OptimiseAI

SMART BUILDINGS SHOW · IT & DIGITAL INFRASTRUCTURE THEATRE

Delivering the BIM Level 3 promise

Turning a handed-over model into an operational digital twin that cuts energy



Nick Tune
Co-founder & CEO, OptimiseAI

THE PROMISE · MAY 2011

The BIM mandate always included asset management mandate

> "Government will require fully collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016."
>
> Cabinet Office, Government Construction Strategy, May 2011

April 2016

Level 2 BIM mandatory on central government projects

PAS 1192-3:2014

Information management in operation

BS 1192-4:2014

COBie: structured asset data at handover

THE MATURITY WEDGE · BEW & RICHARDS, 2008

We reached Level 2ish, but Level 3 never came

LEVEL 0

Unmanaged CAD

2D drawings, paper or PDF

LEVEL 1

Managed CAD

2D and 3D files in a shared data environment

LEVEL 2

Collaborative BIM

Federated models, COBie at handover

Mandated 2016

LEVEL 3

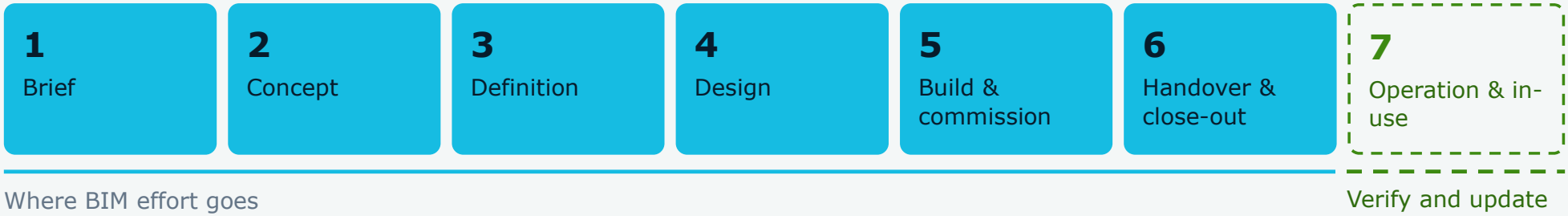
Integrated BIM

One open model (IFC) used for the whole life of the

Never delivered

PAS 1192-2 INFORMATION STAGES

Where BIM stops: Stage 7 was defined but rarely reached



DIGITAL BUILT BRITAIN · LEVEL 3 STRATEGIC PLAN, FEBRUARY 2015

Level 3 was written for the operational life of assets

33%

Whole-life cost saving target (Level 2: ~20% capex)

p.14

"In operation it provides … maintainers with accurate assessments of the condition of assets."

"The ability to measure 'in service' performance and compare it to 'as briefed' and 'as delivered' assets…"

LEVEL 3 DELIVERY STAGES, 2015

Recognise these problems, 11 years on???

Stage	Proposed	Barrier (our reading)
3A	Better handover data; FM contracts	FM can't use the handover
3B	IoT; incentives to capture data	No one paid to keep data right
3C	Performance-based contracts	Fees reward activity, not outcomes
3D	International standards	Achieved: ISO 19650

WHAT HAPPENED · 2011 TO 2022

From BIM Level 3 to digital twins

2017

NIC calls for a national digital twin; up

2018

National Digital Twin programme; Gemini Principles

2019

ISO 19650; “BIM levels” retired

2020

ISO 19650-3 for operation

2022

CDBB closes

WHAT CHANGED

Level 3 was renamed, not delivered.

Digital twins carry the same promise. What didn’t carry over: a mandate to asset model to the people who run the building.

WHY IT DIDN'T TRANSFER

Why the asset information model sits unused

01

Quality

Incomplete, inaccurate or unusable by FM

02

Habit

FM runs on PDFs, spreadsheets and BMS screens

03

Incentive?

If the model worked, whose would fall?

REASON 1 · QUALITY

The model handed over isn't fit to operate from

2,177

information issues across three projects with strict BIM

Tsay et al., Frontiers in Built Environment,

> *"We cannot always trust the information presented in the models."*

Senior design leader, quoted in Tsay et al., 2023

REASON 2 · HABIT

Facilities management works the way it always has

What the project hands over

- IFC or Revit models
- COBie spreadsheets
- AIM in a common data environment

What FM actually works from

- PDF O&M manuals
- BMS screens
- Meter readings
- Helpdesk tickets

FM will use a model only if it answers: why is usage up, and what do we fix first?

