
MCPD 2025
Digital Twin

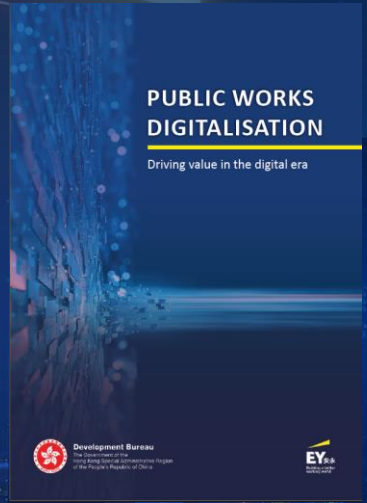
Origin of Digital Twin

A Digital Twin is a virtual model of a physical object, system, or process that uses real-time data to simulate and optimize its performance. The term was first introduced by Dr. Michael Grieves in 2002 in the context of Product Lifecycle Management (PLM), with early applications in the aerospace industry, notably by NASA. Over time, the concept has expanded into broader sectors such as manufacturing, smart cities, healthcare, and energy, becoming a key technology for digital transformation across industries.

Digital Twin Initiatives from the DEVB

It is the Government's long-term objective to build a digital twin for each Government asset. A digital twin is a realistic digital representation of physical assets by real-time data collected through IoT and remote sensors. The data is translated into useful information and is represented in the digital models with support by BIM and GIS, etc.

With information generated in a digital model, which can be further enhanced by advanced technologies such as AI and Big Data Analytics, Works Departments will be able to make informed decisions and provide feedback and control to the physical assets, which in turn could be automated. The digital twins would achieve better information, better efficiency and better outcomes for asset management.



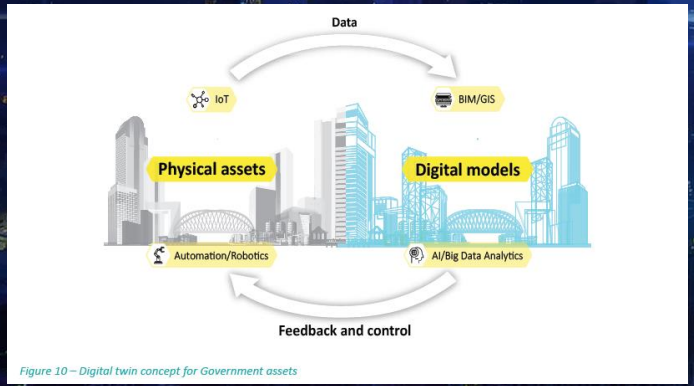


Figure 10 – Digital twin concept for Government assets

Digital Twin Initiatives from the CIC

A DIGITAL TWIN

is a virtual representation of real-world entities and processes, synchronised at a specified frequency and fidelity.

數碼分身

是現實世界實體和流程的虛擬分身，以特定的頻率和擬真度與現實世界進行同步更新。

Digital twin systems transform business by accelerating holistic understanding, optimal decision-making, and effective action.
數碼分身系統能通過了解大局、制定最佳決策和有效行動達至業務革新。

Digital twins use real-time and historical data to represent the past and present and simulate predicted futures.
數碼分身利用實時和過往數據，並模擬及預測未來。

Digital twins connected physical object and virtual (digital) model, processes and services. Pairing allows analysis of data, monitoring of systems and optimising performance.
數碼分身連接實體對象和虛擬（數碼）模型、流程及服務。配對允許分析數據、監控系統及優化性能。

Connection Between Physical and Digital World

Digital Twin

Digital Twin Components

APPLICATIONS 應用

- Applications for Design and Planning 設計和規劃應用
- Smart Control Centre 智能控制中心
- Applications for Construction 工程施工應用
- Digital Twin / Dashboard 數碼分身/儀表板
- Applications for Asset/ Facility Management 資產/設施管理應用

ARTIFICIAL INTELLIGENCE / DATA ANALYTICS
人工智能 / 數據分析

DATABASE 數據庫

Integrated Common Data Environment (Database)
綜合數碼共用平台（數據庫）

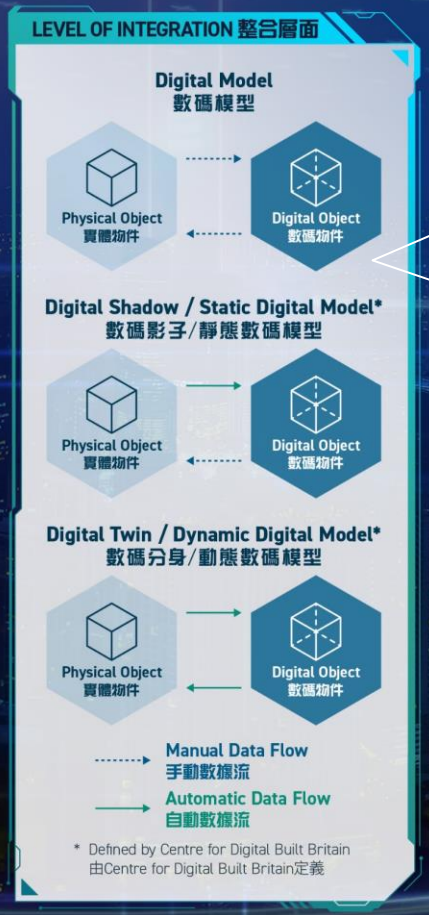
DATA 數據

- Documents 文件
- BIM & GIS Models 建築信息模擬和地理信息系統模型
- Photo & Videos 照片和影片
- Project Progress Data 工程進度數據
- Sensor Data 傳感器數據
- Data from Other Sources 來自其他來源的數據

REALTIME DATA COLLECTION DEVICES/INFRASTRUCTURE 實時數據收集設備/基礎設施

- Network (WAN, LAN, 5G) 網絡（廣域網、局域網、5G）
- Building Management System Sensors and IoT 樓宇管理系統傳感器和物聯網
- AI Cameras 人工智能相機
- Other Data Capture Devices (e.g. Drone, Laser Scanner, RFID Gun) 其他數據採集設備（例如無人機、激光掃描儀、RFID 槍）
- Wearables 可穿戴設備

Digital Twin Application Areas
數碼分身領域



Please pay attention to the data flow in different scenarios.

Showcases of Digital Twin Adoptions

(Click below to open the YouTube link)

- Language of presentation: Cantonese/English
- Presentation materials: English

Remarks: For quiz questions related to the showcases below, the answers should be able to find from the presentation materials of the speakers. If needed, you may use the live translation feature in YouTube to translate the verbal Cantonese into English.

1. **Trunk Road T2 and Cha Kwo Ling Tunnel - Synergising Construction Innovation and Digitalisation (Duration 51:35)**

2. **Team Collaboration through Smart Platforms: Connecting future in the 1601 Kwu Tung Station Project (Duration 17:46)**

3. **Empowering Smart Airport City with Digital Twin (Duration 29:16)**