THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Smart City Platform:
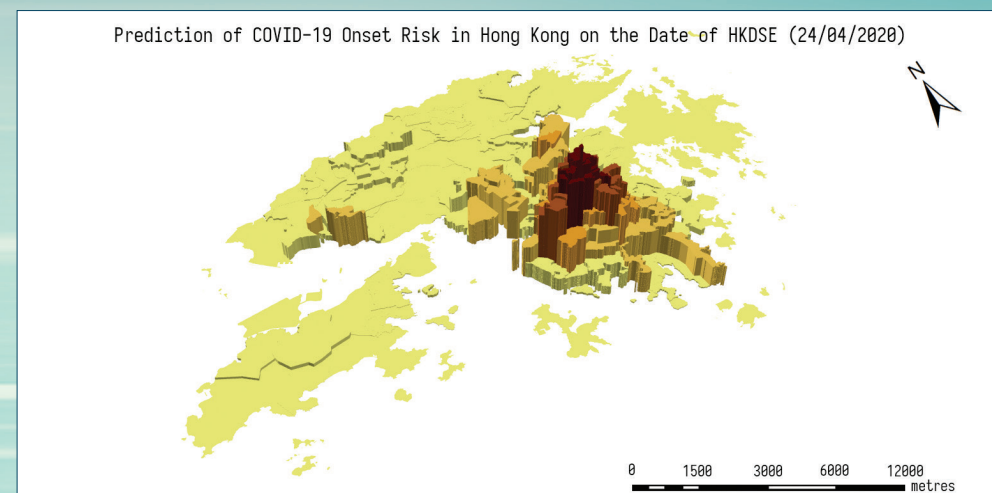# A comprehensive spatial data infrastructure
智慧城市平台：全面的空間數據基礎建設

Applications 應用：

- Virtual test-bedding, experimentation and visualisation of proposed developments
- City planning, urban analysis, transportation analysis and crowd flow analysis with spatiotemporal big data analytics
- Cross-disciplinary urban and environmental studies
- BIM development for all buildings (including aged ones)
- Seamless indoor-outdoor mapping and navigation

- 擬議發展項目的虛擬試驗、實驗及可視化演示
- 以時空大數據分析進行城市規劃，以及市區、交通和人流等方面的分析
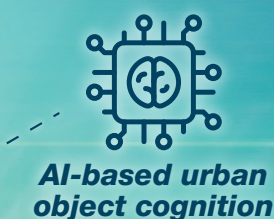- 跨學科城市與環境研究
- 所有建築物(包括舊建築物)的建築資訊模型開發
- 室內外無縫製圖與導航

Prediction of COVID-19 Onset Risk in Hong Kong on the Date of HKDSE (24/04/2020)

N

0   1500   3000   6000   12000
metres

Urban spatiotemporal big data analytics: prediction of illness onset risk in Hong Kong
城市時空大數據分析：香港新型冠狀病毒肺炎發病風險預測

Award 獎項：

Gold Medal - Special Edition 2021 Inventions Geneva Evaluation Days - Virtual Event (Mar 2021)
瑞士日內瓦國際發明展 - 2021年網上特別版 - 金獎 (2021年3月)

Virtual test-bedding

City planning

AI-based urban object cognition

Aboveground & underground 3D city modelling

9_LSGI_01_0321

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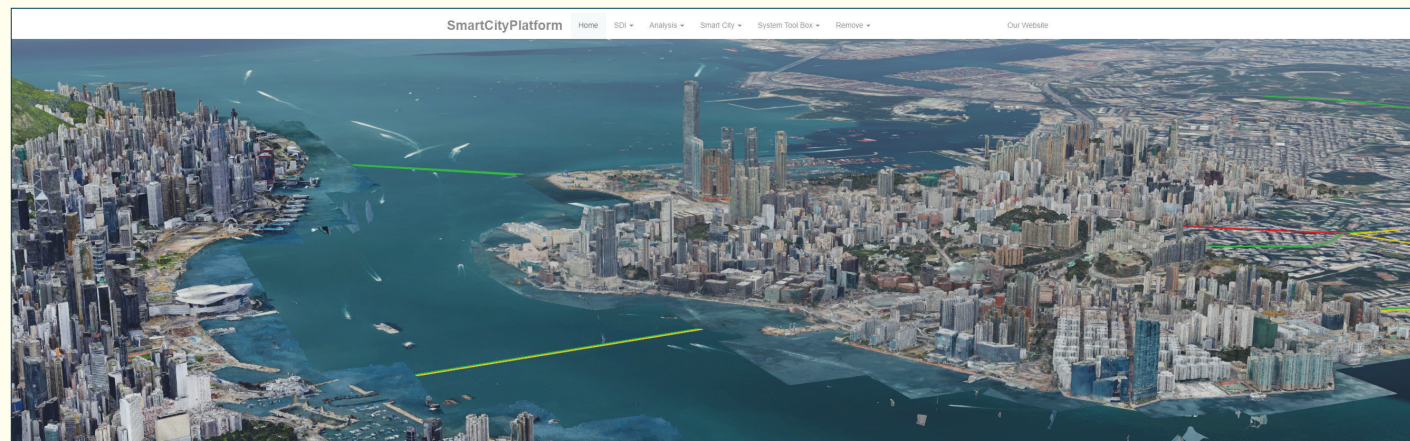
A platform for seamless fusion, AI-based urban object cognition, visualisation and analysis of massive 3D urban models, and spatial big data analytics

