

The Establishment of a Territory-wide BIM Data Repository

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CIC Webinar on BIM talks
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Survey and Mapping Office
Lands Department



CONSTRUCTION
INDUSTRY COUNCIL
建造業議會

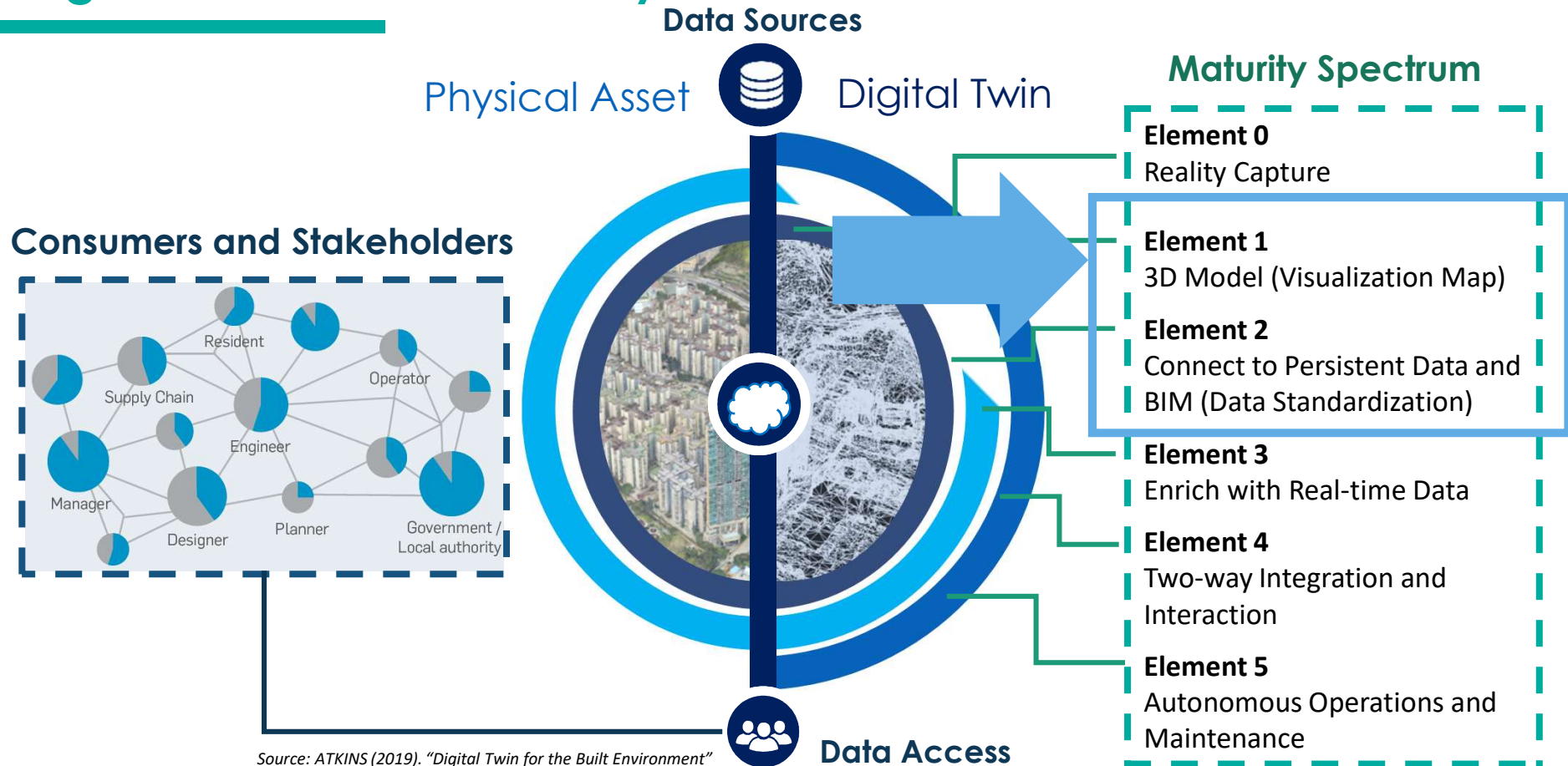


Hong Kong Smart City Blueprint



- Under **Smart Government**, it recommended the adoption of **BIM**, development of **Common Spatial Data Infrastructure**, and creation of **3D Digital Map**

