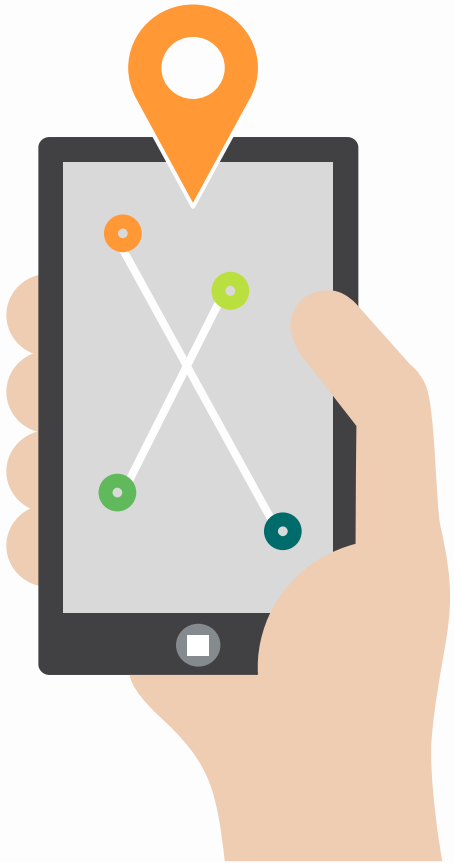
空間數據共享平台
Common Spatial Data Infrastructure

地理空間實驗室
Geospatial Lab

Welcome to Geospatial Lab



AGENDA

Part 1

Introduction (40 mins)

- Geospatial Lab - who are we?
- What is Spatial Data?
- Where can we get Spatial Data?
- Geographic Information System (GIS)

Part 2

Hands-on Workshop (60 mins)

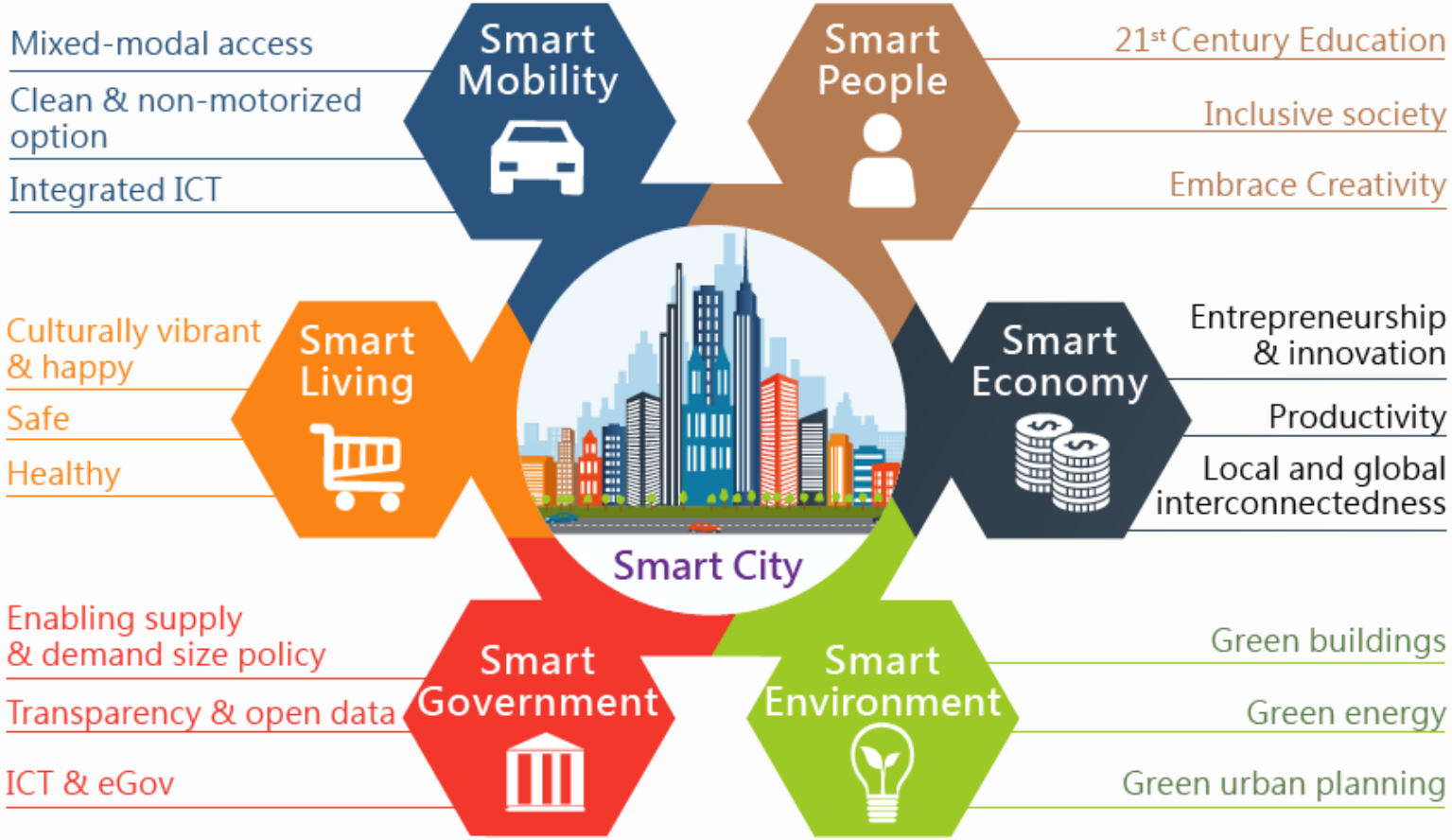
- Download Spatial Data
- Data Visualisation
- Spatial Data Processing & Analysis
- Share your findings!

Part 3

Lab Tour (10 mins)

Check out some real-world applications of spatial data!

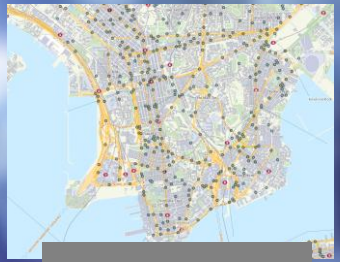
Smart City


Mixed-modal access
Clean & non-motorized option
Integrated ICT
Smart Mobility
Smart People
21st Century Education
Inclusive society
Embrace Creativity
Culturally vibrant & happy
Safe
Healthy
Smart Living
Smart Economy
Entrepreneurship & innovation
Productivity
Local and global interconnectedness
Smart City
Enabling supply & demand size policy
Transparency & open data
ICT & eGov
Smart Government
Smart Environment
Green buildings
Green energy
Green urban planning

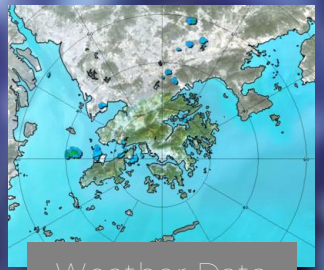

Smart city is not possible without a robust data infrastructure!
Smart cities depend on intelligent data management to share information, empower app developers to build innovative products, and leverage analytics to enhance the foundational systems of the city.

No Data Sharing? – Tough Times…

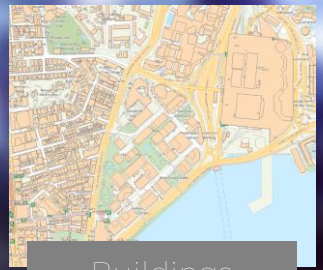
Road Network



Traffic Census



Weather Data



Buildings

Development of Data Infrastructure in Hong Kong Smart City

2017

SmartCity Blueprint 1.0

2017 policy address have commited to develop HK into a smart city

2020

SmartCity Blueprint 2.0

CSDI and 3D Digital Map – key components underpinning Hong Kong's smart city development

CSDI

2021

Opening of Geospatial Lab

Geospatial Lab – one of the initiatives to promote CSDI to the public

地理空間實驗室
Geospatial Lab

2022

Launch of CSDI portal

for people to search, view and download various kinds of spatial data there for free

