LIÈGE université
Geomatics

« Digital Twins »

An « academic » viewpoint

Smart Lunches
21.06.2022
CIRB

Preamble

Are Digital Twins the new Smart Cities

?

Smart City

► **As defined by the European Commission:**

A **Smart City** is a **place** where *traditional* networks and services are made *more efficient* with the use of *digital solutions* for the benefit of its inhabitants and business.
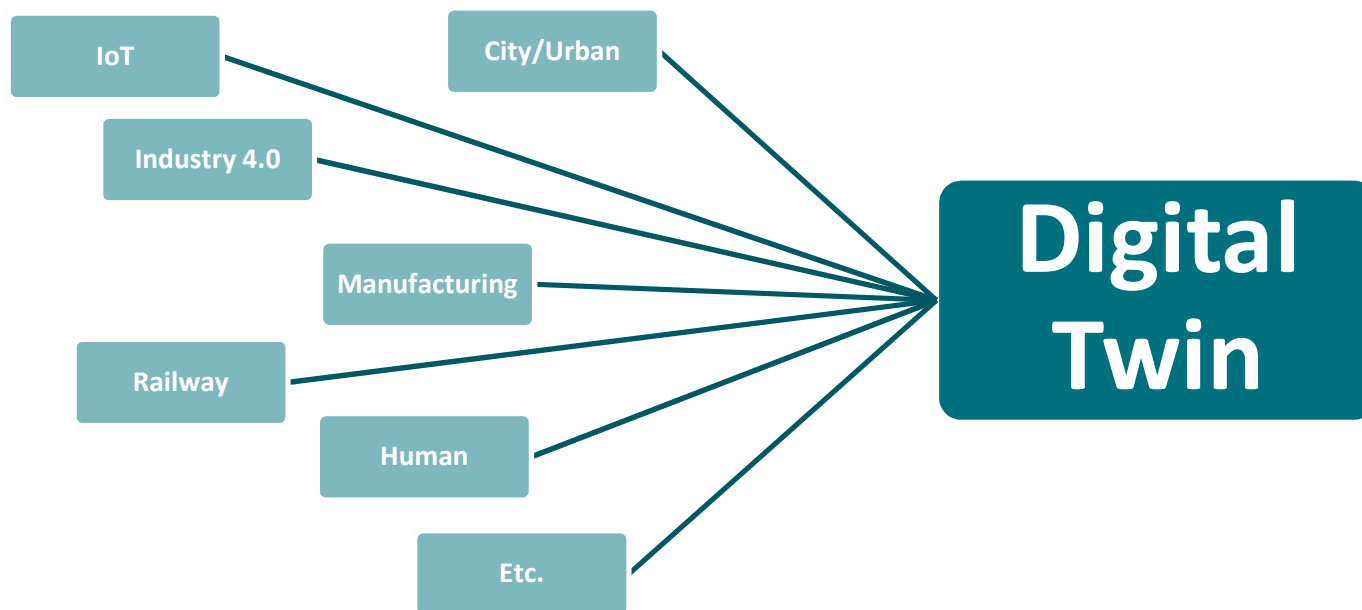
Digital Twins

► **As defined by IBM:**

A **Digital Twin** is a **virtual representation** of an object or system that *spans its lifecycle*, is *updated* from real-time data, and *uses* simulation, machine learning and reasoning to help decision-making