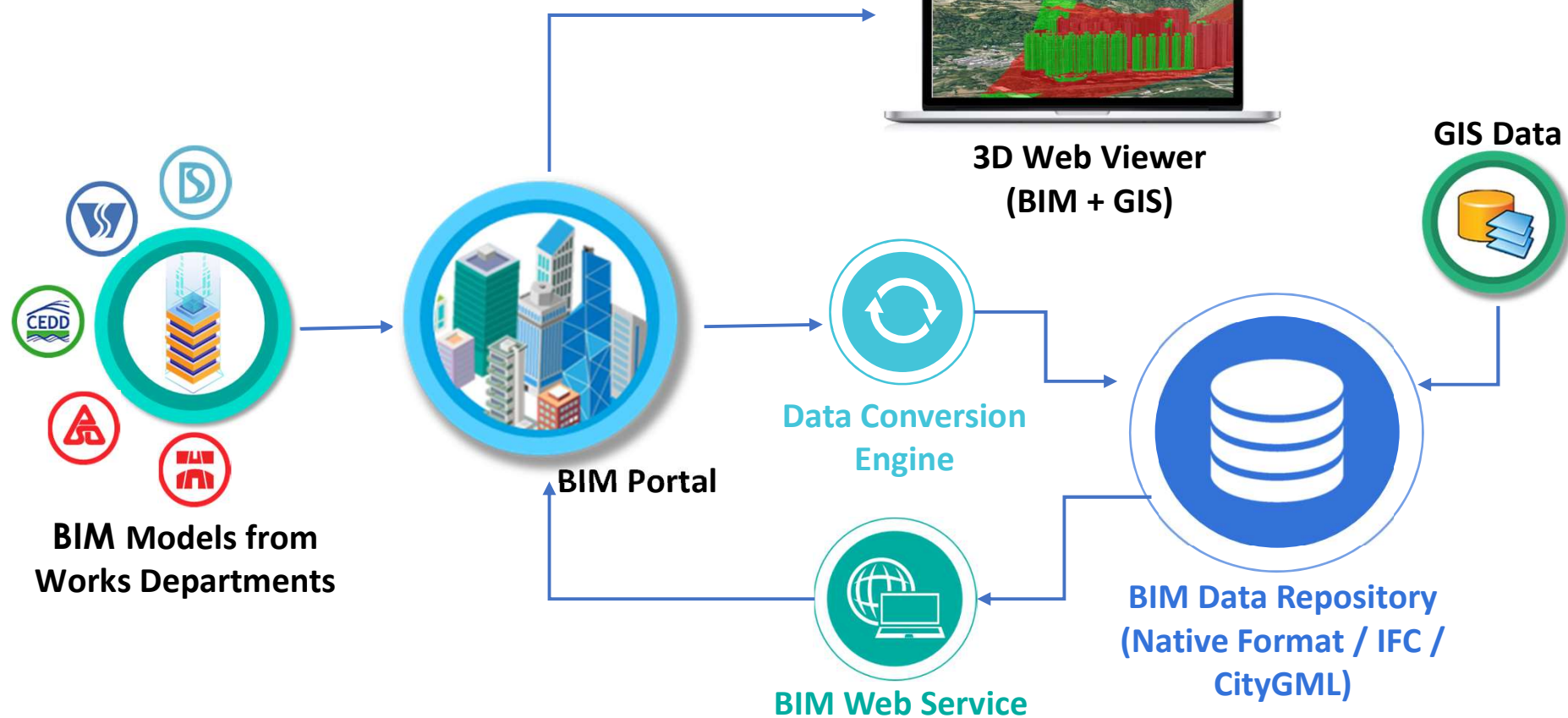
Digital Twin for A Smart City



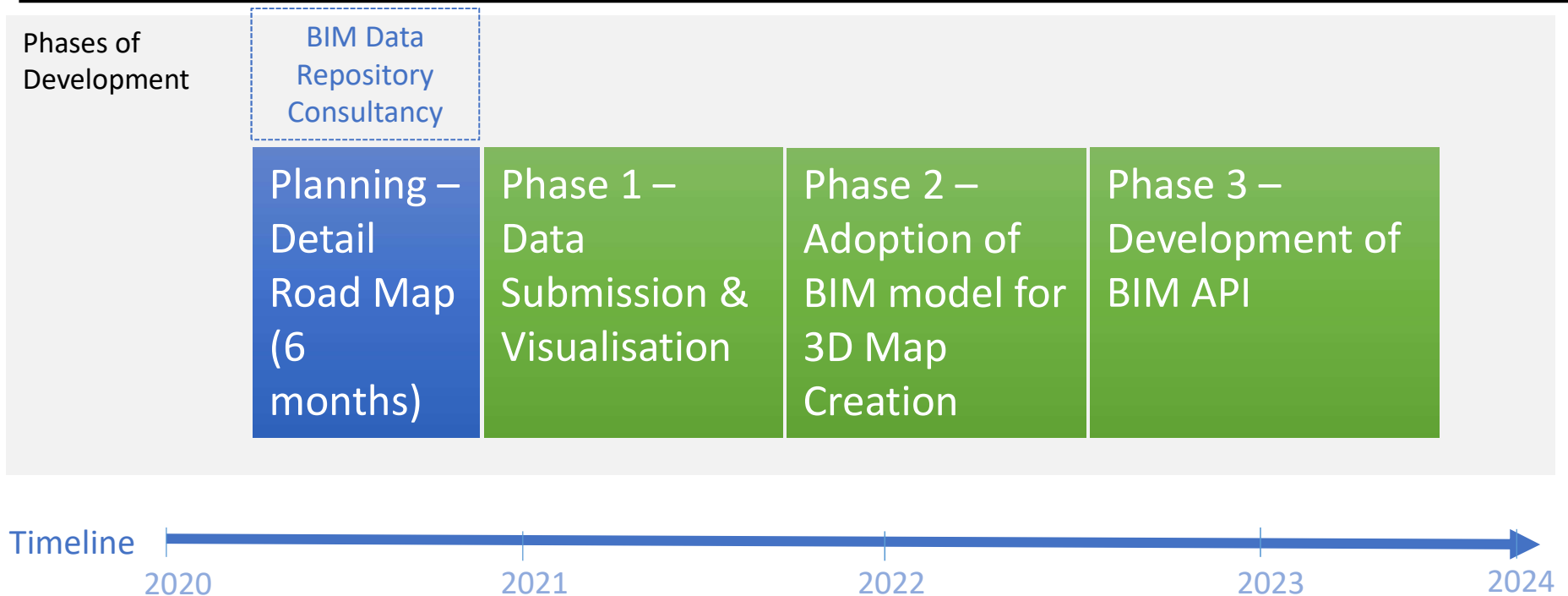
Current Problems

- More and more quality BIM Data are available at government and private development projects, but they are not easy to exploit in a broader context
 - Fragmentation in sharing of BIM Data
 - Gaps in standard BIM Data
 - Problems of identifying, accessing or using data
- Those problems hinder the sharing of BIM data across Bureaux and Departments (B/Ds) as well as integration of BIM Data and 3D Map of Lands Department