Nurture a Geospatial Community to Use Spatial data

The Establishment of Geospatial Lab

10 May 2021 – Soft Launch
30 July 2021 – Opening

Established and funded by DEVB

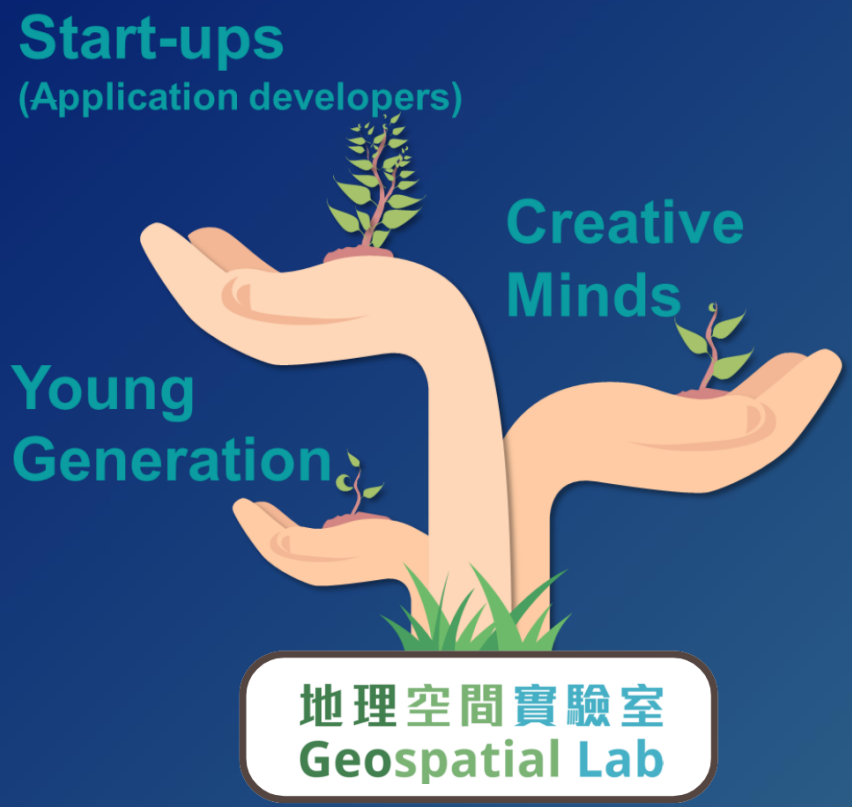
Operated by TWGHs

Supported by SCC

發展局
Development Bureau

東華三院
Tung Wah Group of Hospitals

SCC
智慧城市聯盟
Smart City Consortium



To provide a platform to nurture a geospatial community

To discuss, explore and exchange ideas for harnessing the potential of spatial data, thereby improving quality of life and promoting business opportunities.

Our Services

Geospatial Lab Key Services

To provide:

- **on-site advisory and consulting services** to develop prototypes for proof-of-concept by using spatial data
- online and offline events such as **webinars**, **forums**, **workshops**, **talks, and school visit**
- **computing facilities** for developing any GIS-related projects

Educational sessions - Talks

Talks for the **general public**

Invite GIS scholars and spatial data professionals to provide talks on spatial data and GIS

Share the use of CSDI data for training to construct a geographically accurate 3D environment for simulation.

Workshops

Workshops for the **general public**

- Introduction to GIS & relevant software (open & proprietary)
- Applying Spatial Data for Geospatial Applications
- Visualization
- Spatial analysis, and network analysis
- Use 3D data to model our world
- Workshop for 3D printer

Workshops for

- Students
- Teachers (EDB x GeoLab)
- Government officers
- Professional bodies & organisations

Group Visits

From schools

- Primary schools
- Secondary schools
- Tertiary institutions

From professional bodies / organisations

- Professional institutions
- NGOs
- Private sectors from telecommunication, property development, etc.

Outreach Activities

HKFI and Insurance Authority (IA)
Geospatial Insights for Insurance

Talk at the school's assembly

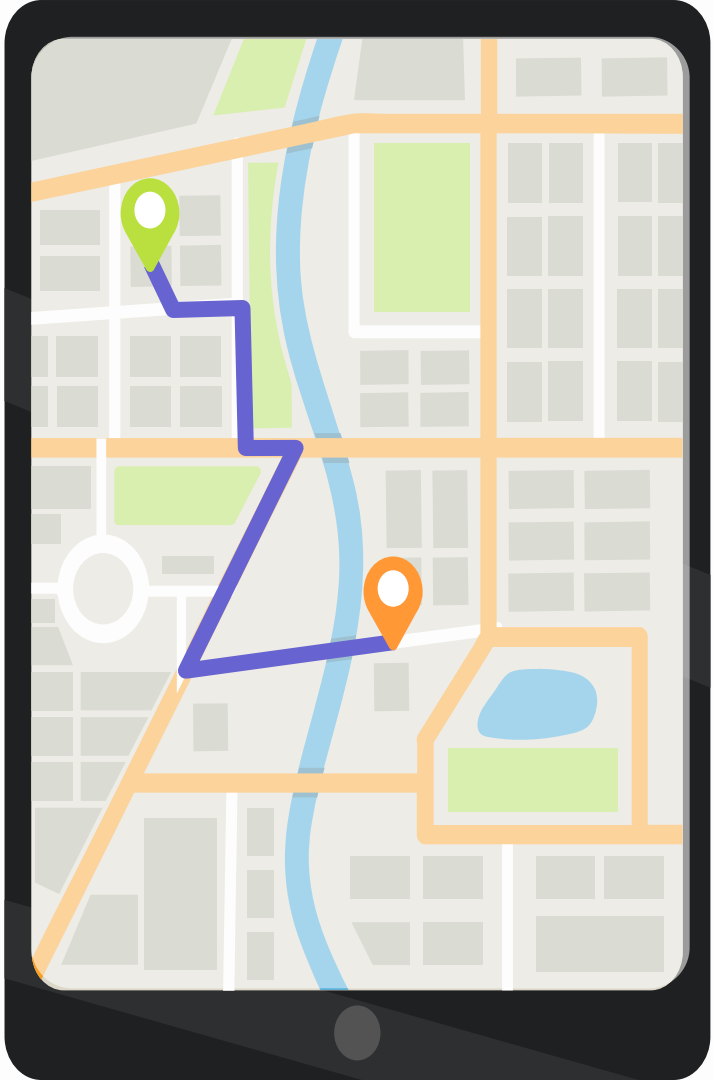
Talk in the Incubation Centre

Exhibition

Exhibition at University

Talk at Tertiary Institution

What is Spatial Data?



Spatial Data

“Information about the **physical location (實體位置)**, typically represented on digital maps using **geometric shapes (幾何形狀)** to indicate geographic features. This data is usually stored as **coordinates (座標)** and **topology (相位關係)**, used for analysing spatial patterns and distributions, such as census data.

5 Characteristics of Spatial Data

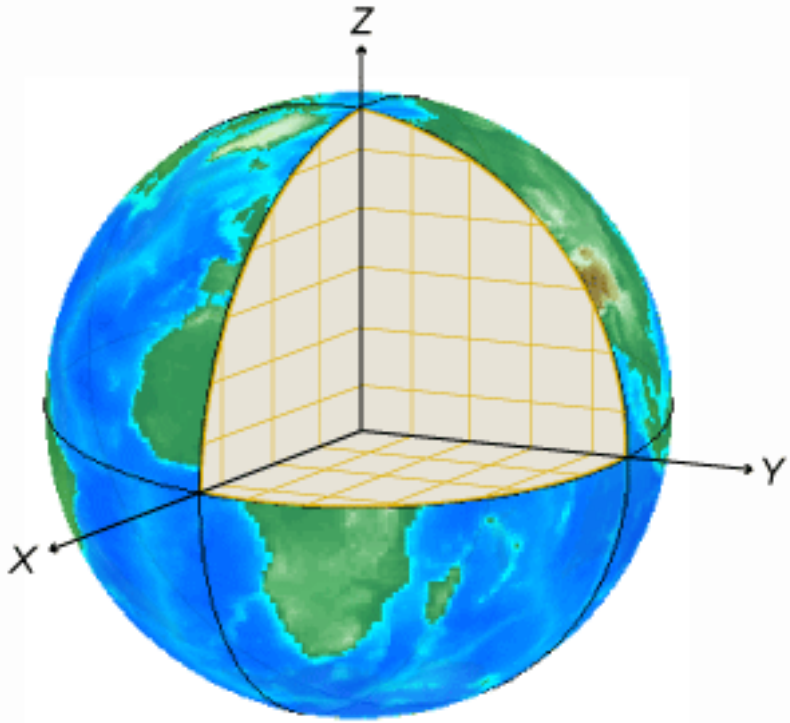
1) Geographic location (地理位置)

