Digital Twins

What are they and why should we care?

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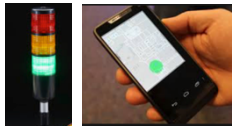
www.cir-strategy.com/events


IoT
BIM
AR
Optimisation
VR
3D
Simulation
AI

Our (working) definition

*A digital twin is a **dynamic virtual representation** of a **physical object or system**, usually across **multiple stages of its lifecycle**. It uses **real-world data**, **simulation** and / or **machine learning** models, combined with **data analysis** to enable **understanding, learning and reasoning**. Digital twins can be used to **answer what-if questions** and should be able to **present the insights in an intuitive way**.*

High level component view of a Digital Twin



Visualisation and Interaction

Actionable insights / Alerts

Real World

People

Places

System Component

Sensors

Digital Twin

Situational Awareness

Visualisation

Digital Model (now-cast)

Predictive Engine (forecast)

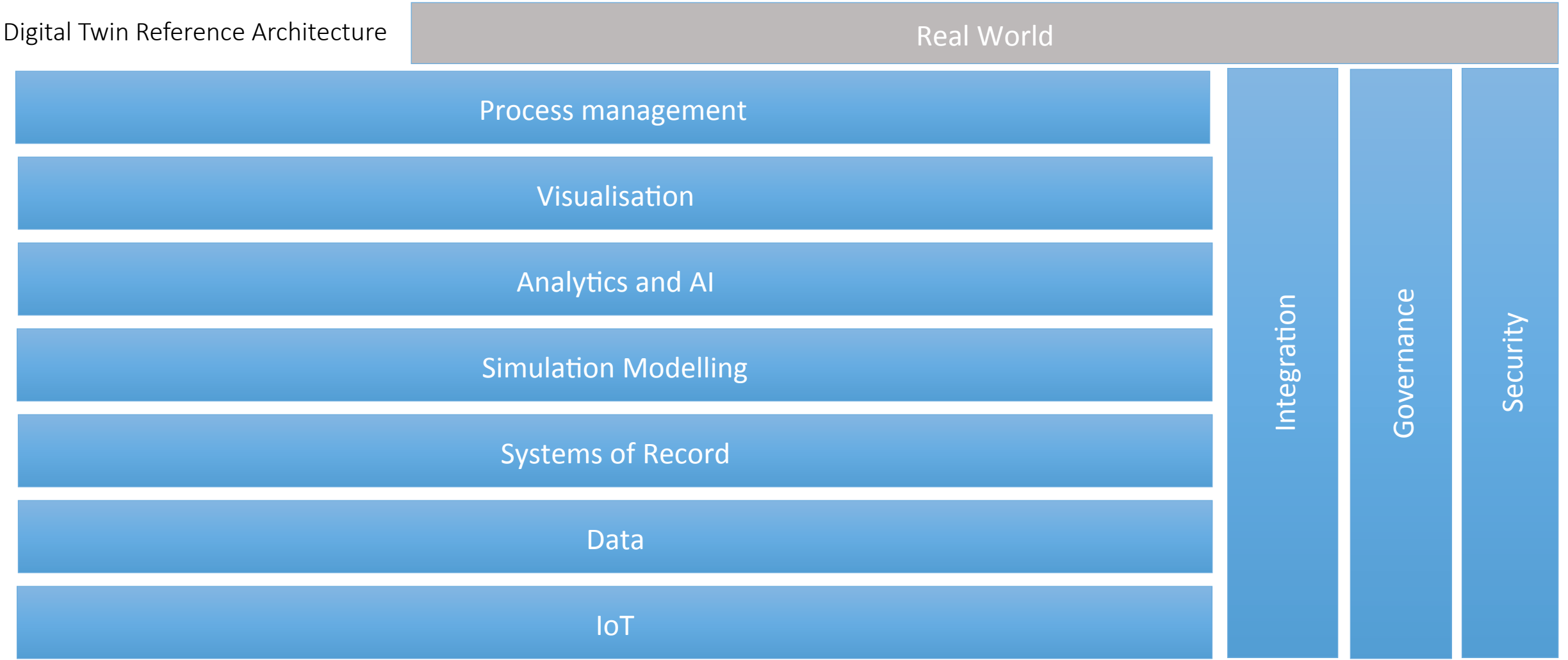
Data Analysis

Real-world sensor data

Physical Model data

Modelling output Estimated states

Data Security and Privacy, Governance and Management etc.