Conceptual Diagram of the BIM Data Repository Solution



Timeline of Development of BIM Data Repository

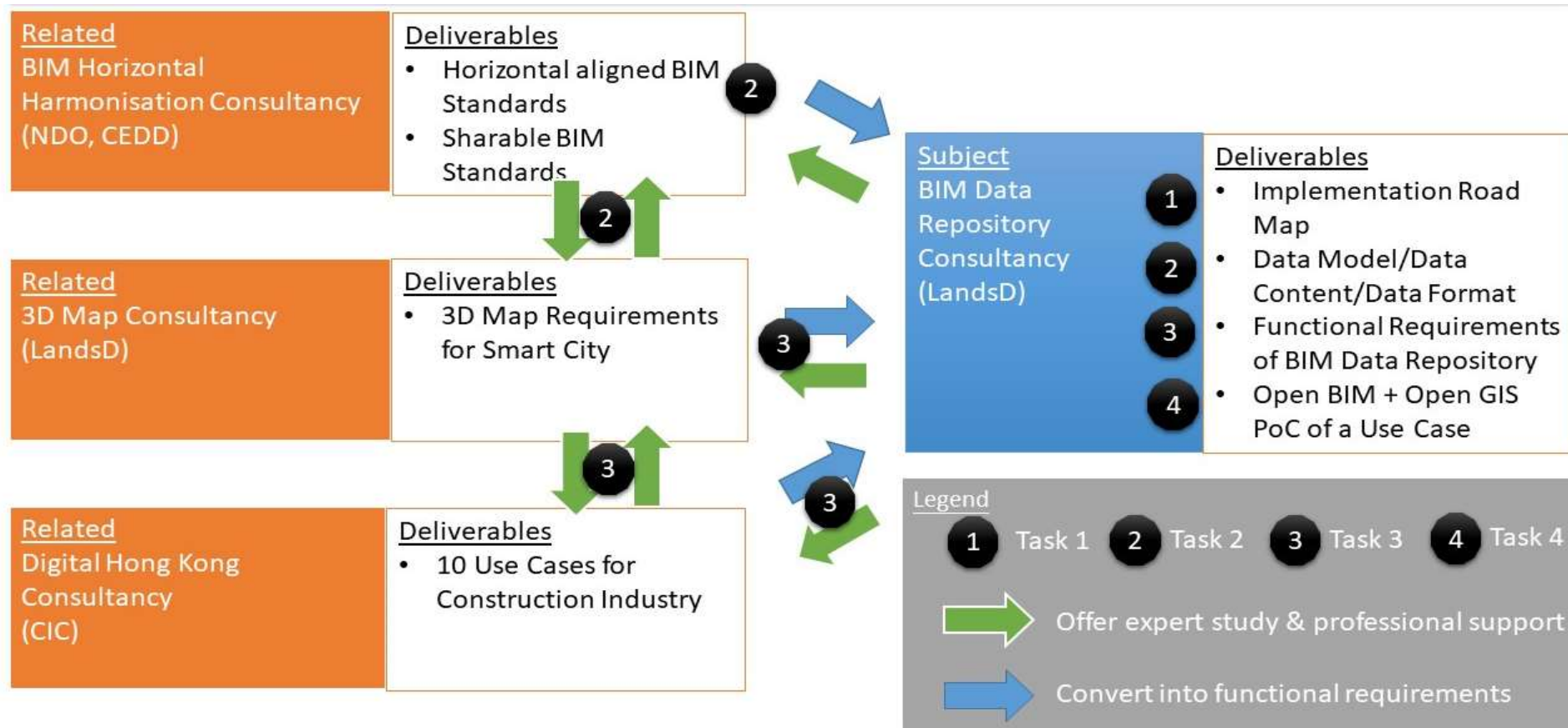


BIM Data Repository Consultancy



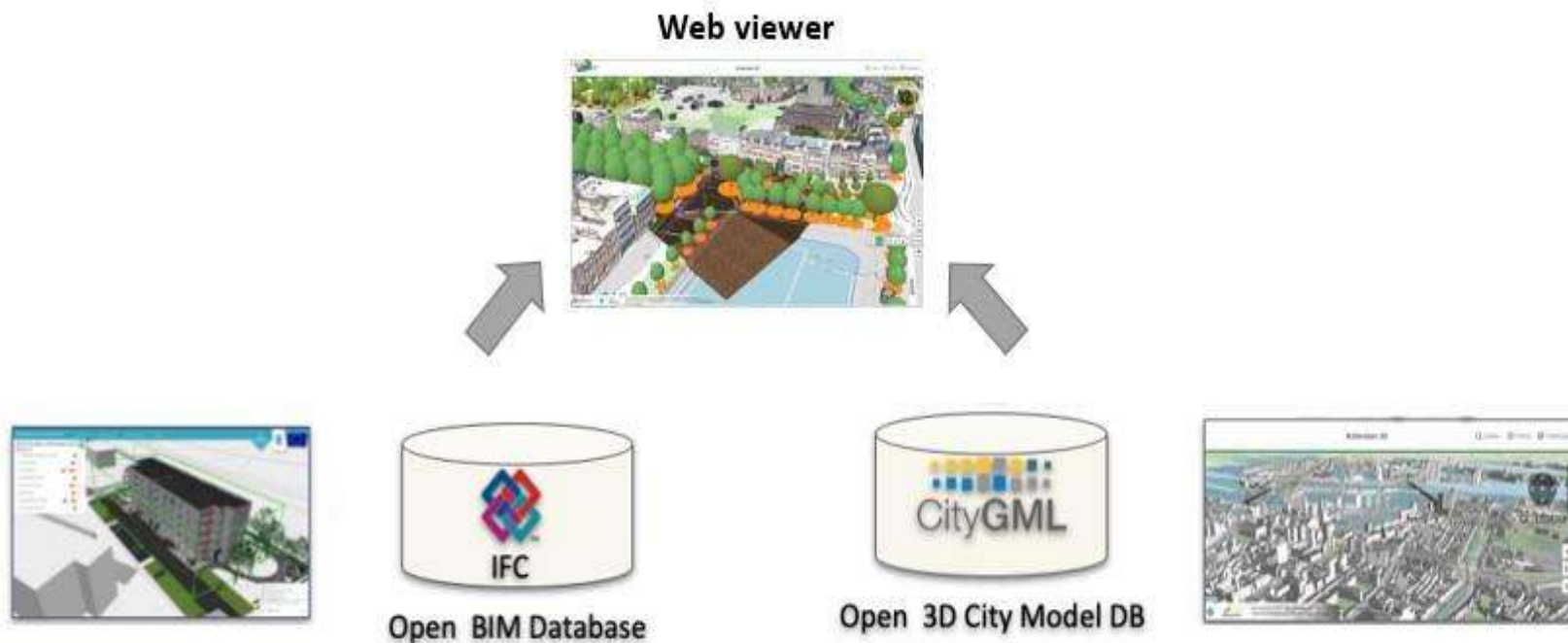
- Define Development Roadmap of BIM Data Repository System
- Develop a Proof-of-Concept application of BIM/GIS integration

