UN GEONOW 2024
首届联合国地信周

Geospatial Solutions for Global Challenges

a New Era Empowered by Digital Twin

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21 Oct 2024, UN GeoNow, Deqing, China

A Challenging World ...

Global challenges, and facing the existential threat of Changing Climate..

Global Trends

Climate Change Causes More Frequent and Severe Disasters

*..climate change, digital disruption, economic downturn and burgeoning populations are all **Sustainability- and Global related Challenges** that we are positioned to make foundational and creative contributions towards.*

***Geospatial Enablement**: Location information is having a huge impact in addressing many of the world's greatest challenges.*

Global Guide for Access to Land for Climate Action

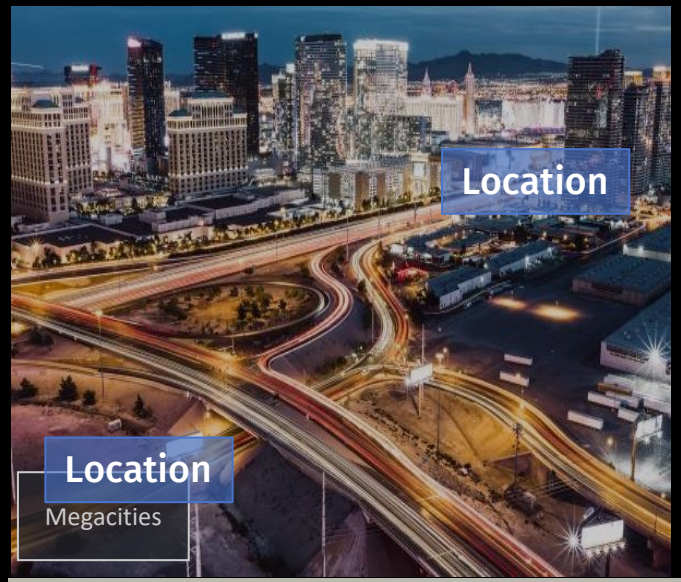
Almost **1 in 2 Climate Actions** will **require accessing Land** with actions related mainly to: ***Forestry, Infrastructure (Energy, Transport,..), Environment and Agriculture***.

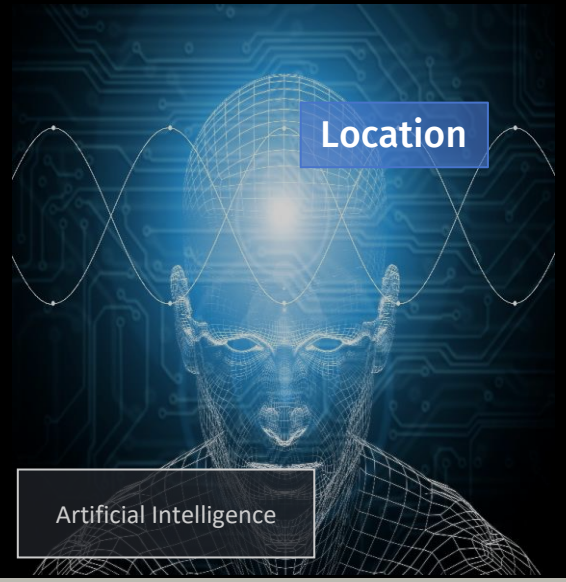
Currently **3% of GDPs on Infrastructures**. But for Climate Action **requires 8% investment** on Infrastructures.