- Co-ordinates

  e.g. 22.3°N 114.2°E

- …or postal address

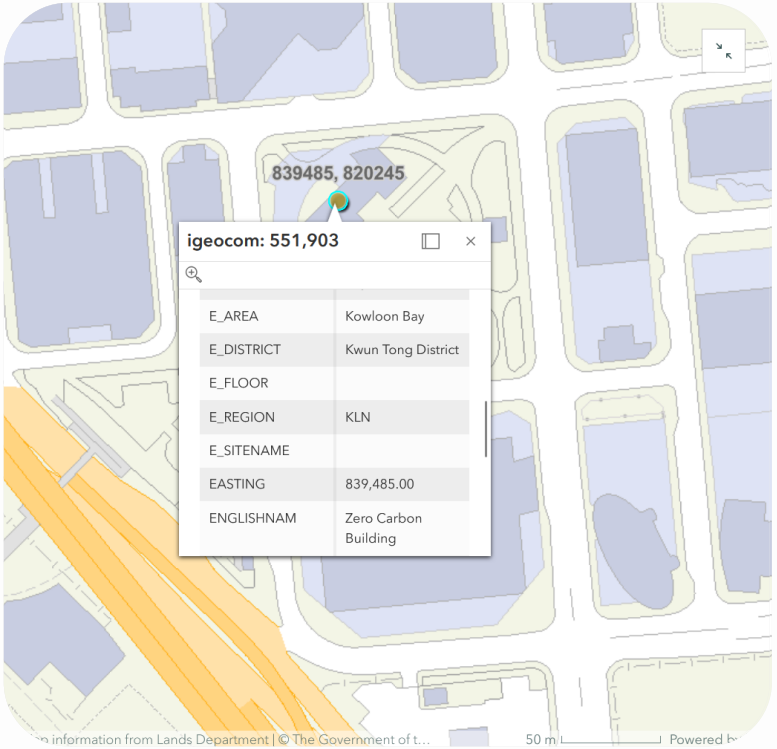
  e.g. Millennium City Tower 1



5 Characteristics of Spatial Data

2) Attributes (屬性)

- Attributes are descriptive information about specified spatial objects.
  e.g. Name of place or area size
- All attribute data are saved in tables.

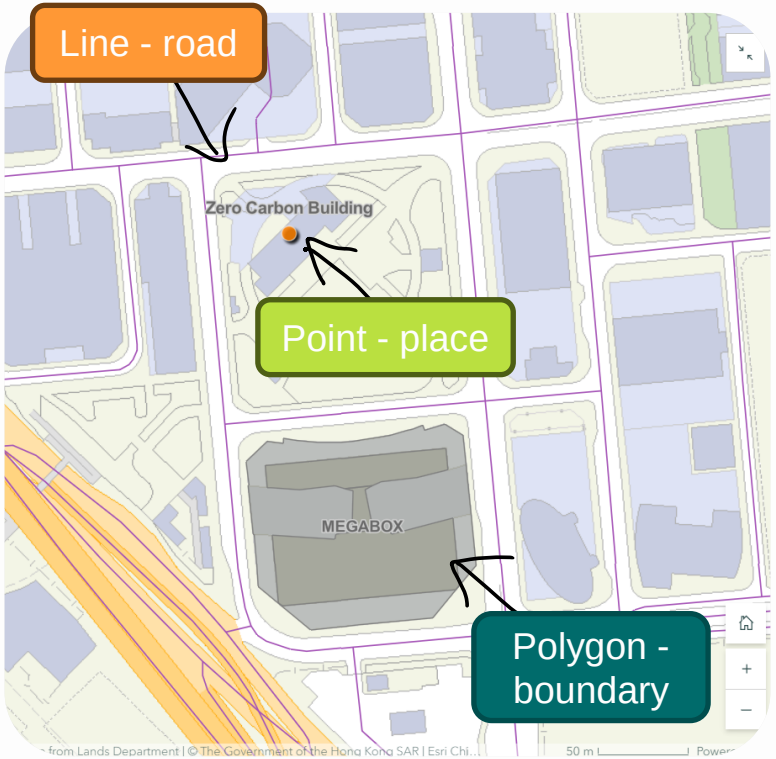


5 Characteristics of Spatial Data

3) Geometry (幾何)

Vector (矢量) - represent various geometric forms and stored as features.

Modelling **discrete features** with precise shapes and boundaries.

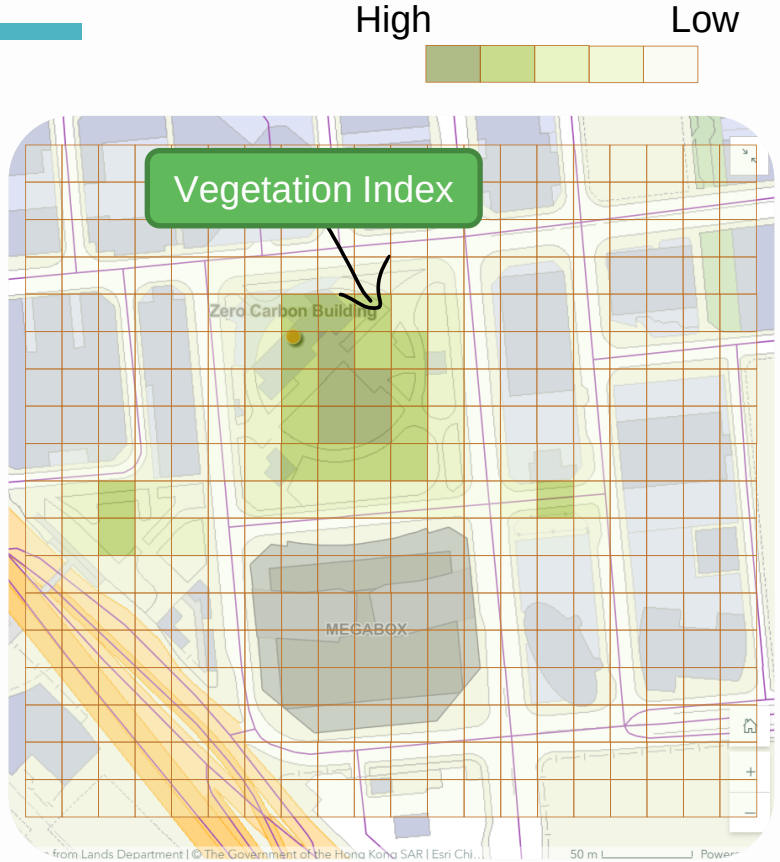


5 Characteristics of Spatial Data

3) Geometry (幾何)

Raster (網格) - pixel-based data where each pixel has a value representing information.

Modelling **continuous phenomena** and images of the earth.

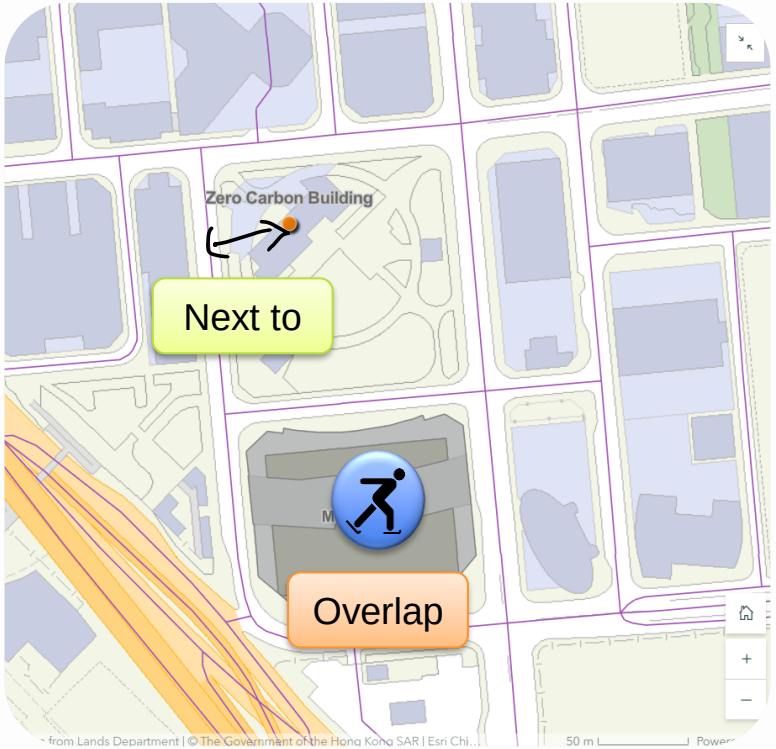


5 Characteristics of Spatial Data

4) Spatial Relationship (空間關係)

Specifies how an object is located in space in relation to another object.

- “next to”
- “inside”
- “near”
- “far from”
- “overlap”

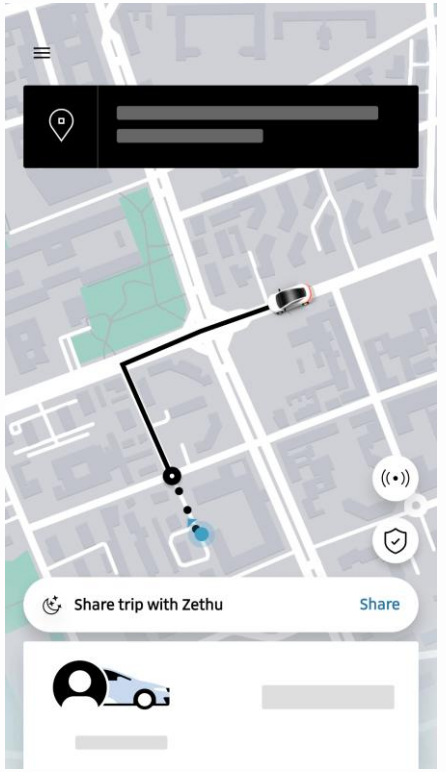


5 Characteristics of Spatial Data

5) Temporal Dimension (時間維度)

How the locations are changing over time.