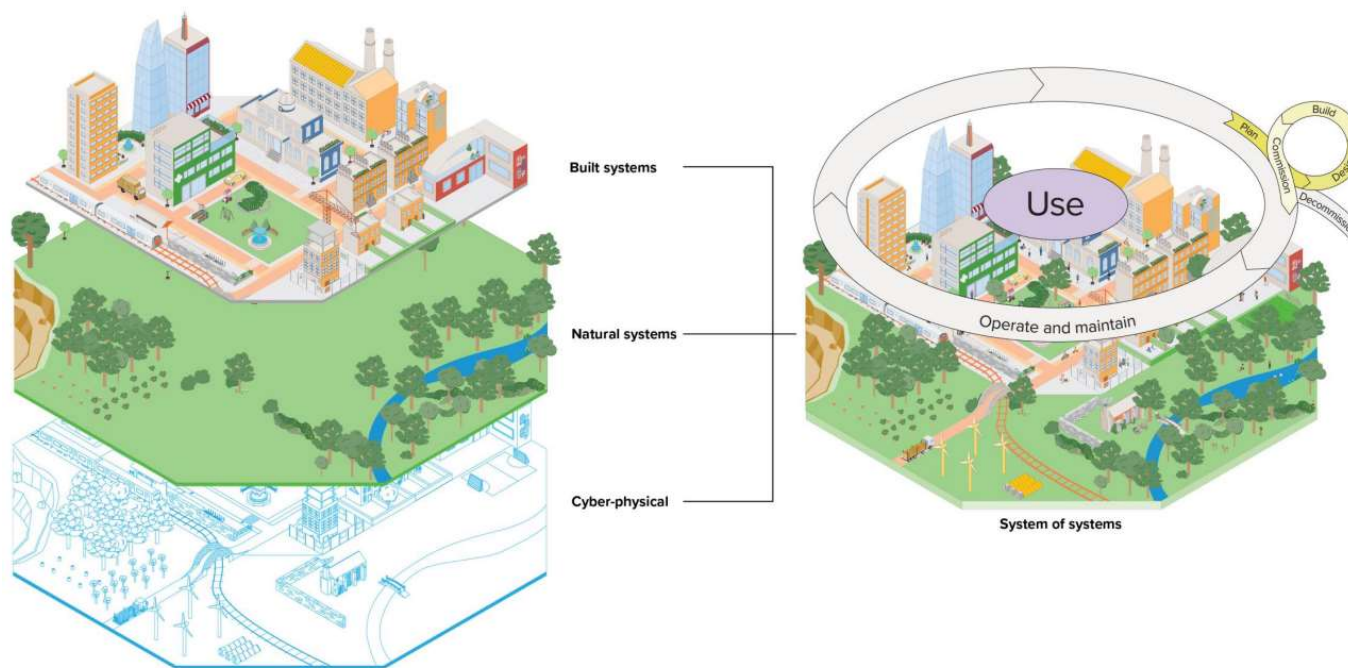# Digital Twin

Digital Twins Workshops

EuroSDR is a not-for-profit organisation linking National Mapping and Cadastral Agencies with Research Institutes, Universities and Companies in Europe for the purpose of applied research in spatial data provision, management and delivery.

Workshops: 21st January 2022
28th January 2022
25th May 2022
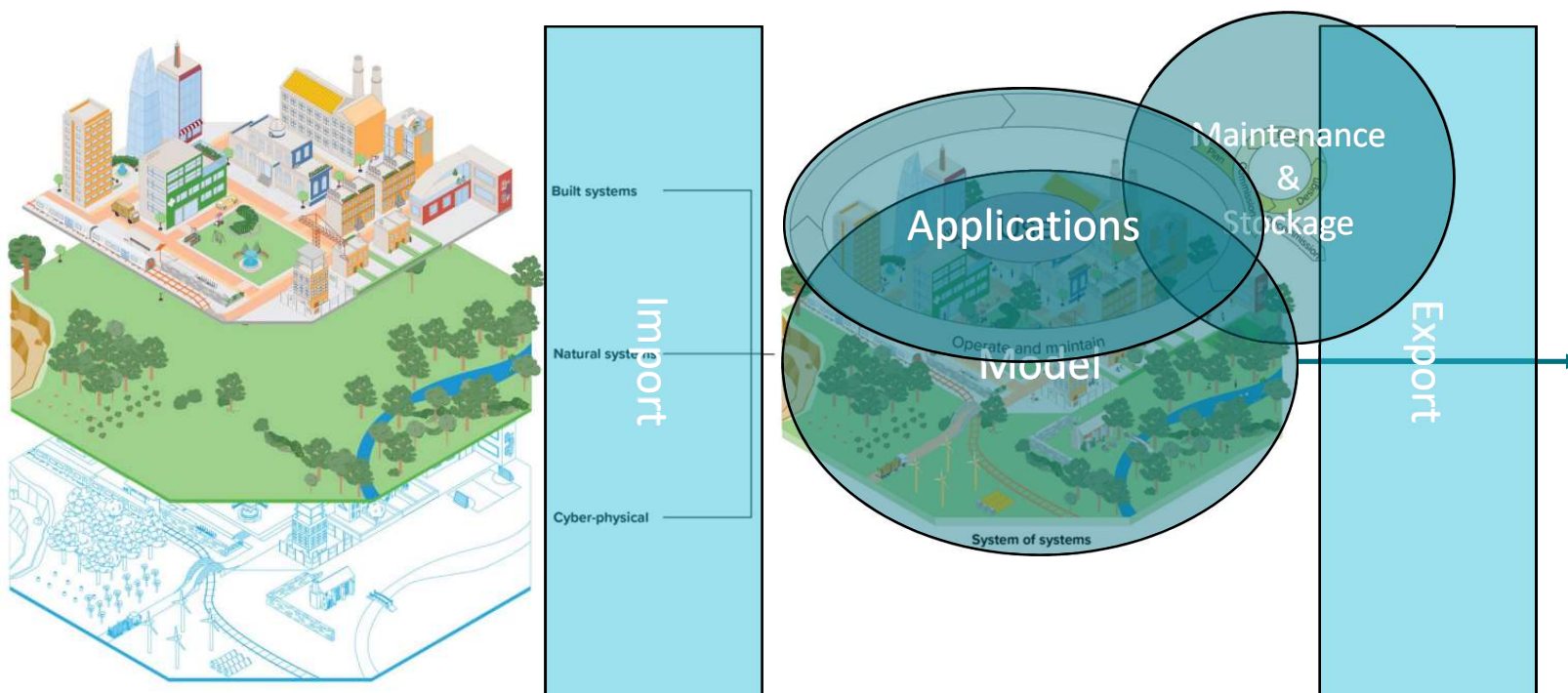
How do WE define what a Digital Twin is?