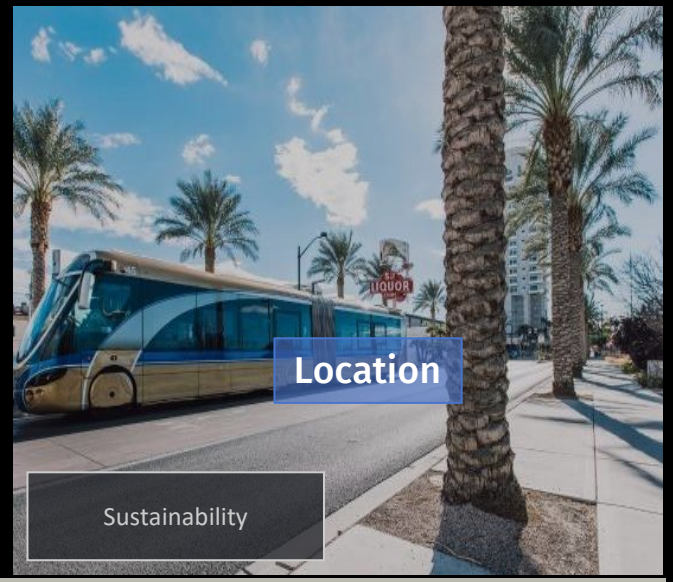
THE WORLD BANK

CSDILA
THE CENTRE FOR SPATIAL DATA INFRASTRUCTURES & LAND ADMINISTRATION

QUALITY INFRASTRUCTURE INVESTMENT PARTNERSHIP

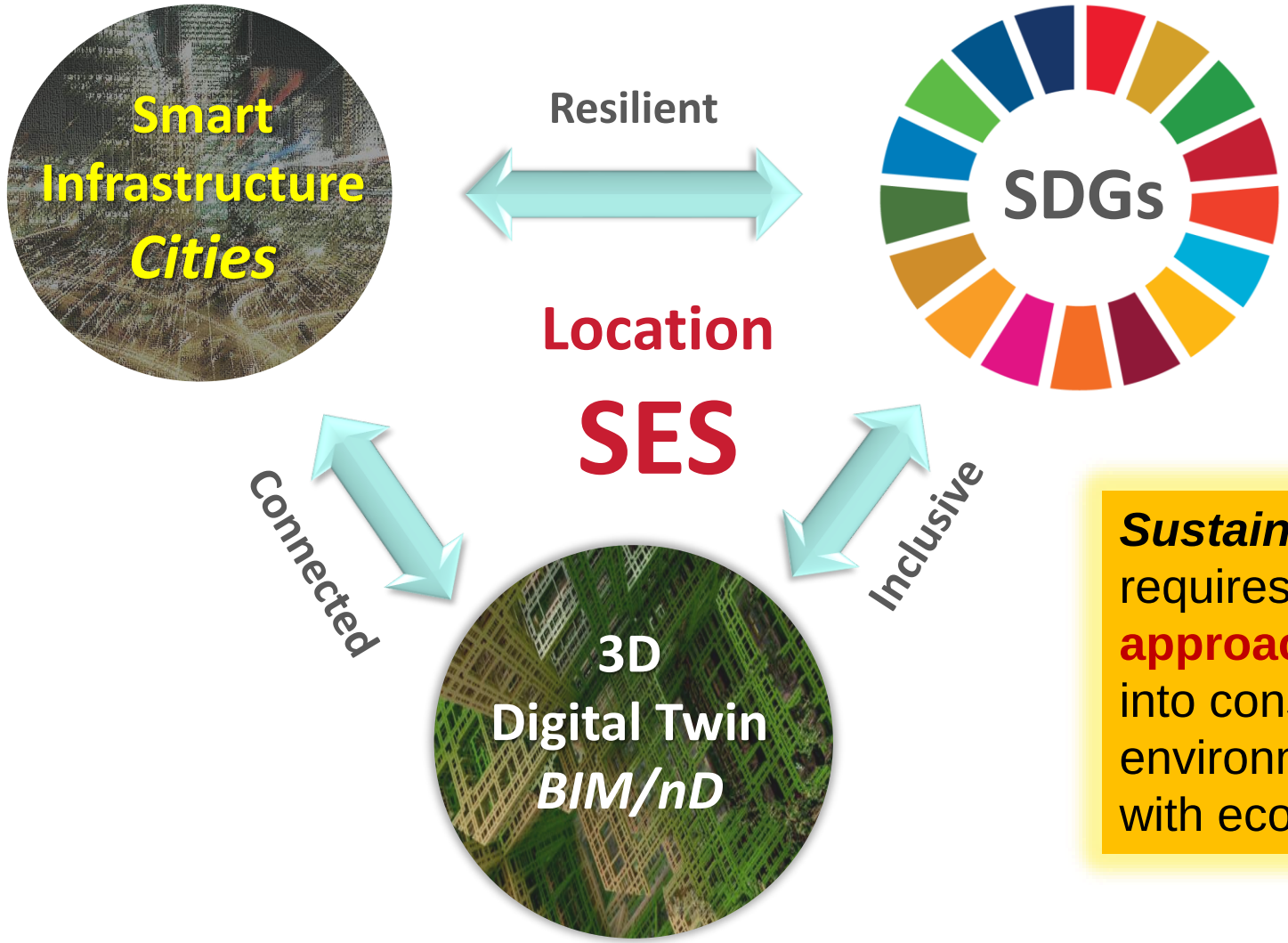






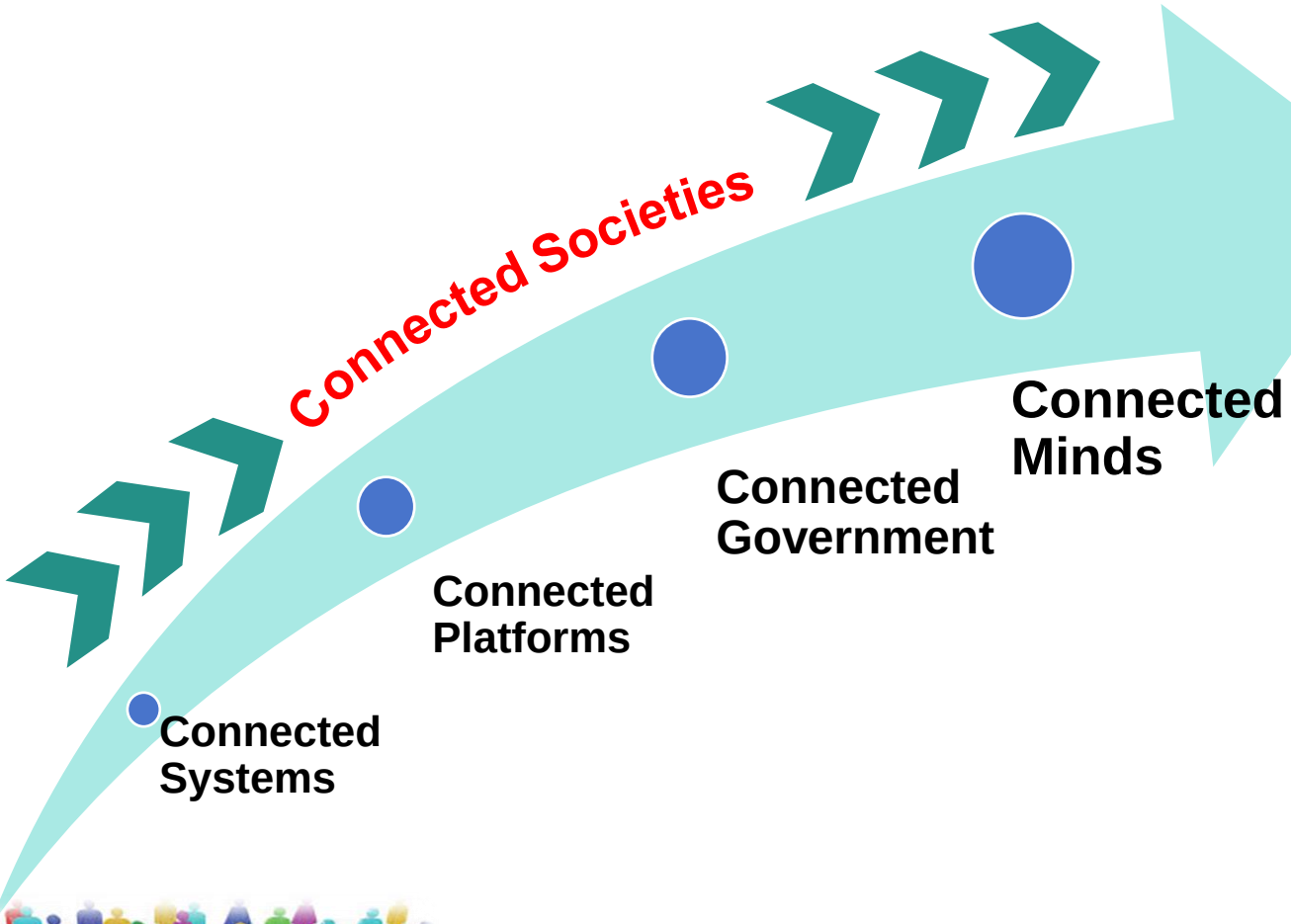
