Integrated BIM Solutions for Buildings and Campuses Infrastructure

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The Challenge

Buildings don't exist in isolation, but our data often does

Siloed systems

BMS, HVAC, lighting and security operate in disconnected silos

Estate complexity

Multiple buildings, stakeholders, and lifecycle stages create fragmented views

Data handover gaps

Design and construction data lost at practical completion

Hidden costs

Energy wastage, poor incident response, and poor sustainability outcomes

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The Solution

Connected estate operations

Digital Twin / Smart Estates

One unified data platform

Single federated model integrating BIM, GIS, building systems and sensor data

Live monitoring

Real-time dashboards across all buildings for energy, occupancy, air quality and asset condition

Golden thread

Asset data carried from design and construction directly into FM and maintenance systems

Data driven decisions

Scenario planning, predictive maintenance and sustainability modelling built on reliable, live data

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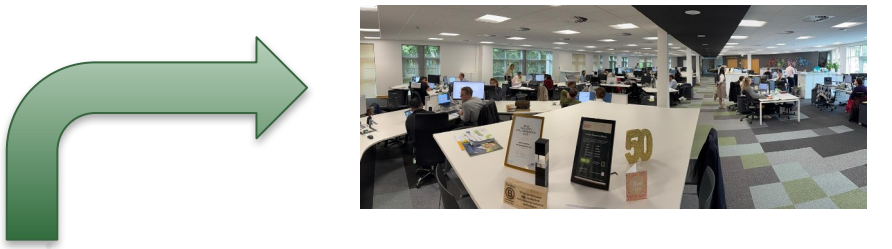
Digital twin: a bi-directional connection between physical and virtual environments



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Structured Data for Education Estates

Inputs (each school)

Local Data Sources
- BMS System
- PV Solar Arrays
- Smart Lighting
- IoT Devices
- Security Systems
- SIMS (MIS)
- Google / MS Tenancies
- IMP (Finance)

Communication via:
- Gateway
- API
- BACNet
- Modbus
- LoraWan

BIM
- 3D Graphical Geometry
- Non-graphical metadata

Public Data Sources
- Air Quality Data
- Weather Data
- School Inspections Data

Data L

Cloud Services
- IoT Core
- Stream Analytics
- Blob Storage

MQTT Protocol

ampu Digital Twin

Outputs

National Digital Twin (DfE)

Benefits & Outputs
- Energy Management
- Decarbonisation
- Occupancy optimisation
- KPI monitoring
- Learning Environment Quality
- FM - Predictive Maintenance
- Lifecycle monitoring
- Strategic Decision Making

Case Study: Digital twins for education estates

The Vision

- Centralise asset data
- Remove reliance on proprietary systems
- Support smarter facilities management
- Enable retrofit planning aligned with Net Zero ambitions
- Be accessible to both technical and non-technical users

Review of Existing Assets

What does each individual school already have in place and what can be utilised?

