

Optimising FM Performance Through BIM Technology

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 @CunninghamReid

Introduction



Introduction

- **Reid Cunningham** – Strategic Development Director and Project Leader for BAM's FM BIM project 'Project Robin'
- **Phil Palmer** – Virtual Construction Manager



Introduction – BAM Construct UK

- £1bn construction based group in UK
- Mandated BIM for construction projects
- Collaboration between
 - Regional construction companies
 - BAM Design
 - BAM SE
 - BAM FM

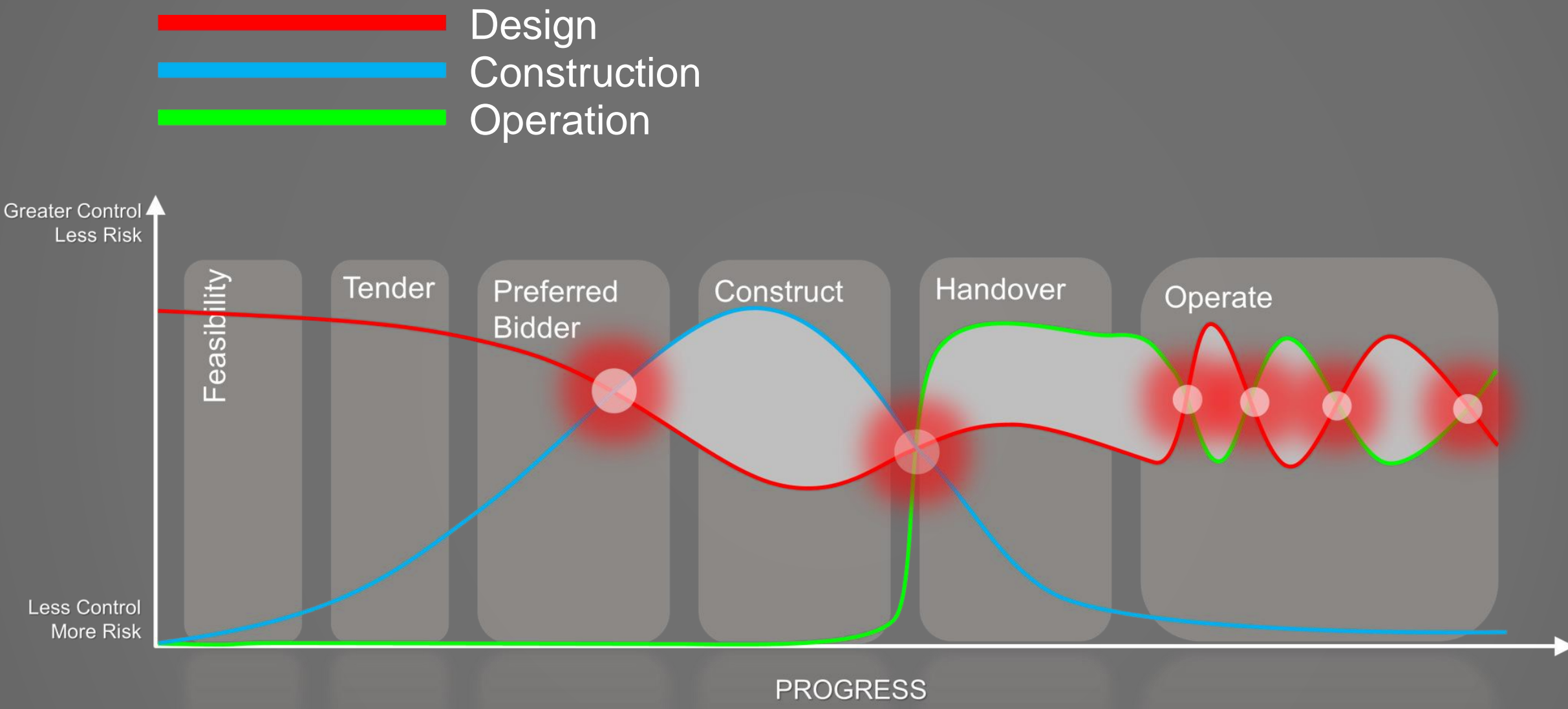


Introduction – BAM FM

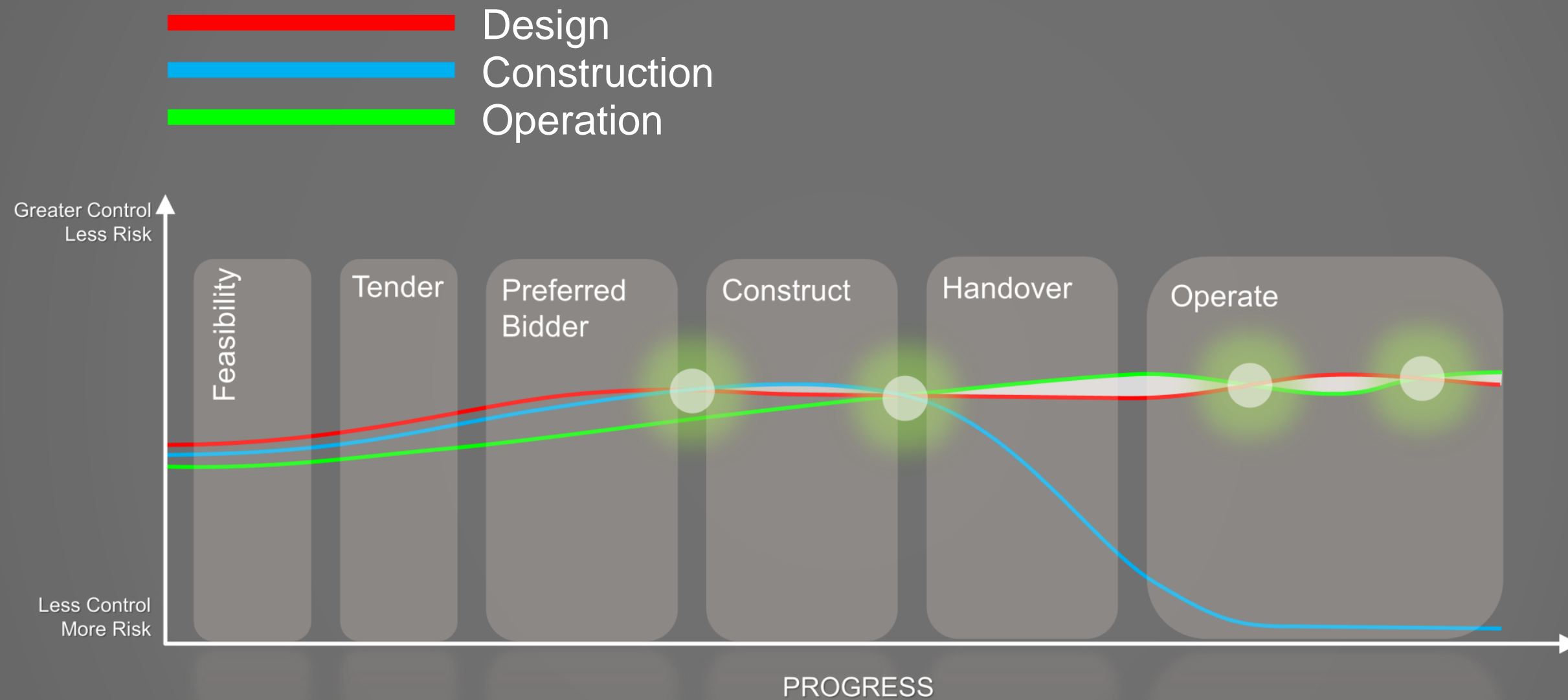
- £44m facilities management
- 60% turnover in PFI
 - Public sector health, education, law & order, public sector accommodation
 - Long term (25 to 30 years)
 - Performance / Availability
 - Fixed price
- 40% turnover in maintenance
 - Commercial sector
 - Static & mobile engineers/technicians



Traditional Data Transfer



Objective of Collaboration Data Transfer using BIM



BAM's 'Project Robin'