Technology and society are driving the Data Ecosystem-

Delivering Spatial Enablement



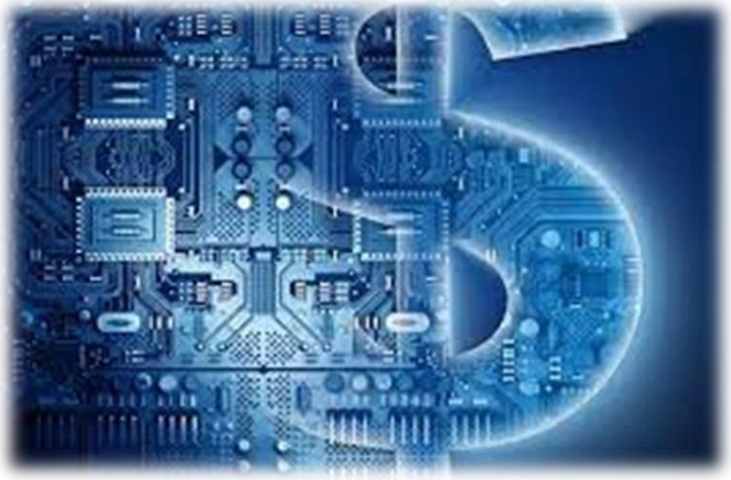
Sustainable Development requires an **integrated approach** that takes **big data** into consideration with environmental concerns along with economic development.

