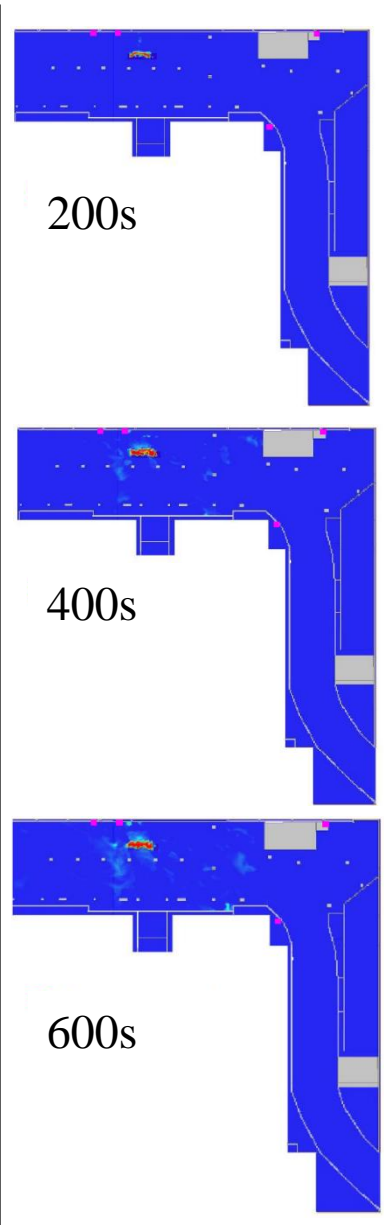
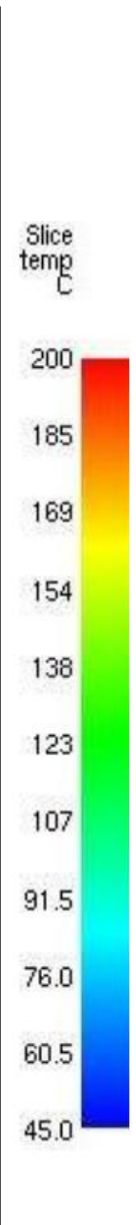
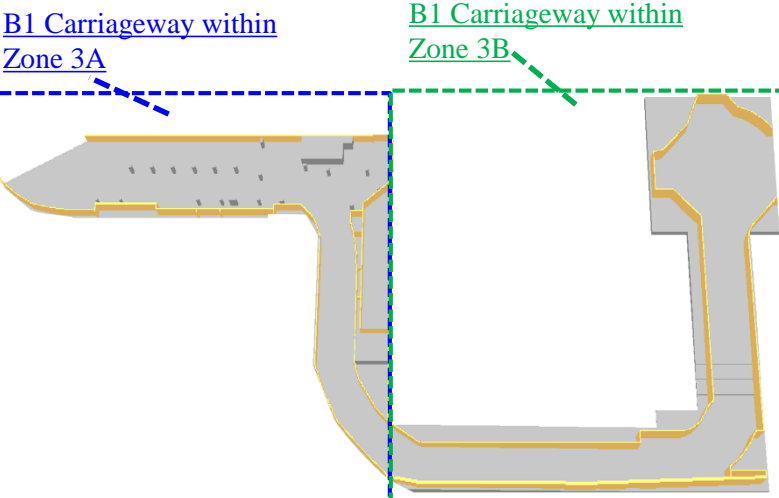
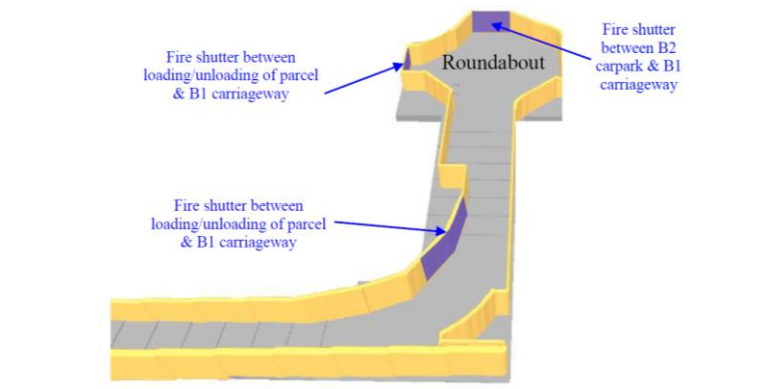
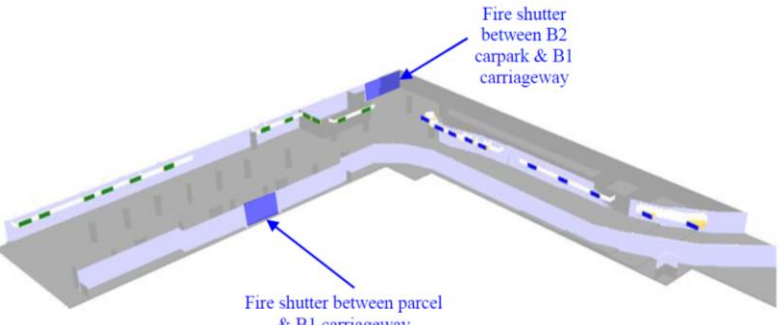
District Wide Fire Safety Strategy