Project Robin

- **Phase 1**

- Populate CAFM with BIM data

- **Phase 2**

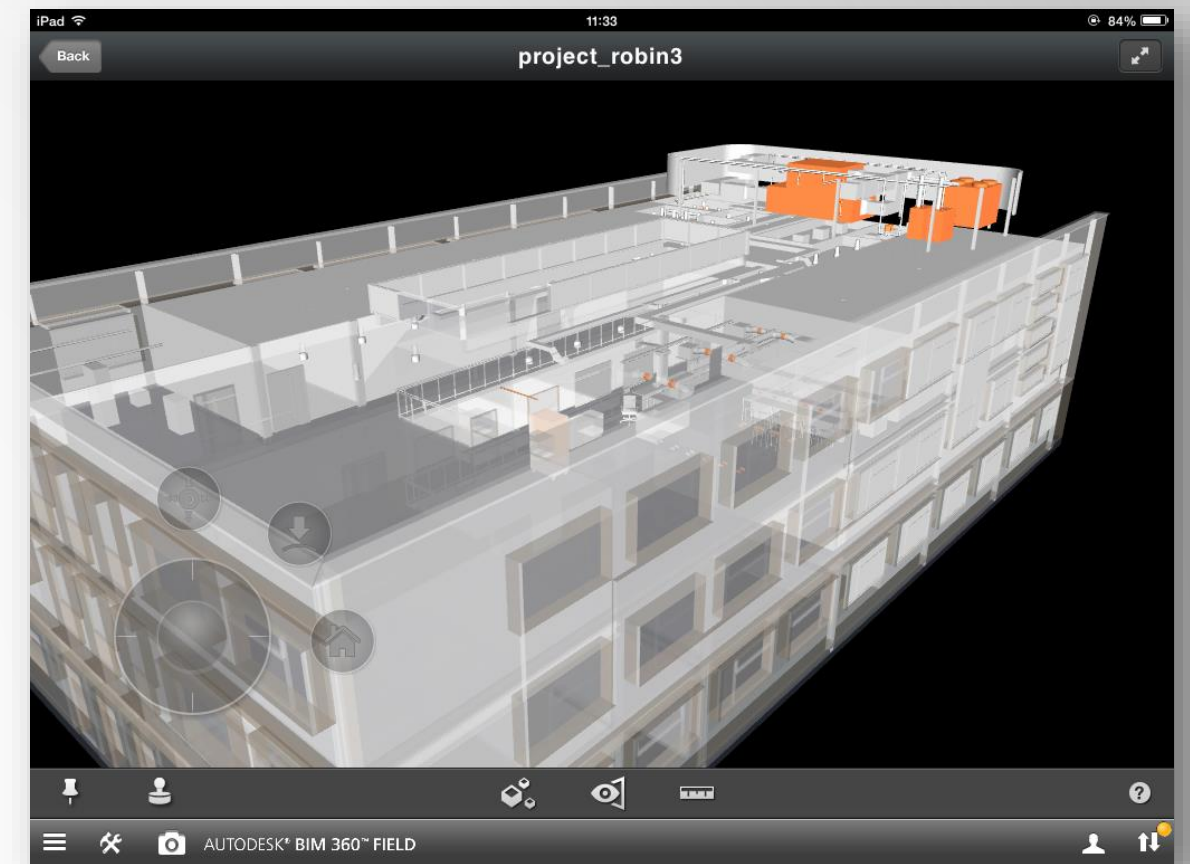
- Populate CAFM with BIM data for UCL Academy, Camden
 - Operate 'live' 3D BIM for UCL Academy, Camden using BIM 360 Field
 - Operational synchronization between BIM and CAFM

Phase 1 – Can we transfer data assets ?

Project Robin – Development POC



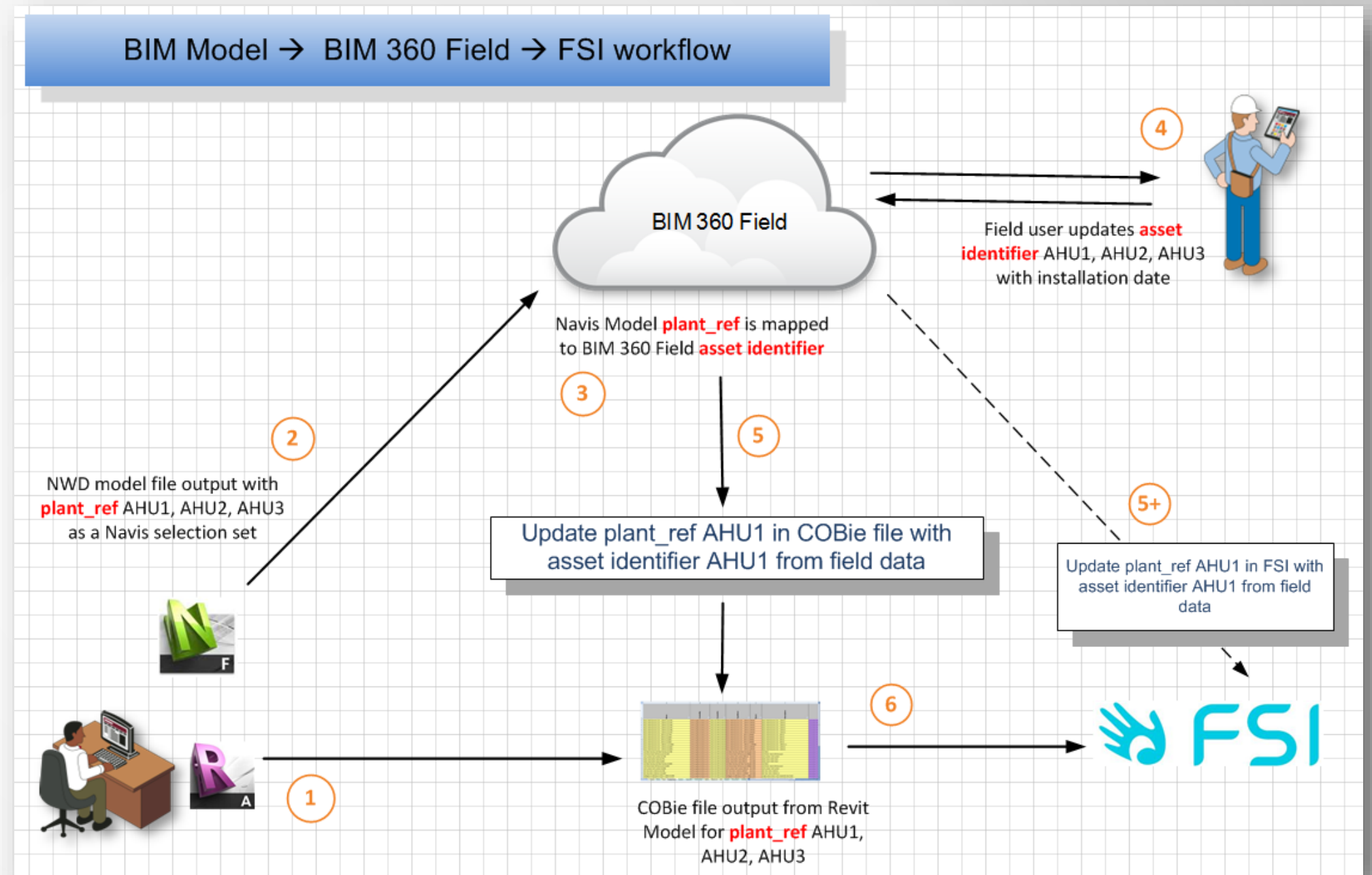
- Phase 1 – Can we do this ?
- Test of data transfer
- Proof of Concept Model (Revit – A “Clean” Model)
- COBIE into BAM FM System
- Mapping the process
- Lessons Learned
- Broadening the scope
- Business Case for Phase 2 - Operational



	Name	ExtSystem	ExtObject	ExtIdentifier	SerialNumber	InstallationDate	WarrantyStartDate	TagNumber	BarCode	AssetIdentifier	Length	Area
731	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1517941	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	1.0704
732	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1519677	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	0.8124
733	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1521178	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	1.0704
734	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1522568	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	1.0704

Project Robin – Development POC

- Map agreed Workflow
- Agree What FM Assets required
- Unique Asset_ref (plant ref)
- Cobie Export ADSK UK Consulting Tool for Revit
- COBIE drops from Discipline Models where required
- Data COBIE Merging Tool
- Phase 1 – Successful Results to move forward with REAL data model



Operational – Phase2 UCL Project



Project Robin – Operational Phase2



The Project

UCL Academy Camden
6 storey Education Sector Building
Central London Location.