Future is Smart, Connected and Sustainable



Moving from being "***Sustainable***" to ***Productivity*** & "***Regenerative***"

Digital Economy



The Problem

To achieve sustainability, we need to **remove barriers to integrating and analysing data from multiple disciplines** and enable access to data that can directly inform decisions. This can reduce costs, increase productivity and help plan climate change mitigation and adaptation.

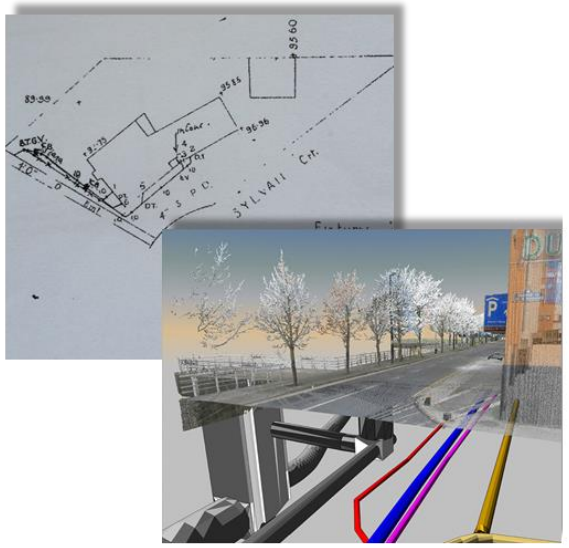
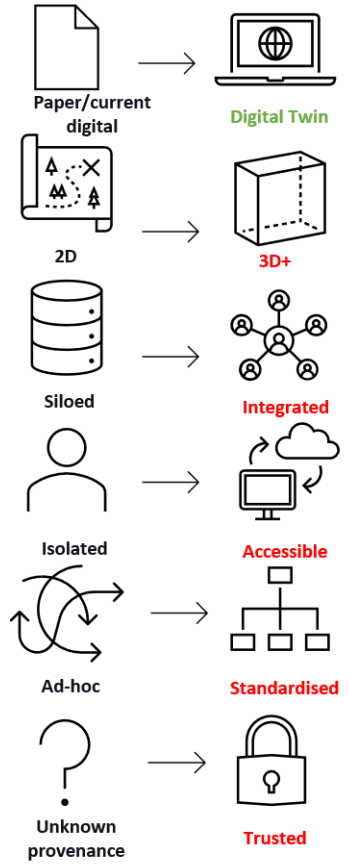


