CILA & AIRMIC SEMINAR

Building Information Modelling

'Not Everything That Glitters is Gold'

by the CILA Construction, Energy & Engineering SIG and the Airmic Construction SIG

Speakers

Gary Holbrook, BAM
Phil Palmer, BAM
May Looi, Kennedys
John Farrell, Kennedys
Mike Skingsley, Crawford & Company

Introduction

Gary Holbrook, BAM

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Legal advice in black and white

BIM @ BAM Construction

by Phil Palmer - Virtual Construction Manager
- BAM Construction Ltd

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BIM

It's a Process and NOT Software

The BIM Process is achieved through the **creation, collation** and **exchange** of 3d models and intelligent structured data shared by the design team, contractor, supply chain, client and end users, to drive **efficiencies , foster innovation** and achieve **optimum asset performance.**

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2D	Traditional CAD Approach providing a transition fro Hand to Computer drafting using lines and limited data associated.
3D	Component based applications with 3 dimensional Geometry and associated data to reflect what it really is. ‘ A Virtual design model ‘ Drawing output is created from the 3d data.
4D	Applications linking Construction tasks to the 3D Model geometry providing a virtual build sequence. Providing certainty of build sequence
5D	Applications linked to 3d Model data to extract quantifications for estimation and cost controls.
6D	Ability to use the BIM Model to create Facility Management Assets and Maintenance Tasks and run the building in the future. Structured data provided from the BIM Process

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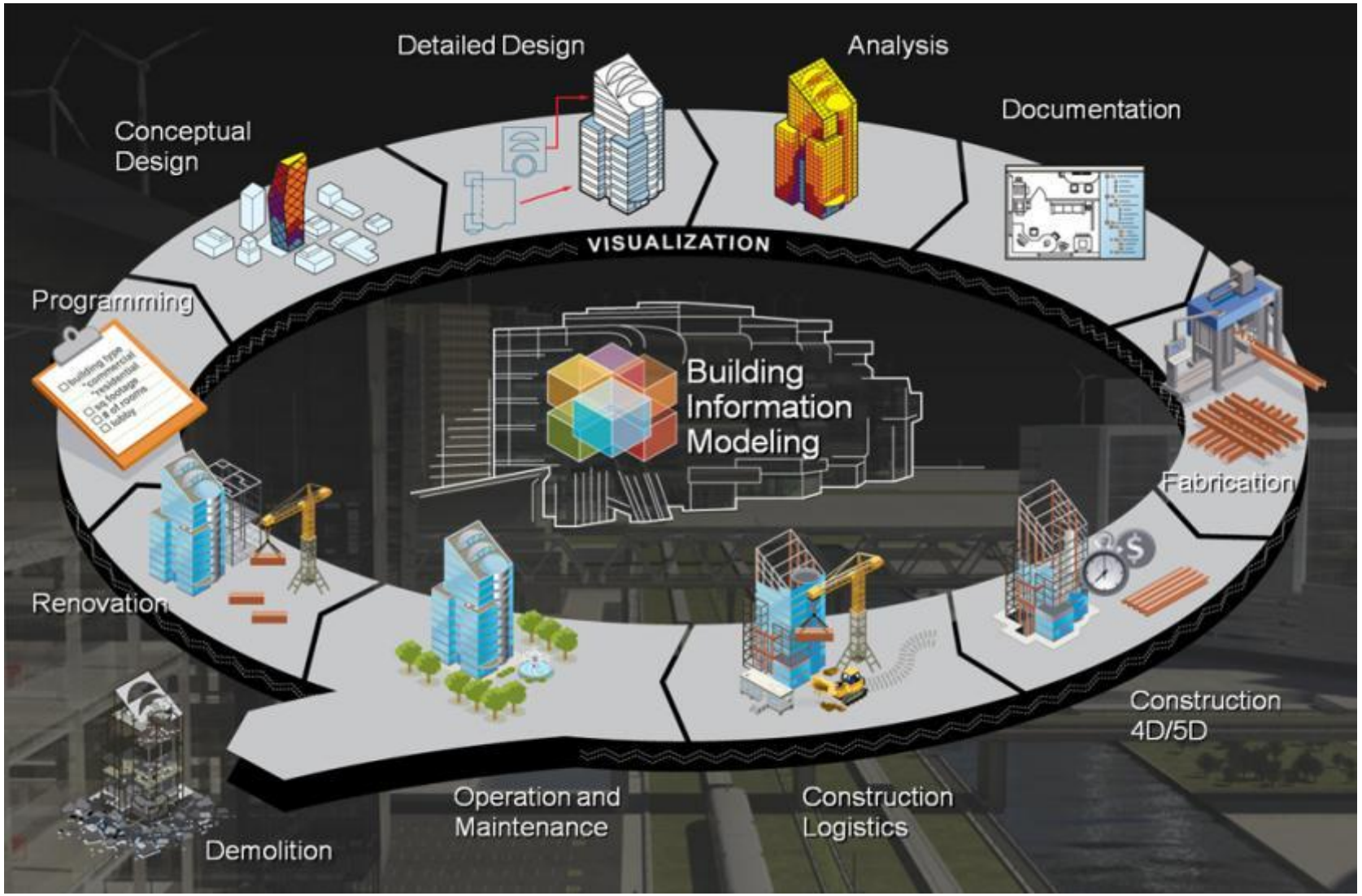