BAM Construction

Main Contractor



BAMFM

FM Service Contract (20 + years)

Design Team

Non BIM users (in 2d land unfortunately)

BAM Design (modellers)

Re-Model from Existing 'Record Drawings'
NO Arch Model available
NO MEP model
FF&E (BAM Design model)



System Live

First Stage Operational - October 2013


Project Robin – Operational Phase 2 Set-Up



- Asset Requirements
- Classification System
- Revit Data Preparation for COBIE and Classifications
- COBIE Data Drops (COBie+)
- BIM Model to Navisworks
 - 360Field Considerations
 - Selection sets for Data Mapping
- BIM360 Data Field Mapping
 - Uniclass2 Filters
 - Additional Documents
- Business Benefits - Measurements

Project Robin – Operational Phase2

Assets / Classifications / Asset_ref – Tying it all Together



Revit/ COBiE model parameters	BIM 360 Field property	Notes
CobieAsset_Identifier	UNIQUE Asset Ref	Plant_ref in Revit
Revit Type: COBiETypeCategory	Description	
Revit Type: COBiETypeRowName	Type (via COBiETypeRowName)	

Revit model parameters	BIM360 property	COBiE data fields	Notes
Revit type:Model	Model	Type Tab:ModelNumber	Data Entry
Revit type: Manufacturer	Manufacturer	Type Tab:Manufacturer	Data Entry

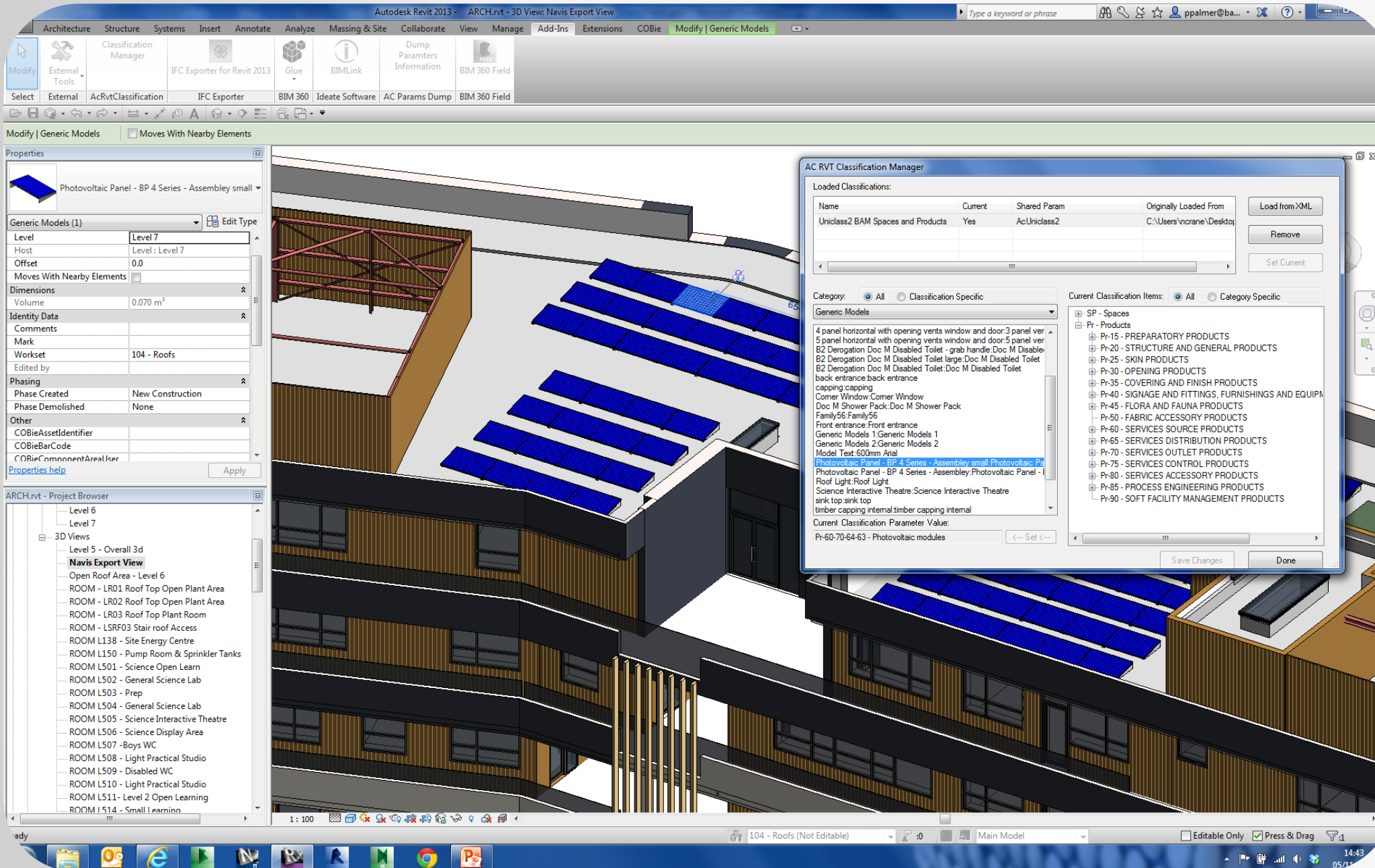
Category Type	Uniclass2 Code
Volume Control Damper	PR-25-25-56 - Non-return dampers
Mechanical Air Terminals-Supply Diffuser	PR-03-04-03 - Air diffusers
Pumps	PR-65-36-98 - Water to water heat pumps
AHUS	PR-04-03-08 - Air handling units
Boilers	PR-87-08-15 - Condensing boilers
Condenser - Air Cooled - Horizontal - 180-533	PR-48-13-04 - Air cooled liquid chillers
Motor Control Valve - 15-50 mm:32 mm	PR-94-95-13 - Check valves

- Uniclass2 – Classification agreed for CAFM system
- PPM Schedules built from Assets identified from Uniclass2 (PR Coding system)
- Asset_ref for a UNIQUE key for 360 Field data.
Aligned with Field Equipment database
Aligned to FM System for Asset Type.
- FM advised on Asset types that are considered assets within the FM world.
- Agree Additional 360Field Data required
- Full data specification to be completed with PAS1192 for BAM workpackages