- Performance analyses with sensitivity study



Time: 00:00:00

District Wide Fire Safety Strategy



A key challenge - Planning for Future...

Major Planned/Committed Projects and Potential Solution Spaces for Economic Land

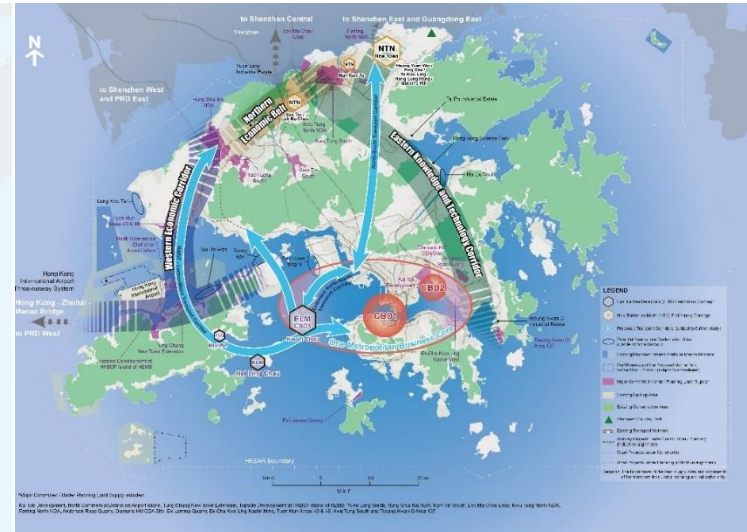
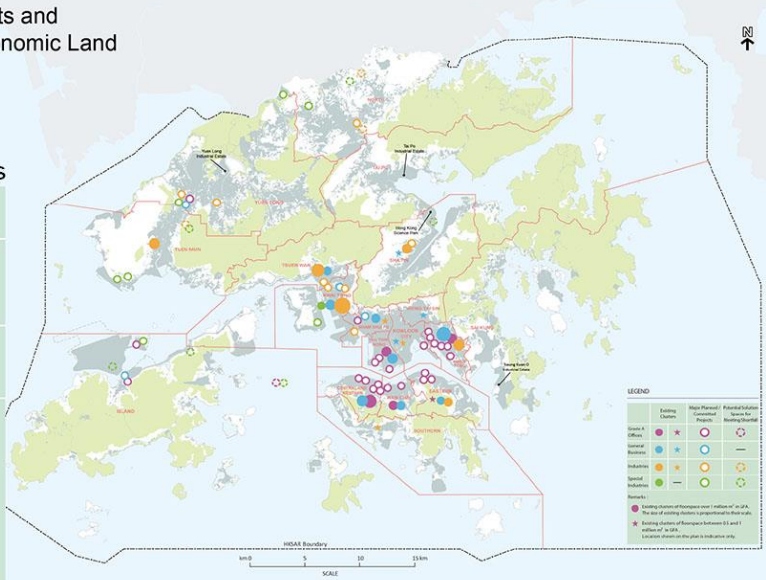
Major Economic Land Uses