Sensors

BMS

CAFM

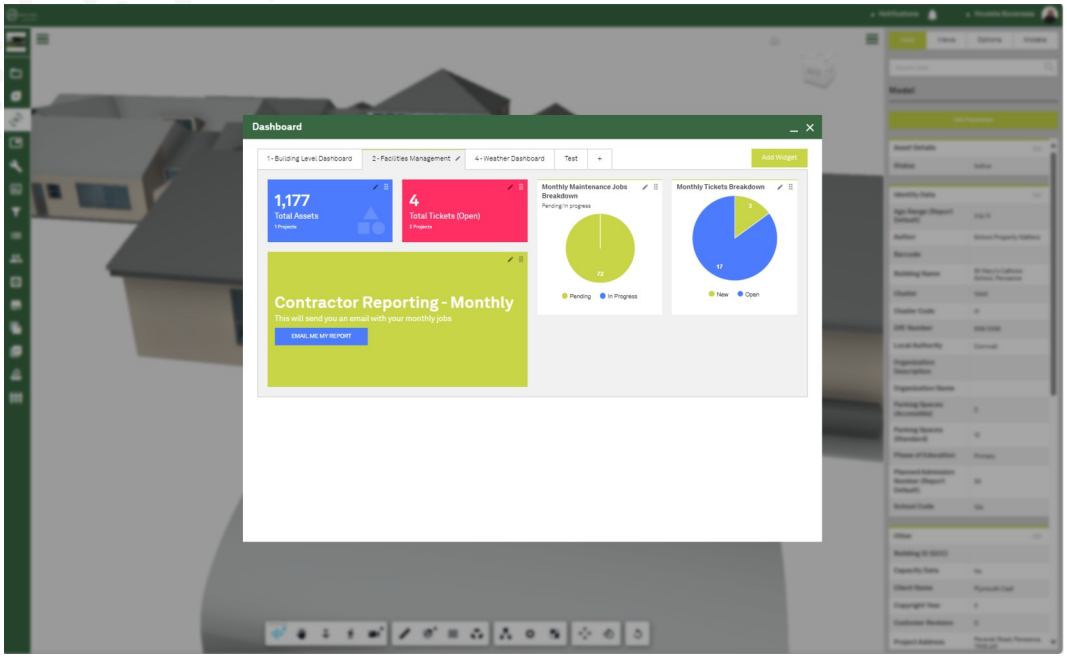
Data

Proof of Concept

This involved:

- Developing 3D models from 2D information using AI
- Structuring asset data using DfE naming conventions
- Integrating maintenance and BMS data

All of this was brought into a digital twin environment that became the foundation for wider estate insights.



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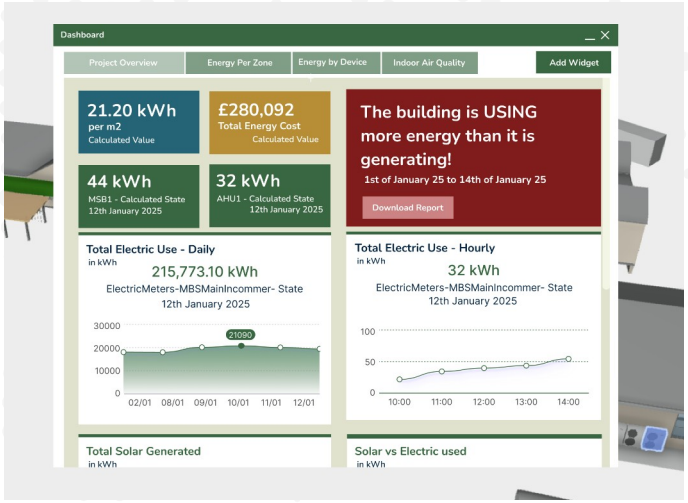
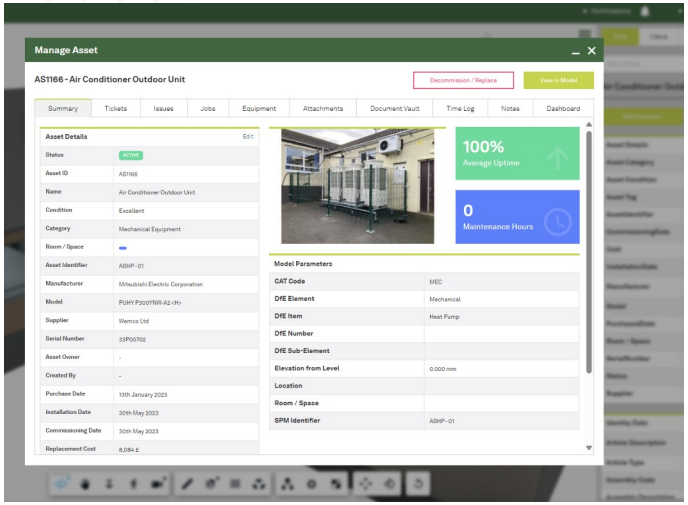
Smart Features in Practice





The digital twin delivered:

- Smart Planned Preventative Maintenance scheduling, assigned at the asset level
- SLA tracking connected to contractor performance
- Dashboards to monitor energy use and identify carbon reduction opportunities

All features were designed to work for both facilities teams and leadership, with custom views to support accessibility.

£60,000 savings annually through PPM alone.