BIM Data Repository Consultancy to Define the Roadmap



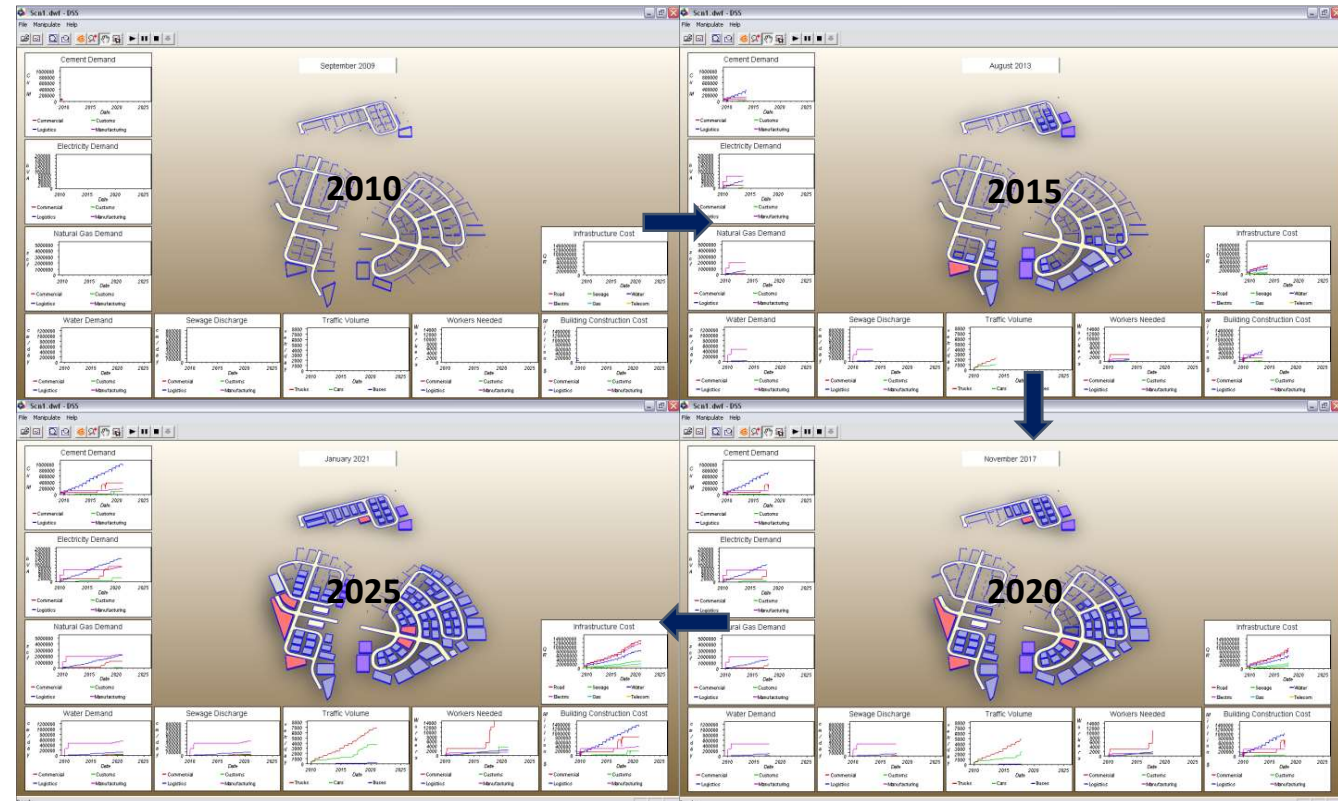
Development of PoC Application

City-Level 4D Application on Open BIM + Open GIS



4D Decision Support

- Visualizes different scenarios along with metrics
- Simulating, predicting, testing
- Provide insights to policy makers with deeper considerations and analysis on different factors to help formulate strategies



Reference: Conceptual research prototype developed in 2015 for QEZ in Doha, Qatar

Stanford University | CIFE

Purpose of the PoC

- **Common repository** integrating BIM and GIS based on **Open BIM** and **Open GIS**
- **Demonstrate** the technical feasibility of mashing up BIM data and 3D GIS information into a single application
- **Dynamic interface** that can be used to visually simulate different scenarios of urban planning
- **Scalable and open platform** that can be extended in the future phases to **analyze and evaluate different scenarios** of urban planning and their impact on **the mid- to long-term metrics** that can **support the decisions of the government leaders**.
- **Improve public engagement** with the provision of rich 3D geographical web interface for better handling of enquiries from public

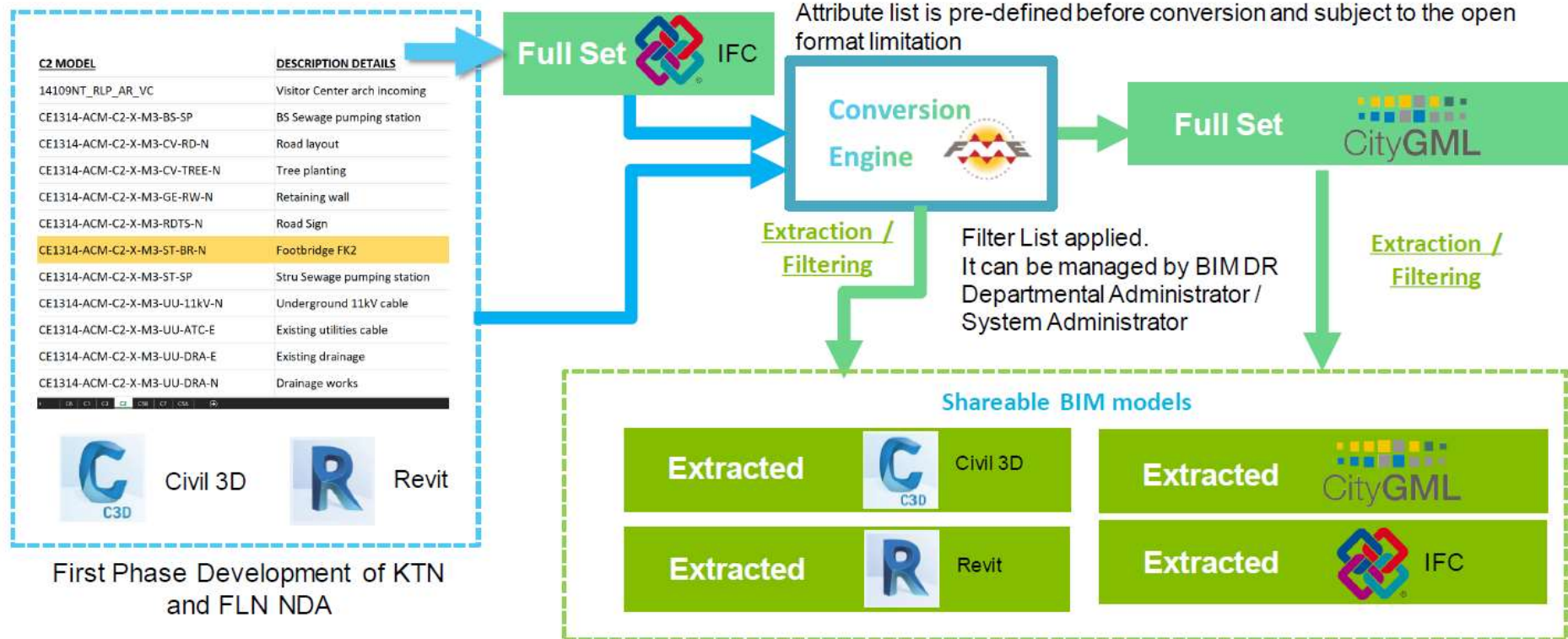
Phase 1 – Cloud-based BIM Data Repository



- Implement a Cloud-based BIM Data Repository System
- Establish scalable and sustainable system infrastructure
- Centralize BIM data management across Works Departments

Conversion of BIM Models

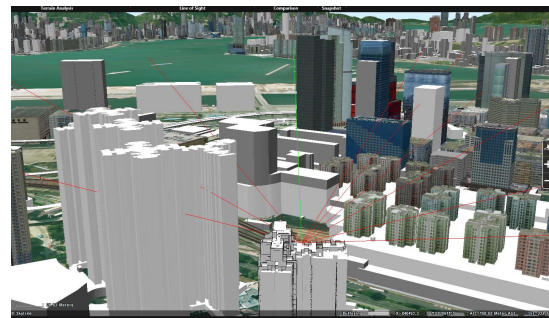
- The System will store the data in its Native & IFC format
- IFC will be converted to CityGML



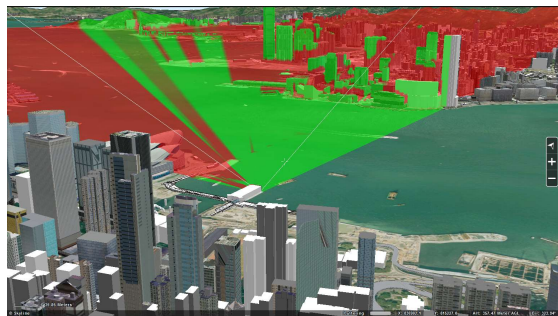
BIM DR Enable 3D Visualization and Analysis



