SGS Office

Role of Digital Twins within the “Swiss Geoinformation Strategy "

Strategie Geoinformation Schweiz
Stratégie suisse pour la géoinformation

2022-12-02
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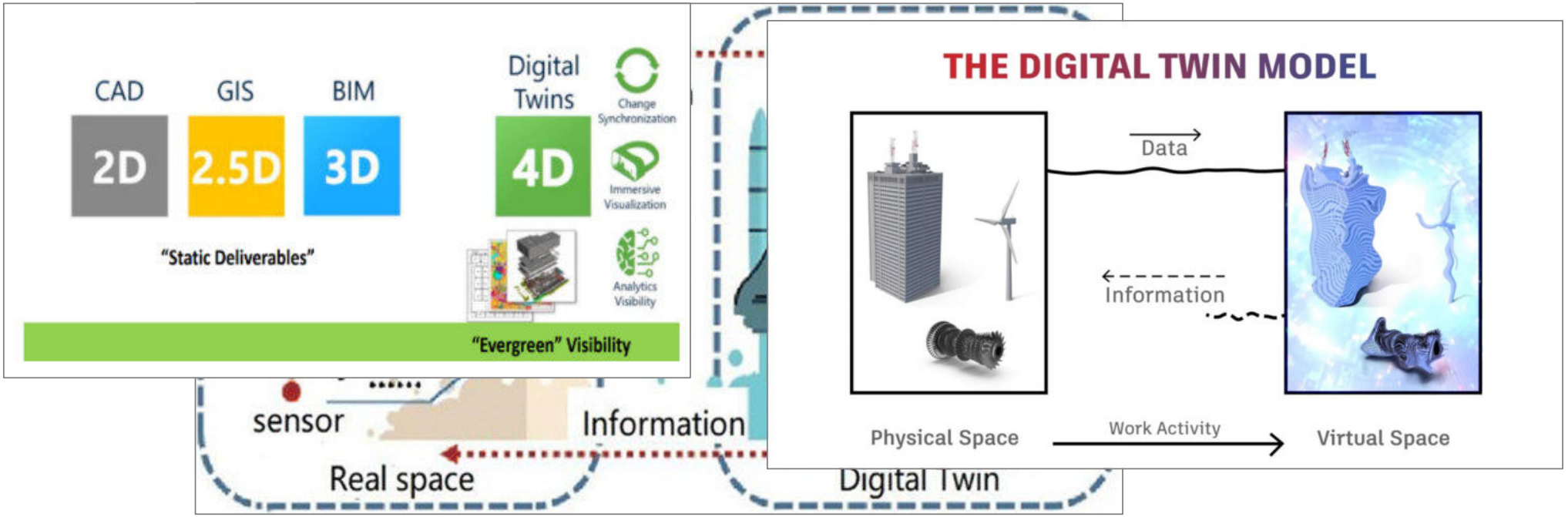
Agenda

- General Introduction- Digital Twin
- Definition and Challenges of Digital Twin- Swiss Geoinformation Strategy

What is a Digital Twin?

Different Definitions



Sources:

https://www.google.com/url?sa=i&url=https%3A%2F%2Fredshift.autodesk.com%2Farticles%2Fwhat-is-a-digital-twin&psig=AOvVaw0WWM669-7Zy3OB2Tgy2U3-&ust=1669914637359000&source=images&cd=vfe&ved=0CA4QjhxqFwoTCLiq-fiy1vsCFQAAAAAdAAAAABAM

https://www.google.com/url?sa=i&url=https%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2Fs11042-022-12536-5&psig=AOvVaw0WWM669-7Zy3OB2Tgy2U3-&ust=1669914637359000&source=images&cd=vfe&ved=0CA4QjhxqFwoTCLiq-fiy1vsCFQAAAAAdAAAAABAH

What are Digital Twins used for?