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(including CBD and Non-CBD Grade A Offices)

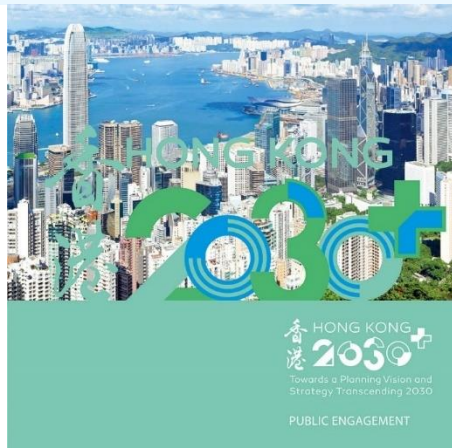
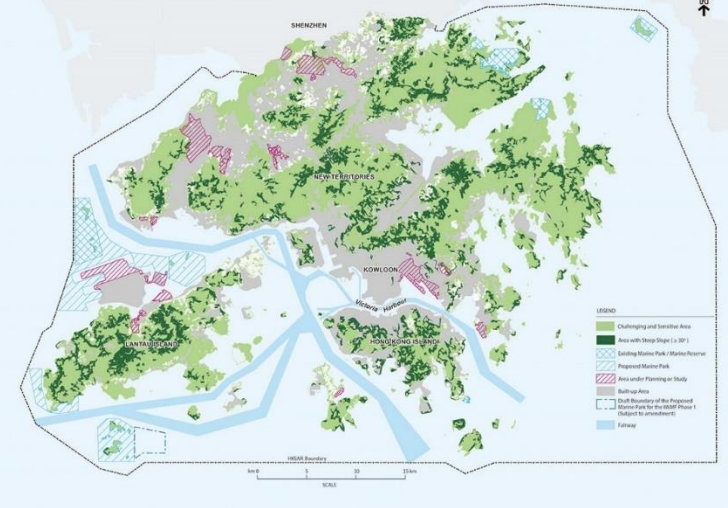
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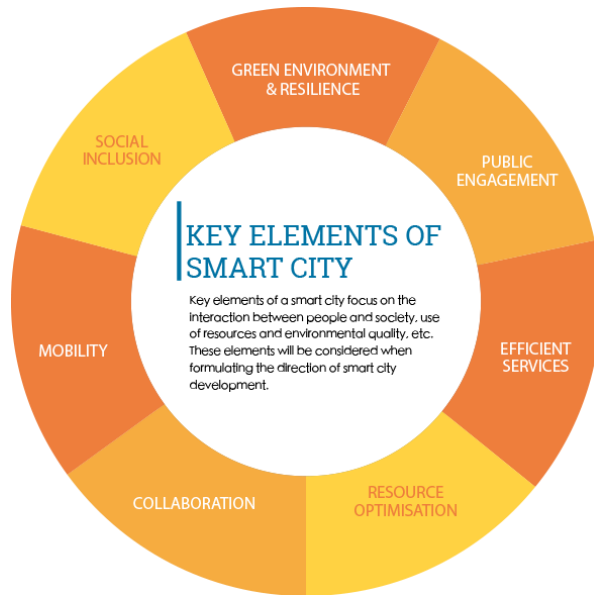


Considerations for Land Supply in Hong Kong



Smart City / Digital Age

智慧城市
SMART CITY @KOWLOON EAST
九龍東



Hong Kong Smart City Blueprint



- A Common Spatial Data Infrastructure (CSDI)

Big Data/ Real Time Data for Design/ Monitoring

- Big data:
 - Public flow (e.g. people, traffic, location, density...)
 - Real time news update of surroundings
 - Characteristics of flow (e.g. gender, age...)