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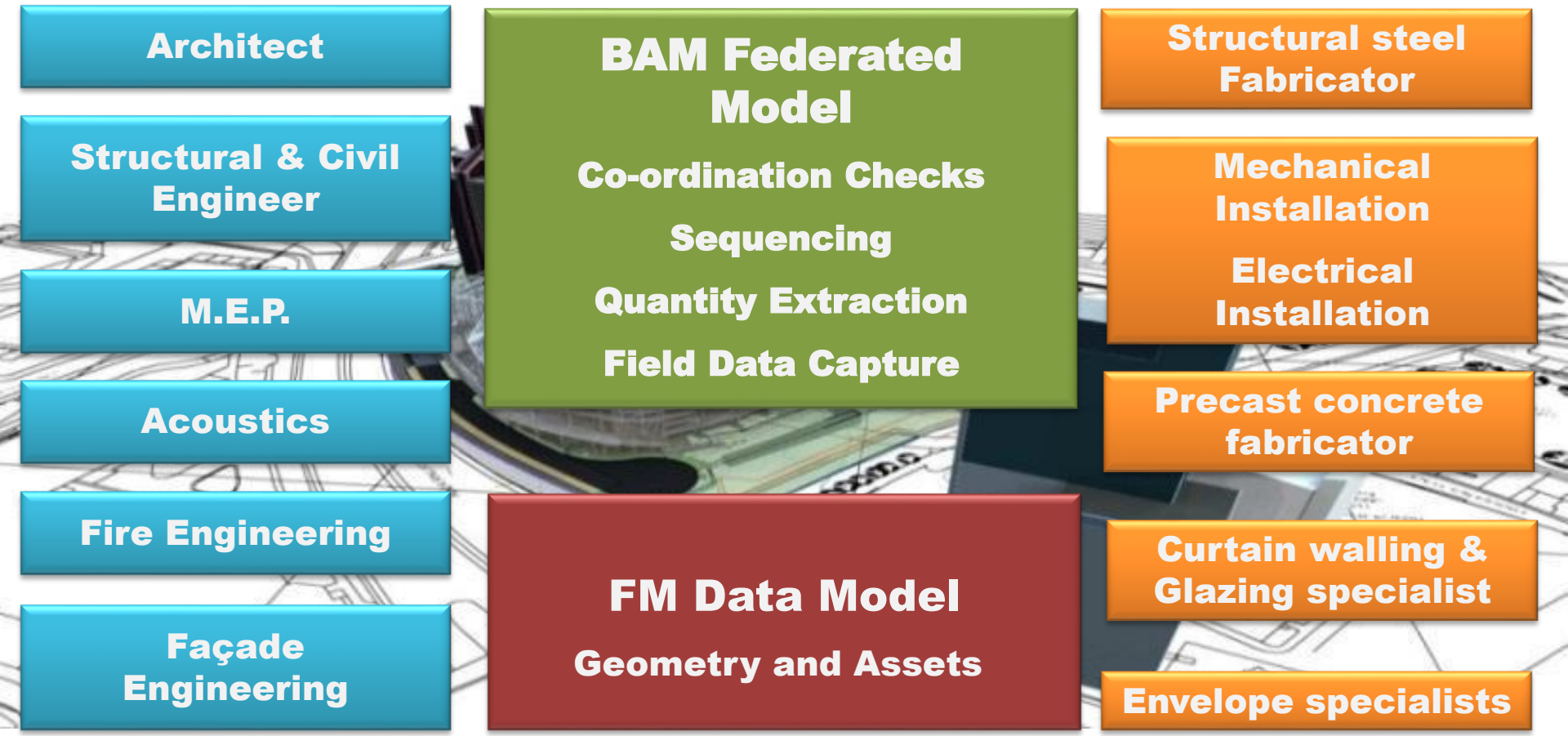

Design Intent Models

- Architect
- Structural & Civil Engineer
- M.E.P.
- Acoustics
- Fire Engineering
- Façade Engineering

Construction BIM Process

BAM Federated Model

Co-ordination Checks

Sequencing

Quantity Extraction

Field Data Capture

FM Data Model

Geometry and Assets

Specialist Sub-Contractor Supply Chain

- Structural steel Fabricator
- Mechanical Installation
- Electrical Installation
- Precast concrete fabricator
- Curtain walling & Glazing specialist
- Envelope specialists

Did you know?

- 30% of **construction** is **rework**
- 60% of **labour effort** is **wasted**
- 10% **loss** due to **wasted materials, injuries**

  Mistakes and **delays** are the biggest added cost to a project
- 80% of inputs are **identical**
- Estimate **+20% increased cost,** due to above conditions

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BIM why it matters!

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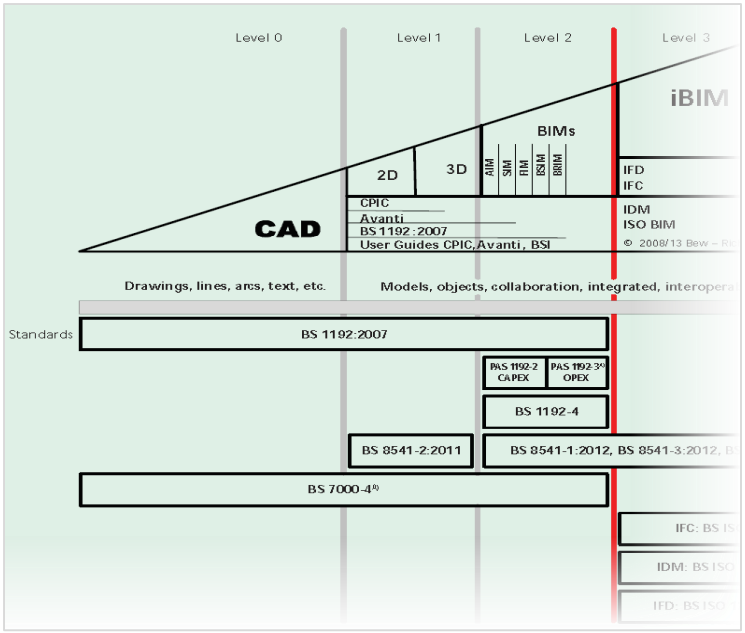
BIM FORMS PART OF THE WHOLE STRATEGY

OTHER AREAS INCLUDE:

- BETTER CLIENT BRIEFS AND **REDUCED SCOPE CREEP**
- MORE **SUPPLY CHAIN** DESIGN ENGAGEMENT
- REDUCED LUMP SUM TENDERS, **MORE PRICE BENCHMARKING**
- MORE OFFSITE MANUFACTURING AND **PREFABRICATION**
- BETTER **VISIBILITY** OF FORWARD PROGRAMME (2 YEARS)
- REPLACE ADVERSARIAL WITH **COLLABORATIVE** CULTURES
- BETTER ALIGNMENT OF **DESIGN, CONSTRUCT, OCCUPY** AND **MANAGE**

WHAT IS COLLABORATIVE LEVEL 2 BIM?

Collaborative BIM is not just parties sharing model data with one another. True collaboration using BIM is understanding the information needs of the other parties, and providing timely, accurate and useful data to them.