Project Robin – Operational Phase2

REVIT data Preparation via. Toolkits

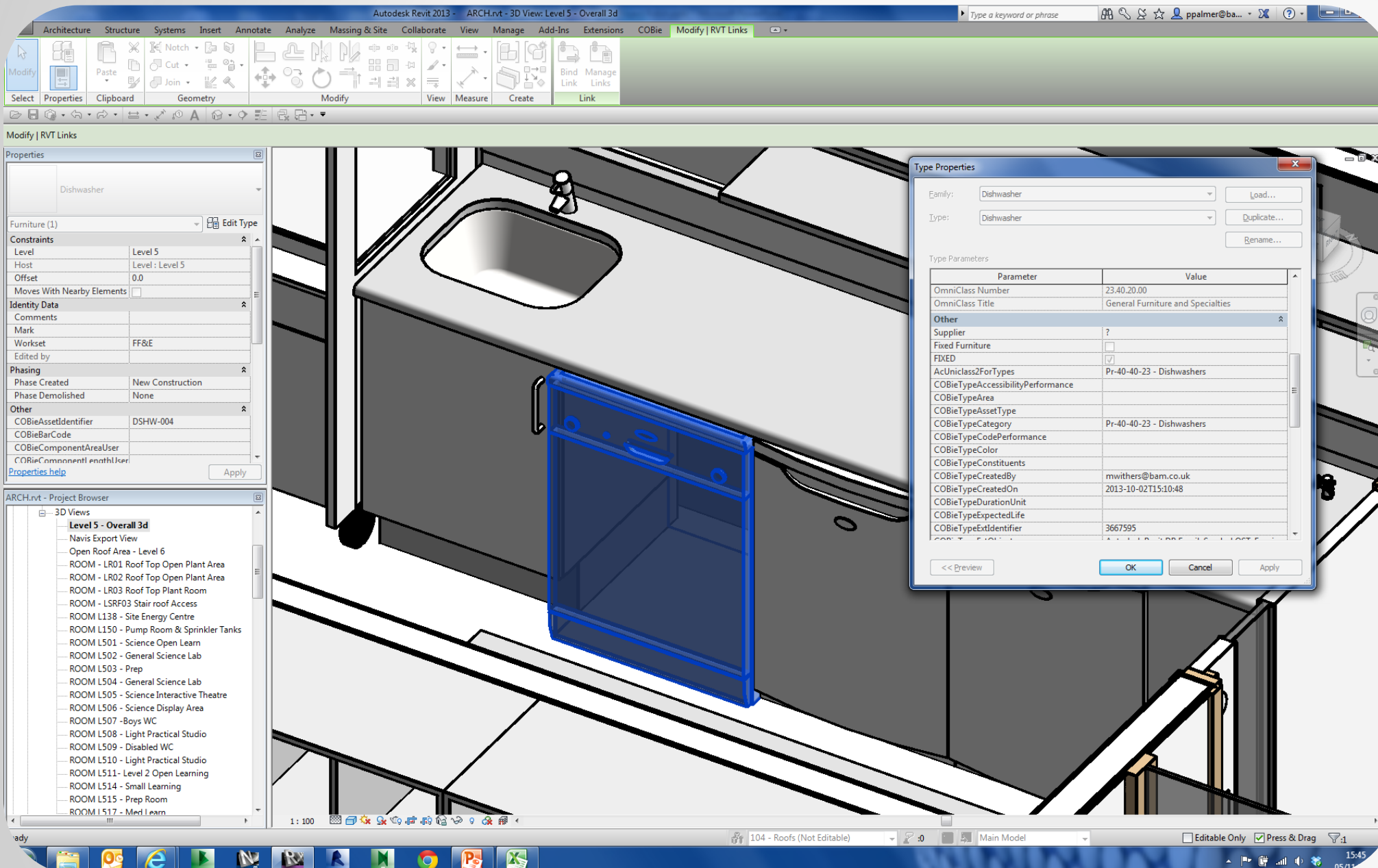


- Classification Toolkit by Autodesk UK Consulting Team xml Uniclass2 import to Revit toolkit
- Applying Uniclass2 PR codes to Family Types within Revit Data Model
- FM System PPM regimes automatically created from Uniclass2 Coding system



Project Robin – Operational Phase2

REVIT data Preparation via. Toolkits

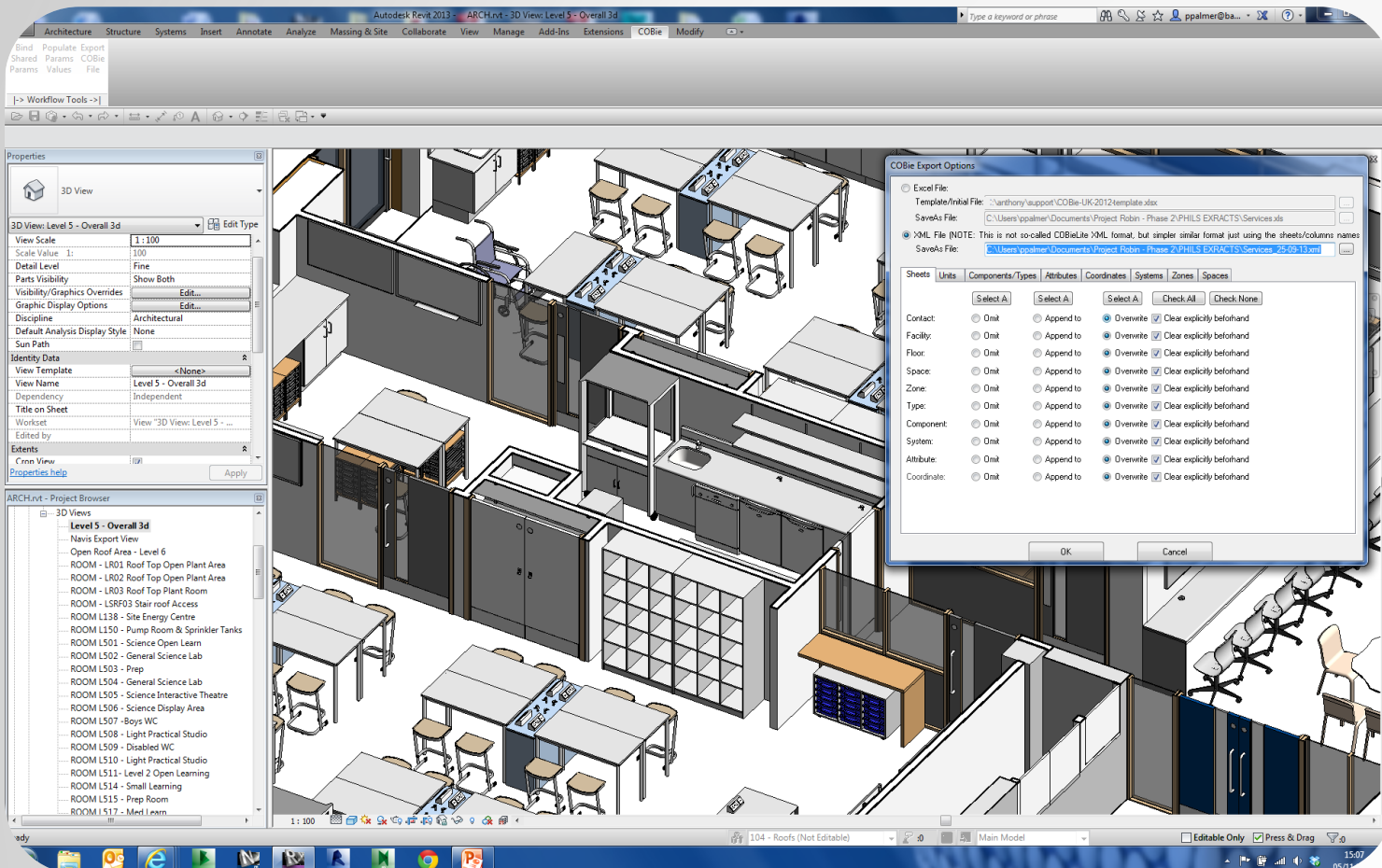


- BAM Unique Asset_Ref system applied to Each Unique Instance of family. (Shared Parameter)
- Asset_Ref linked to Bim360
- Asset_ID database of equipment in 360 Field provides linking mechanism for Field360 and FM System