- Policy Address
- Policy Agenda
- Highlights
- Webcast
- Press Releases
- TV Announcements
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- Archives
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- Sitemap



Policy Address

Smart City

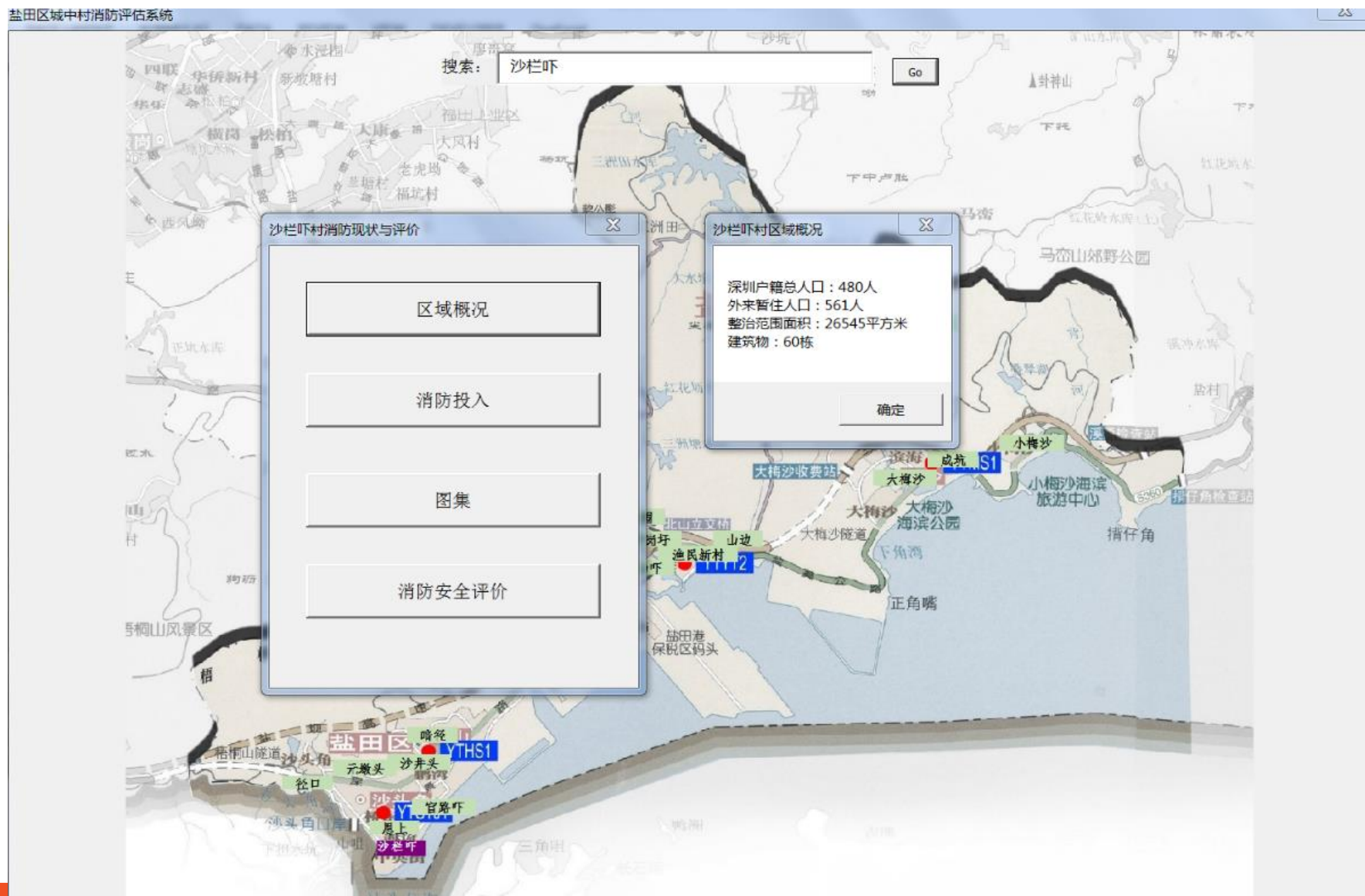
69. The Government is committed to developing Hong Kong into a smart city by using innovation and technology to enhance city management and improve people's livelihood. Our consultant will complete its study by the middle of this year. So far, preliminary studies have been carried out on some important areas such as the environment, healthcare and transport.