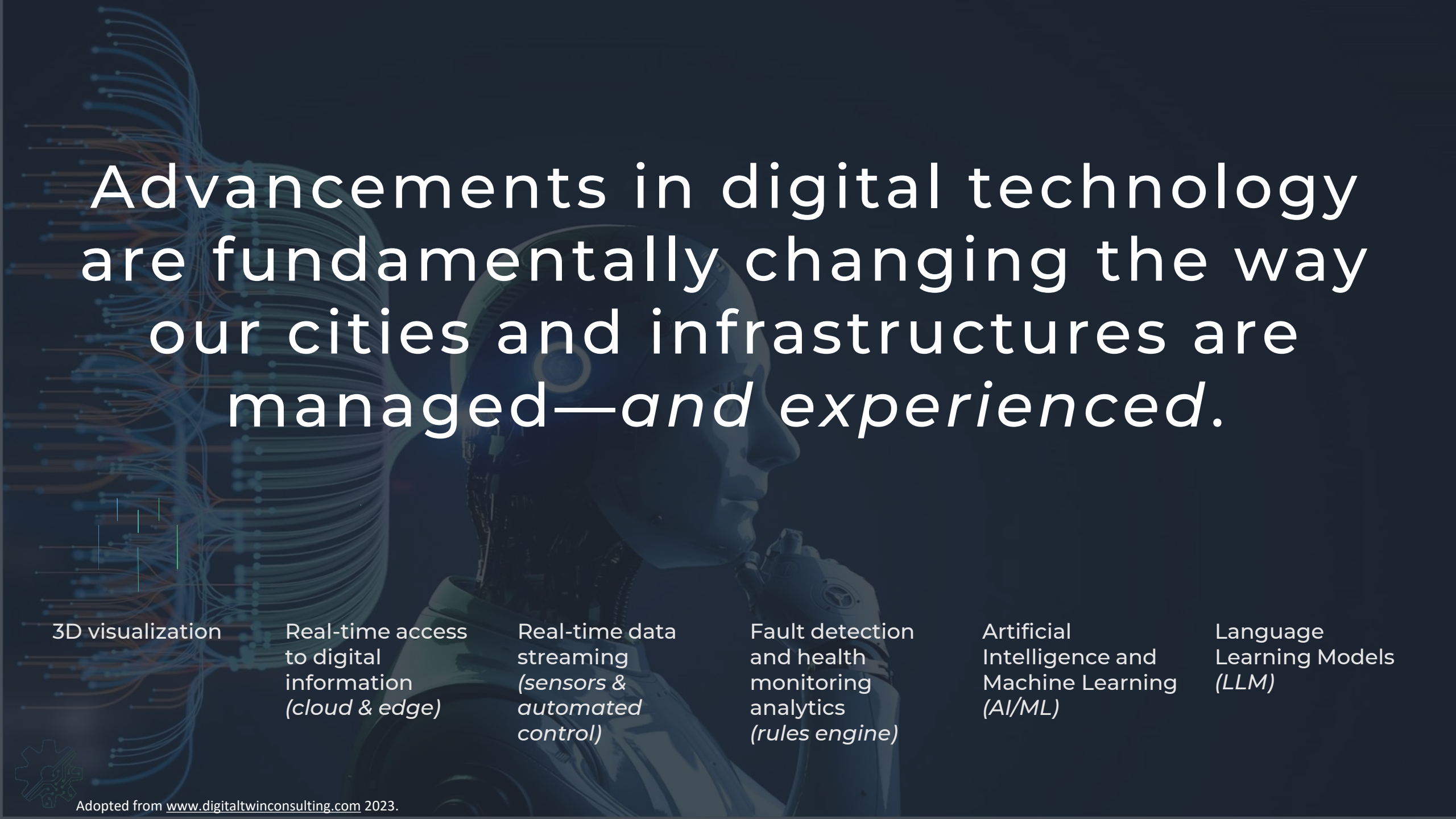
Image 4. A 'place based' strategy

Complex Urban Environments

A primary reason for the limitations in addressing the interdisciplinary challenge of sustainability is the lack of an ecosystem of **open, harmonised and interoperable** information models and datasets across **land, built environment and natural environments**.

Addressing the Problem





Advancements in digital technology are fundamentally changing the way our cities and infrastructures are managed—*and experienced*.

3D visualization

Real-time access to digital information *(cloud & edge)*

Real-time data streaming *(sensors & automated control)*

Fault detection and health monitoring analytics *(rules engine)*

Artificial Intelligence and Machine Learning *(AI/ML)*

Language Learning Models *(LLM)*

Adopted from www.digitaltwinconsulting.com 2023.