Project Robin – Operational Phase2

REVIT – COBIE data Drops



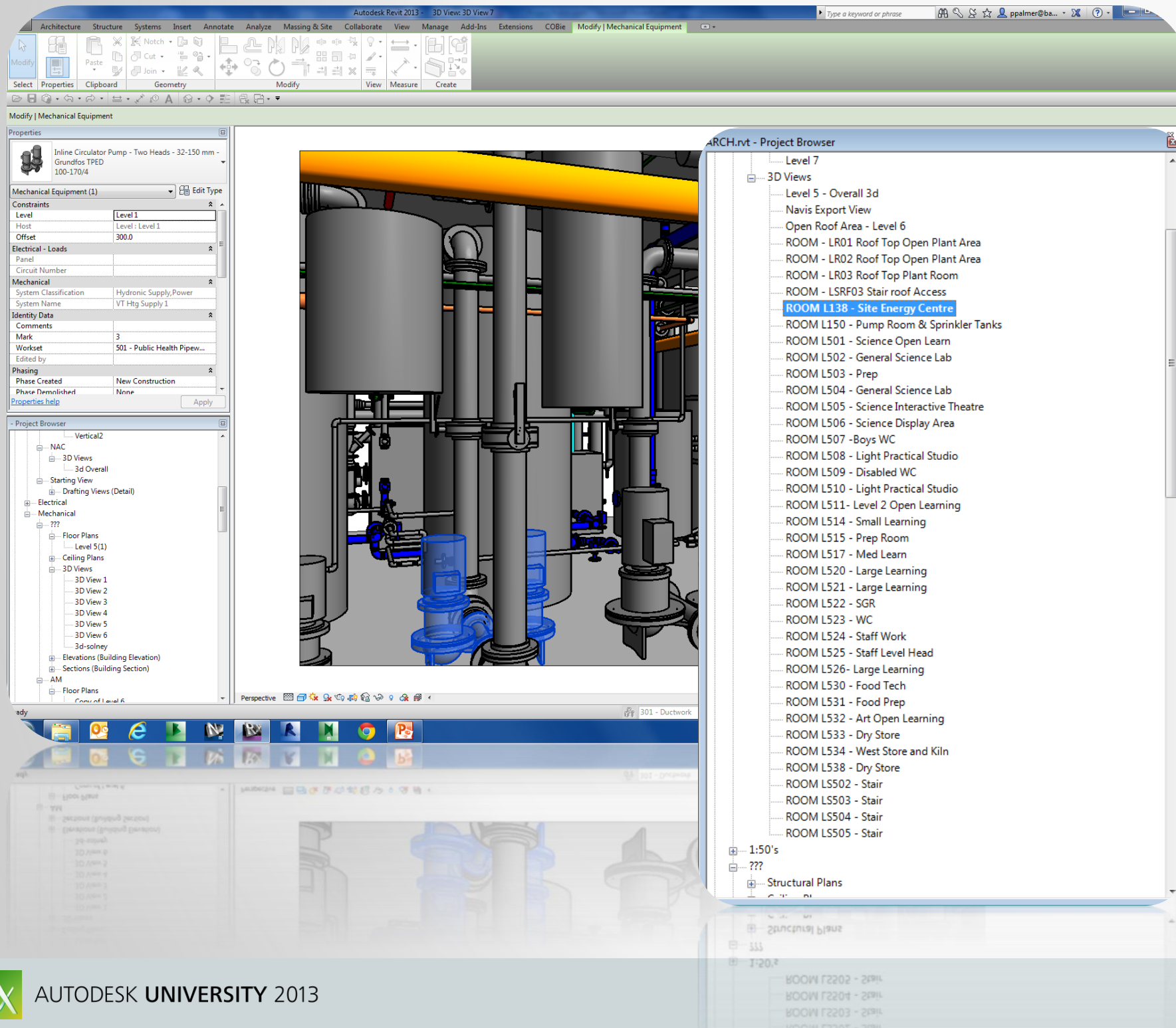
- COBIE Exporter Toolkit by Autodesk UK Consulting within the Revit environment.
- COBIE exported to XML format for data transfer to FSI CAFM system
- COBIE XLS exports also available if required
- Separate XML Outputs provided from EACH design data model
- STRU – ARCH – MEP – Interiors
- Assets then available in FSI FM System

The screenshot shows a Microsoft Excel spreadsheet titled 'Robin_Services_24-09-13.xlsx'. The spreadsheet contains a table with columns for 'Name', 'ExtSystem', 'ExtObject', 'ExtIdentifier', 'SerialNumber', 'InstallationDate', 'WarrantyStartDate', 'TagNumber', 'BarCode', 'AssetIdentifier', 'Length', and 'Area'. The data is organized into rows, with the first row (row 731) highlighted in yellow. The table contains data for VAV Units and their associated systems and objects.

	Name	ExtSystem	ExtObject	ExtIdentifier	SerialNumber	InstallationDate	WarrantyStartDate	TagNumber	BarCode	AssetIdentifier	Length	Area
731	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1517941	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	1.0704
732	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1519677	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	0.8124
733	VAV Unit - Trox TVJD-TVTD - Attenuator:VAV Unit - Trox TVJD-TVTD	Autodesk Revit 2013 - 20130531	Autodesk.Revit.DB.Fan	1521178	n/a	n/a	n/a	n/a	n/a	U-VAV-S-	n/a	1.0704
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Project Robin – Operational Phase2

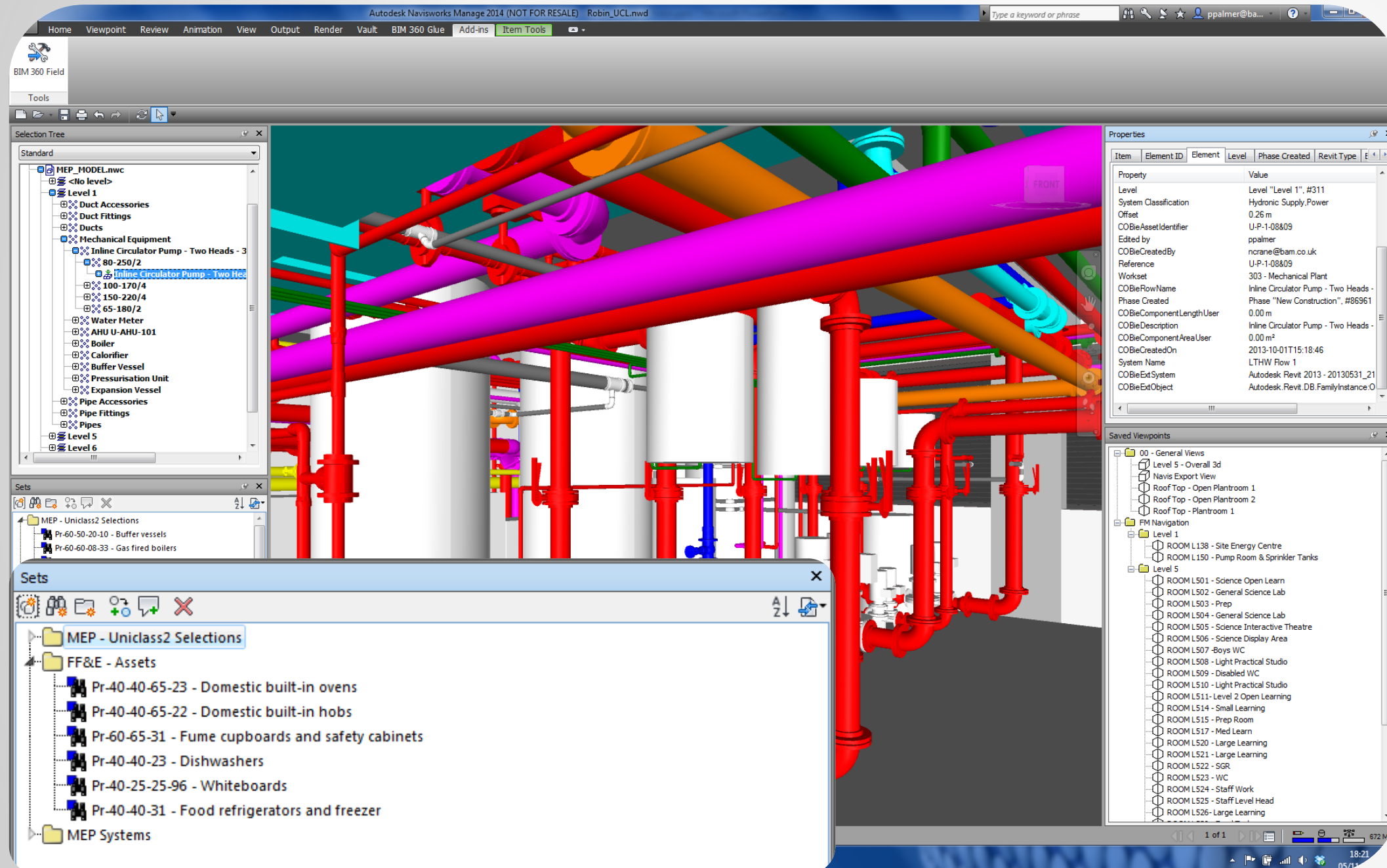
Model Preparation for Navisworks – 360 Field Considerations



- Consider the 'End User' in mind
It's a new tool to them
- Consideration for BIM360 Field Navigation Required for ease of use by users
- Views associated to Rooms and Major Building Areas created within Revit Environment
- Views then transferred over to Navisworks Combined Model when exported from Revit data model.