70. The Government is striving to promote the establishment of a **Common Spatial Data Infrastructure (CSDI)** to provide government departments as well as public and private organisations with an information infrastructure to share spatial data, supporting various smart city applications, and support the smart city blueprint of the ITB. The Development Bureau is commissioning a strategic study on the development of CSDI.

71. The Government is using Kowloon East as a smart city pilot area, leveraging people-centric information and communications technology solutions for the sharing of data to improve the use of resources and enhance the management of pedestrian and vehicular traffic flows.

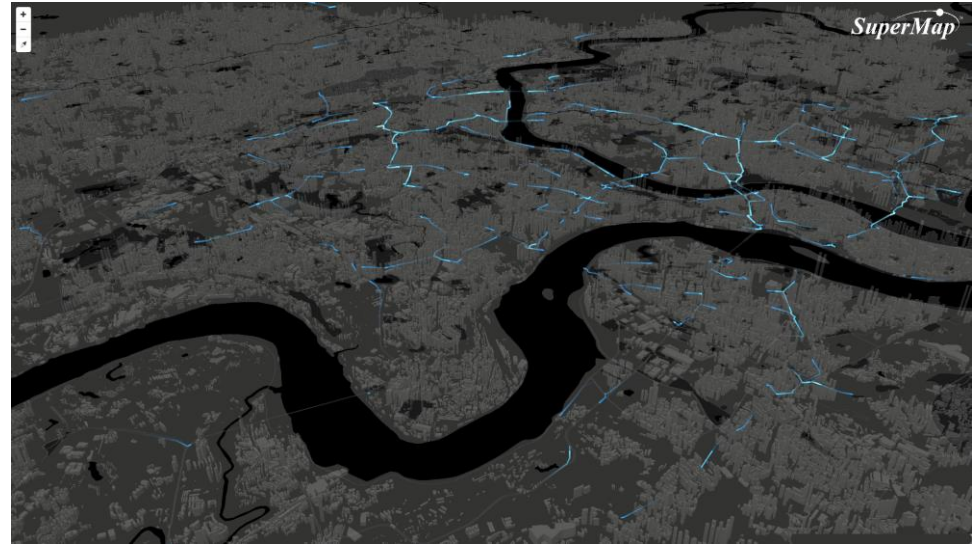
Big Data/ Real Time Data for Emergency and Rescue