## 集無縫數據融合、基於人工智能的城市對象認知、大規模三維城市模型可視化與分析及空間大數據分析於一身的平台

Smart City Platform
智慧城市平台

The platform can be used to create digital city replicas for acquiring insights into urban situations, testing solutions and conducting technological research.

Incorporating 3D city modelling, AI-based urban object cognition, web-based visualisation and analytics technologies, it enables seamless fusion of massive geometrical information, 3D LiDAR data, image data and spatial big data from various sources, including public and private agencies, to provide a realistic and accurate representation of a city.

本平台可用於創建真實城市的數碼版本,藉以深入了解城市狀況、測試解決方案及進行技術研究。

平台結合了三維城市建模技術、基於人工智能的城市對象認知、基於互聯網的可視化和分析技術,將來自公共和私人機構的大規模城市空間信息、三維激光雷達數據、影像數據及空間大數據無縫融合起來,提供切合真實情況而準確的數碼城市。
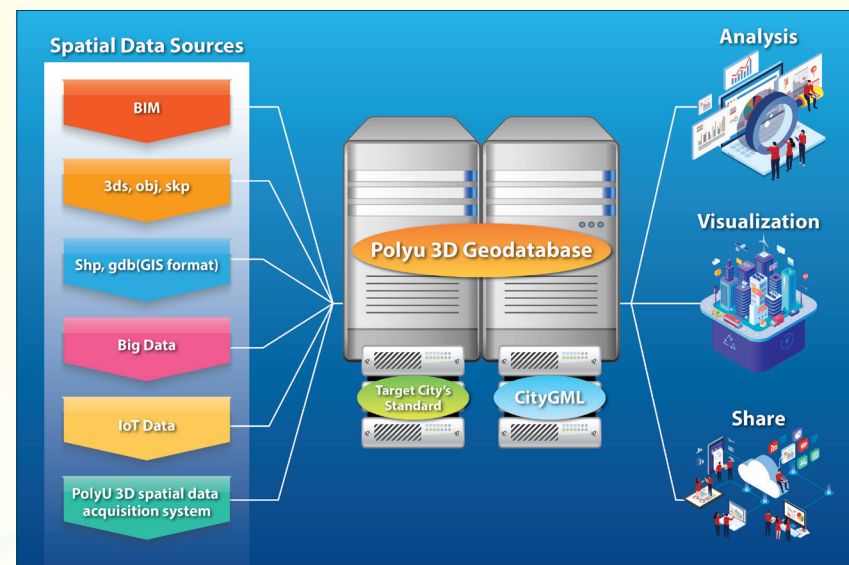
Framework of the smart city platform
智慧城市平台

A comprehensive spatial data infrastructure that
- integrates indoor, outdoor, aboveground, underground and spatiotemporal dynamic models
- includes a specially developed 3D Geodatabase for effective storage, sharing and exchange of massive urban geographical and dynamic data
- can be accessed with web browsers, promoting wider use of the platform and community engagement
- facilitates smarter decision-making by governments, the general public and private companies

全面的空間數據數碼基礎建設
- 整合室內、室外、地上、地下和時空動態模型
- 包含特別開發的三維地理數據庫,能有效存儲、分享和交換大量城市地理和動態數據
- 可透過網頁瀏覽器操作,以普及本平台的應用和促進社區參與
- 有助政府、公共和私營機構作更明智的決策

A 3D spatial data acquisition system has been specially developed to enhance both outdoor and indoor 3D environment of buildings. It can identify indoor objects and automatically reconstruct a digital model (Building Information Model) of the indoor environment from raw LiDAR data.