System of Systems

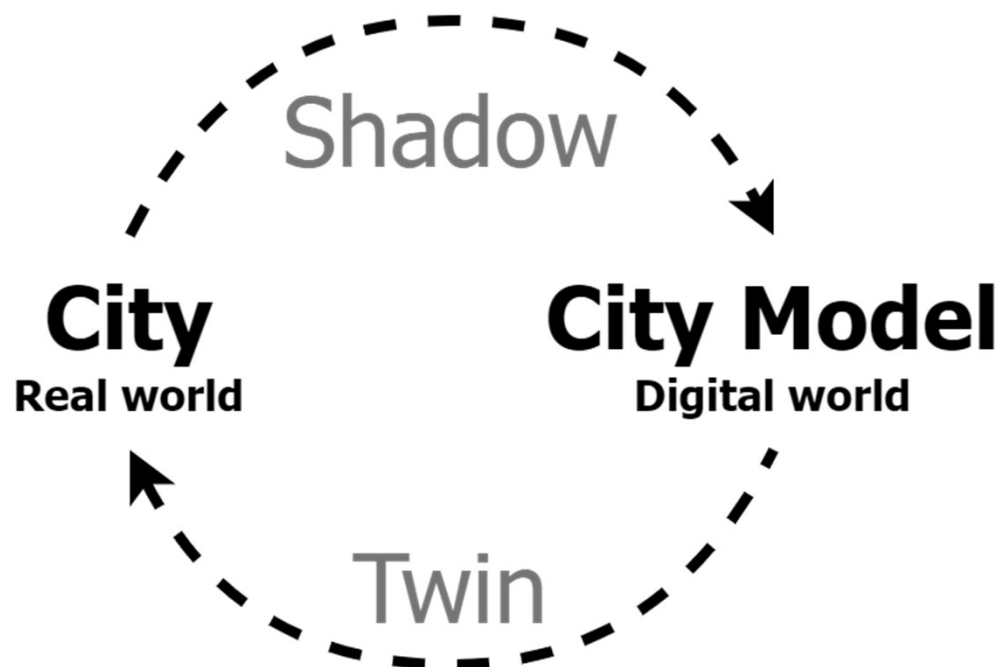Credits to **Mark Enzer**, *CTO at Mott MacDonald Group*

System of Systems – Spatial Data Infrastructure

Levels of Definition

Based on: Kritzinger, W., Karner, M., Traar, G., Henjes, J., & Sihn, W. (2018). Digital Twin in manufacturing: A categorical literature review and classification. *IFAC-PapersOnLine*, *51*(11), 1016–1022. https://doi.org/10.1016/j.ifacol.2018.08.474

Geomatics Unit - Researchers

Prof. Roland Billen

Ballouch Zouhair

Segmentation de nuages de points enrichis (Contexte urbain)

El Yamani Siham

Extension de CityGML pour l'évaluation immobilière

Jeddoub Imane

Intégration de données dans les modèles urbains 3D

Kharroubi Abderrazzaq

Détection de changement dans les nuages de points (Chemins de fer)