REASON 3 · A QUESTION, NOT AN ACCUSATION

Who gets paid when the data is poor?

Work created by missing or untrusted data:

- Re-surveys and asset tagging
- One-off audits and condition surveys
- Reactive fault-finding
- Manual reporting cycles

A trusted, live model removes work: a threat to some fees, an opportunity for anyone paid on outcomes.

The 2015 plan called for "new performance contracting models".

Digital Built Britain, p.15

OPTIMISEAI AND CARDIFF UNIVERSITY

We started on this before the mandate





Nick Tune



Prof. Yacine Rezgui

2007	BRE Wales research centre at Cardiff: can building information run buildings better?
2011–14	KnoHolEM (EU): information models for energy management in public
2010s	Semantic digital twins and the CUSP platform; £10m+ UKRI funding
2019–23	US patent: semantic, autonomous building optimisation
2023	OptimiseAI spun out of Cardiff University
2024–26	Network Rail, ScotRail; Wales Tech Start-Up of the Year 2024

HOW WE DELIVER IT

Taking the handed-over model into operation

Validate. Enrich. Connect. Cut energy and water.



THE METHOD

From handed-over model to operational twin

1

Ingest

IFC, Revit, COBie, O&M. No model? Build one from and GIS.

2

Validate

Check spaces, systems and links against operational needs

3

Enrich

Fill gaps; build semantic model

4

Link

Map meters, BMS and IoT to spaces and systems

5

Calibrate

Simulation tuned to measured use sets the baseline

6

Act and

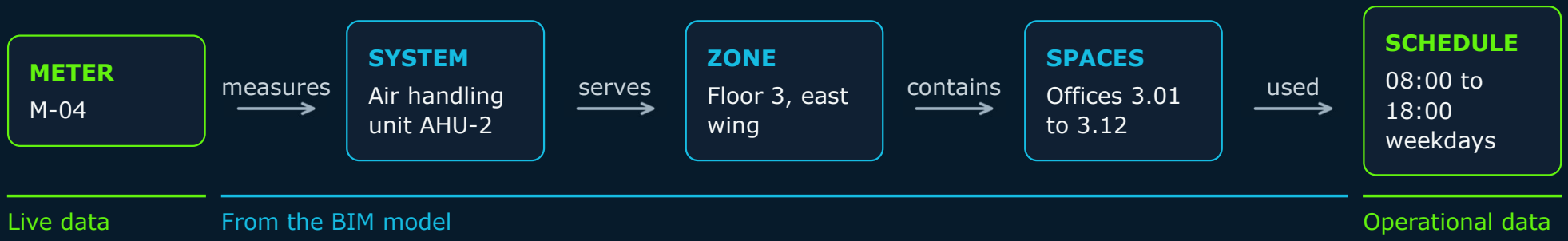
Find waste, act, check against the twin

Steps 1–3: **model quality**. Steps 4–5: **live operation**. Step 6: what FM uses every week.

THE CORE IP · SEMANTIC DIGITAL TWIN

Semantics let the twin reason about the building

ILLUSTRATIVE EXAMPLE



M-04’s night-time load rises: the twin knows AHU-2 serves empty offices, and to expect. Result: a cause and an action, not another graph.

Patented approach: US11669059B2

LEVELS OF DETAIL · BIM

BIM LODs describe the building as built

LOD 100

Concept

Massing; approximate

Stage 2

LOD 200

Approximate

Generic systems; approximate size and location

Stage 3

LOD 300

Precise

Specific elements; accurate size and location

Stage 4

LOD 400

Fabrication

Fabrication and installation detail

Stage 5

LOD 500

As built

Field-verified as built

Stage 6 · handover

In use

Not defined

No level for live performance

Stage 7

Sources: AIA E202 and BIMForum LOD Specification; stage alignment approximate (PAS 1192-2).