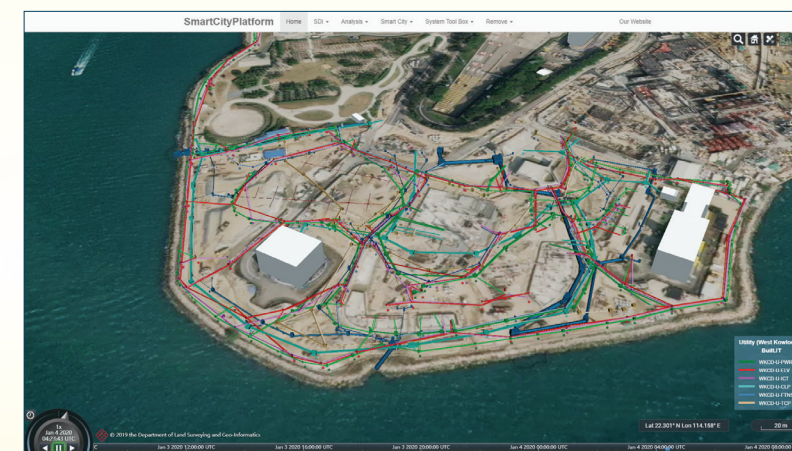為改善建築物的室外同室內三維環境信息,我們開發了三維空間數據採集系統。它能識別室內對象,並根據原始激光雷達數據自動重建室內環境的數碼模型(建築資訊模型)。
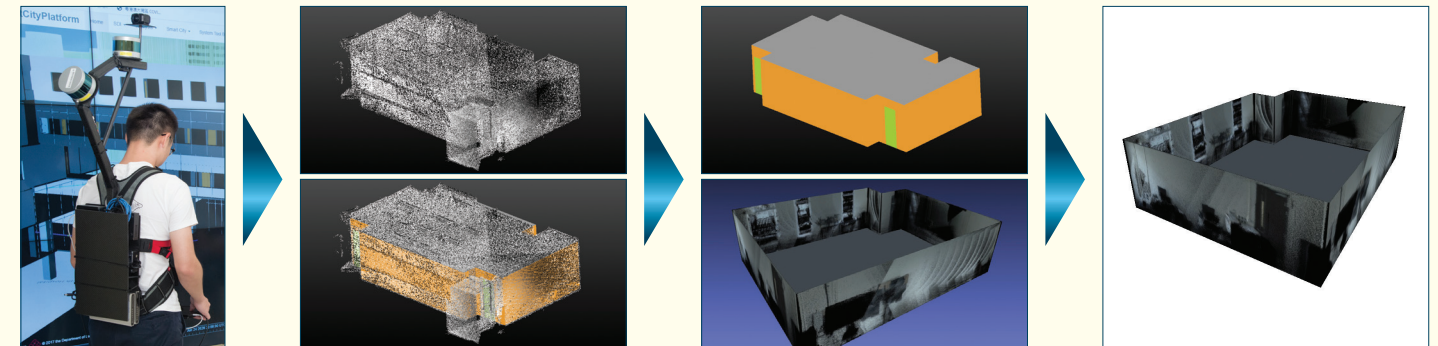
Using our Lightweight seamless 3D spatial data acquisition with 3D LiDAR to capture indoor and outdoor data for building 3D modeling
利用由我們基於激光雷達開發的輕量級三維空間數據採集系統採集室外室內環境,以建立三維模型

A lightweight LiDAR-based 3D spatial data acquisition system with a post-processing software toolkit that
- seamlessly captures 3D spatial data of indoor and outdoor environments, without the need for reconfiguration
- utilises simultaneous localisation and mapping (SLAM) technology, enabling accurate positioning and 3D modelling

基於激光雷達的輕量級三維空間數據採集系統,連同後處理軟件
- 可無縫採集室內及室外環境的三維空間數據,使用期間無需進行重新配置
- 利用同步定位及地圖構建(SLAM)技術,以準確定位和建立三維模型

Integrating the aboveground and underground aspects of a city, we have developed a new set of 3D model specifications with multiple detail levels with reference to the standards of the underground utility industry. The specifications are included in the Smart City Platform, and have been submitted to the Open Geospatial Consortium (OGC) for the adoption as an international standard.

透過結合城市地上及地下數據,團隊根據地下公用事業的標準,開發出一套包括多個細節層面的三維模型標準規格。團隊已把此規格應用在本平台,並已呈交予開放地理空間信息聯盟(OGC),建議其採納為國際標準。

The underground utilities of West Kowloon, Hong Kong
香港西九龍的地下公用設施

An international standard of underground utility model that
- makes geospatial information and services findable, accessible, interoperable, and reusable
- makes geoprocessing technologies interoperable and plug-and-playable

地下設施模型的國際標準
- 使地理空間信息和服務更易查找、 存取、互操作及重用
- 使地理處理技術能互動操作及即插即用