Nys Gilles-Antoine

Nouvelle génération de GIS: Semantic Web, NoSQL & CityJSON

Geomatics Unit - Students

Master 2 - « Geo-Expert »
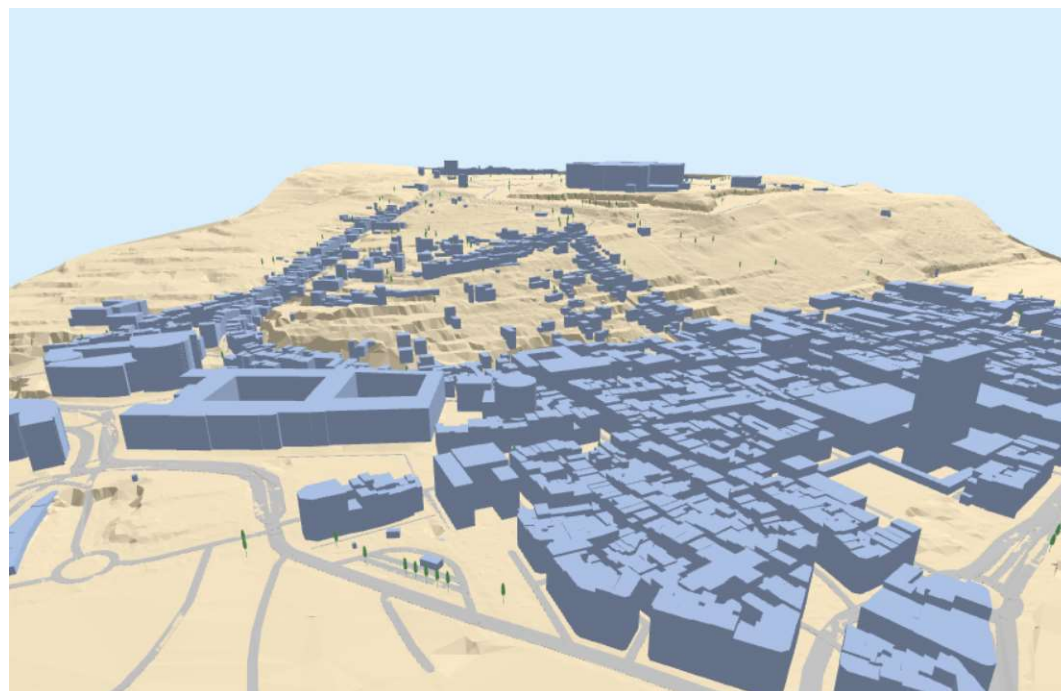
>   Pâques Larissa

>   Petit Céline

>   Van Den Spiegel Quentin

>   Wilkin Cyril

From **LiDAR** and **PICC** layers
to **CityJSON City Model 1.1**

- Creation

- Storage

- Requests and computations

References

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▶ Joshi, M. Y., Selmi, W., Binard, M., Nys, G.-A., & Teller, J. (2020). POTENTIAL FOR URBAN GREENING WITH GREEN ROOFS: A WAY TOWARDS SMART CITIES. *ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences*, *VI-4/W2-2020*, 87–94. https://doi.org/10.5194/isprs-annals-VI-4-W2-2020-87-2020

▶ Nys, G., & Billen, R. (2021). From consistency to flexibility: A simplified database schema for the management of CityJSON 3D city models. *Transactions in GIS*, tgis.12807. https://doi.org/10.1111/tgis.12807

▶ Nys, G.-A., Billen, R., & Poux, F. (2020). AUTOMATIC 3D BUILDINGS COMPACT RECONSTRUCTION FROM LIDAR POINT CLOUDS. *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLIII-B2-2020*, 473–478. https://doi.org/10.5194/isprs-archives-XLIII-B2-2020-473-2020

▶ Nys, G.-A., Kharroubi, A., Poux, F., & Billen, R. (2021). AN EXTENSION OF CITYJSON TO SUPPORT POINT CLOUDS. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLIII-B4-2021*, 301–306. https://doi.org/10.5194/isprs-archives-XLIII-B4-2021-301-2021

▶ Nys, G.-A., Poux, F., & Billen, R. (2020). CityJSON Building Generation from Airborne LiDAR 3D Point Clouds. *ISPRS International Journal of Geo-Information*, *9*(9), 521. https://doi.org/10.3390/ijgi9090521