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Thank You

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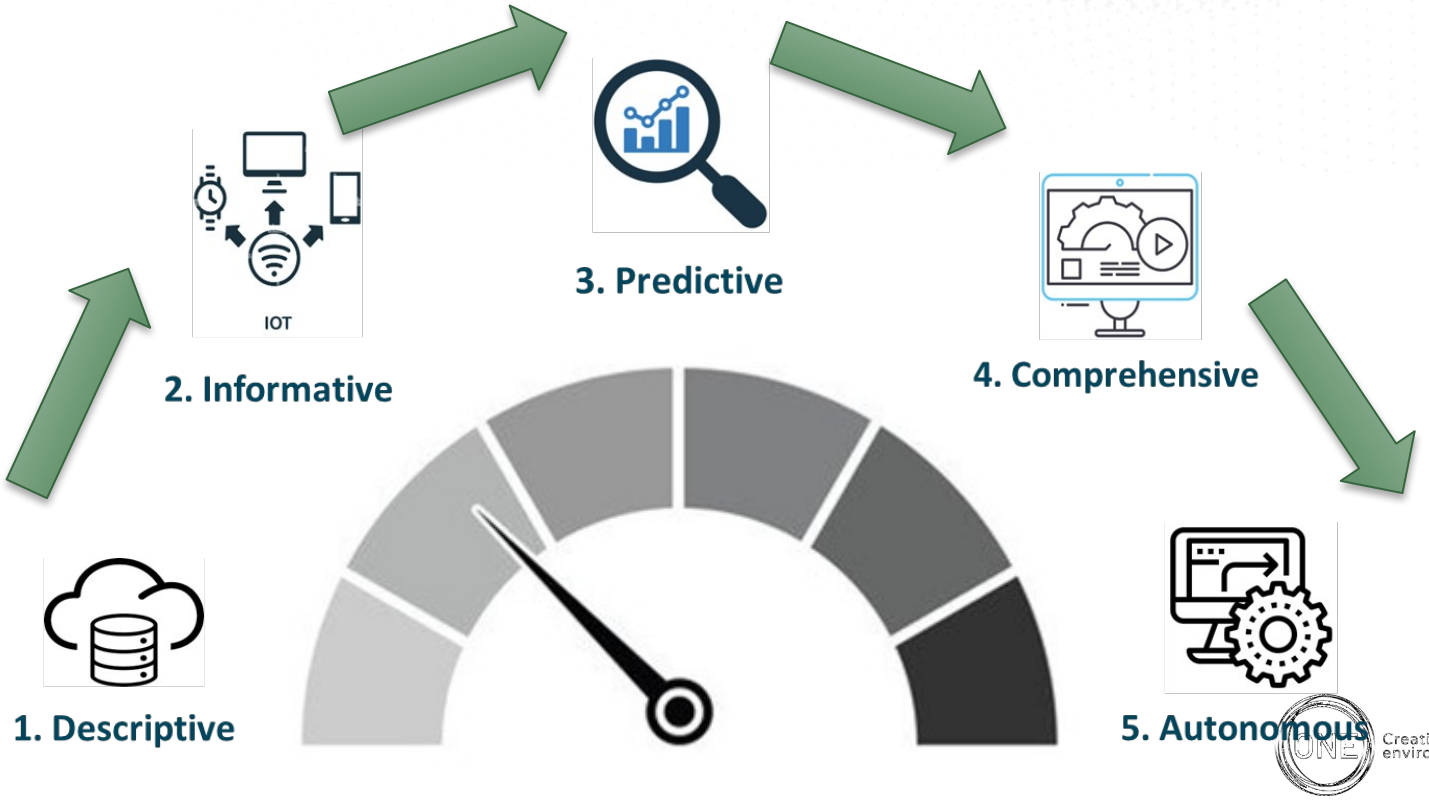
Digital Twin Maturity



Information Requirements

Organisational Information Requirements (OIR)

Identify Strategic Goals and Drivers

Engage Internal Stakeholders Across Functions

Define High-Level Information Outcomes

Asset Information Requirements (AIR)

Identify which assets need to be managed

Set out data fields for handover and ongoing FM

Prioritise high-impact systems (e.g., HVAC, lighting, renewables)

Exchange Information Requirements (EIR)

Specify required data at each project stage

Clarify formats, standards, roles, and responsibilities

Include validation and delivery methods

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