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LEVEL 2 BIM DEFINED AND SUPPORTED WITH STANDARDS

The Government in March 2014 defined Level 2 BIM as executing a project using the following 8standards. Some of which aren't yet available:

PAS 1192-2:2013
Specification for information delivery & management during CAPEX phase

CIC BIM Protocol (2013)
Provides templates for the creation of BIM execution plans, required roles & responsibilities and team capability assessments

Classification (April 2015)
Provides a standardized classification system to identify component types and aid interoperability of data between systems. This will form part of the dPoW

PAS 1192-3:2014
Specification for information delivery & management during OPEX phase

Government Soft Landings (GSL)
Approach to ensure asset can be used and operated from handover and check that asset meets operational performance brief during first 3 years following handover:

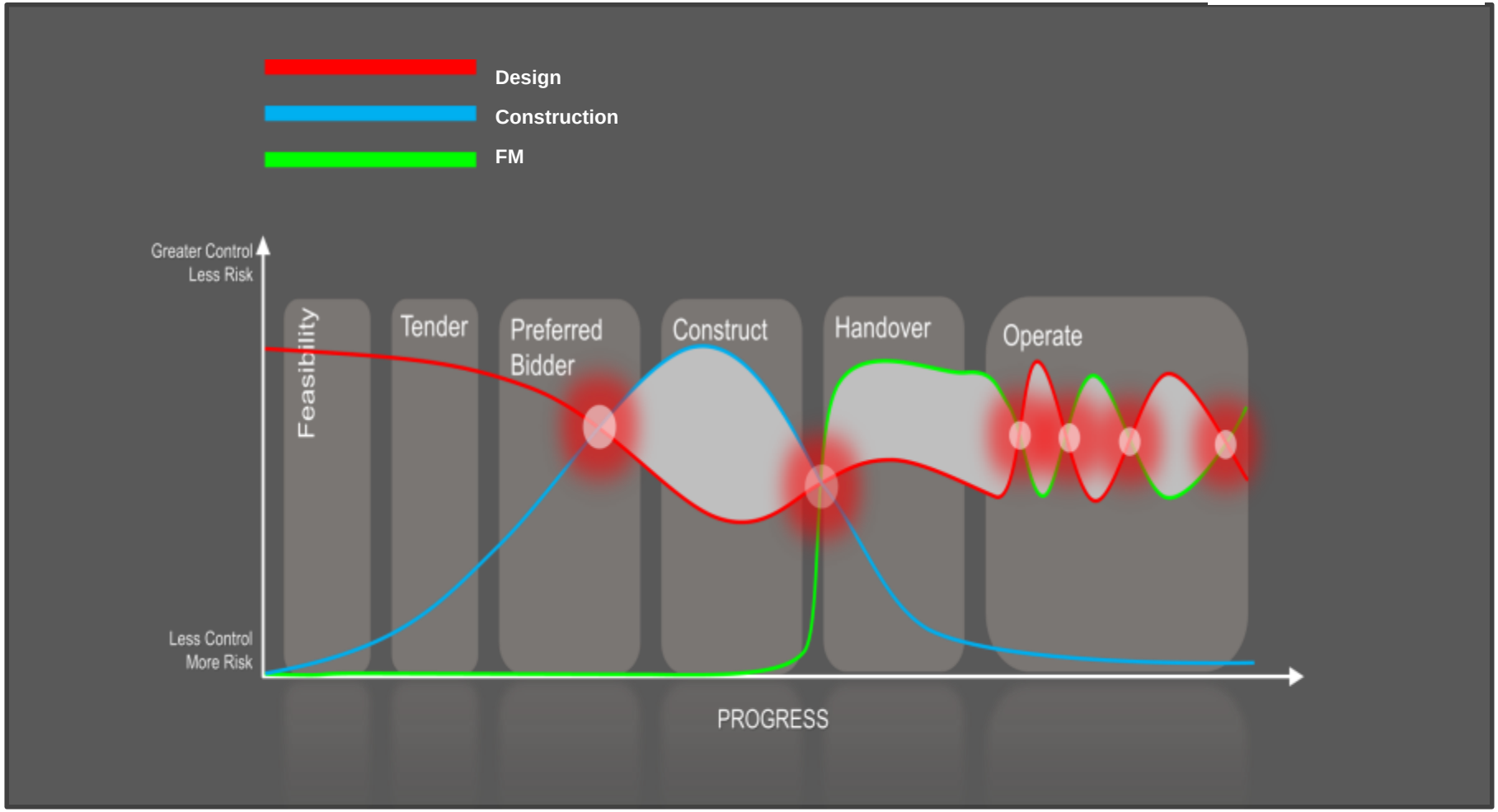
- Design to generate productivity
- Flavour
- Lean project
- Project strategy intervention

Digital Plan of Work (dPoW) (April 2015)
Describes the data that is required to be provided by the project team to fulfill the Employer's Information Requirements. Effectively a data specification for the BIM

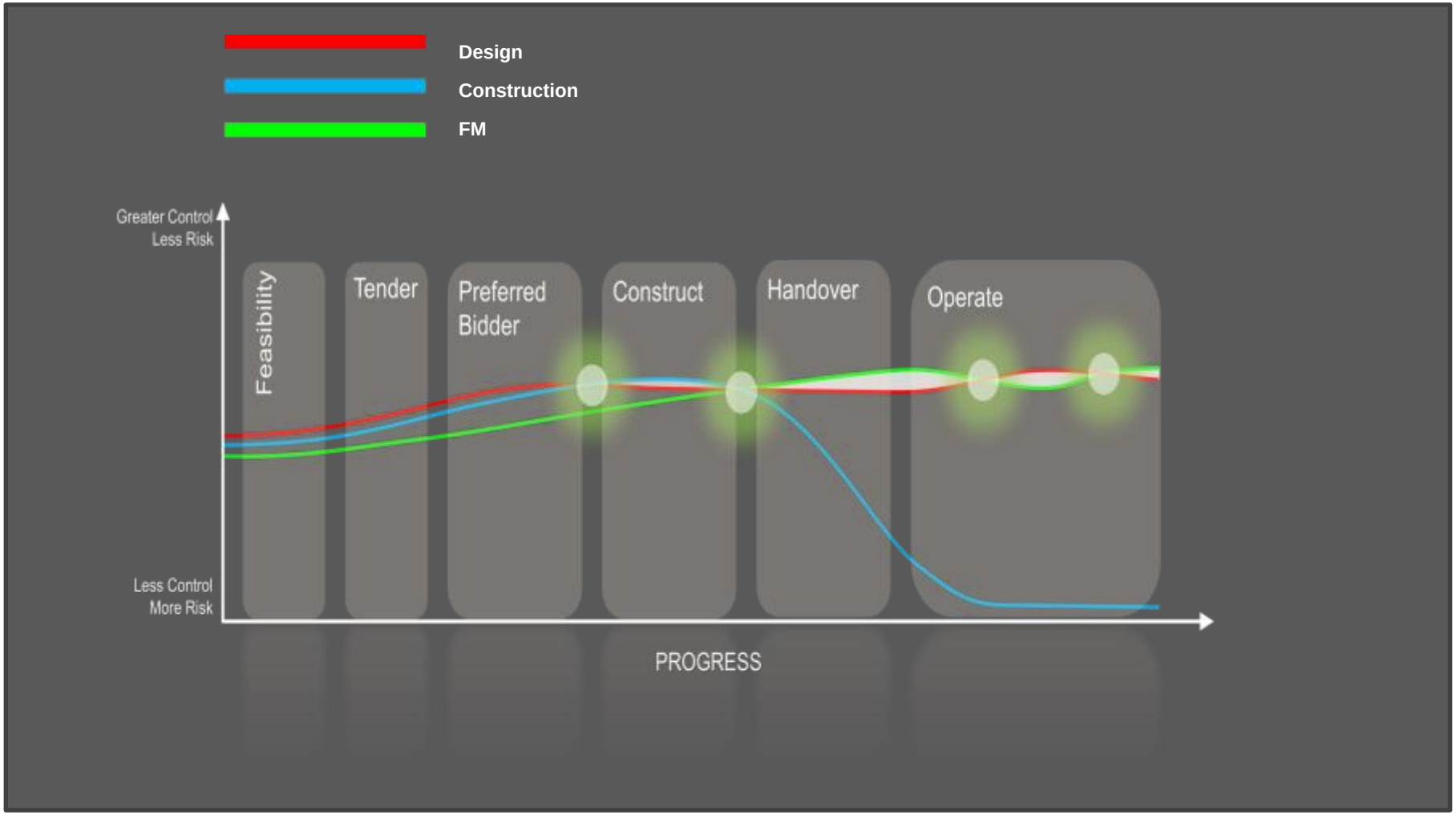
BS 1192-4:2014
Specification for the production of Non-Graphical Data (Structured Information) in COBie format