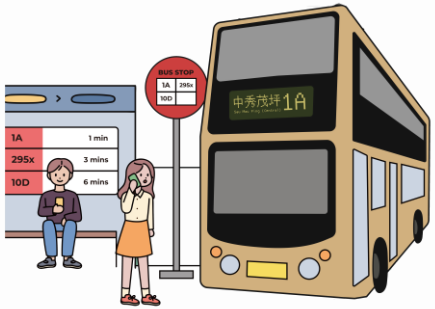
e.g. Tracking the movement of vehicles or the expansion of urban areas.

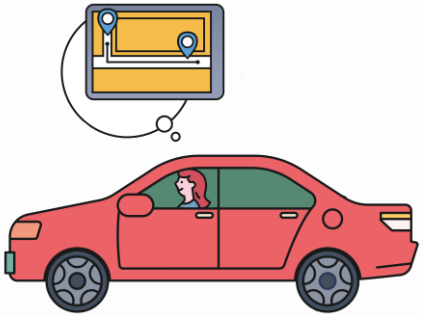


How is Spatial Data related to you?

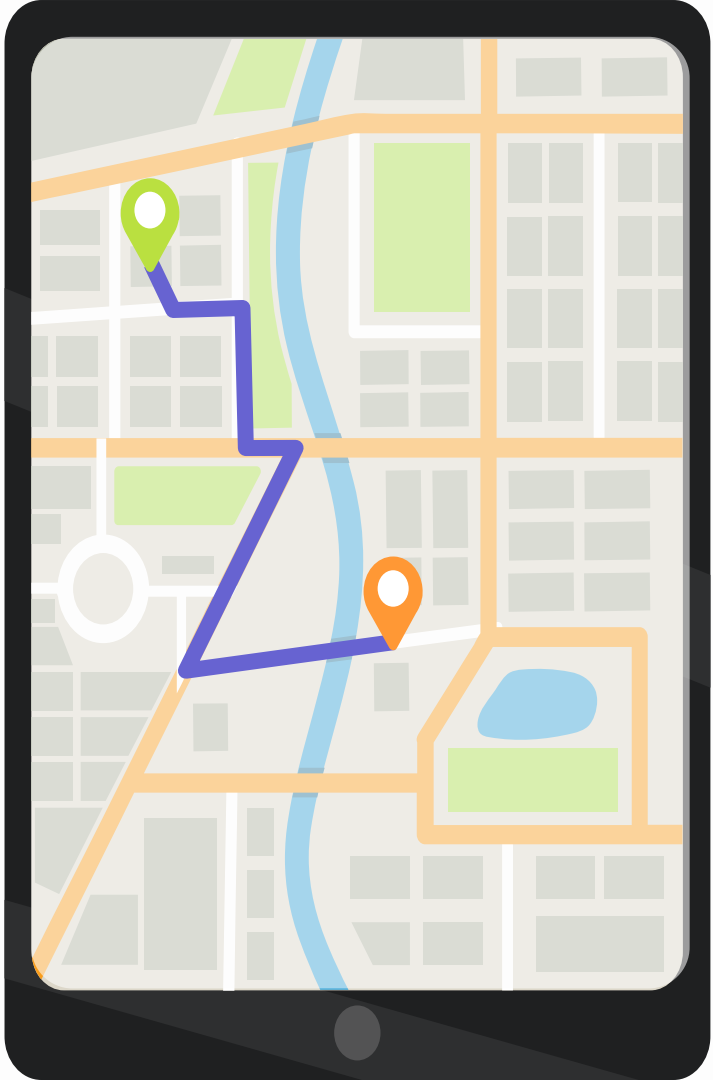
Frequently use in our daily life:

- Locate bus real-time location and arrival time at stops
- Find the route from an origin to a destination
- Takeaway Express, Online Shopping Delivery
- Tracking typhoon movement
- ……and MORE!



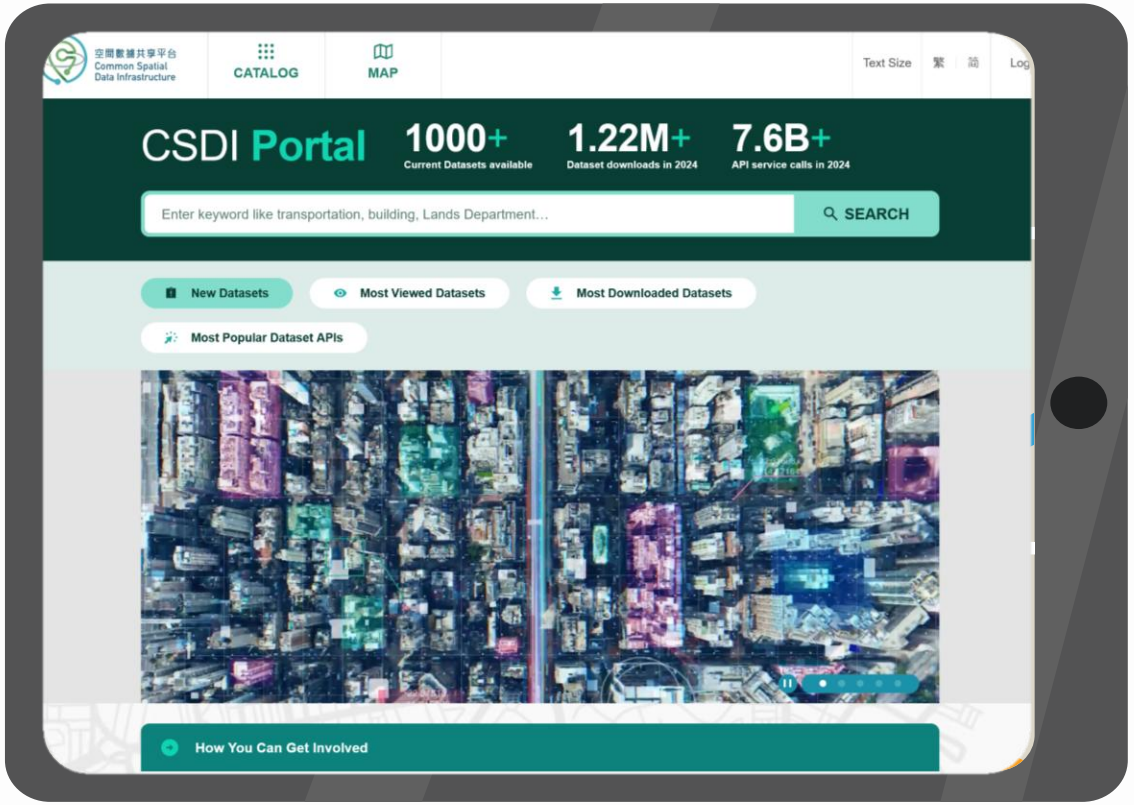


Where can you get Spatial Data?