- District real time model for information sharing



Data Visualization

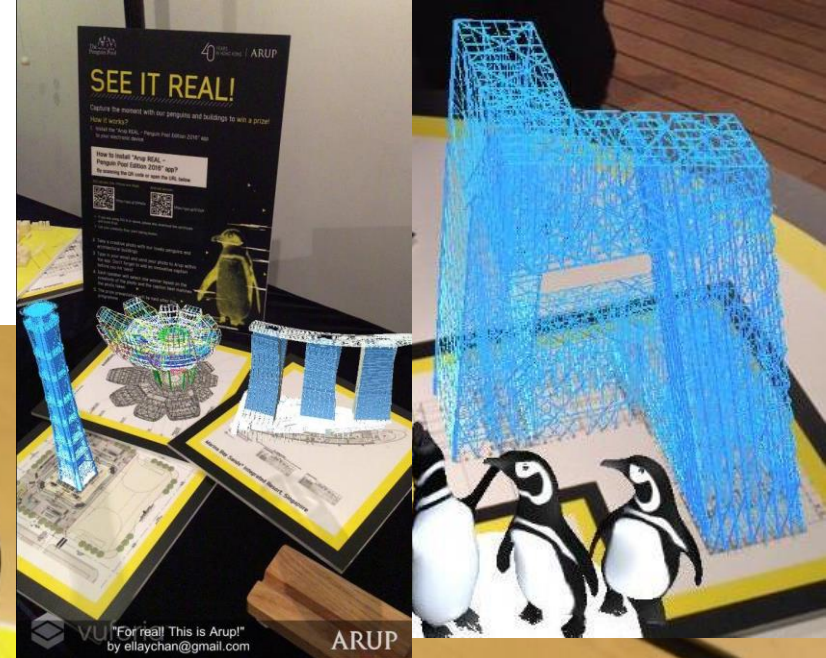
Spatial Big Data Visualization



Indoor-outdoor Navigation

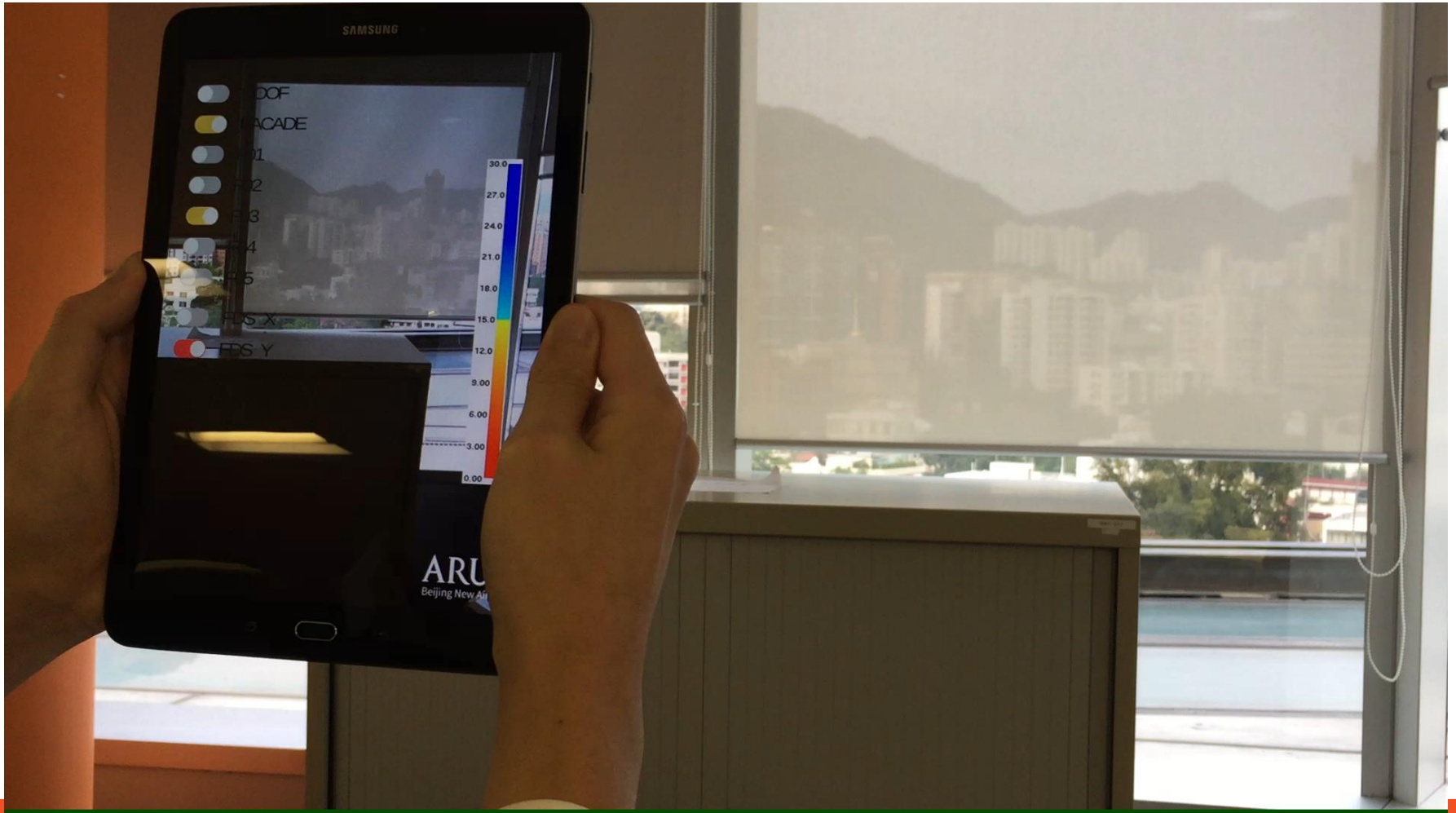
Visualization

- Platform to:
 - Demonstrate fire scenarios
 - Conduct training (Fire drill in VR or AR)