PAS 1192-5:2015
Specification for Information Security to control access to parts of the information model
*Announced October 2014

Information management - The Standard Process



Information management - Streamlined BIM Process



BIM opportunities

DESIGN

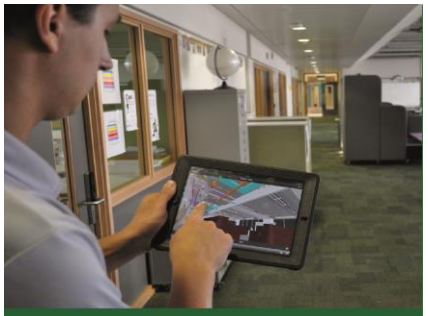
- Visualisations
- Assembly Drawings
- Coordinated Documents
- Existing Condition
- Capture
- Rapid Energy Modeling
- Site Analysis
- Intelligent Content

PRE-CONSTRUCTION

- 4D Scheduling
- Clash Detection
- 5D Take-off
- Life Cycle Decisions

CONSTRUCTION

- Bidding & Coordinating Subcontractor Shop/Submissions
- Prefabrication
- Machine Controlled
- Grading
- Monitor Field Work
- 360 Field



OPERATIONS

- As Built Intelligent Model
- Building Controls
- Facilities Management
- Renovation Control
- 6D Automated Data
- Generation

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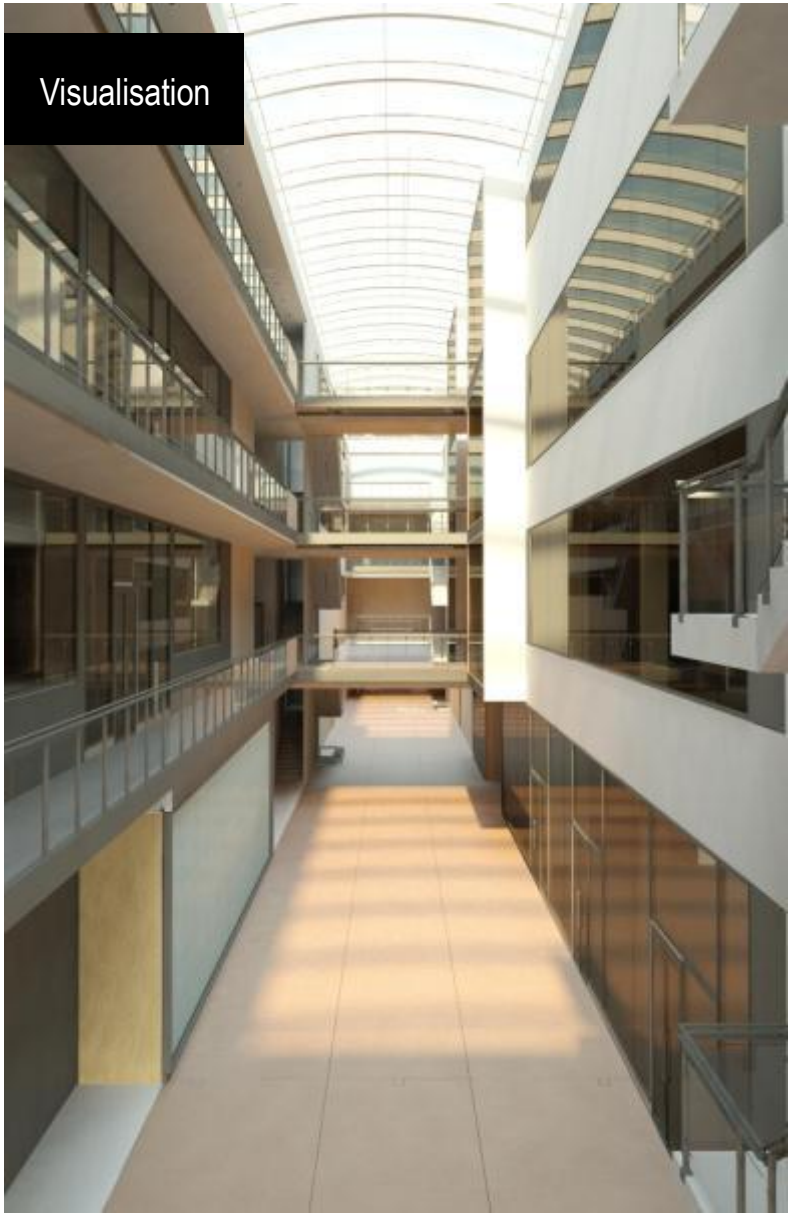
Visualisation