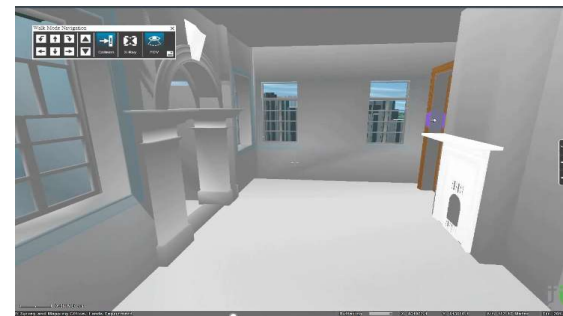
Integrating BIM and 3D Spatial Data



Line-of-sight Analysis



Viewshed Analysis



Walking through the BIM model

A Prototype of BIM Data Repository

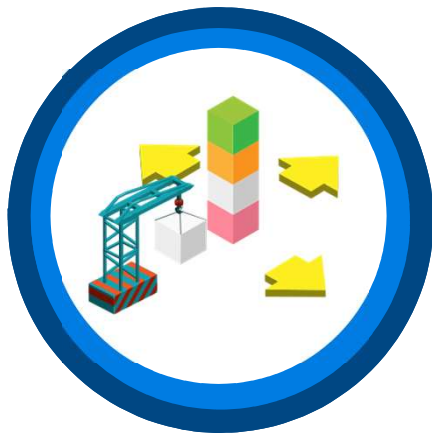
Video Demonstration

Benefits of BIM Data Repository



- Facilitate BIM data sharing and collaboration
- Provide a centralized platform for managing BIM data in Object-based approach
- Support integrating BIM and GIS data into a single environment

Phase 2 – Creation of 3D Map with BIM



- Extract BIM model elements for 3D Map creation and updating
- Automate and streamline the workflow of BIM to GIS
- Enrich the 3D analytical capabilities

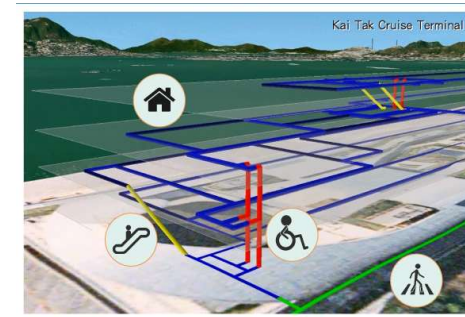
3D Digital Map to Be Delivered in 2023



Territory-wide 3D Visualization Map with Individualized Buildings

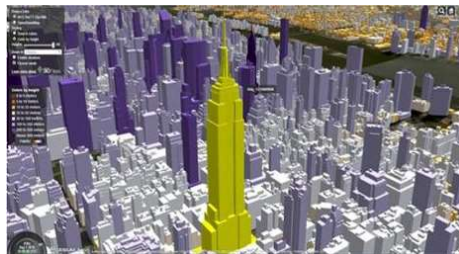
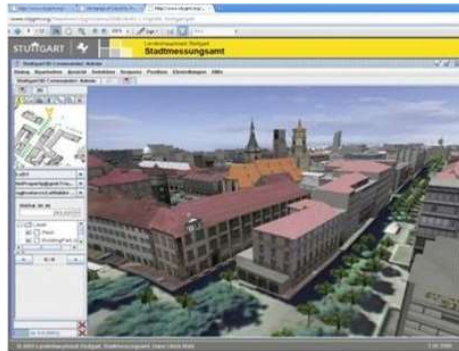