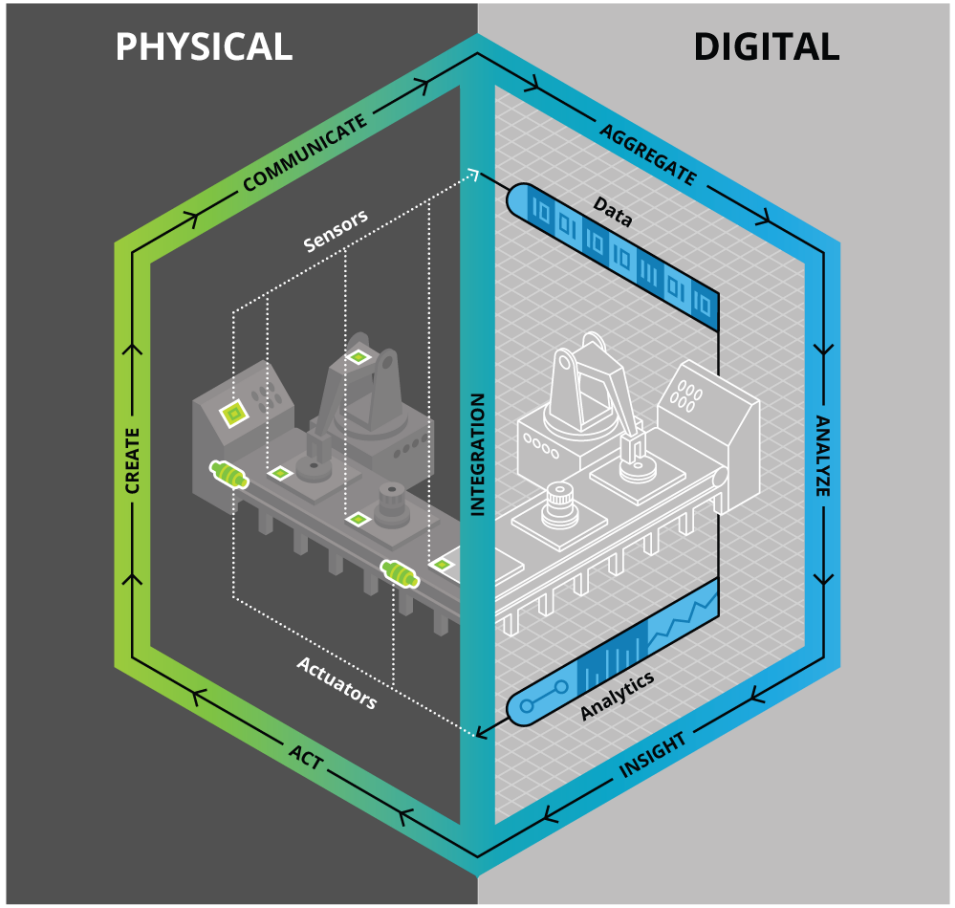
Adopted and Modified from HERE 2021

Digital Twin

*A digital representation of a **real-world entity** or **system**. The implementation of a Digital Twin is:*

- Connecting **data**, **model**, and **visualisation** to mirror a unique physical object, process, organisation, or person.
- Data from **multiple Digital Twins** can be aggregated for a composite view across several real-world entities, such as a building, power plant or a city, and their related processes.

https://www.gartner.com/en/information-technology/glossary/digital-twin



Source: Deloitte University Press.

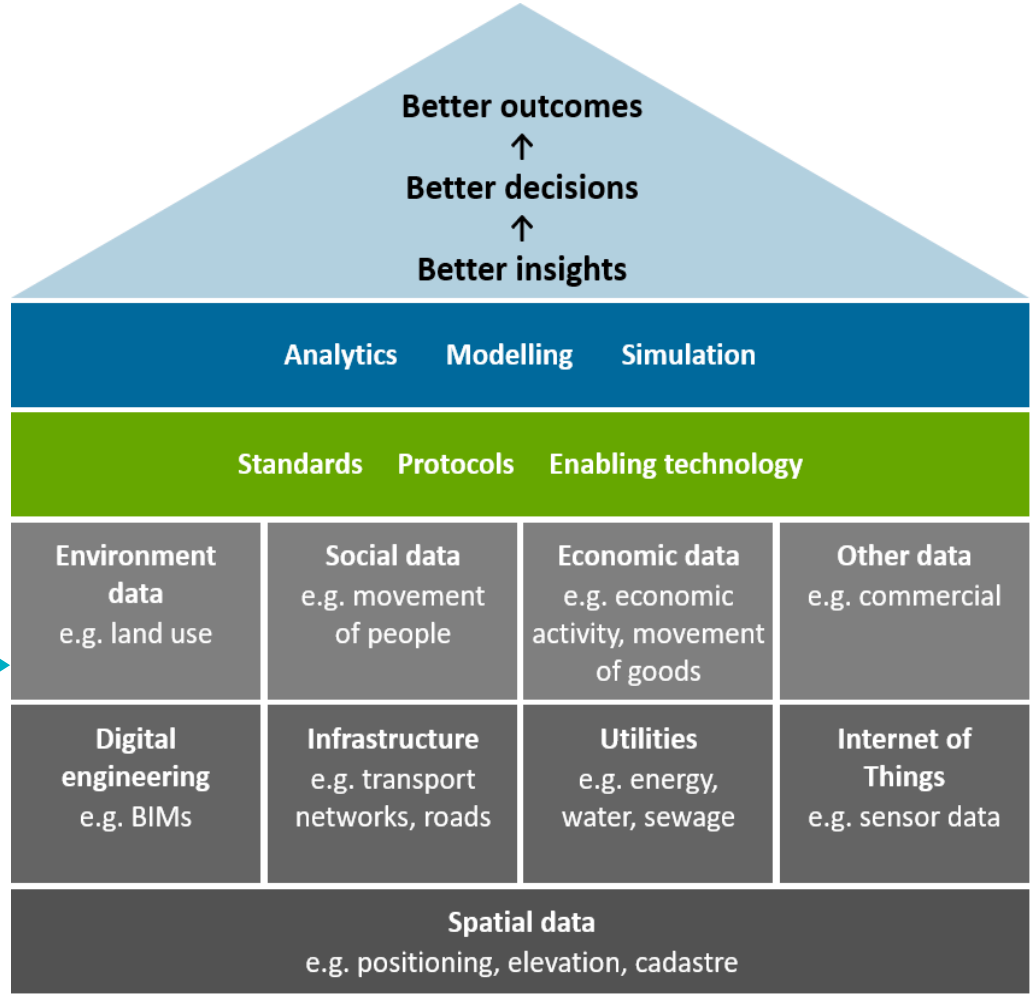
Deloitte University Press | dupress.deloitte.com

https://www2.deloitte.com/us/en/insights/focus/industry-4-0/digital-twin-technology-smart-factory.html

Spatial Digital Twin Principles

Highly advanced digital representations of the real world.