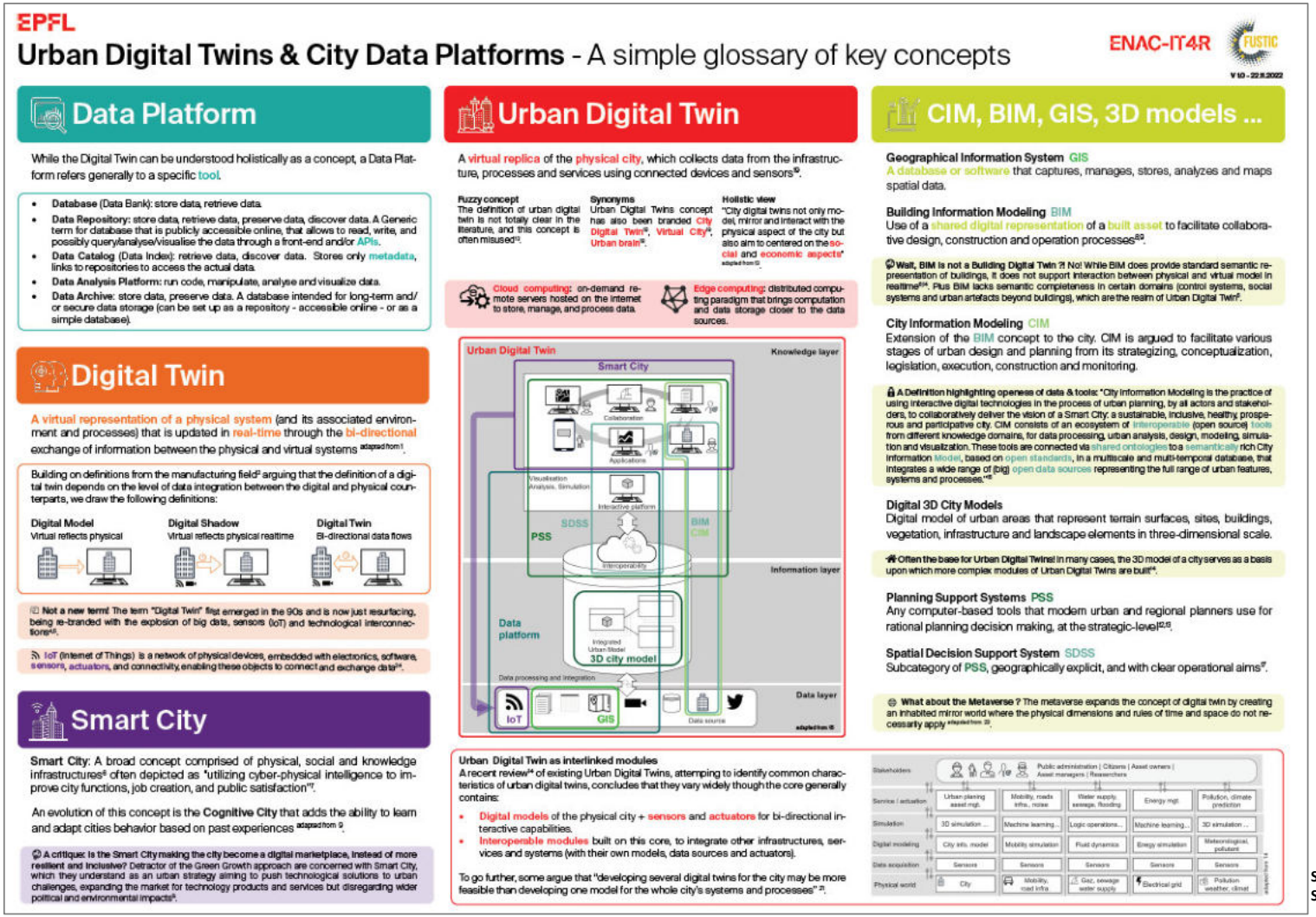
- Simulation of What-if scenarios
- Bring information to citizens
- better insights-> better decisions-> better outcomes

Digital Twin in context Swiss Geoinformation Strategy

Geoinformation as Common Good

…In the digital age, geographical space is increasingly being represented in digital form, to a certain extent as a **“digital twin”.** The better the description of geographical space and the integration of digital technologies, the more useful the **knowledge gained** from linking these two aspects. **This expands on our ability to make decisions and helps us to improve processes.**

What is a Digital Twin? – Context Swiss Geoinformation Strategy



Sources:
Study by EPFL-ENAC-IT4R, 2022 (mandated by SGS)

What is a Digital Twin?

Digital Twin

A virtual representation of a physical system (and its associated environment and processes) that is updated in **real-time** through the **bi-directional** exchange of information between the physical and virtual systems [adapted from 1].

Building on definitions from the manufacturing field[2] arguing that the definition of a digital twin depends on the level of data integration between the digital and physical counterparts, we draw the following definitions:

Digital Model
Virtual reflects physical

Digital Shadow
Virtual reflects physical realtime

Digital Twin
Bi-directional data flows

Sources:
Study by EPFL-ENAC-IT4R, 2022 (mandated by SGS)

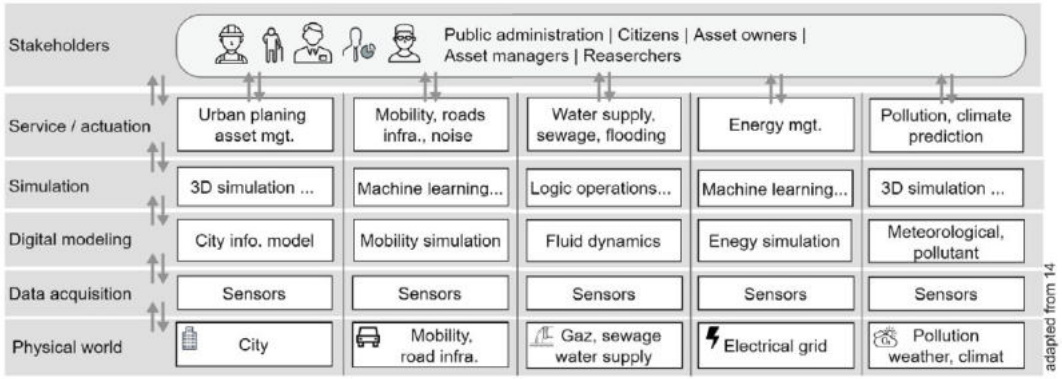
What are the Components of a Digital Twin?

