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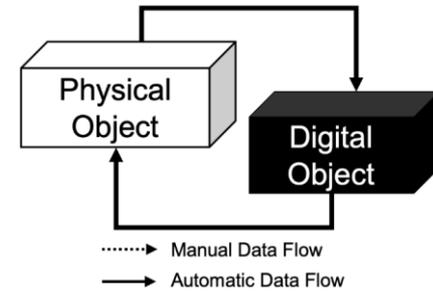
MEMBER OF BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE

# CITY DIGITAL TWIN

- Smart City Expo
- 16-18 November 2021

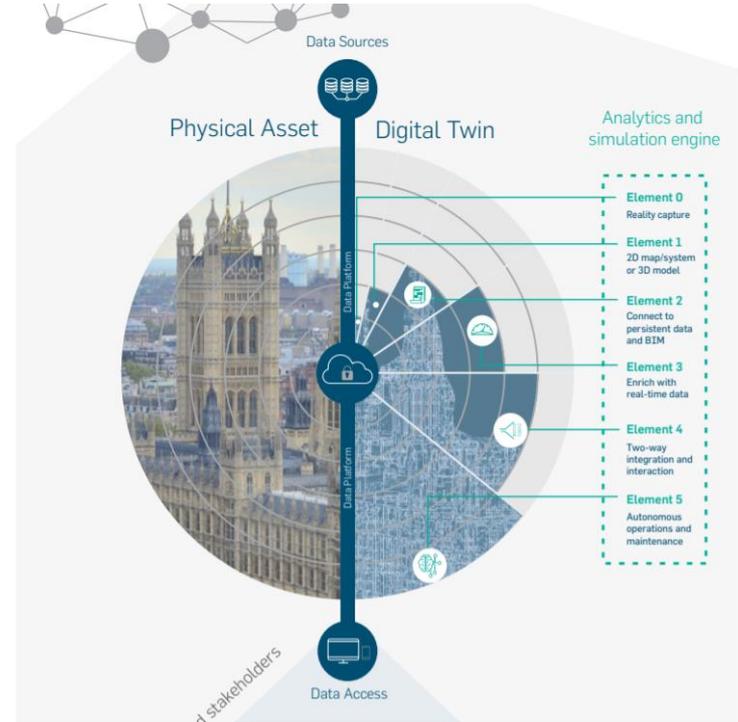
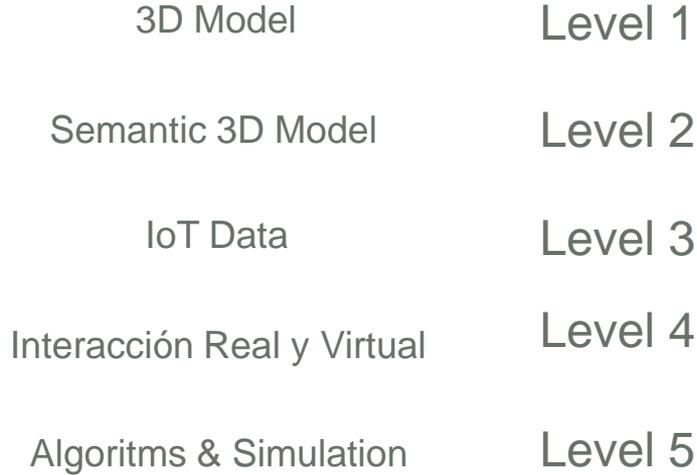
## DIGITAL TWIN CONCEPT

- Digital Model: It is only the representation of a physical object, but it has no simulation, any change in physical or digital object needs to be manually translated from the physical to digital object and viceversa.
- Digital Shadow: When changes in physical object are automatically updated in digital object, but no viceversa.
- Digital Twin: It is two side automatically updated



**Digital Twin in manufacturing: A categorical literature review and classification (2018);  
Kritzinger, W., Karner, M., Traar, G., Henjes, J., Sihn, W**

# DIGITAL TWIN CONCEPT



**Digital twins for the built environment. An introduction to the opportunities, benefits, challenges and risks. (2020) Centre for Digital Built Britain (CDBB)**