Reality

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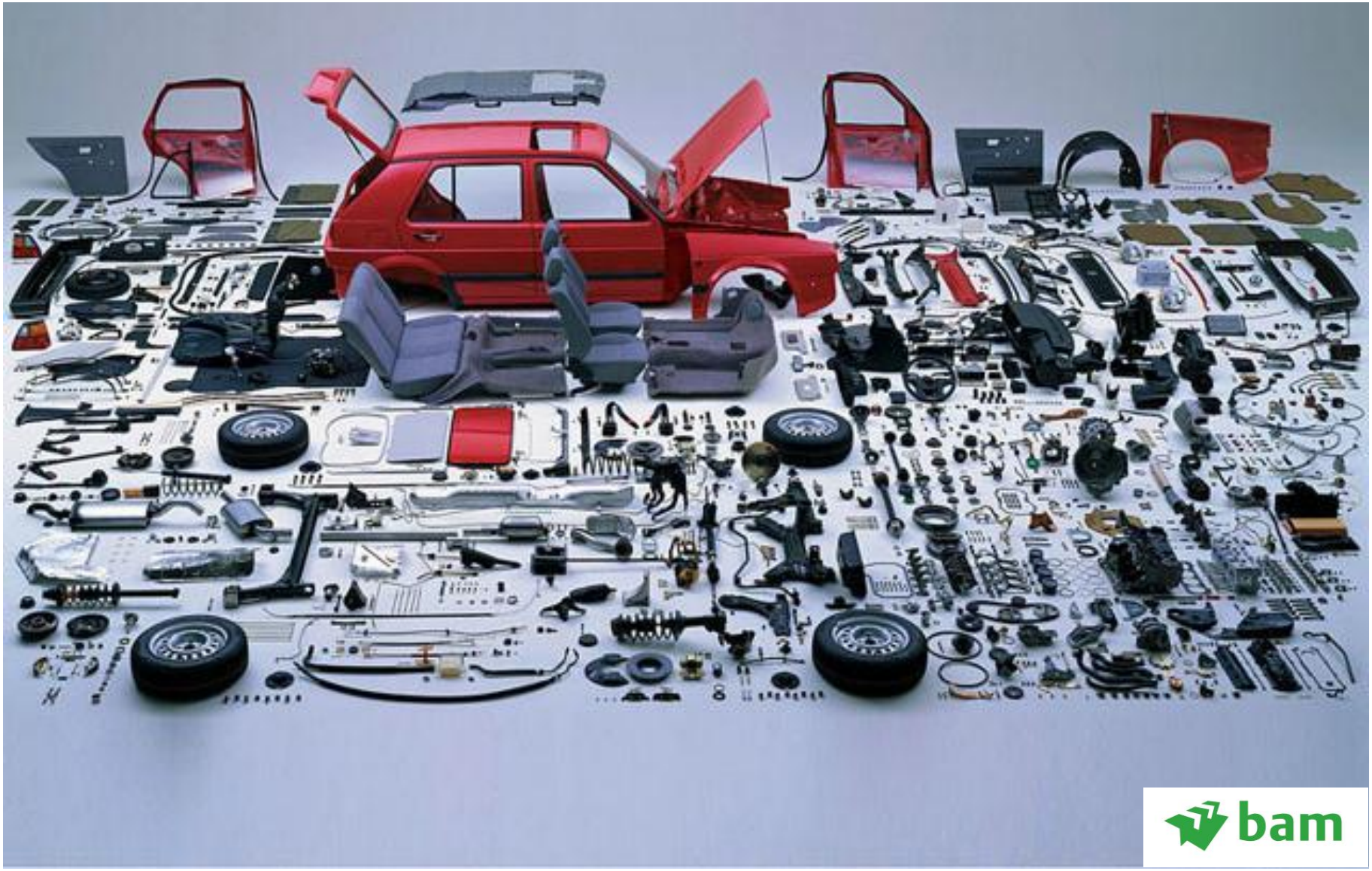
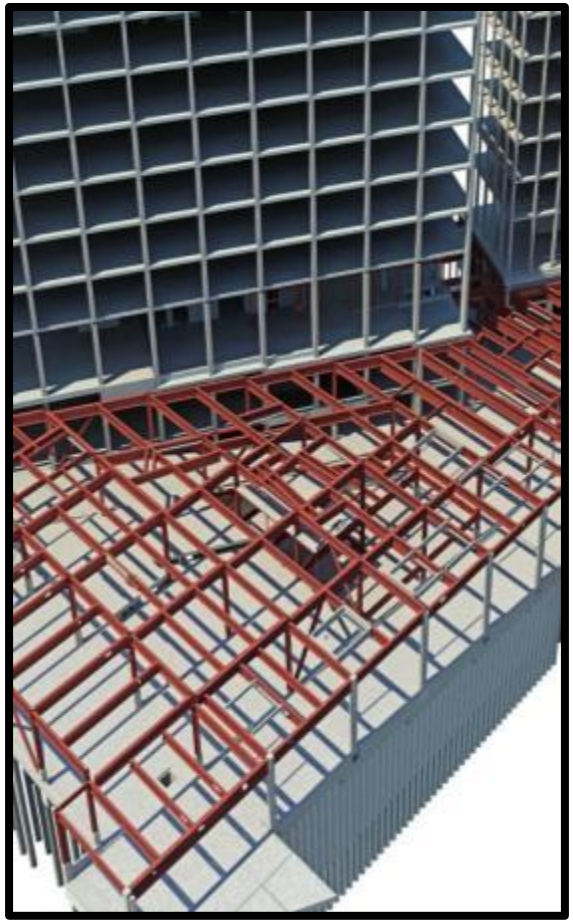
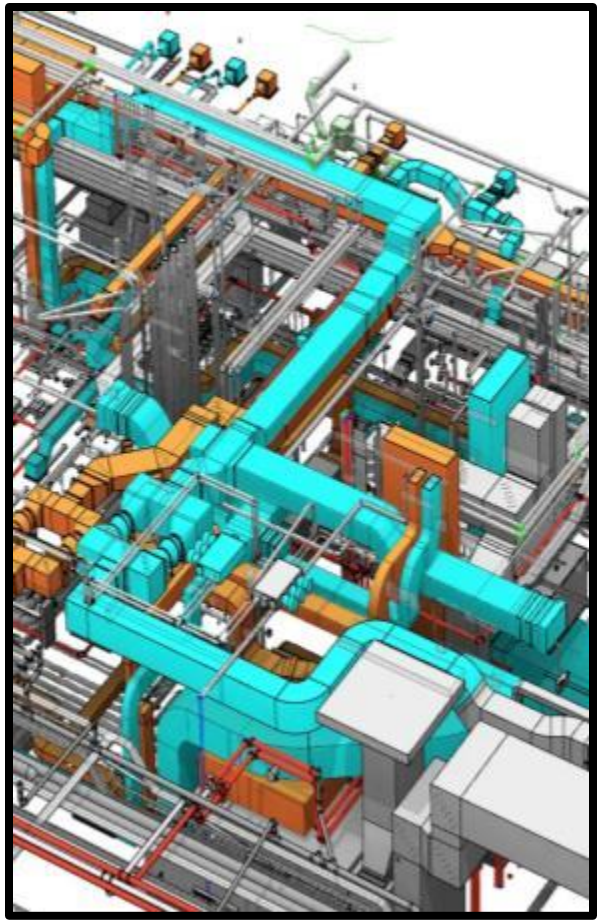
Building components with embedded data and tagged