LEVELS OF DETAIL · OPTIMISEAI

Our LODs describe the building as it runs



LOD 1 Core

Whole building

Smart meter, whole-building assessment

Builds on BIM at LOD 100–200

Form, fabric, area and use



LOD 2 Plus

Zones and rooms

Zone and room sub-metering, IoT anomaly alerts

Builds on BIM at LOD 300

Spaces, zones and room data



LOD 3 Advanced

Dynamic optimisation

System sub-metering, BMS live control

Builds on BIM at LOD 400–500

Systems and what serves what

WHY THE HANDOVER MATTERS

A good asset model is the shortcut from Core to Advanced

Level	Live data	Needs	Without an AIM	With an AIM
LOD 1 Core	Smart meter	Form, fabric, use	Built from EPC and GIS	Read from the model
LOD 2 Plus	Sub-meters, IoT	Spaces and zones	Surveyed or inferred	Read from the model
LOD 3 Advanced	BMS points, actuation	Systems, what serves what	Mapped by hand	Topology from the model

No perfect model needed to start. A good one gets you to LOD 3 faster and for less.

ENERGY AND WATER

What the twin finds, and what to do about it

Detect

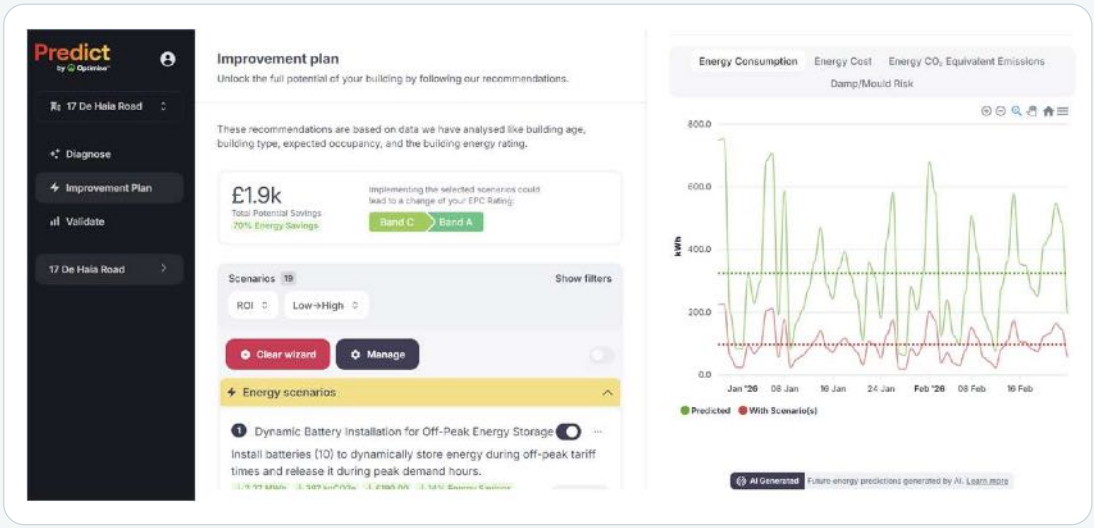
Out-of-hours load, control faults, abnormal water flow

Evaluate

Test and rank measures by savings, cost, carbon and

Act

Plain-language actions for FM, or direct BMS control



Predict: improvement plan for a building

VERIFICATION · PAS 1192-2 STAGE 7, DELIVERED

Every saving is checked against the twin

1. **Baseline**
   Twin predicts expected use
2. **Implement**
   Make the change
3. **Measure**
   Stream actual consumption
4. **Verify**
   Compare with the twin, continuously



From static plan to continuous performance management

RESULTS

Working in live, complex estates

25%

Average energy reduction in trials, with better air quality

Cardiff University, July 2025

300+

ScotRail: 25 stations → 8 in depth → 300+ net zero planning

2

Network Rail: Reading and Bristol Temple Meads



FOR CLIENTS, DESIGNERS AND FM TEAMS

Four things to ask for at your next handover

1 Specify for operation

Start with the Why and the What (do you need to manage the asset)

2 Validate before handover

QA/QC the model before practical completion

3 Connect from day one

Link meters and BMS while commissioning is on site

4 Pay for outcomes

Contract on measured performance (DBB Level 3C)

Optimise AI

Level 3 was never about the model. It was about running the building.



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