3D Indoor Map of 1,250 buildings



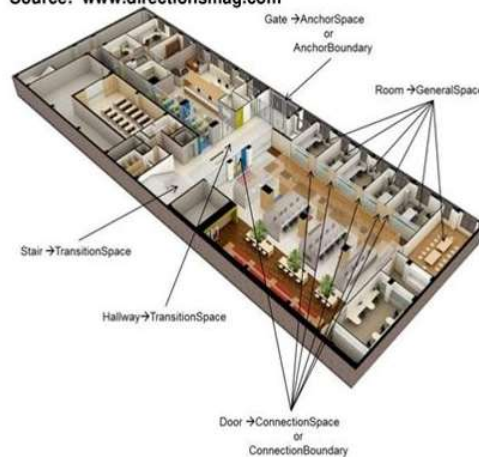
Territory-wide 3D Pedestrian Network

We Need an Object-oriented 3D Map for Smart City



3D City Modelling Standards - OGC CityGML & IndoorGML

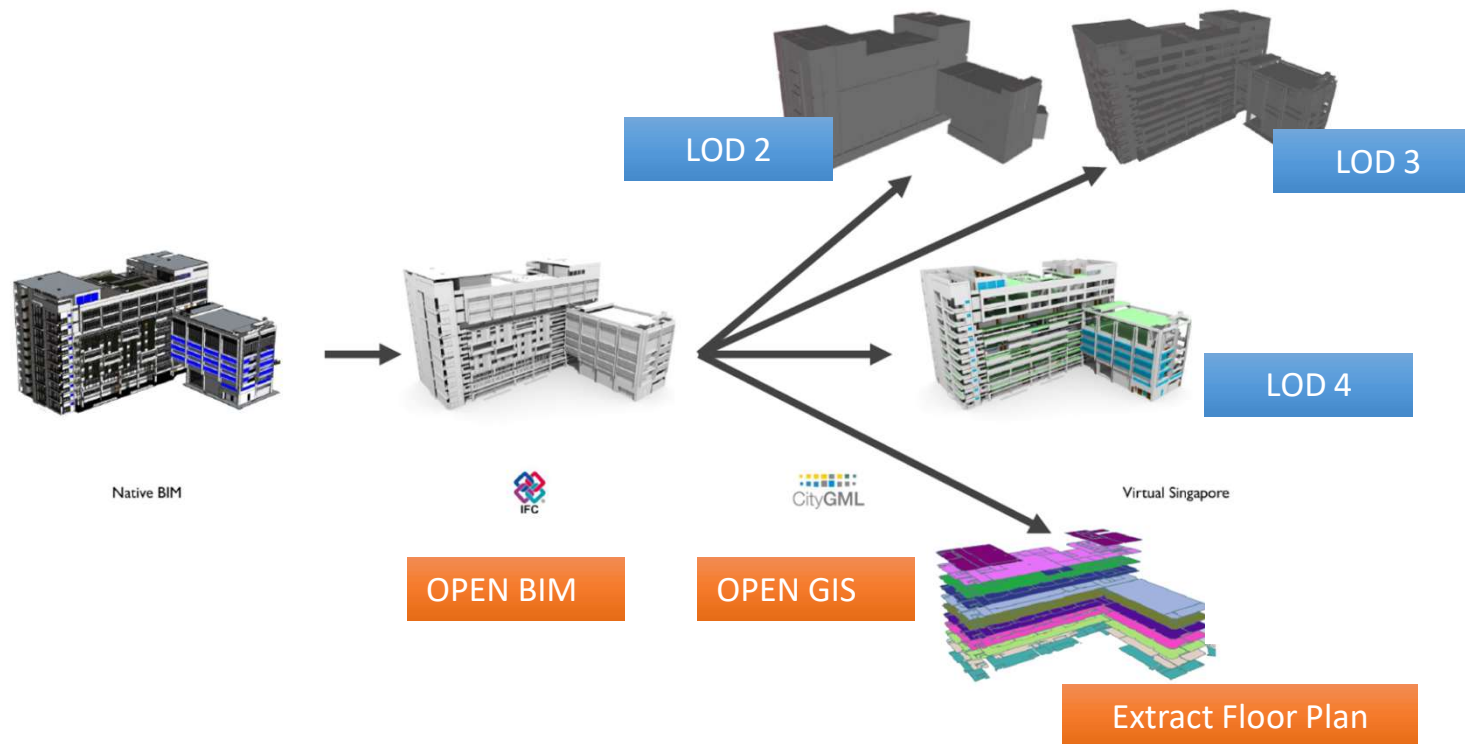
Source: www.directionsmag.com



- Urban Planning / Operations
- Emergency Mgt / Response
- Transportation / Routing / Logistics
- Indoor navigation
- Retail Site analysis
- Sustainable / Green Communities
- City Services Management
- Noise abatement
- Telecommunications placement
- Many other uses...

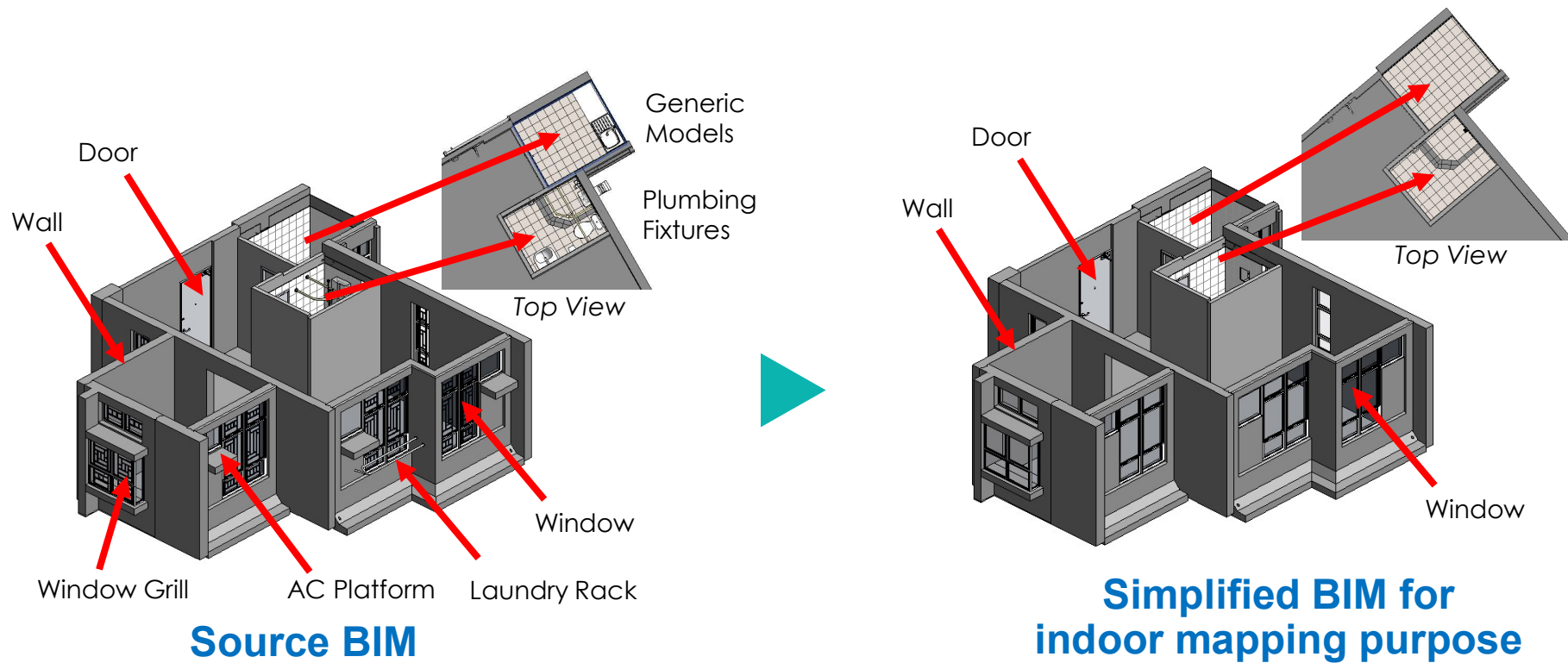
Source: <http://www1.nyc.gov/site/doitt/initiatives/3d-building.page>

BIM Data Provides Rich 3D Context for 3D Map



Note: LOD = Level of Detail

Enrichment of 3D Map using BIM Models

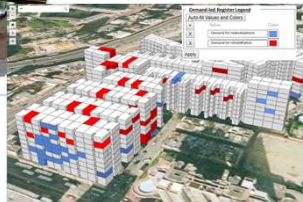


BIM helps to enrich 3D Maps

3D Digital Map Streamlines the Construction Life Cycle



Feasibility Study



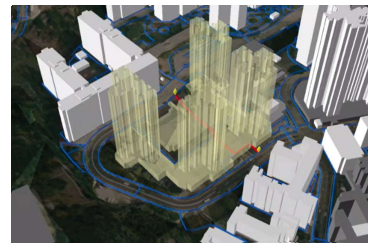
Re-development Study

Planning & Design

Design Options



Visualisation / Simulation



Optimum route finding in different development stages with Intelligent Pedestrian Network