Urban Digital Twin as interlinked modules

A recent review[14] of existing Urban Digital Twins, attemping to identify common characteristics of urban digital twins, concludes that they vary widely though the core generally contains:

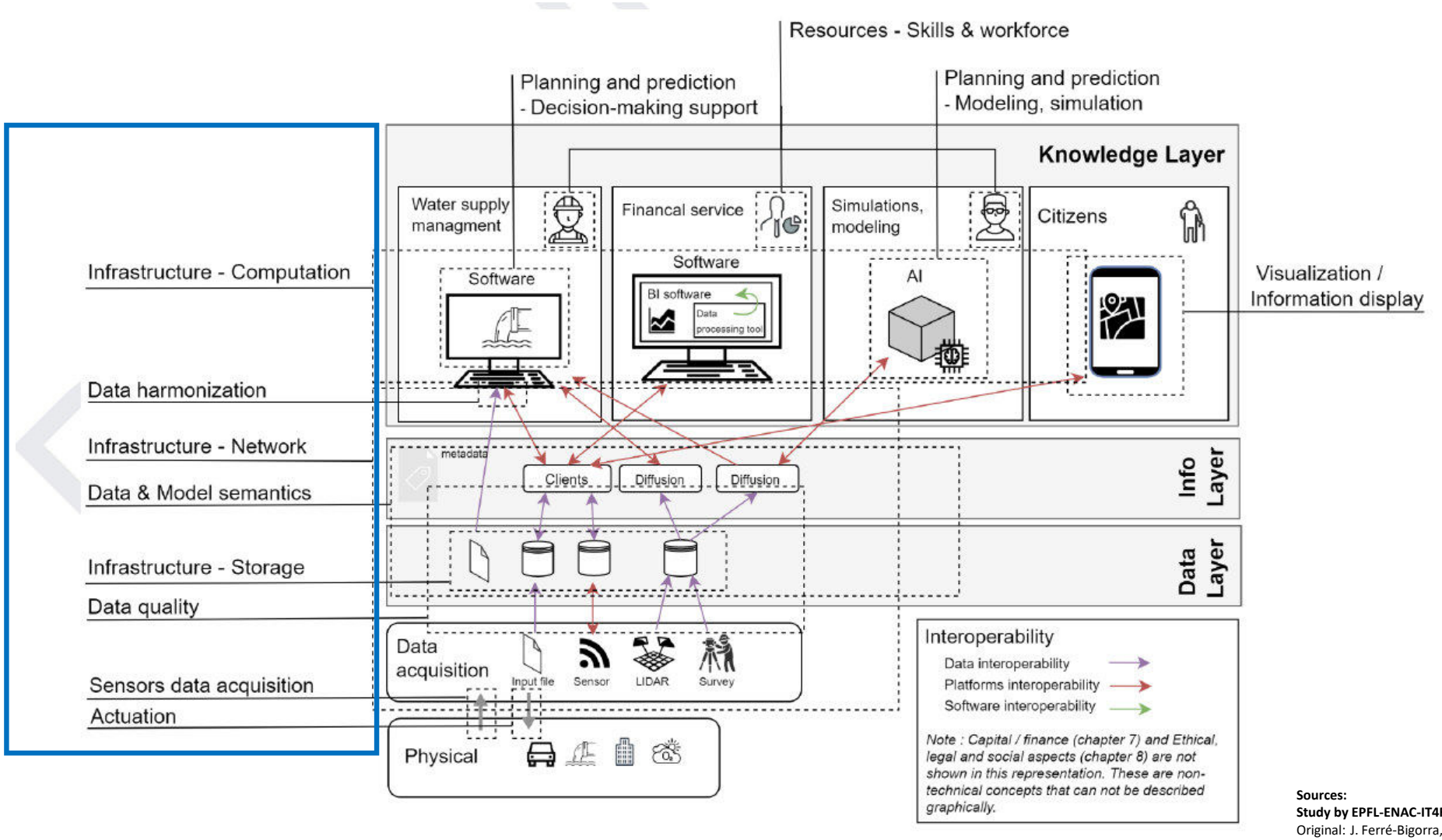
- **Digital models** of the physical city + **sensors** and **actuators** for bi-directional interactive capabilities.
- **Interoperable modules** built on this core, to integrate other infrastructures, services and systems (with their own models, data sources and actuators).

To go further, some argue that "developing several digital twins for the city may be more feasible than developing one model for the whole city's systems and processes" [21].



Sources:
Study by EPFL-ENAC-IT4R, 2022 (mandated by SGS)
Original: J. Ferré-Bigorra, M. Casals, M. Gangolells, 2022

Challenges of Digital Twin



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Digital Twin in the Swiss Geoinformation Strategy?

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