Combining with underpinning spatial data increases the value of Digital Twins as it can provide location-based insights.



Broad Application Domains

Disaster Management

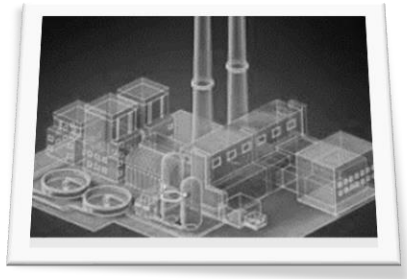
Environment Monitoring

Transport & Energy

Smart City & Urban Planning

HealthCare

Land Administration



Infrastructure & Construction

Manufacturing & Industry 4.0

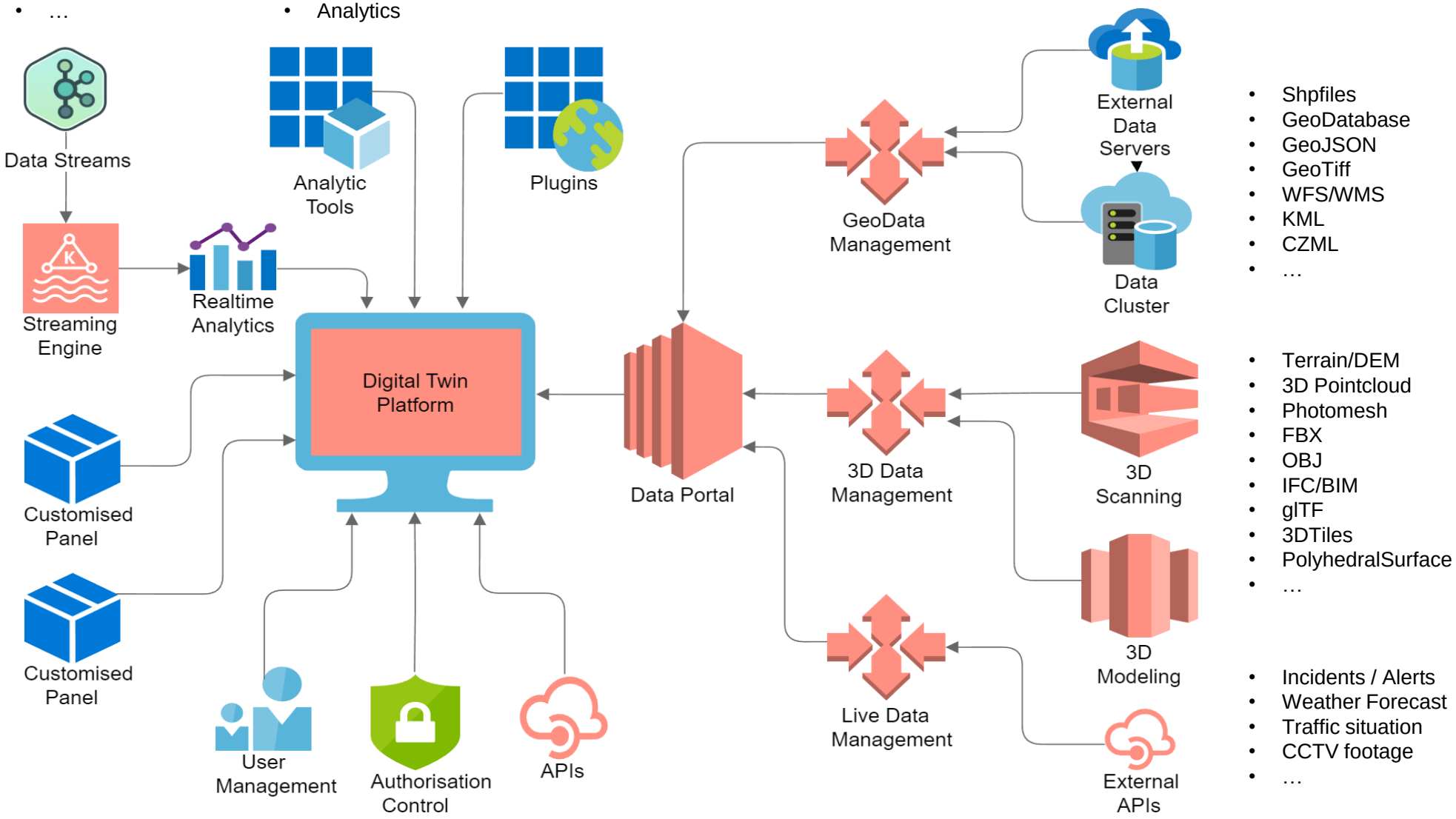
And more ..