Embedded into large multi-disciplinary design models





Intelligent embedded 3d content

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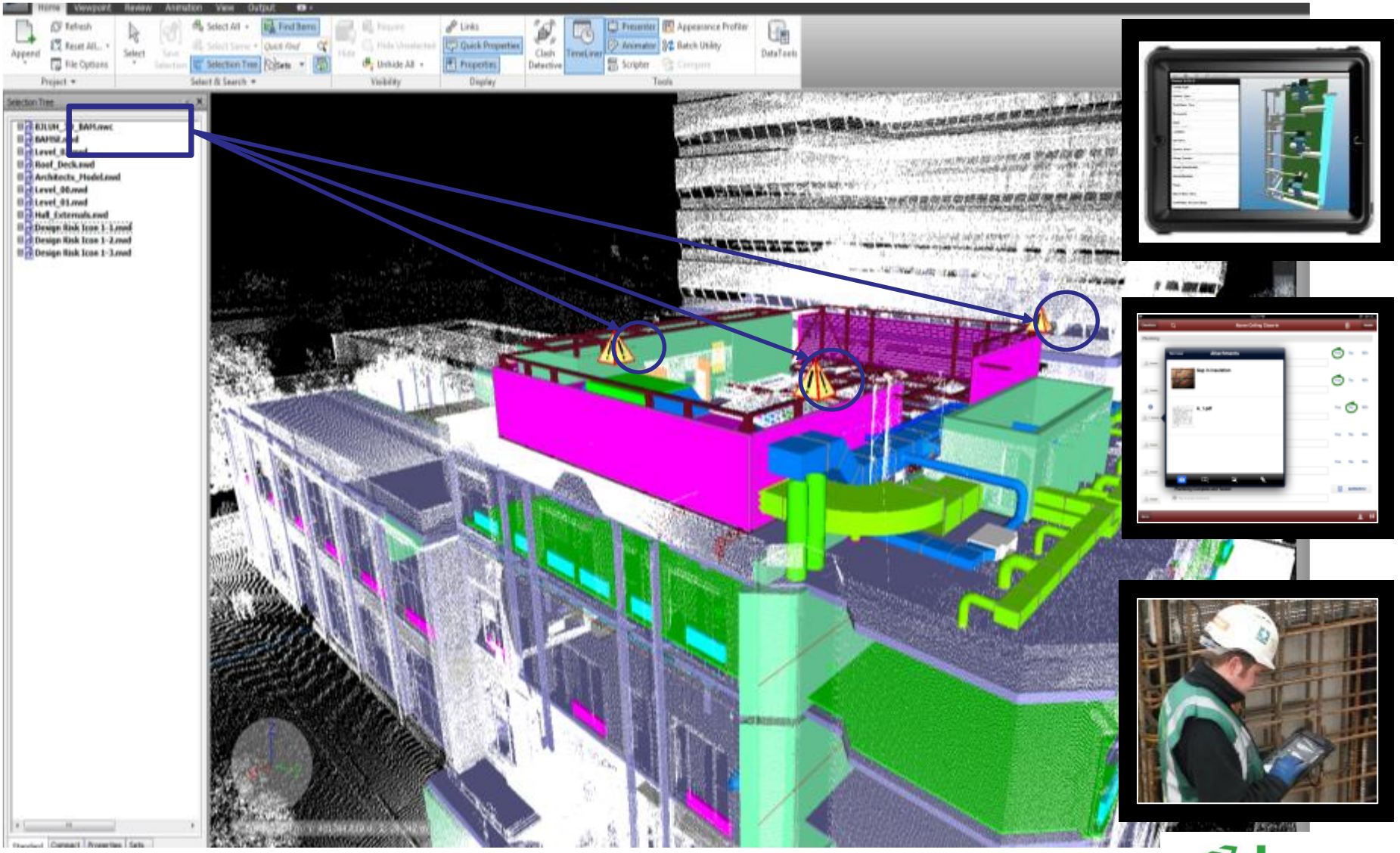

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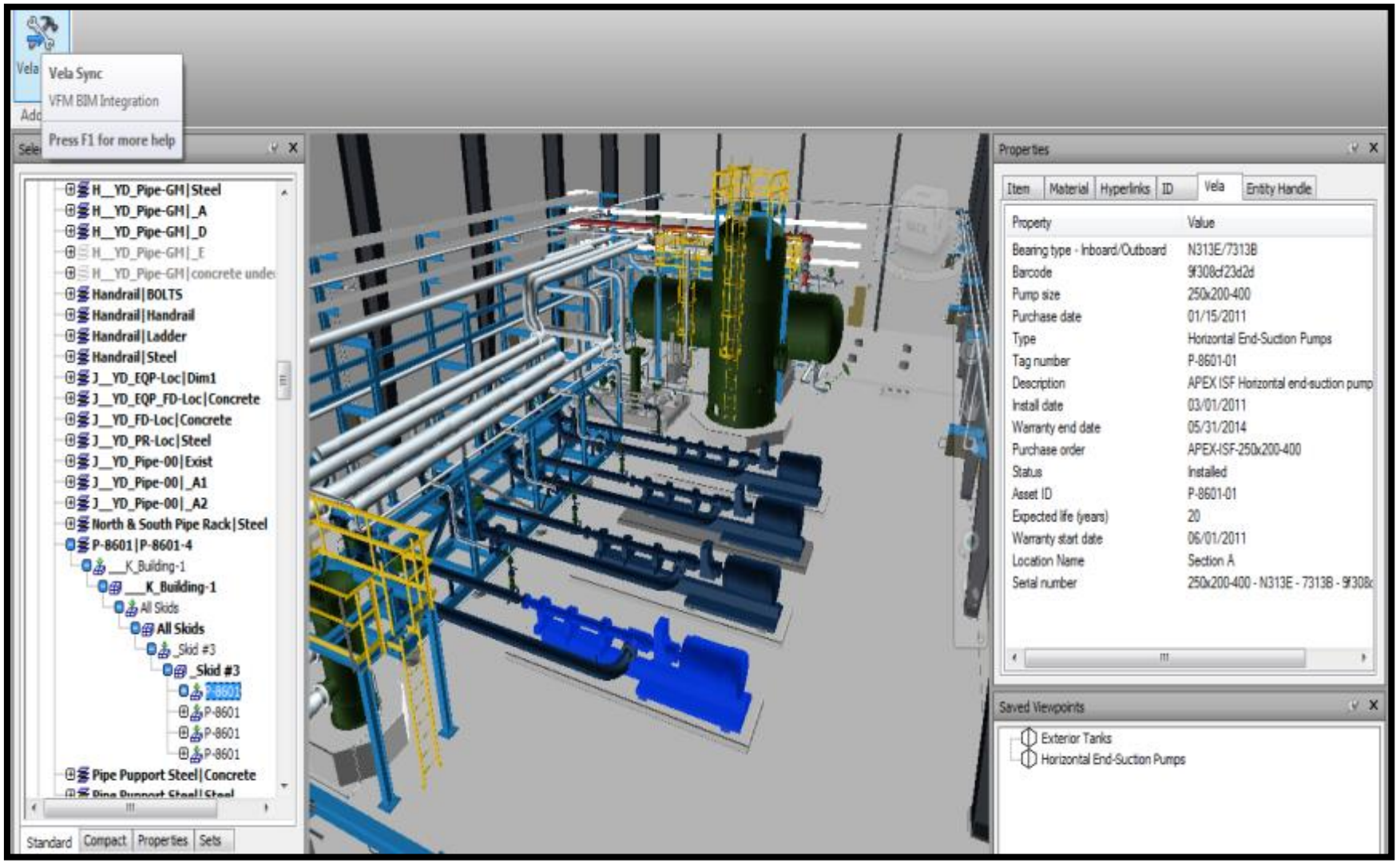
O&M information linked to the model