空間數據共享平台
Common Spatial
Data Infrastructure

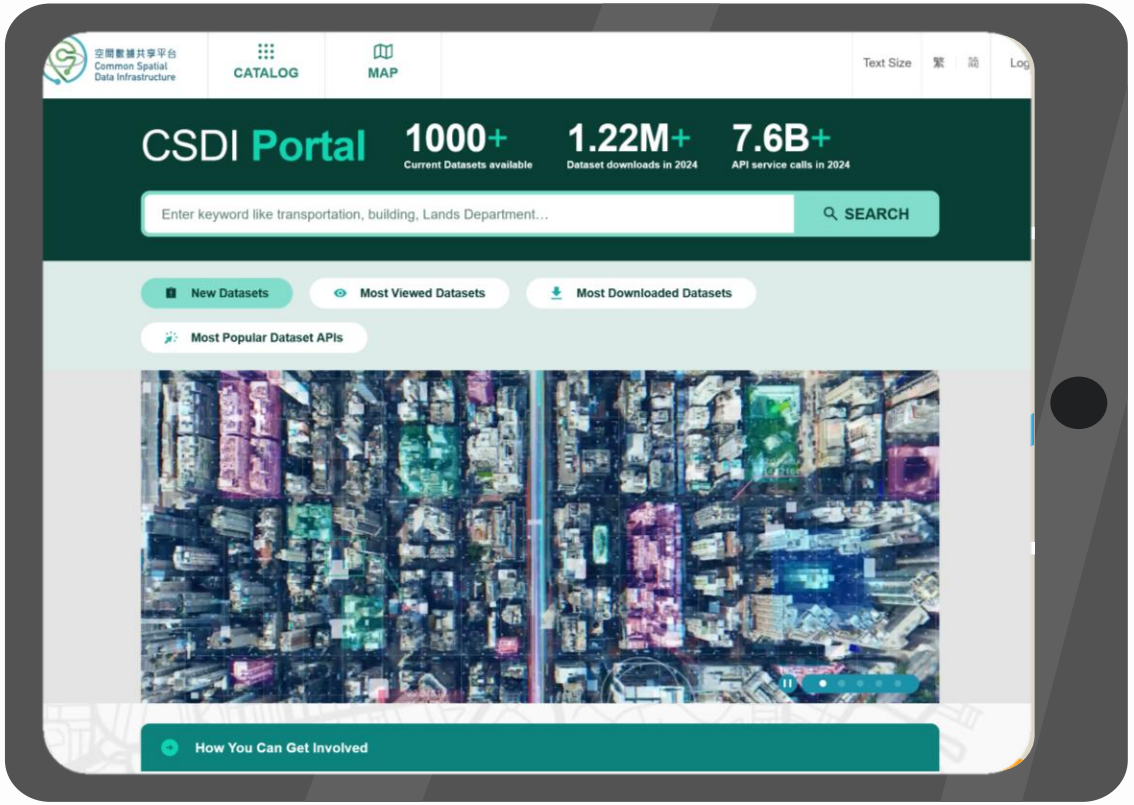
Where can you get spatial data?



空間數據共享平台
Common Spatial Data Infrastructure

A centralized platform of standardized spatial data

Where can you get spatial data?



- Over **1000** spatial datasets available, shared by **60+** Bureaus and Government Departments
- **FREE** spatial data + geospatial data services

CSDI Data Standards

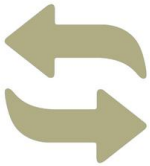
空間數據共享平台
Common Spatial Data Infrastructure

comply with 5 CSDI standards

Geo-tagging of non-spatial data

Documentation of data specifications

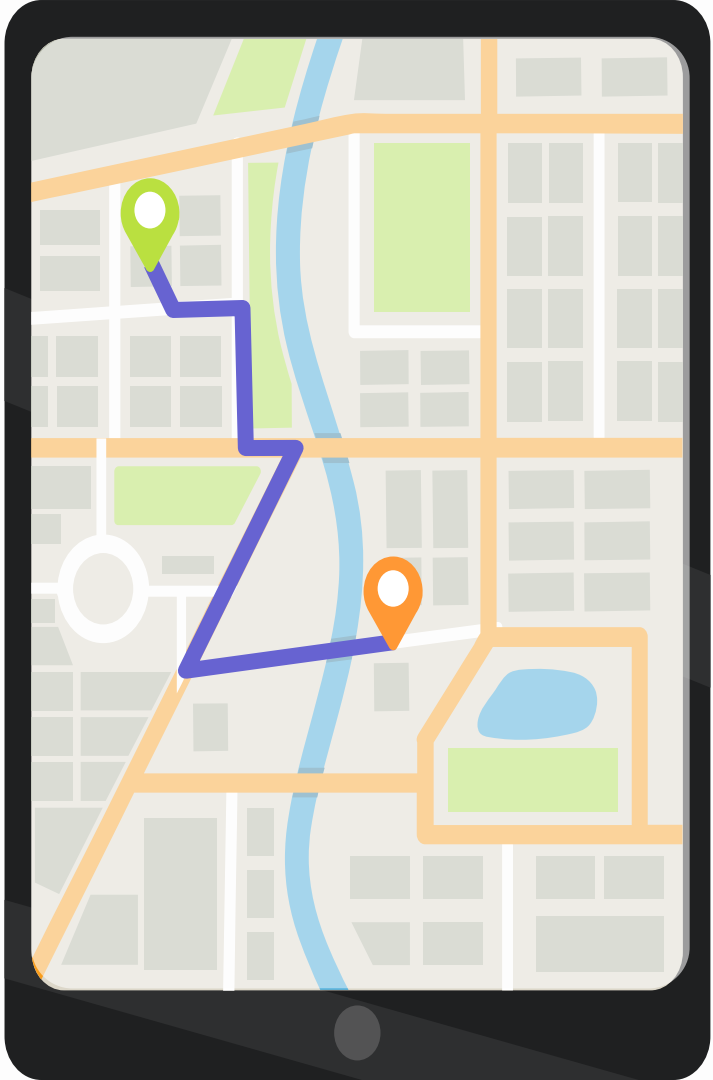
Documentation of metadata



Conversion of spatial data to an open and machine-readable format

Establishment of Application Programming Interface

What is GIS?



Urban Challenges

Transportation and Traffic

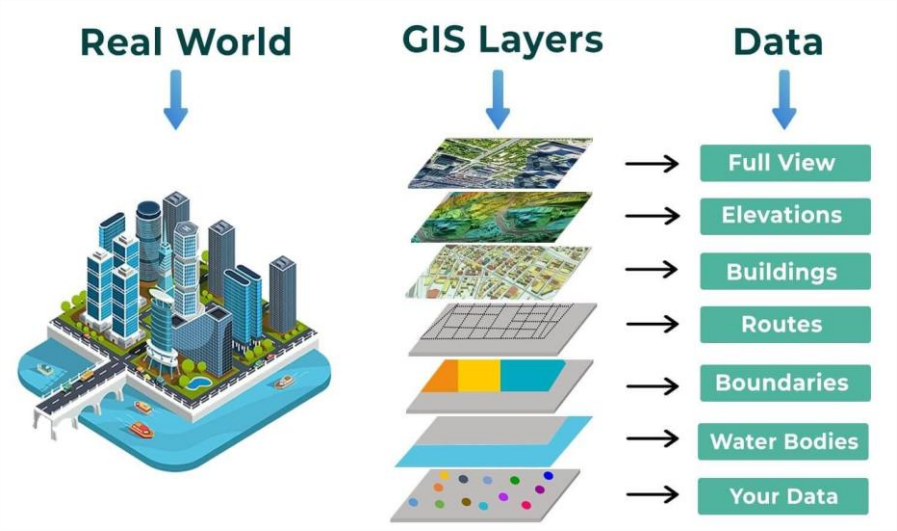
Housing and Overpopulation

Environmental
(Waste/Air Pollution)

GIS is…

GIS - Geographic Information Systems
地理信息系統

connects geospatial data, integrate location with all types of descriptive information, utilizes maps to visualize, communicate, perform analysis, share information, ultimately to **solve complex problems** around the world.



… the Solution to Challenges

GIS - Geographic Information Systems
地理信息系統

connects geospatial data, integrate location with all types of descriptive information, utilizes maps to visualize, communicate, perform analysis, share information, ultimately to **solve complex problems** around the world.

Identify Problem

↓

Visualize Problem

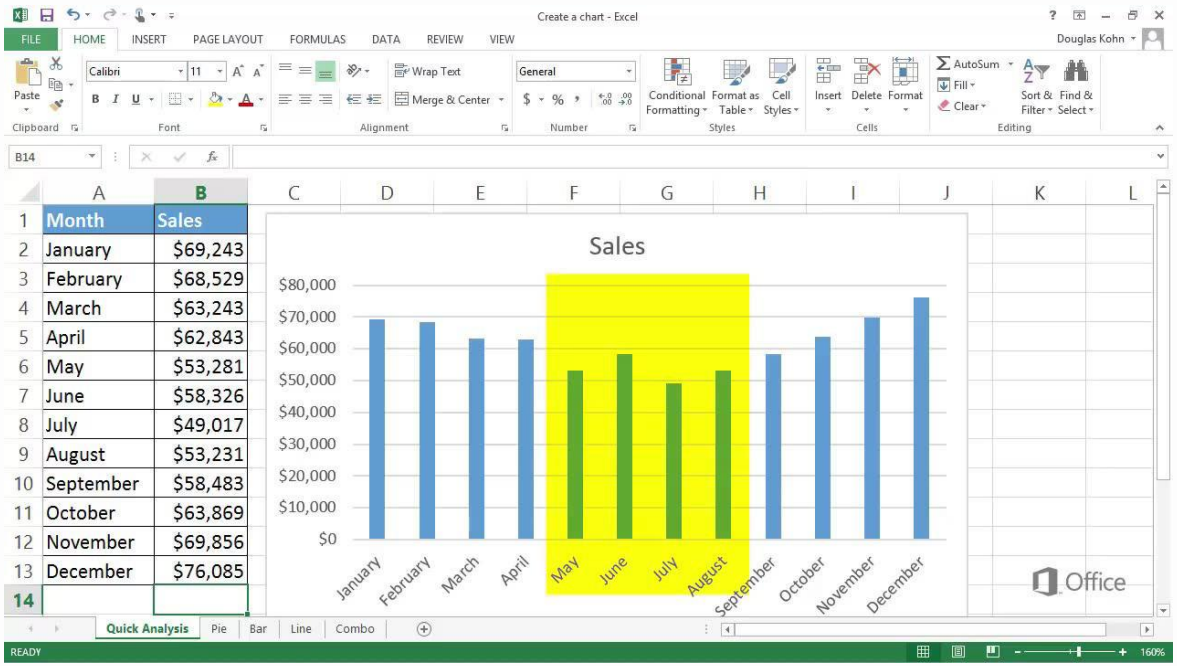
↓

Analyze Problem

↓

Solve Problem

Excel and GIS?