Project Robin – Operational Phase2

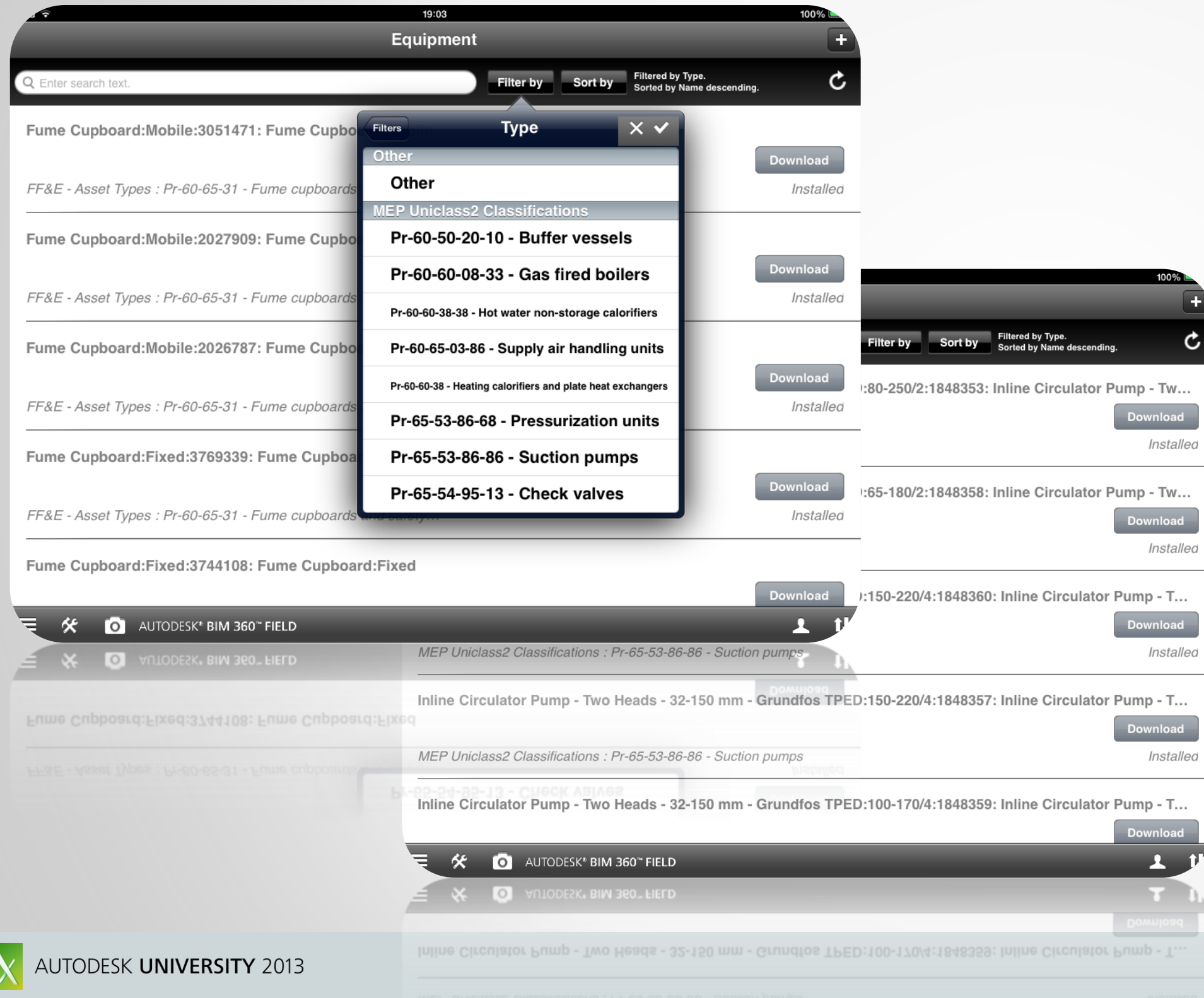
Navisworks Preparation – Selection Sets Mapping



- Revit Models Exported to NWC for Navisworks
- Selection Search sets created to select UNICLASS2 categories assigned to Revit Data objects
- Views and all Revit data available within Navisworks properties of objects
- Model ready to Publish to BIM360 Field Project Data
- Selections then mapped in 360Field application for equipment assets

Project Robin – Operational Phase2

BIM360 Field – Uniclass2 Filtering of Assets



- 360Data Organised By Uniclass2
- Type Filters Created for equipment
- O+M and SFG20 Regime Data assigned to Assets



Project Robin – Operational Phase2

BIM360 Field – Navigation by end users

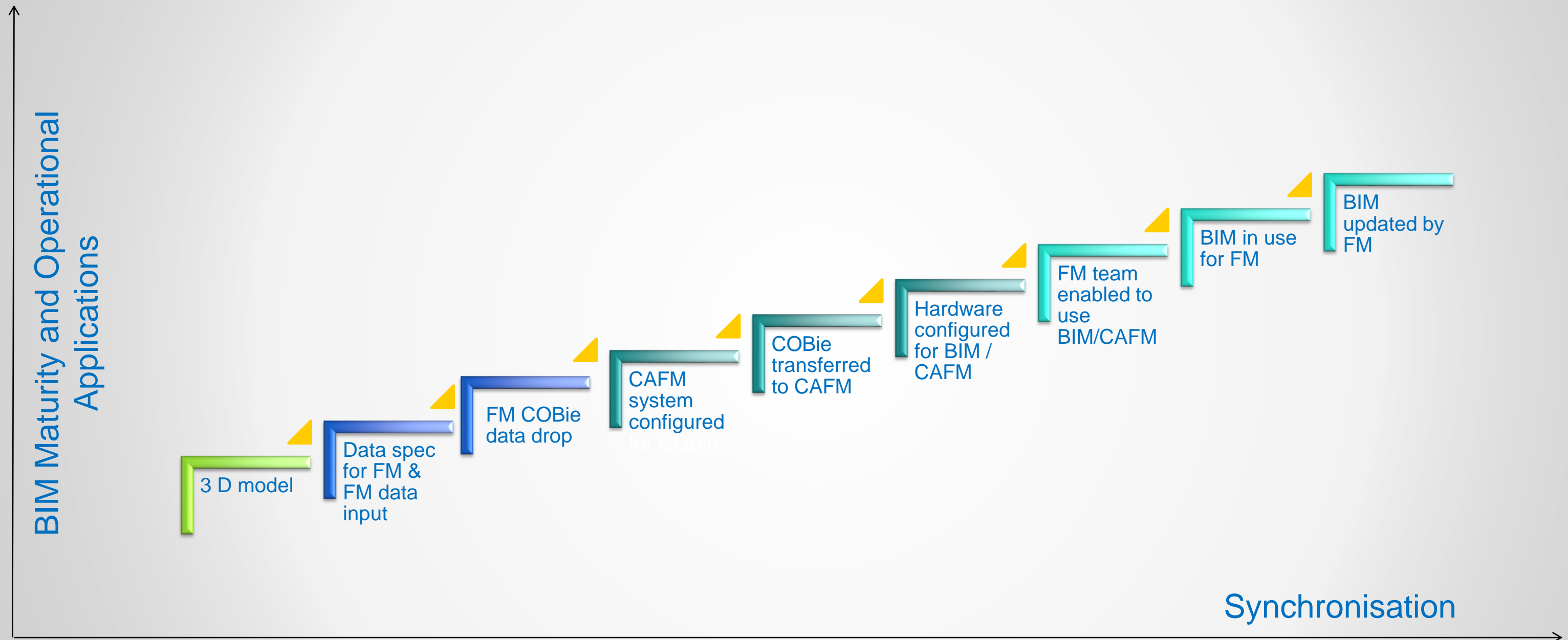


- Equipment listing to model or model to equipment listing
- Navigational Views and hiding of Objects or separated Models Provides full facility to get to the equipment data for FM purposes
- ALL information available as required to FM Engineers