LEEDS ARENA

Leeds Arena, a new high profile cultural facility in the heart of the city.

Our use of BIM allowed us to “build the arena twice”, once in virtual 3D CAD and then on site.

This has driven efficiency throughout the design and construction phases

- 1,000+ design co-ordination issues found [saving £500k]
- 30% less revisions of drawings to process
- 9,000 less paper drawings
- 15,000 hours saved across the team
- 60,000 miles saved through Webex BIM meetings
- 8% less material waste

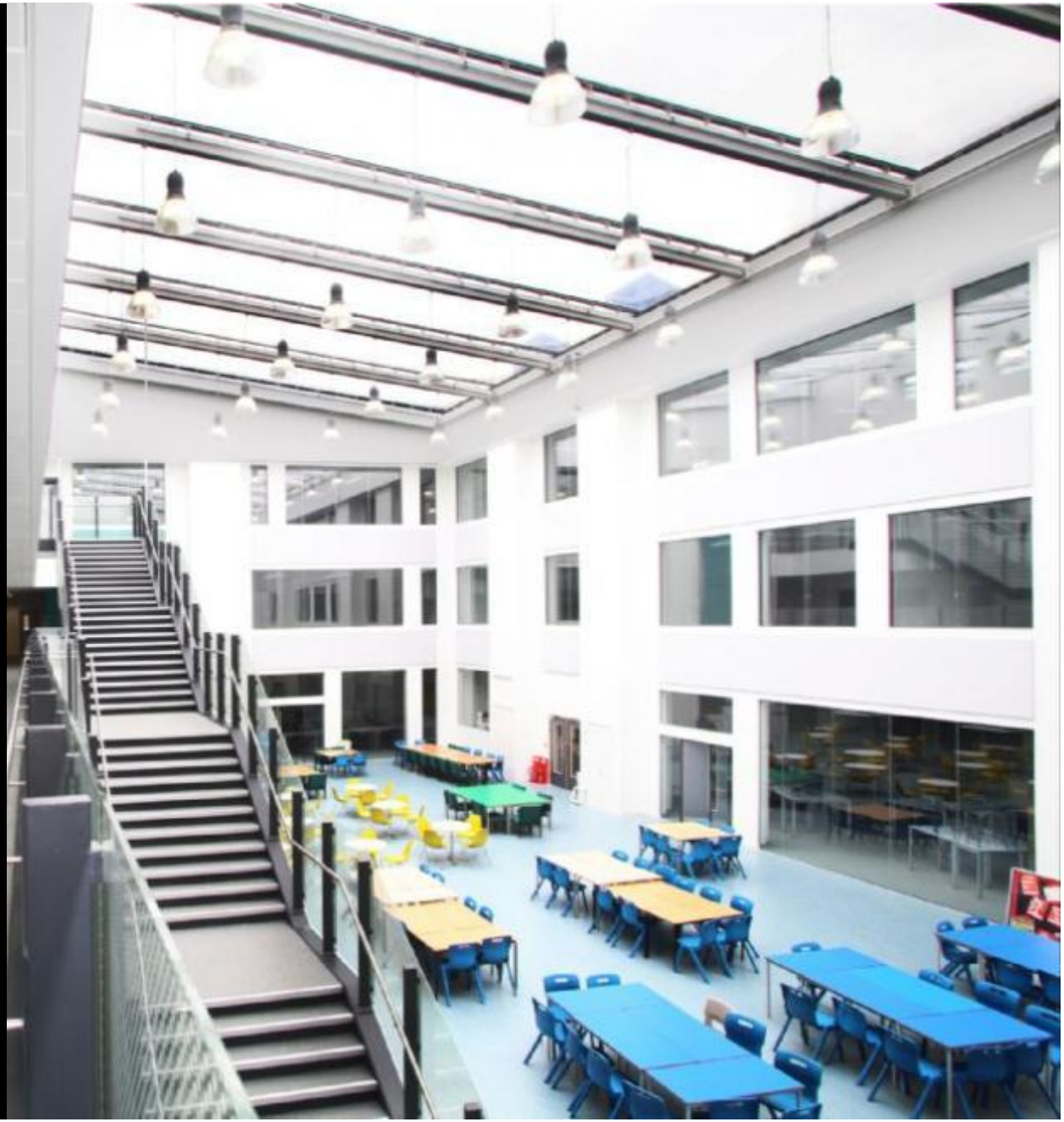
AYLESBURY VALE ACADEMY

The new academy will accommodate 1,500 students aged 11-18.

BIM informed the client and enabled decisions to be made at an early stage, without a need for excessive value engineering.

Benefits have included:

- 50% efficiencies using 5d
- 30% improved cost certainty
- 50% improved change management tracking
- 80% faster production of Book of Quantities



NETWORK RAIL HQ MILTON KEYNES

The new £120m HQ for Network Rail in Milton Keynes accommodates 3,000 staff. It comprises four standalone office blocks offering a total of 38,000m^2 of space.

Site logistics was identified as a potential barrier to completing the building on time.

However, BAM's use of a 4d BIM sequencing model made programming three times more

Supply chain engagement was also improved by 50%, increasing understanding and minimising defects and site incidents.