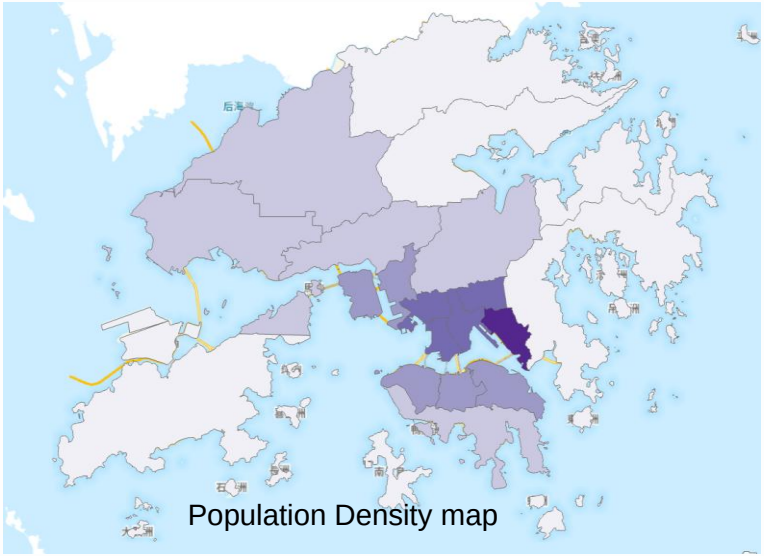
Excel table shows data in tables and charts

Excel and GIS?

Can you discern instantly the population pattern of the world from this table of texts and numbers?

District	Pop Density (person per sq km)
Central and Western	18799.585
Wan Chai	15677.854
Eastern	29209.040
Southern	6674.387
Yau Tsim Mong	44451.990
Sham Shui Po	46041.243
Kowloon City	41047.489
Wong Tai Sin	43729.893
Kwun Tong	59717.79
Kwai Tsing	21255.339
Tsuen Wan	5108.218
Tuen Mun	5986.905
Yuen Long	4763.512
North	2261.661
Tai Po	2128.423
Sha Tin	9995.100
Sai Kung	3580.047
Islands	1028.276

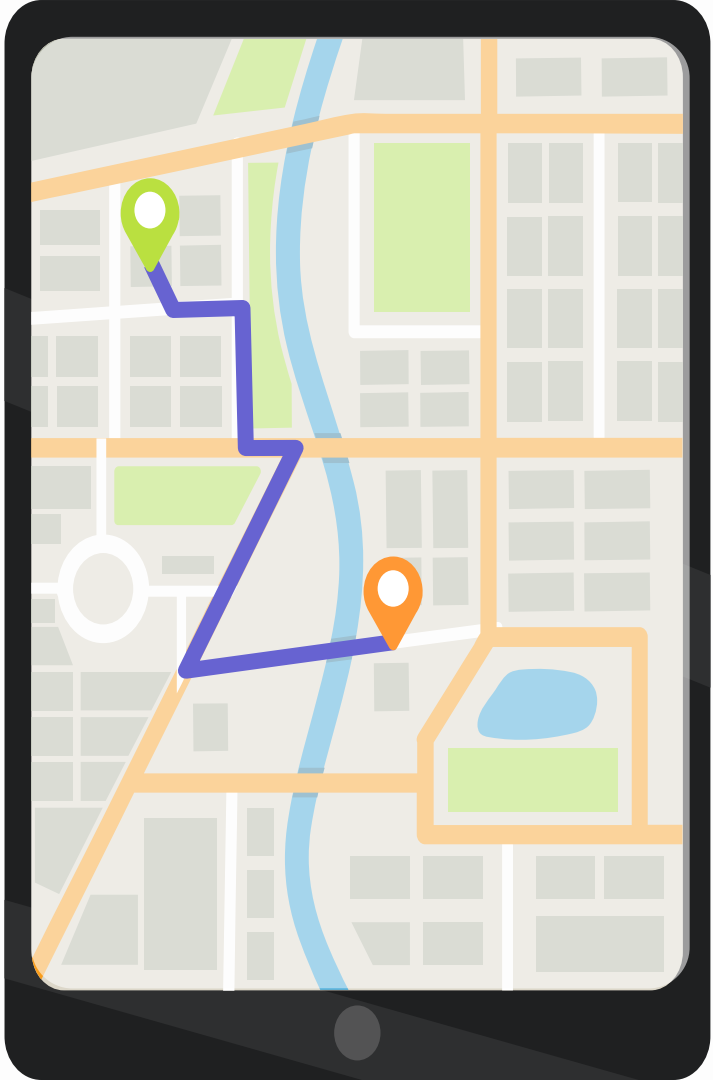
Data shown in Attribute table



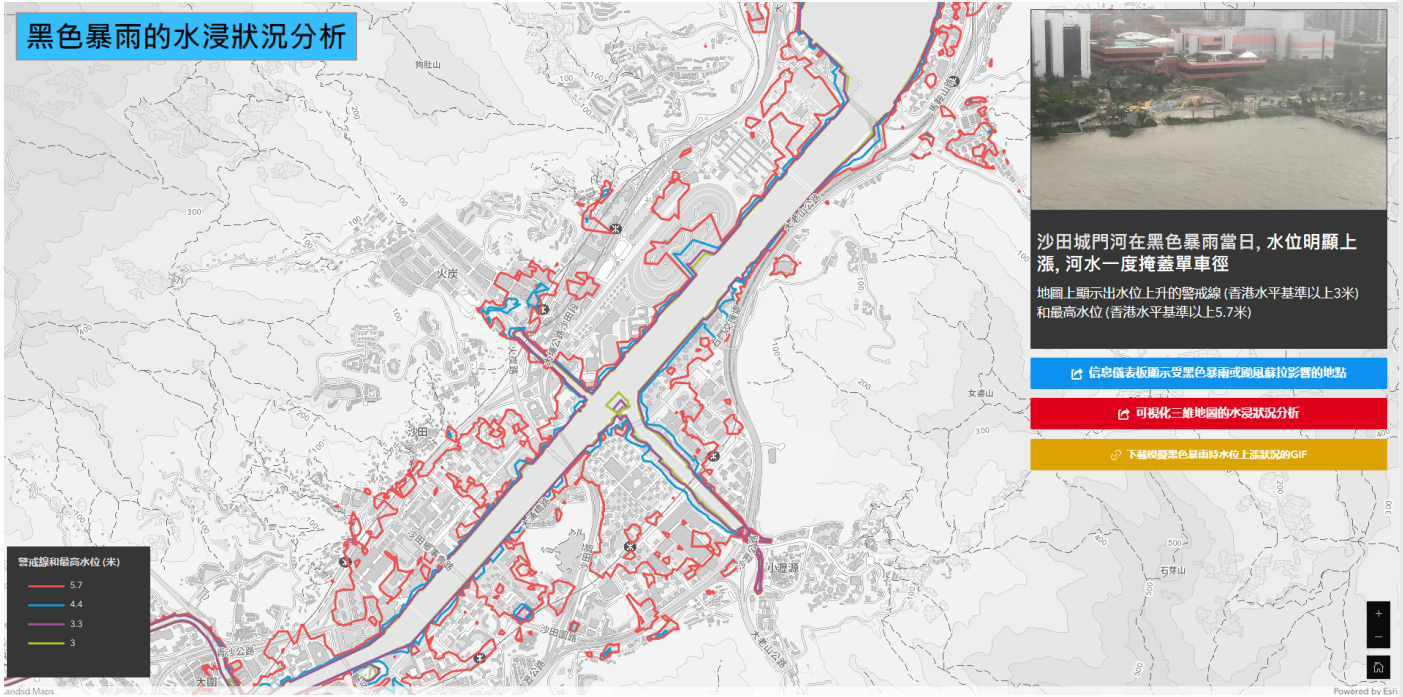
Population Density map

From the map, you can visually see the **population pattern**: where is more populated and where is less populated