BIM360 Field – Live Demonstration



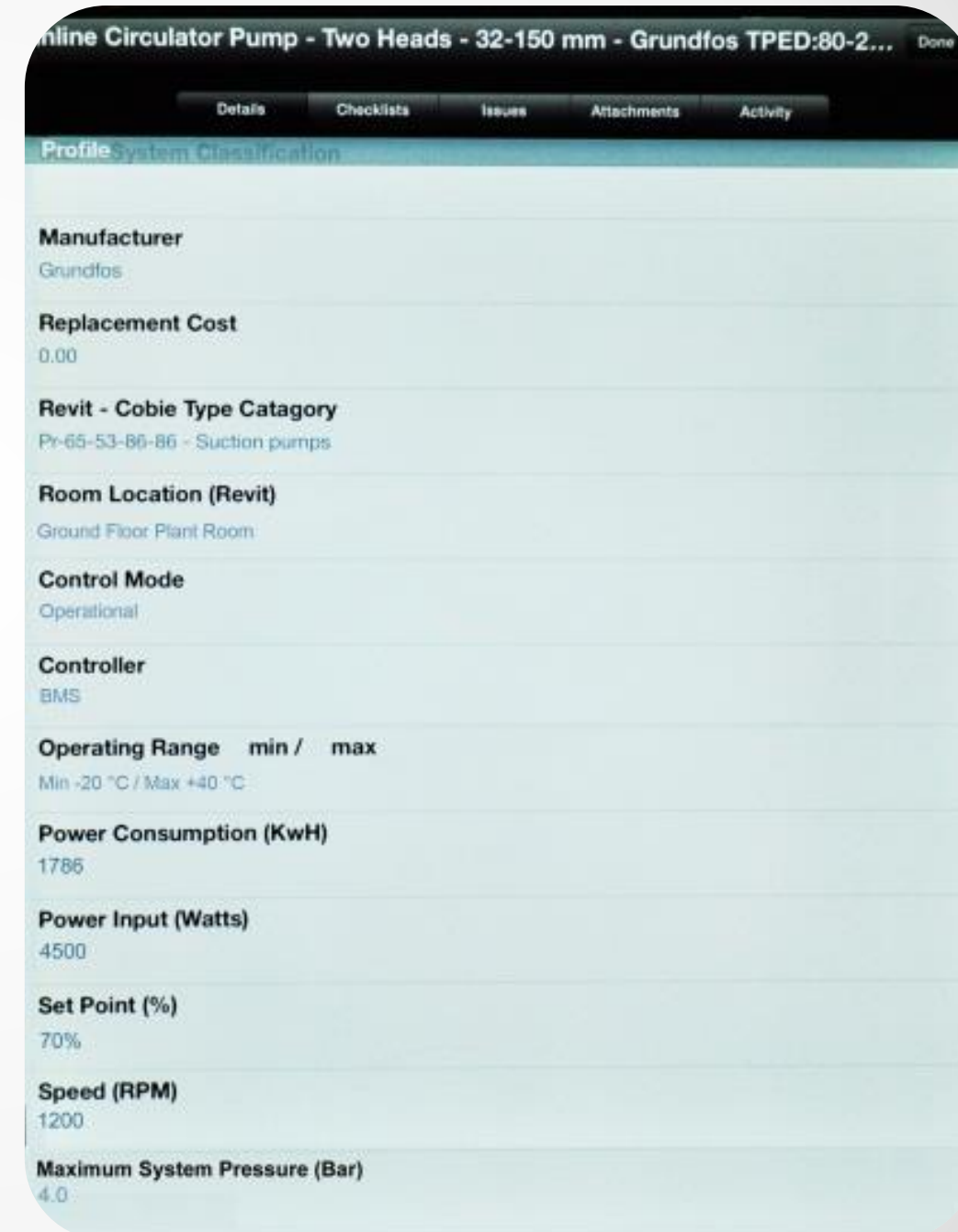
BIM for FM Journey and Synchronisation



‘Faster First Fix’



'Faster First Fix'



Project Robin – Operational Phase2

BIM360 Field – Business Benefits to BAMFM



Measurement Phase – 3 weeks into Operational Phase



Caretaker Response

*An average of 10mins saved
by receiving the job card to the device*

*The Caretaker was able to address an
additional issue whilst attending 16% of
all jobs*

*The Caretaker had no previous experience
of using an iPad however they are now able
to easily navigate both apps via the device*

Engineer Response

*An average of 25mins saved
by receiving the job card to the device*

*The Engineer found BIM 360 Field to be
useful when completing 39% of tasks*

*The Engineer had some experience of
using apple devices and has found the ability
to interrogate assets within BIM 360 Field
particularly useful*

Project Robin (Phase 3)

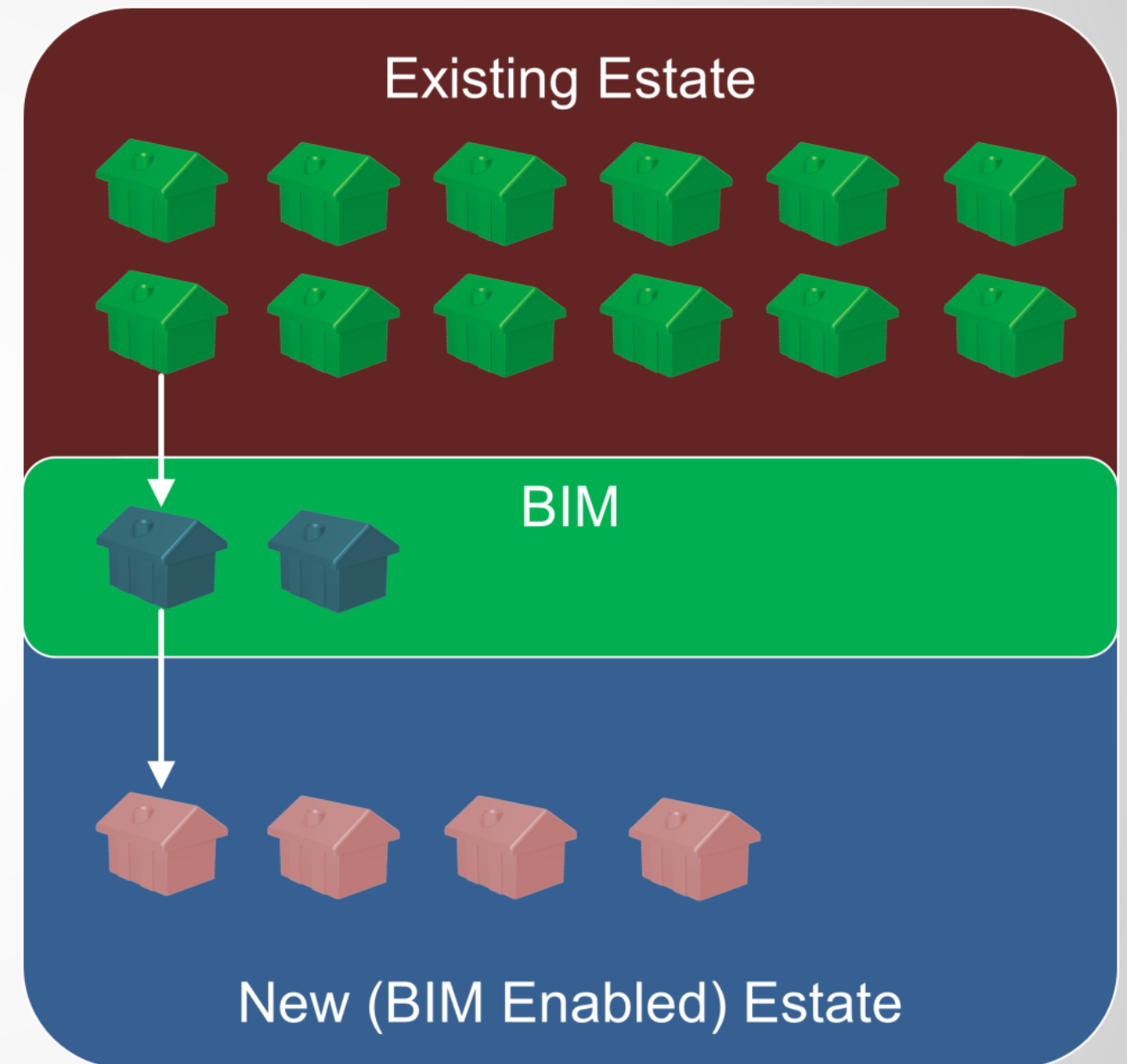
- Phase 3
 - Add 'live' BMS data to the BIM 360 Field screen for assets/systems
 - Increased synchronization of BIM data with other facility or business data to generate a 'common data environment'