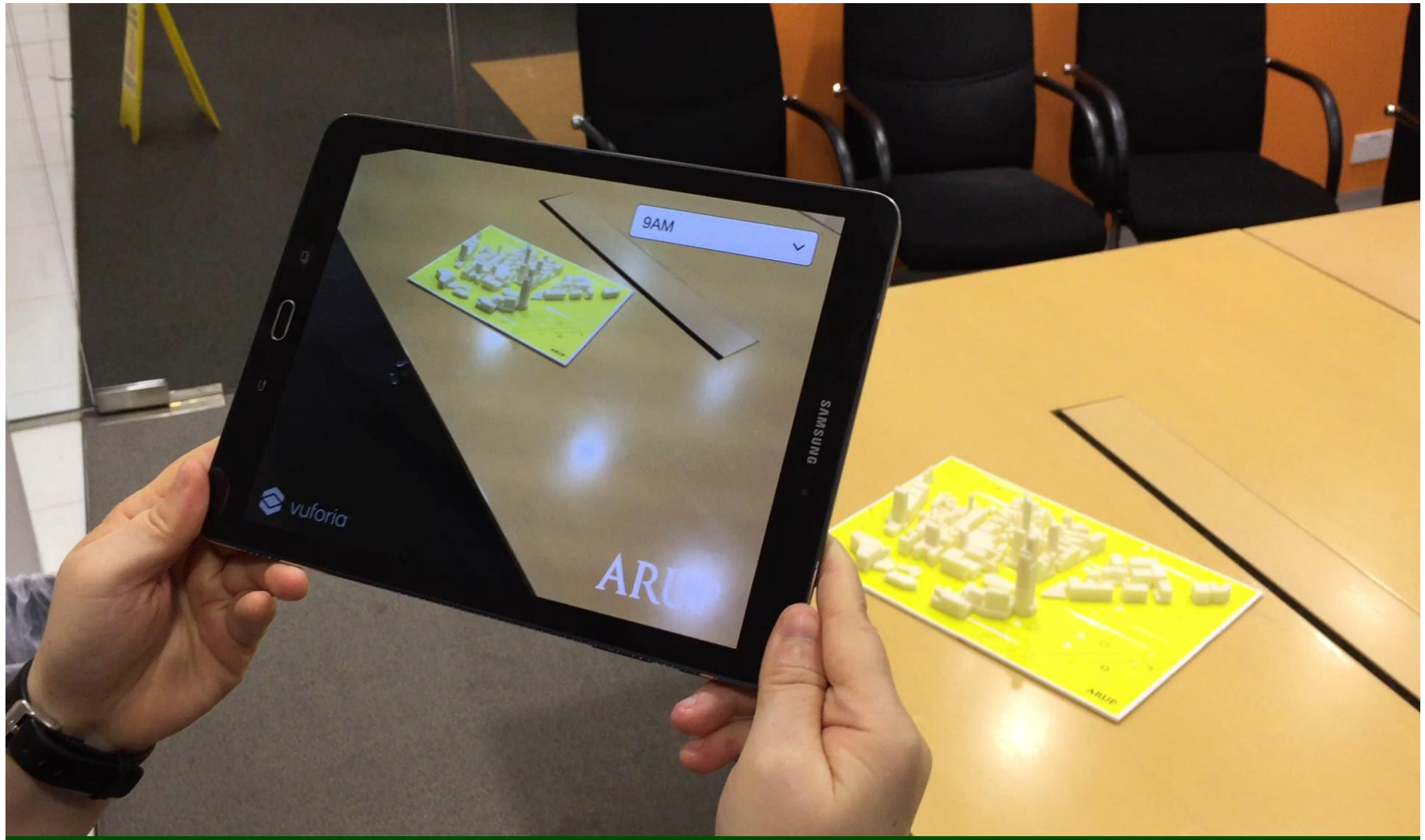
Visualization

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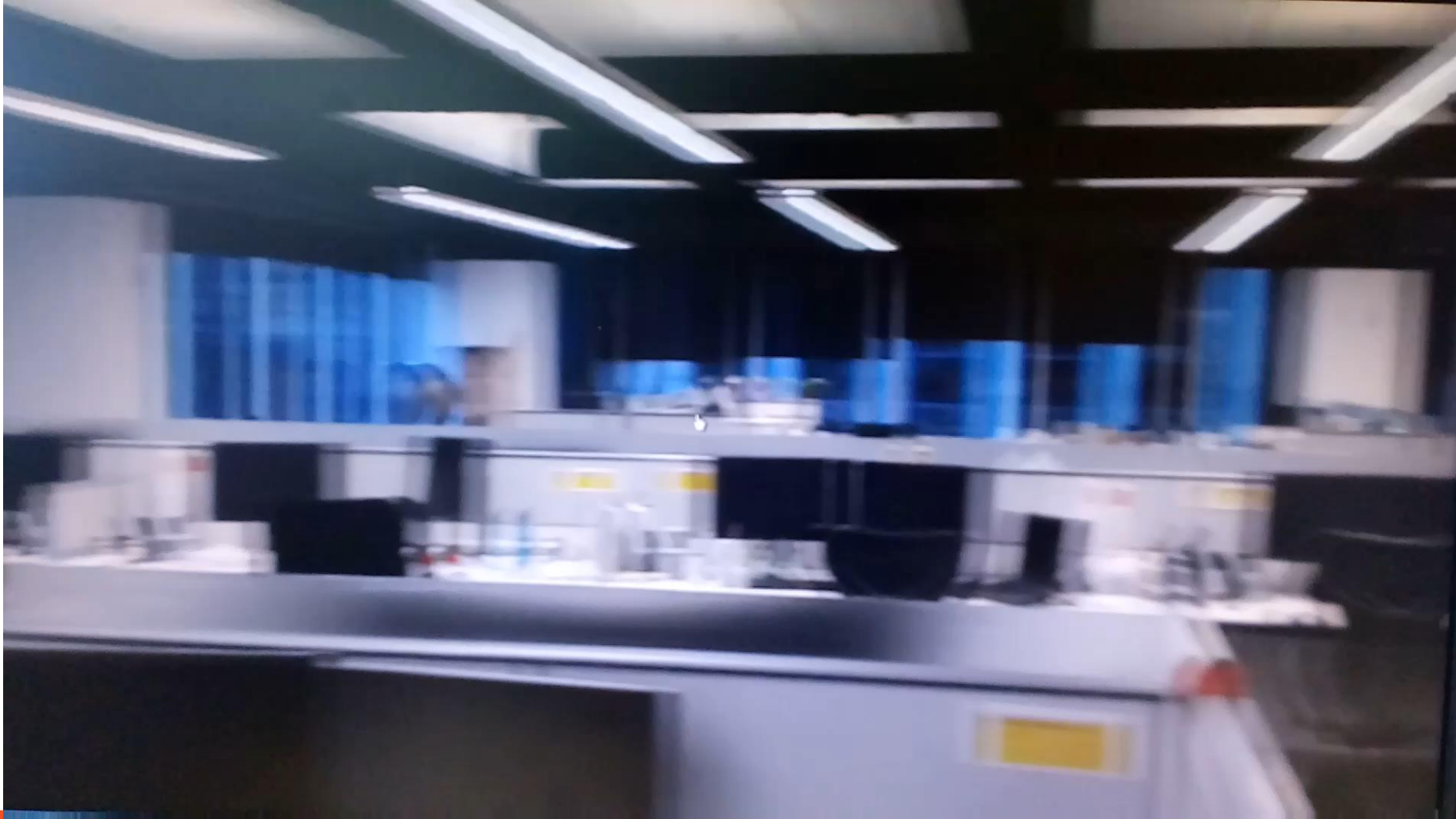
Visualization

- District environmental data for analysis



Connect Fire Safety & Smart Design

- Fire Drill / Training using VR or AR)
- Familiarisation



What else can we do more as fire practitioners?

Conclusion

- District-scale project brings challenges:
 - Dynamic characters for the whole district
 - Changing trends
 - Phasing of developments
 - Implication to surroundings
- District wide fire safety strategy as a platform record design concepts and solutions
- Potential opportunities for fire safety practitioners in the digital age and smart city initiatives





Thank you **谢谢**