<https://www.theiet.org/media/4719/digital-twins-for-the-built-environment.pdf>

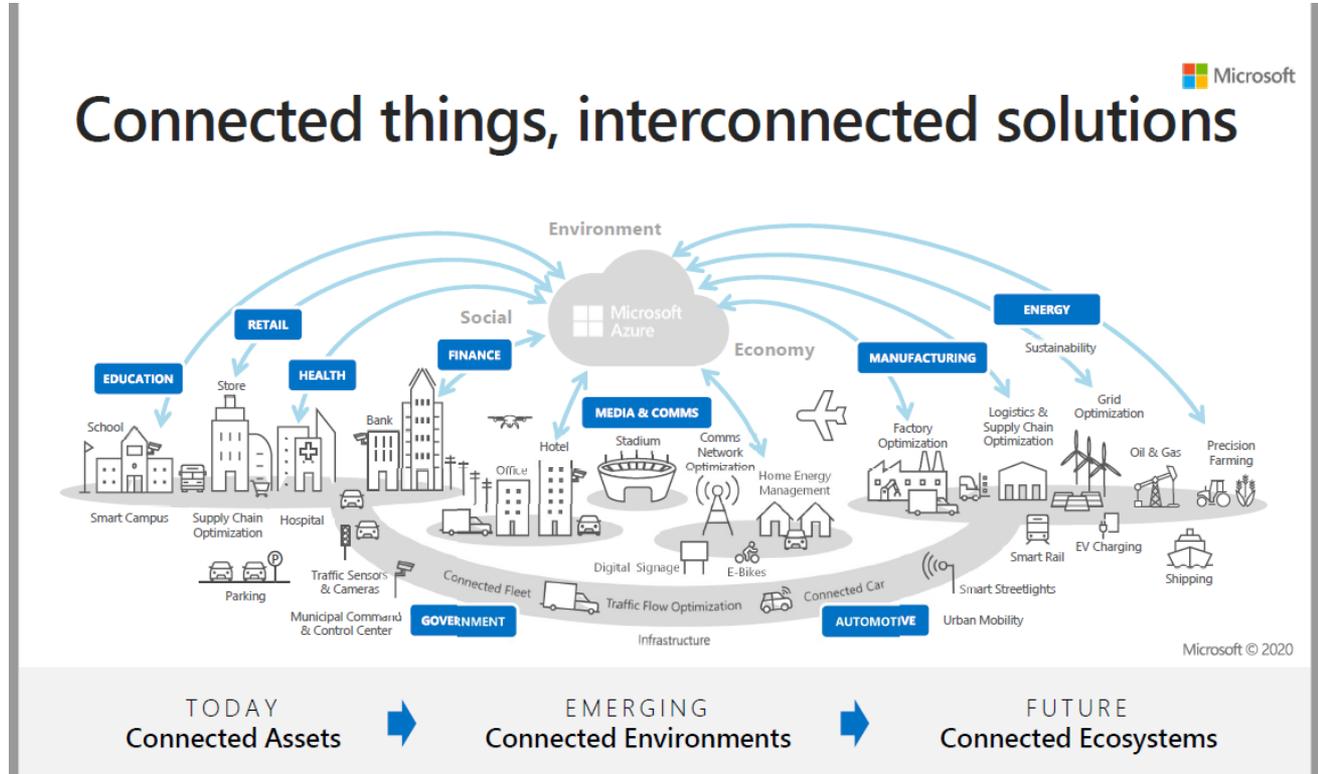
## DIGITAL TWIN CONCEPT

- Digital Twin is a mirror image of a physical process, matching exactly the operation of the process in real time.
- Digital Model is a simplification of a real system.
- Digital Twin is connected to the real system, however the Digital Model is disconnected and can be used to explore, simulate and test new designs.
- In the context of cities:
  - Digital representations of cities abstracts only a limited set of variables and processes, they rarely include socio-economic functions
  - Wildfire (2018) calls “reactive” models to real-time monitoring of the city or asset and “predictive” to long term scenario planning.
- Digital twins are not identical twins and the notion of an exact mirror is an idealization that will never be achieved.

**Digital twins (2018); M. Batty, Environmental and Planning: Urban Analytics and City Science**

# DIGITAL TWIN ECOSYSTEM

Each Digital Twin Asset fits into an Urban Digital Twin Ecosystem as a node in a network



# URBAN PLANNING

- Quantitatively analyze the city of Today to help design the city of Tomorrow.
- 3D City Model + Spatial datasets + Non-spatial datasets

Examples of tools for Urban Planning:

- Urban Synthesis Computational Methods (Interactive Urban Synthesis)
- Kaisersrot projects in Zurich

## REFERENCES

<https://www.buildingsmart.org/wp-content/uploads/2020/05/Enabling-Digital-Twins-Positioning-Paper-Final.pdf>

<https://digitaltwinhub.co.uk/>

<https://www.cdbb.cam.ac.uk/system/files/documents/TheGeminiPrinciples.pdf>

<https://www.theiet.org/media/4719/digital-twins-for-the-built-environment.pdf>

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Data Sources



Policies



Modelling & Mapping

URBANAGE City Information Model



Citizen

(Data providers and service beneficiaries)



Urban Planning

(City design, land use, etc.)



Physical Infrastructure

(Buildings, infrastructures, urban spaces, etc.)



Technical Infrastructure

(Lighting, communication networks, sensors, etc.)



Information Retrieval



Services



Communicate & Inform



Planning alternatives



Works in public space



Service Dimensioning



Geospatial Analysis

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**THANK YOU!**

● Smart City Expo