Myth 1

- BIM is only for new facilities ('Back to the future BIM')



Myth 2

■ COBie

- Facility
- Floor
- Space
- Zone
- Type
- Component
- System
- Assembly
- Connection
- Spare
- Resource
- Job
- Impact
- Document
- Attribute
- Coordinate
- Issue



ARCHICAD_COBIE_EXPORT_01 [Compatibility Mode] - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L
2	Version		2									
3	Release		4									
4	Status	IFC2x3										
5	Region	en-UK										
6	Purpose		From	Till	Count	Ratio	Key	This spreadsheet supports the exchange of building, system and product information through the life of the project.				
7	Outline		1900-01-00T00:00:00	2012-09-28T17:41:17	4042	1.89	Additional information per Object	Individual worksheets are organized by project phase as shown below				
9	All Phases	Sheet	From	Till	Count	Ratio	Key	Contents				
10	Contact		1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Contacts per Object	People and Companies				
12	Early Design Worksheets	Sheet	From	Till	Count	Ratio	Key	Contents				
13	Facility		1900-01-00T00:00:00	1900-01-00T00:00:00	0							
14	Floor		2012-09-28T17:41:17	2012-09-28T17:41:17	5	#DIV/0!	Floors per Facility	Vertical levels and exterior areas				
15	Space		2012-09-28T17:41:17	2012-09-28T17:41:17	21	4.20	Spaces per Floor	Spaces				
16	Zone		2012-09-28T17:41:17	2012-09-28T17:41:17	-1	-21.00	Spaces per Zone	Sets of spaces sharing a specific attribute				
17	Type		2012-09-28T17:41:17	2012-09-28T17:41:17	74	17.55	Components per Type	Types of equipment, products, and materials				
19	Detailed Design Worksheet	Sheet	From	Till	Count	Ratio	Key	Contents				
20	Component		2012-09-07T17:51:36	2012-09-28T17:41:17	1299	61.86	Components per Space	Individually named or schedule items				
21	System		1900-01-00T00:00:00	1900-01-00T00:00:00	-1	-1299.00	Components per System	Sets of components providing a service				
22	Assembly				0	0.00	Assemblies per Object	Constituents for Types, Components and others				
23	Connection				0	0.00	Connections per Object	Logical connections between components				
24	Impact				0	0.00	Impacts per Object	Economic, Environmental and Social Impacts at various stages in the life cycle				
26	Construction Worksheets	Sheet	From	Till	Count	Ratio	Key	Contents				
27								Note: submittals and approvals added on Documents				
28								Note: manufacturer and model added on Type				
29								Note: serial and tag added on Component				
31	Operations and Maintenance	Sheet	From	Till	Count	Ratio	Key	Contents				
32	Spare				0	0.00	Spares per Type	Onsite and replacement parts				
33	Resource				0	0.00	Resources per Type	Required materials, tools, and training				
34	Job				0	0.00	Jobs per Type	PM, Safety, and other job plans				
35								Note: warranty information added on Type				
37	All Phases	Sheet	From	Till	Count	Ratio	Key	Contents				
38	Document				0	0.00	Documents per Object	All applicable document references				
39	Attribute				0	0.00	Attributes per Object	Properties of referenced item				
40	Coordinate		2012-09-07T17:51:36	2012-09-28T17:41:17	2645	1.89	Coordinates per Object	Spatial locations in box, line, or point format				
41	Issue				0	0.00	Issues per Object	Other issues remaining at handover.				
43	Legend											
45	text							required				
47	text							reference to other sheet or pick list				



Myth 3

‘Design team’ inputs to BIM are sufficient for COBie and FM purposes.....

and

any benefits of harmonisation of design software used by the design team lasts.’



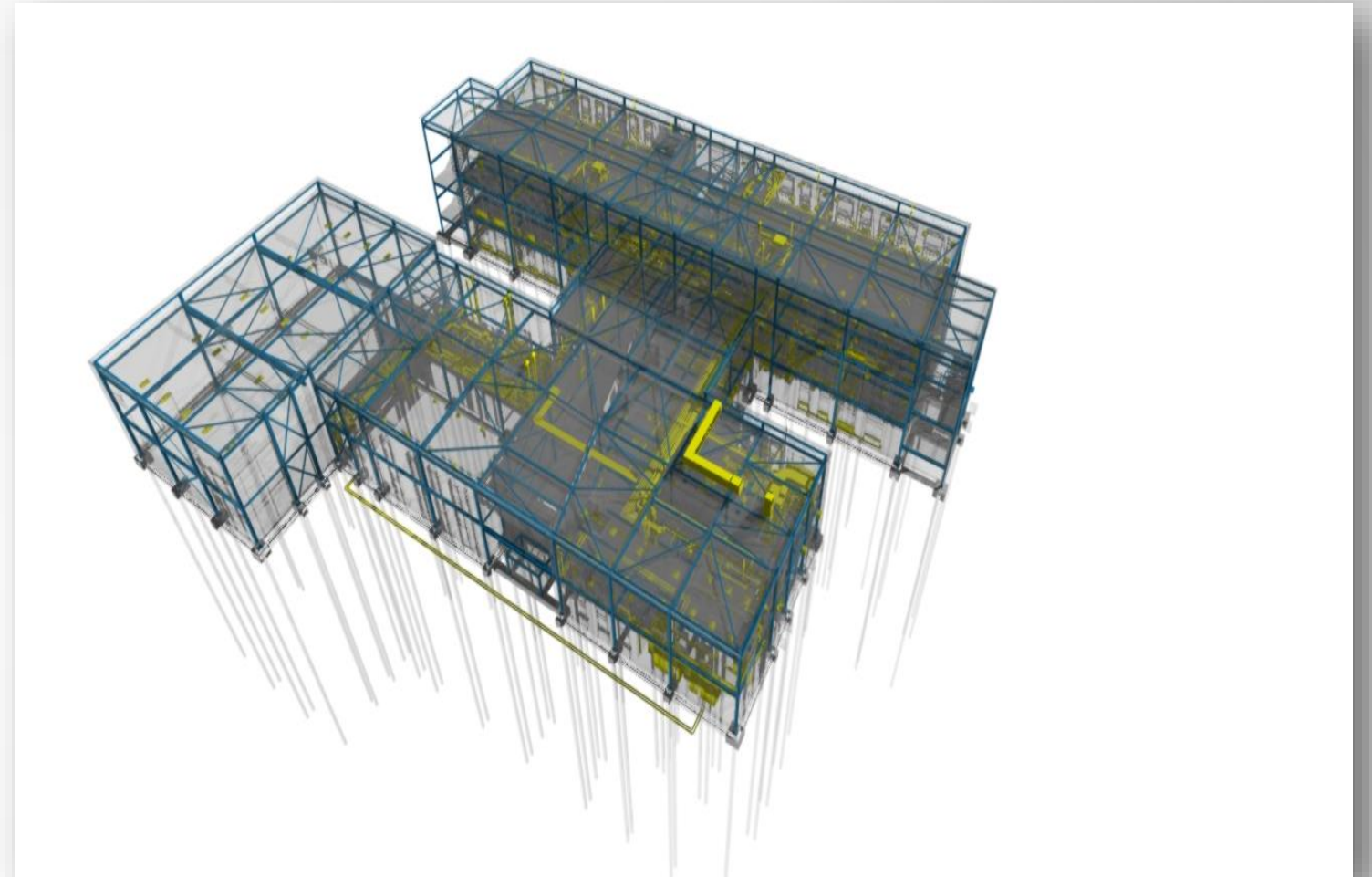
Myth 4

As fitted Drawings (and O&M Manuals are here to stay i.e the BIM model will be replaced on completion of construction by paper O&M manuals.



Myth 5

As fitted Drawings (and O&M Manuals are here to stay i.e the BIM model will be replaced on completion of construction by paper O&M manuals.



Questions