Digital Twin Conceptual Architecture

- IOT Data Packet
- Live streams
- …

- Modelling & Simulation
- Analytics

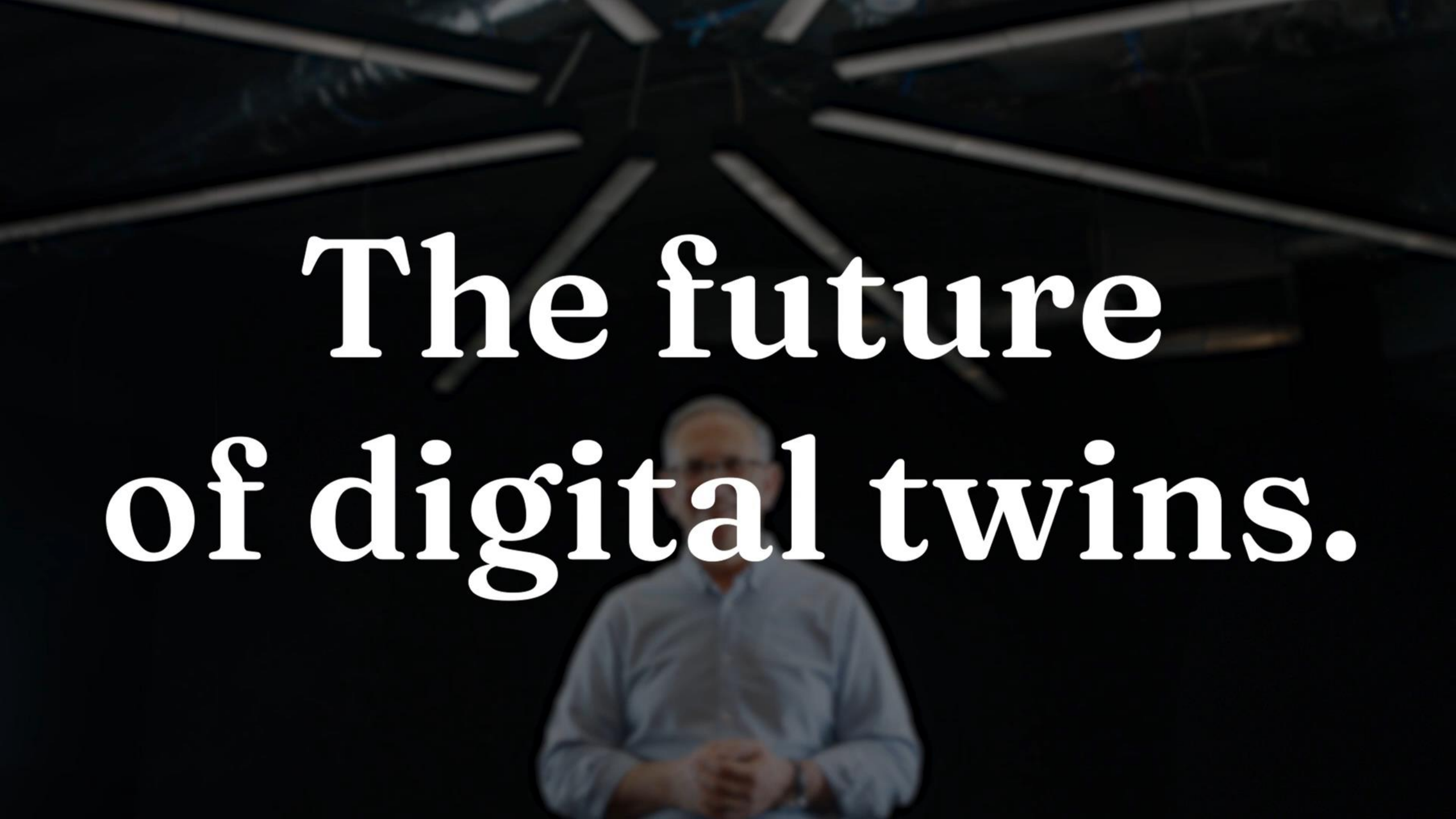
- Ecosystem & Community



- Shpfiles
- GeoDatabase
- GeoJSON
- GeoTiff
- WFS/WMS
- KML
- CZML
- …

- Terrain/DEM
- 3D Pointcloud
- Photomesh
- FBX
- OBJ
- IFC/BIM
- glTF
- 3DTiles
- PolyhedralSurface
- …

- Incidents / Alerts
- Weather Forecast
- Traffic situation
- CCTV footage
- …


The future
of digital twins.

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THANK YOU