Applications of Spatial Data & GIS

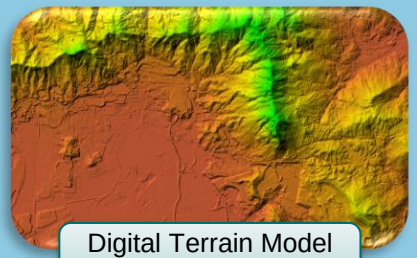


Use Spatial Data to Identify Flood Risks



Using what we have on

空間數據共享平台
Common Spatial Data Infrastructure



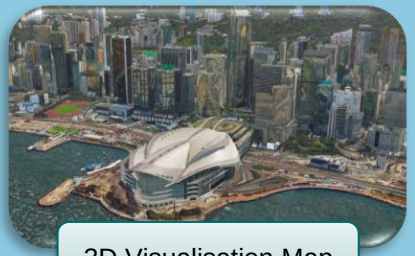
Digital Terrain Model (DTM)

Building

Use Spatial Data to Identify Flood Risks

Using what we have on

空間數據共享平台
Common Spatial Data Infrastructure

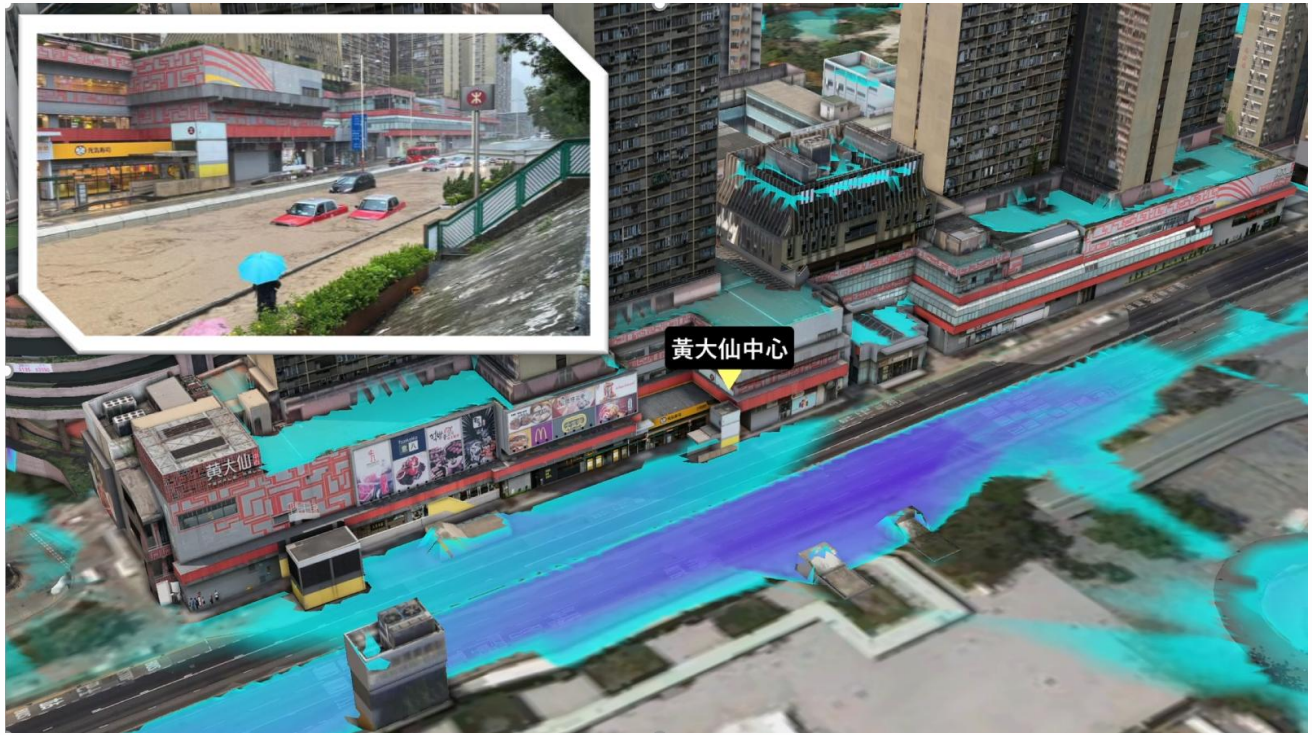


3D Visualisation Map

iGeoCom Database

Use Spatial Data to Identify Flood Risks

Real-life comparison of the actual event !



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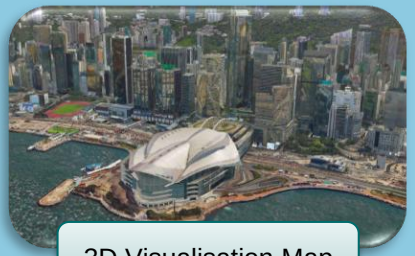

3D Visualisation Map

iGeoCom Database

… And come up with mitigation measures

Before **After**

Using what we have on

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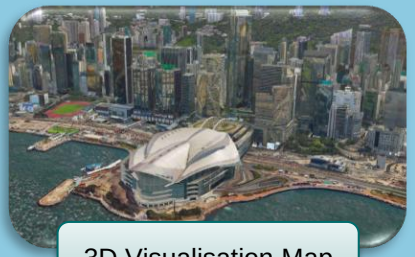
Common Spatial Data Infrastructure



3D Visualisation Map

iGeoCom Database

Manage Disaster Risk with Spatial Data & AI

- **Predictive Analytics:**

  Use machine learning to forecast floods with current and past data

- **Automated Damage Assessment:**

  Apply computer vision to evaluate damage from drone or aerial images after a disaster

- **Resource Optimization:**

  Utilize AI to efficiently distribute emergency resources during floods.

Using what we have on

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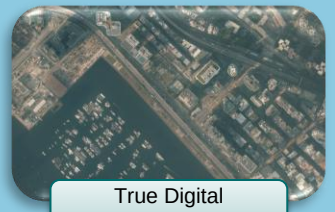
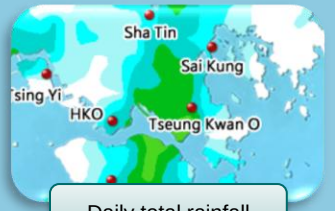
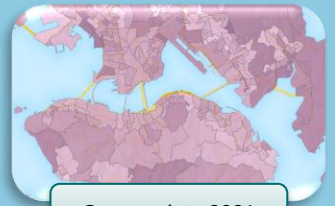
Common Spatial Data Infrastructure



True Digital Orthophoto (TDOP)



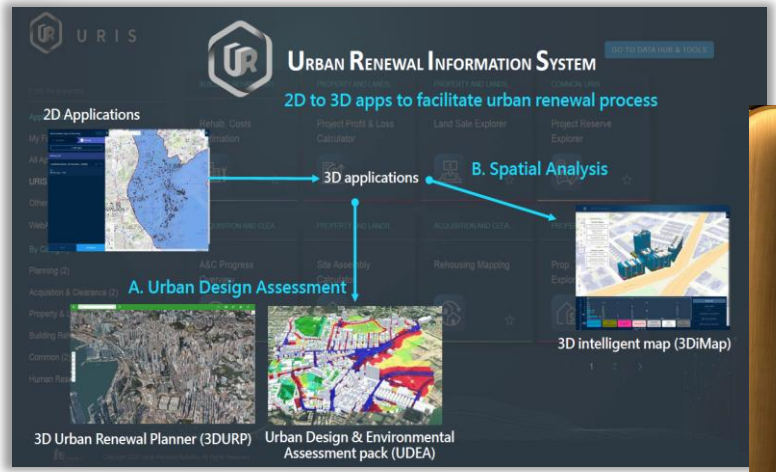
Daily total rainfall

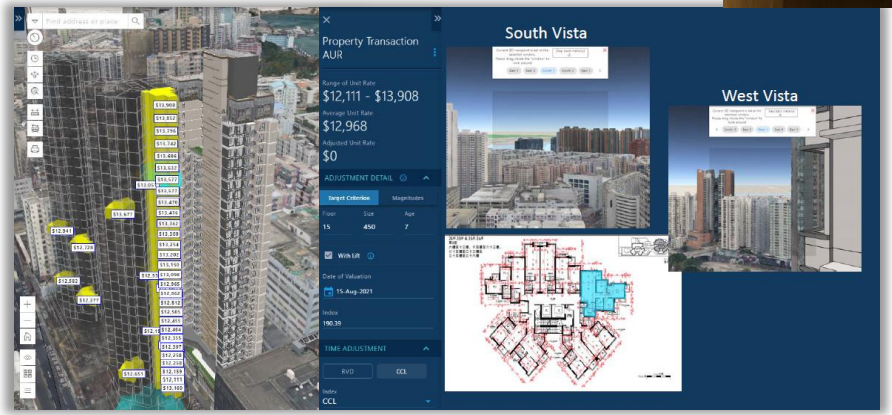


Census data 2021

…and more!