QUEEN STREET, GLASGOW

This new nine storey building will have a striking façade and will provide best in class, highly sustainable (BREEAM Excellent) office and retail space.

A BAM BIM Exemplar, the project builds on the extensive BIM experience of BAM Design, who has been undertaking Level two BIM since the mid 1990's.

It brings together a full BAM team comprising Properties (the client), Design, Construction and FM, to ensure that collaboration, co-ordination and transparency are optimised.

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Whole Life BIM

BIM to FM for Facilities Management

The End Goal – Bam Achievements

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Whole life BIM: UCL Camden

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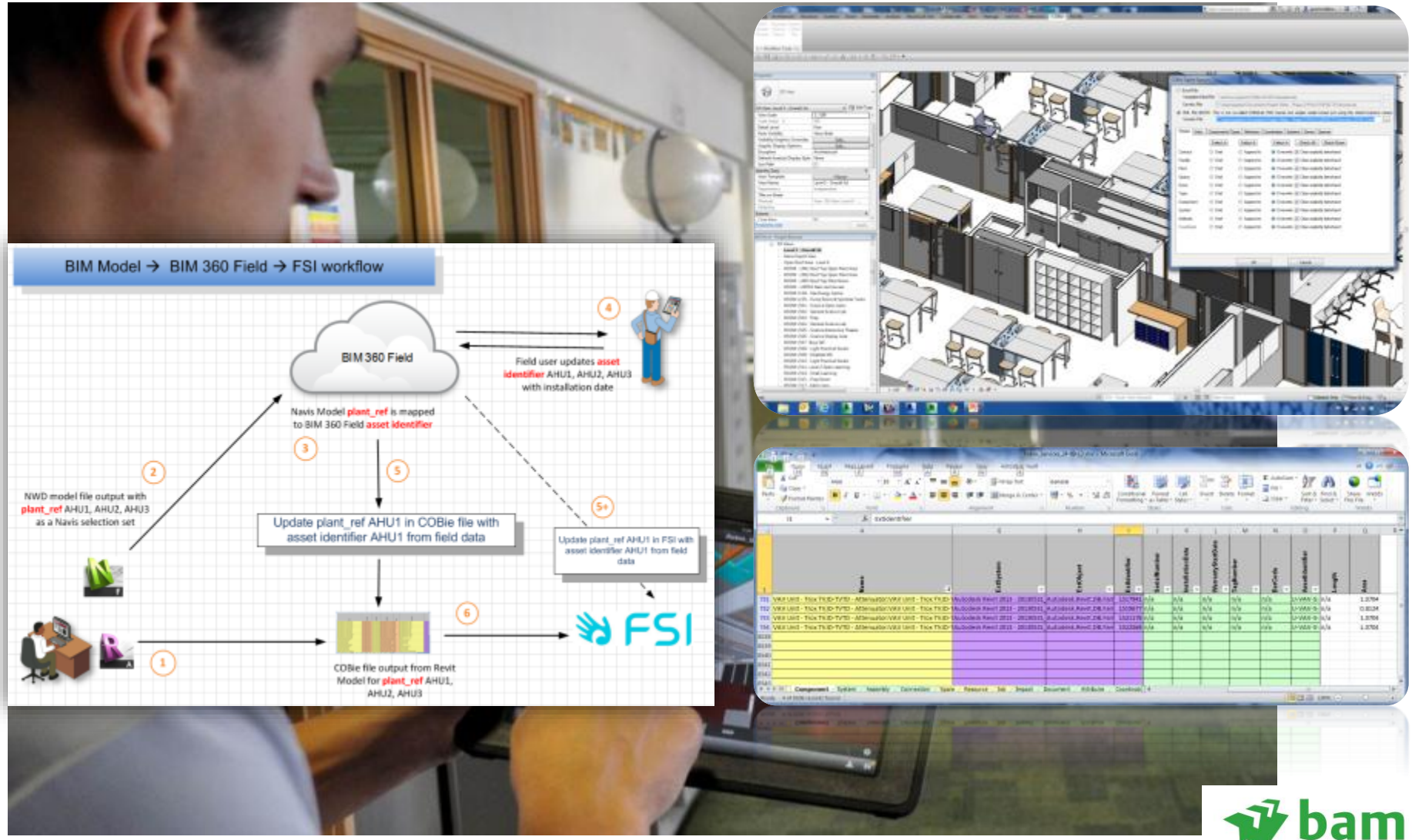
Whole life BIM for BAMFM



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A better understanding of the building

Achieve goals and legislative compliance

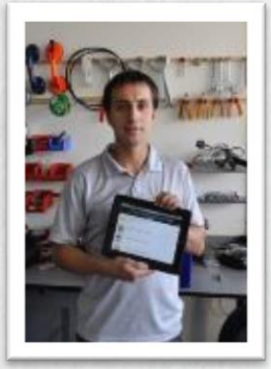
Certainty assets will perform as expected

Proactive maintenance

A BIM that always reflects the latest data

Elimination of cyclical FM costs

Whole life BIM: Staff responses



Mihails Sedicenkovs

'The Introduction of the iPads have brought about efficiencies from our traditional way of working'

'BIM 360 enables us to scale back walls to reveal pipework, assisting with investigation of faults'

'Ability to organise our workload, dealing with tasks in similar areas of the building"

Dean Dixon

'The ability to interrogate issues whilst off site has been excellent'

'The ability to view issues, visualise the asset and retrieve information such as Model/Serial Number whilst being off site has enabled engineers to come to site with the knowledge of what is required to rectify the job'

Measured Benefits

CARETAKERS

Caretakers are able to undertake 16% more work

ENGINEERS

Engineers are saving 30mins per task equating to 3 hours saved on an average day

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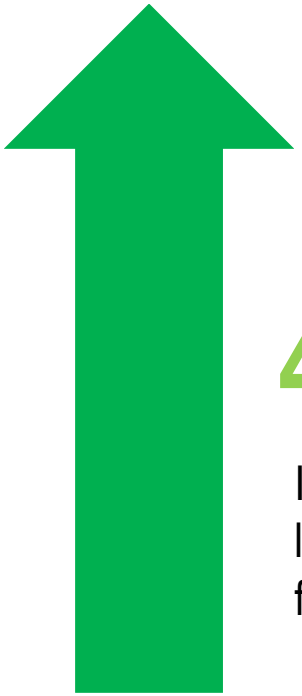

45%

Improvement in
like for like service in
four months

54%

Improvement in PPM
completion per month

Whole life BIM: Wharfedale Hospital

Demonstration - IPAD

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