Construction

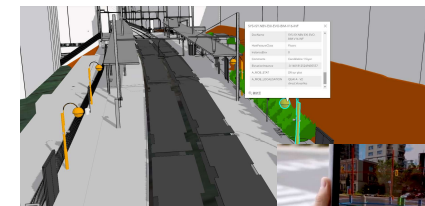


Progress monitoring with IoT and UAV integration



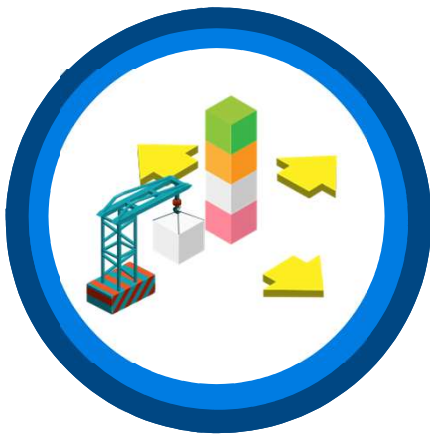
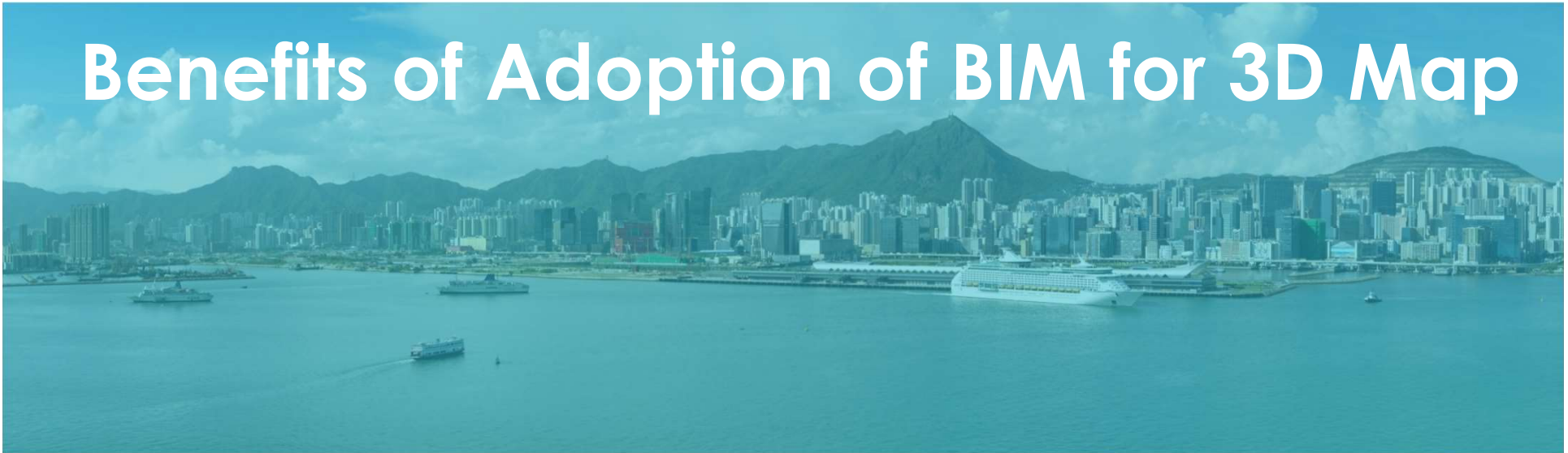
Inspection with indoor 3D map

Operation & Maintenance



Efficient asset locates for on-going maintenance

Benefits of Adoption of BIM for 3D Map



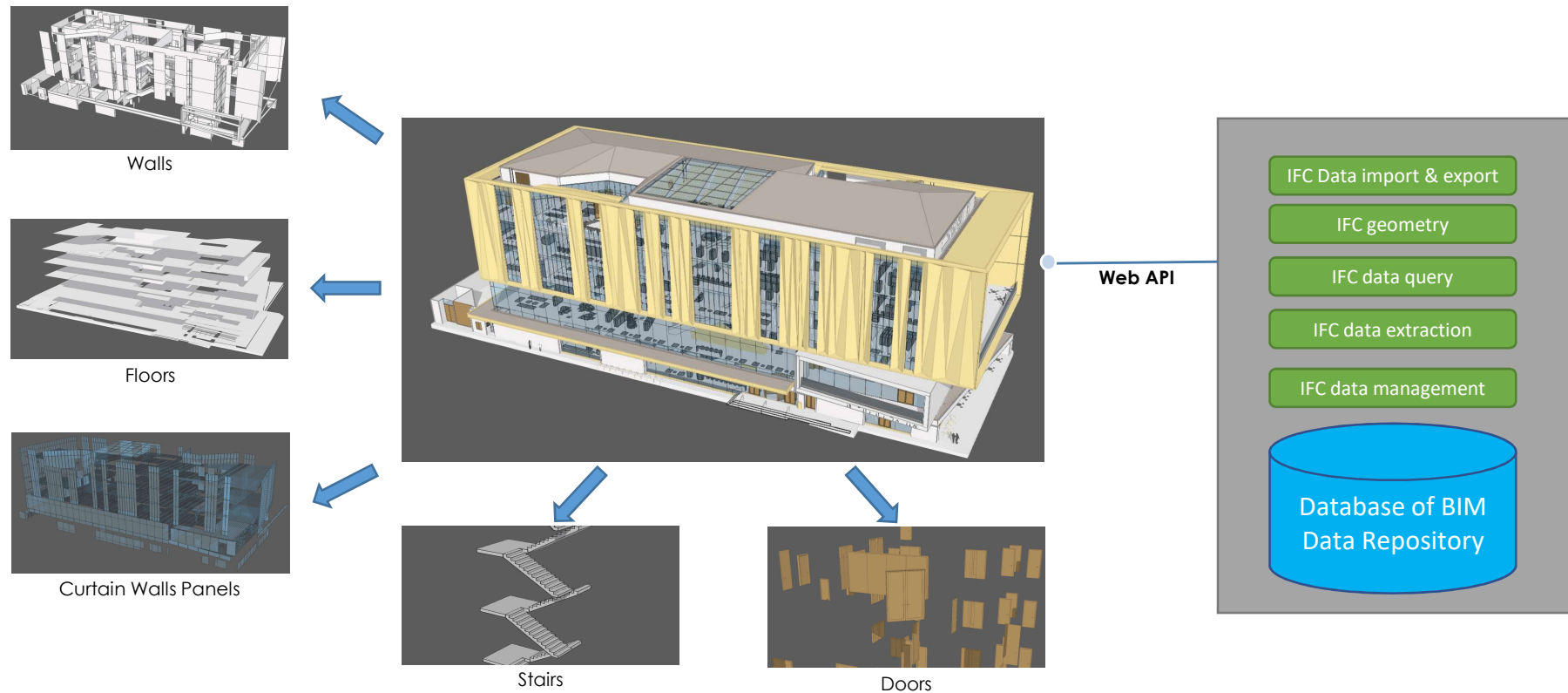
- Speed up the creation and updating of 3D Map
- Enrich context of 3D Map features

Phase 3 – Development of BIM API

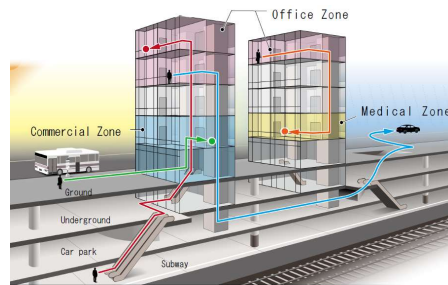


- Share BIM elements with open standard web services Application Programming Interface (API)
- Enhance the BIM data adoption and integration
- Provide BIM analytical features