Digital Twin Reference Architecture
Real World
Process management
Visualisation
Analytics and AI
Simulation Modelling
Systems of Record
Data
IoT
Integration
Governance
Security


ASTON MARTIN
PIRELLI
Mobil 1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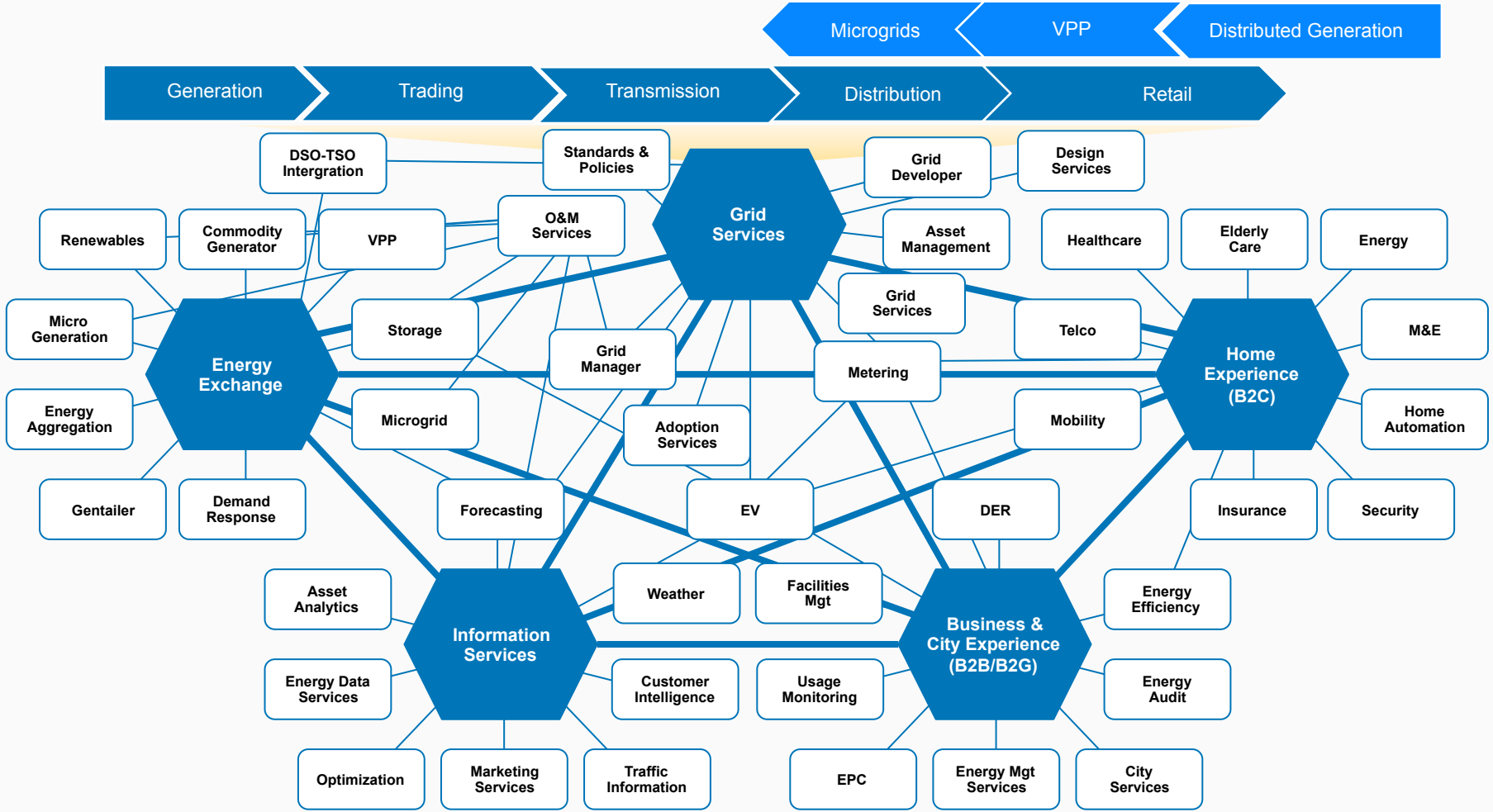
Future Energy & Utilities Industry Models