Data-driven Urban Renewal through GIS





- Urban Design Assessment
- Spatial Analysis
- Financial Valuation

Using what we have on

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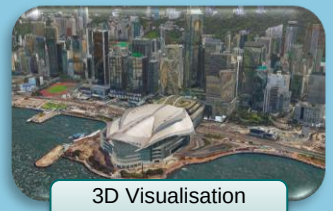

3D Visualisation Map

iGeoCom Database

3D Intelligent Map

…and more!

Data-driven Urban Renewal through GIS

Using what we have on

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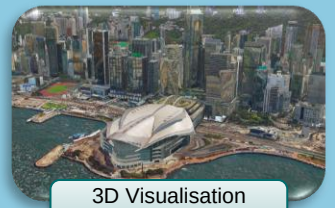
Common Spatial Data Infrastructure



3D Visualisation Map

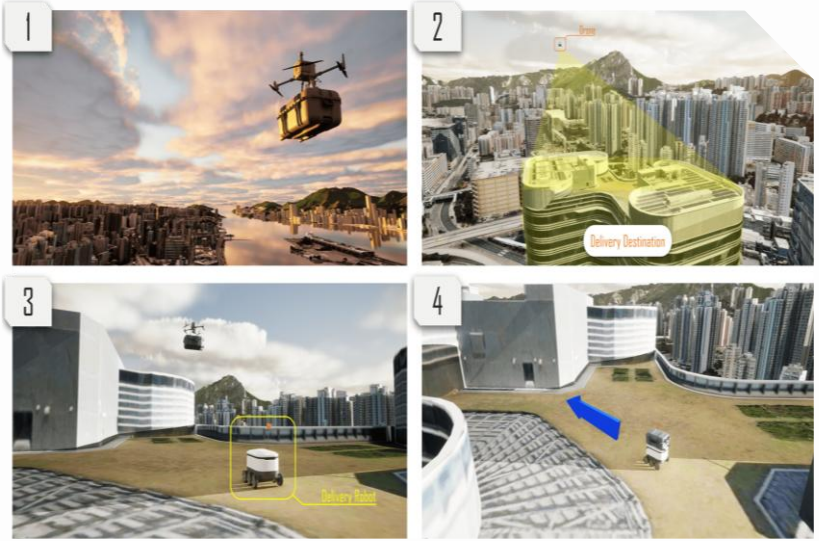
iGeoCom Database

3D Intelligent Map

…and more!

Spatial Data in Drone Delivery (LAE)

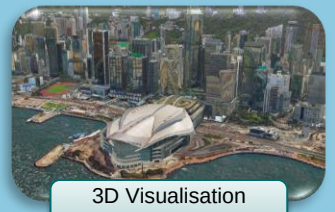
1. Using GIS, the system analyses the area and maps out a flight path.
2. Ensures the drone avoids schools, hospitals, and no-fly zones.



3. Navigates to destination, using geocoding to pinpoint the exact drop-off spot.
4. Transfers the package to a ground robot that delivers directly to the door.

Using what we have on

空間數據共享平台
Common Spatial Data Infrastructure



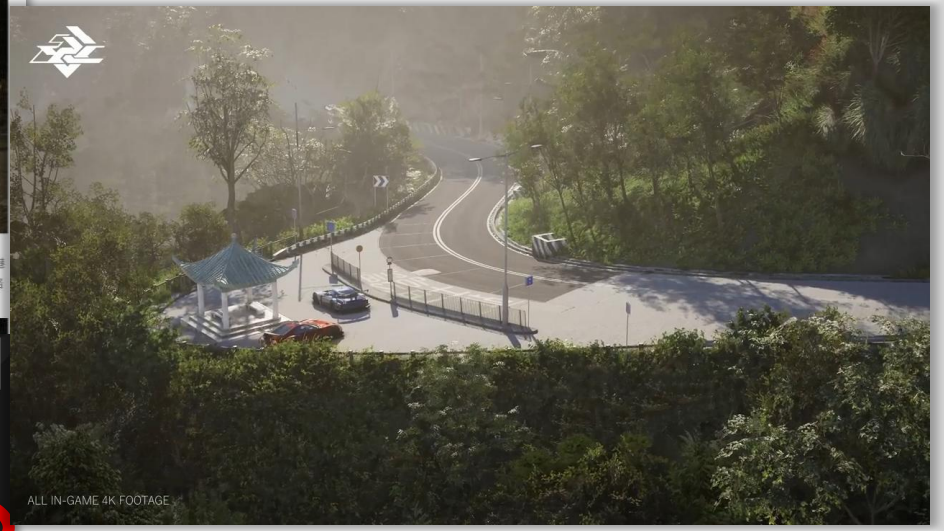
3D Visualisation Map

3D Indoor Map

Topographic Map

…and more!

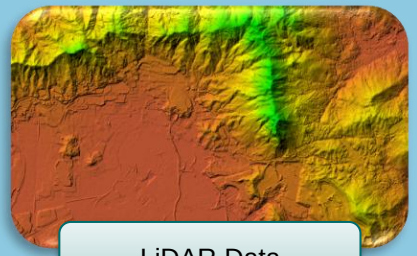
Geospatial Mapping in Video Games



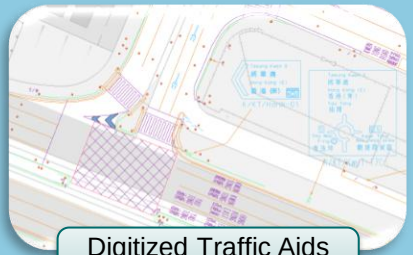
https://unwire.hk/2022/07/26/%e3%80%8arev-to-vertex%e3%80%8b/fun-tech/

Using what we have on

空間數據共享平台
Common Spatial Data Infrastructure

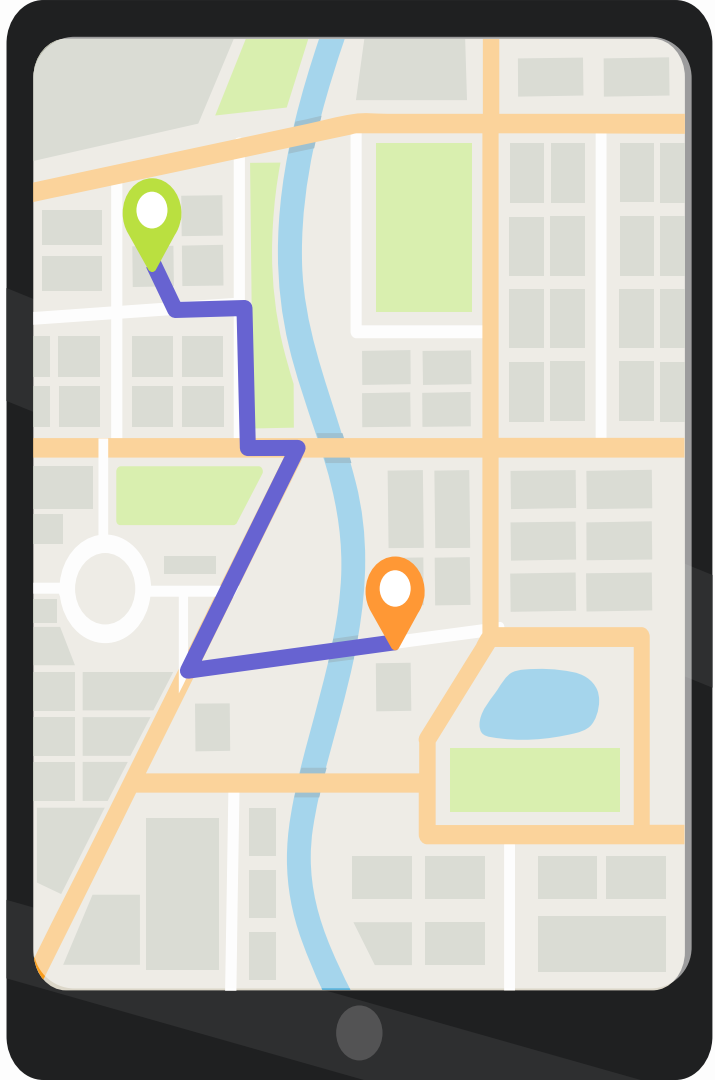


LiDAR Data



Digitized Traffic Aids Drawings

Hands-on Workshop



Objective

The task is to conduct a quick visual assessment of the surrounding environment for a 50-storey condominium project in Hung Hom, a densely developed area in Kowloon.

This assessment is crucial for understanding how the new building will integrate with the existing and upcoming urban landscape.

Data?

3D models of built environment

3D model of development

- 3D Visualisation Map (Tile-based)
- BIM/CAD of Proposed Building

Questions?

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