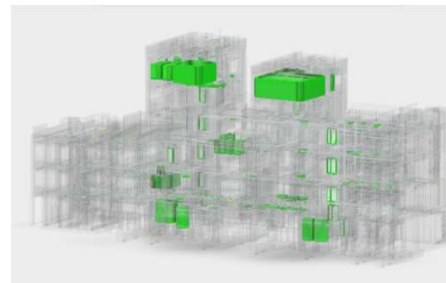
Provide Flexibility of Accessing BIM Data



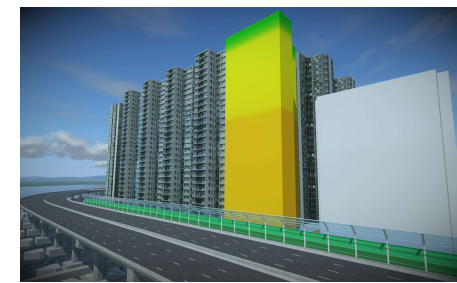
Potential Use Cases of BIM API



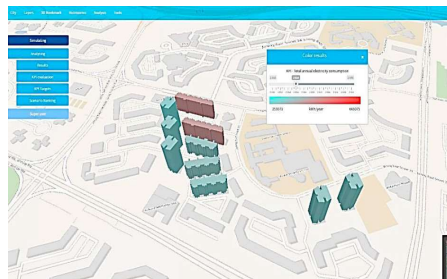
Smart Indoor Service



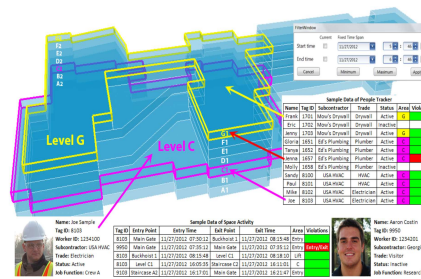
Facilitates Management



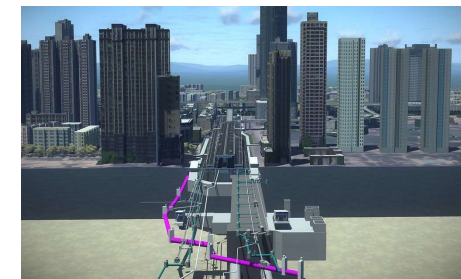
Environmental Impact Assessment



Energy Consumption Analysis



Workforce Management



Underground Utilities Management

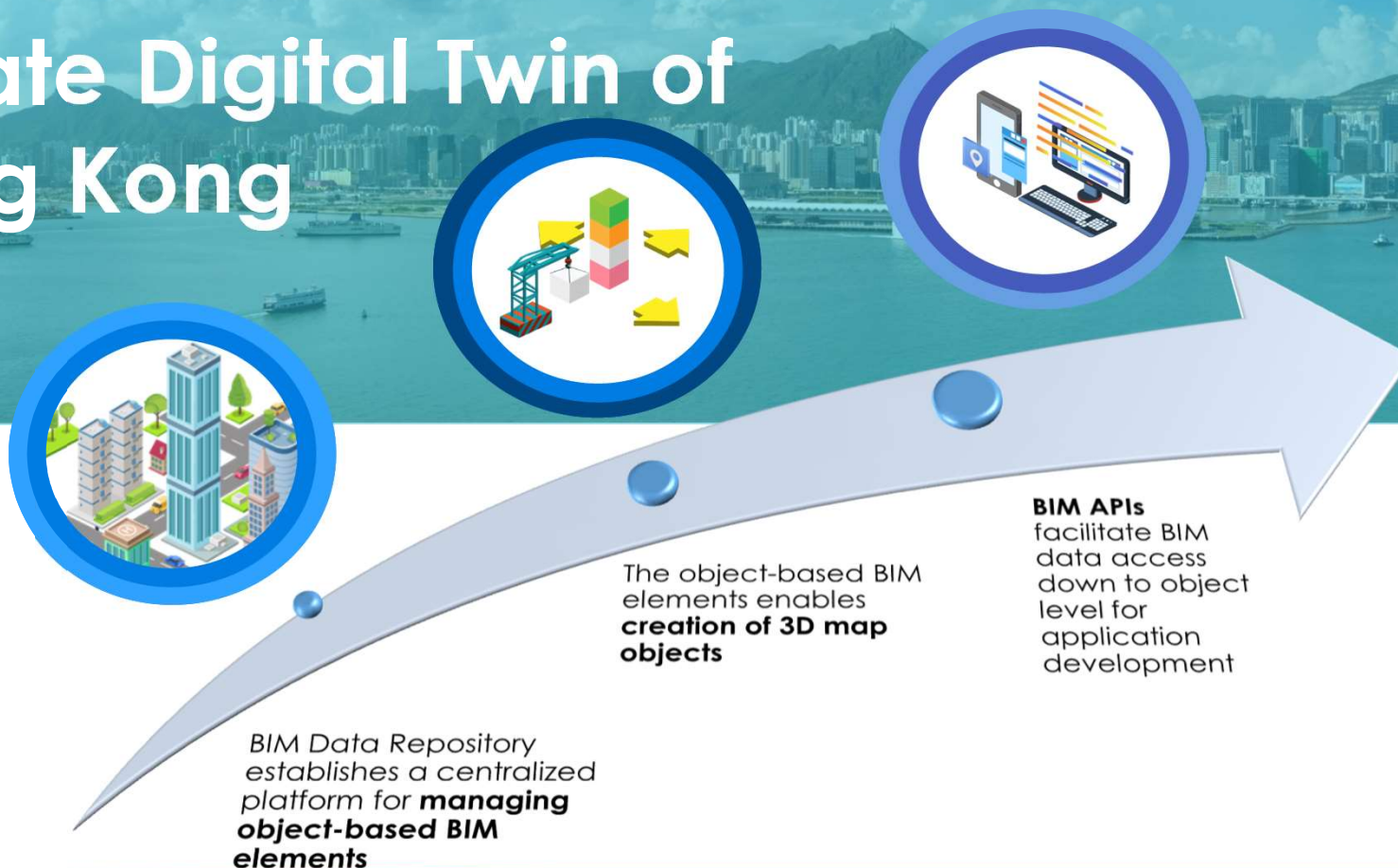
And more...

Benefits of BIM API



- Access rich BIM context without the need of BIM software
- Simplify system integration with BIM
- Foster innovative application

3 Phases Connected To Create Digital Twin of Hong Kong



Benefits of the Our Works

- Establish a **centralized and sustainable digital infrastructure** for managing BIM data across B/Ds
- Provide a **single source of BIM data** access on the cloud
- BIM data are **harmonized in an open format, eliminate dependency on BIM software and version**
- **Open APIs** provide ease of access and integration to the BIM data. No BIM software is necessary
- **Enrich** the context of **3D Map** to better support **Smart City** development

thank
you!