Emerging new business models transform the traditional utility value chain by integrating energy on the back of more flexible and digitally enabled ecosystems/business platforms



Imperial College London

Integrated Development of Low-Carbon Energy Systems (IDLES)

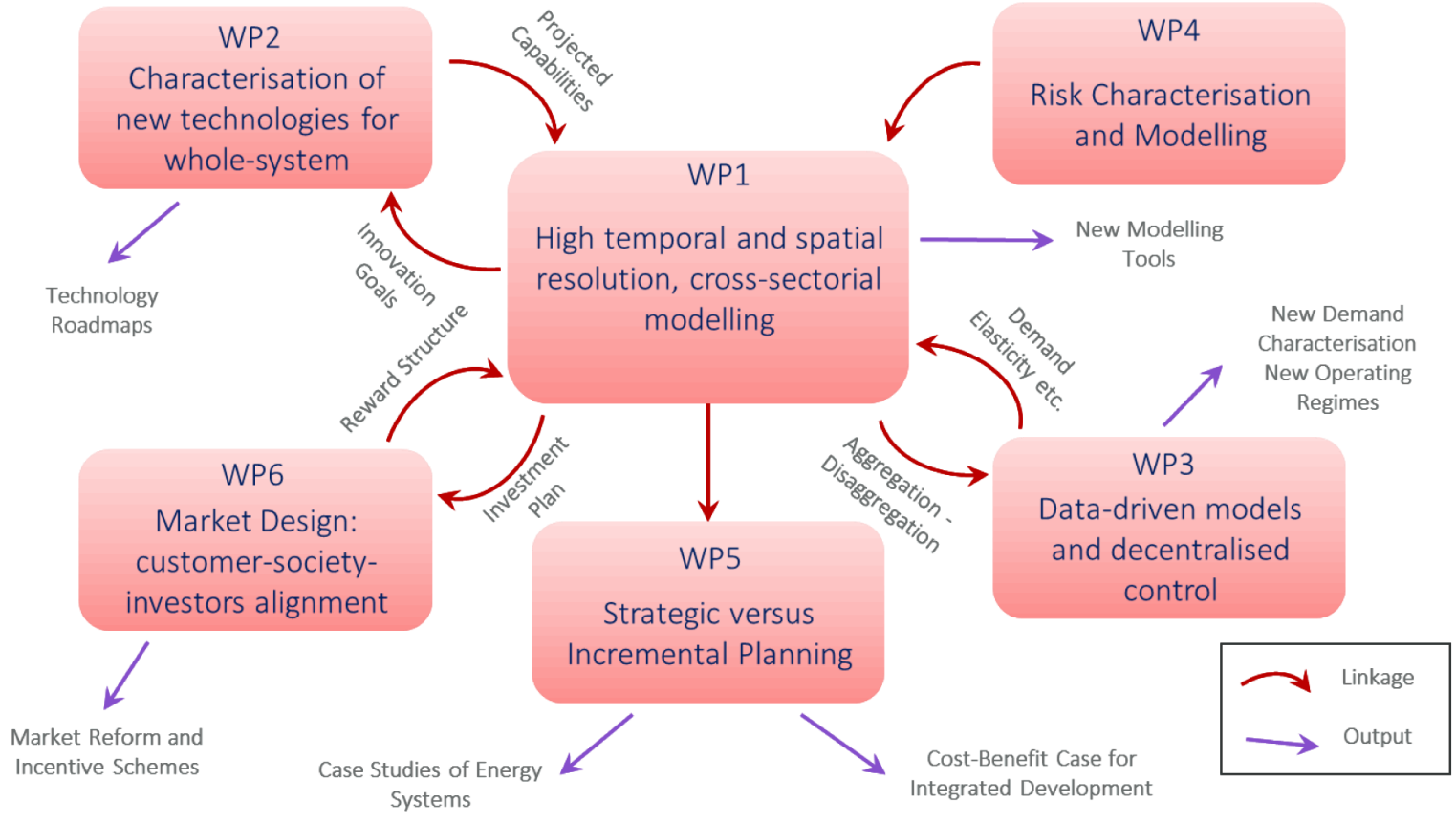
ABB

Ecocentric

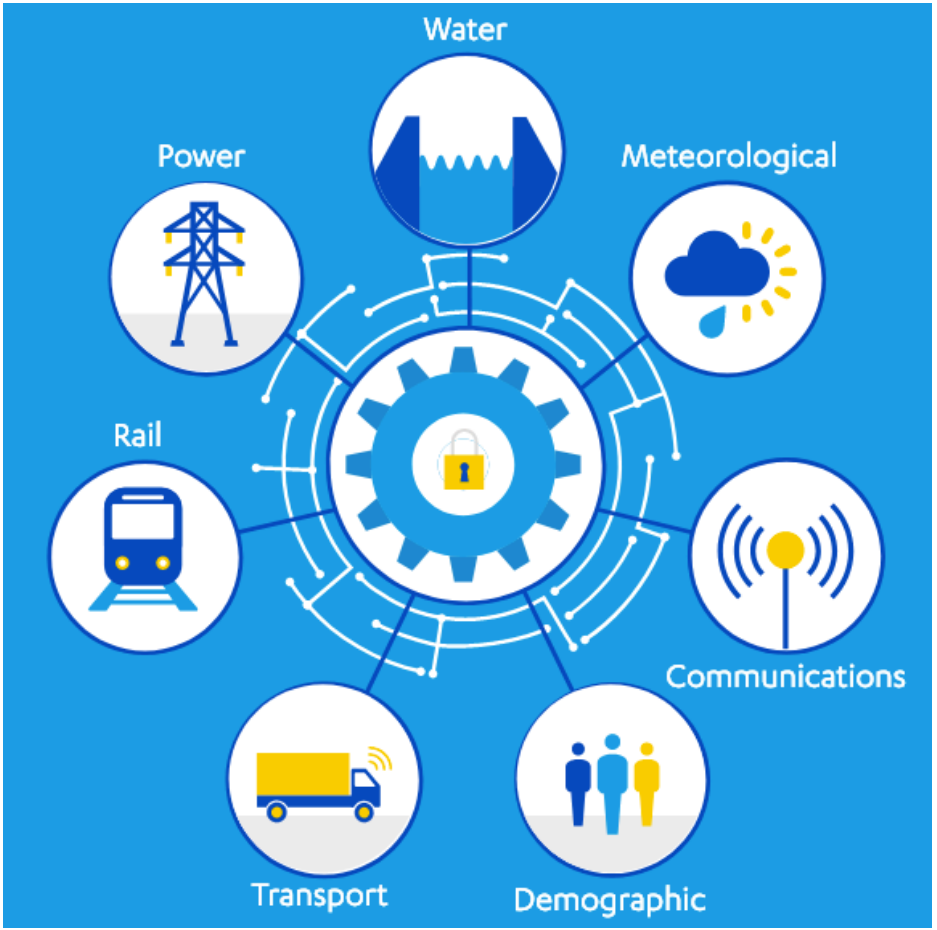
EDF Energy

IBM

Nationalgrid



National Infrastructure Commission: National Digital Twin or *Brit-Twin*



WHY DOES THE UK NEED A DIGITAL TWIN?

A national digital twin would enable the UK to develop a richer understanding of the way our infrastructure works and optimise it, so government and industry can make more informed decisions about the future.

- Optimise use of resources such as energy and water
- Reduce disruption and delay for transport and ease traffic flow
- Increase resilience in the face of terrorist attacks
- Boost quality of life for UK citizens
- Improve responsiveness in natural disasters

A digital twin that unifies these separate systems can answer questions such as:

Is it possible to:

Avoid building a new hospital carpark by managing appointment times and traffic flows?

Reduce energy consumption by 10% per person over six months?

Assess the impact of closing a road in the event of a water leak?

https://www.nic.org.uk/wp-content/uploads/Data-for-the-Public-Good-NIC-Report.pdf

https://www.cdbb.cam.ac.uk/Resources/ResoucePublications/TheGeminiPrinciples.pdf

The vision for the **national digital twin** is not that it will be a huge singular digital twin of the entire built environment. Rather, it is envisaged to consist of ‘federations’ of digital twins joined together via securely shared data.