MEP - Getting the Process Right with "Who Does What and When"

Mark Taylor

Digital Construction Manager

BAM Construct : #mstjohntaylor

Shashi Verma

Project Manager

Autodesk Consulting : #ssverma

Introductions

Mark Taylor

- Set company Information Management procedures to deliver high quality information
- Researching and trialling future technology for the business
- Working with key clients to develop BIM requirements and asset information requirements.
- Specialist knowledge of BIM software, workflows, interoperability and modelling techniques
- Trainer (procedures and software)
- 2nd AU

Shashi Verma

- Project manager for Autodesk Consulting in EMEA
- Project Management Professional (PMP)®
- AEC, Manufacturing
- Large-scale, enterprise solutions
- BIM Implementations, Buildings, Infrastructure, Transport Planning, Airports, Utilities
- Program Management for Enterprise Accounts
- 4th AU

Class summary

This class will present BAM's approach to MEP (mechanical, electrical, and plumbing) through the design, engineering, and subcontractor Building Information Modeling (BIM) process, along with the end in mind for facilities management (FM) operations. We'll look at how BAM worked closely with Autodesk Consulting to deliver a set of tools that defines who does what at all stages of a project in a collaborative BIM environment, including how you can pass BIM data along to non-BIM engineering staff to streamline all aspects of the process. The presentation will look at the effectiveness for BAM of the Autodesk Consulting methodology used throughout this challenging working practice for the MEP industry, and how BAM adopted the processes and worked with the Consulting Team to deliver an effective outcome. We will show tools for the data requirements, classifications, and scheduling requirements for all stages of an MEP project, and we'll discuss how the process can extend into the fabrication level of a project.

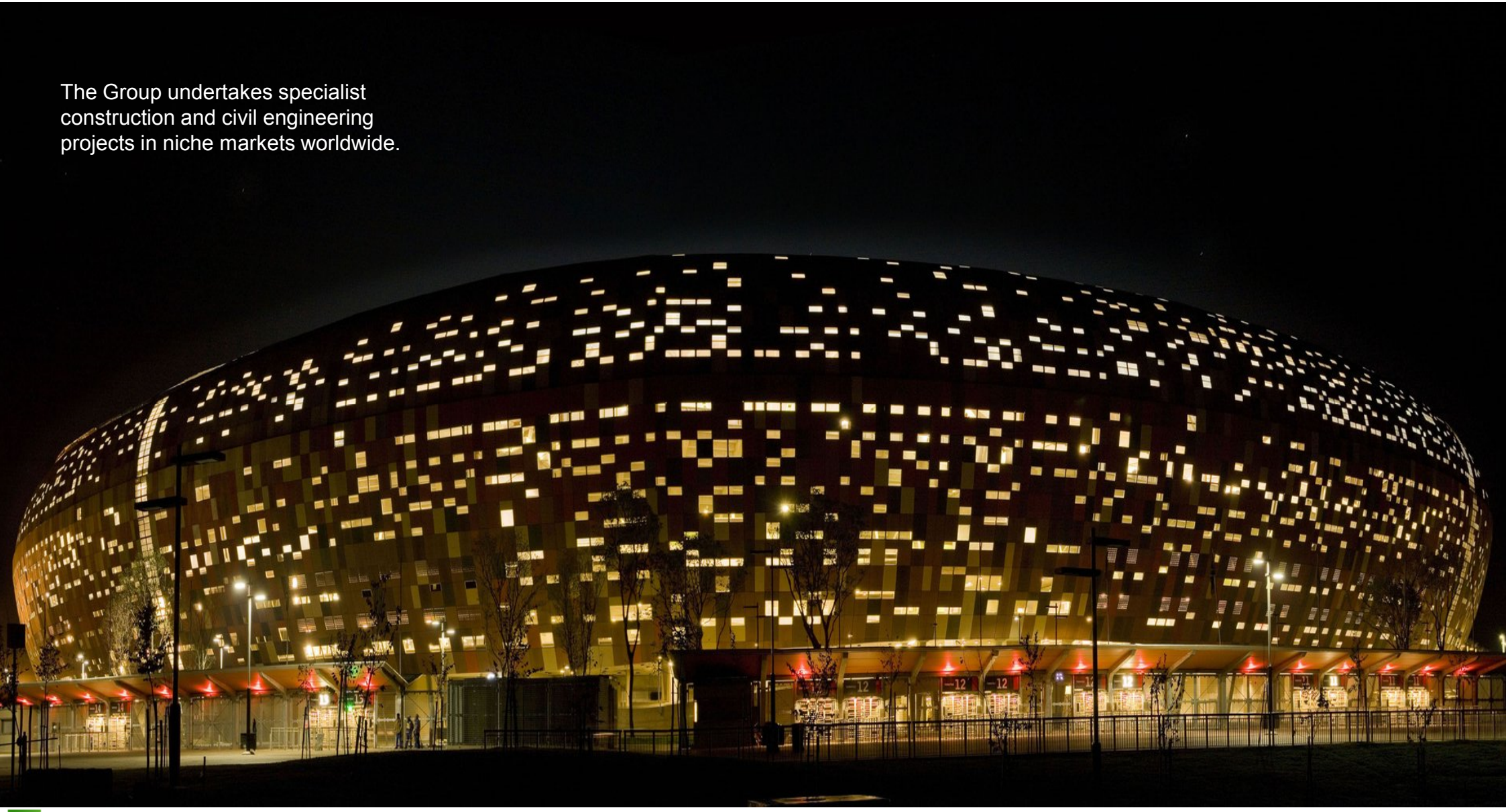
Agenda

- Drivers for Change
- BAM's Strategy
- Autodesk Consulting & Business Value Methodology
- Project Lifecycle
- BIM Project outputs & demonstrations
  - Model Development Requirement
  - Schedule Production
  - Model Checker
- Lessons Learnt
- Next Steps

Royal BAM Group

- A successful European construction group, headquartered in the Netherlands.
- We are market leaders in the Netherlands, Belgium, the United Kingdom, Ireland and Germany.
- Listed on the NYSE Euronext Amsterdam, BAM is active in the construction, property, public and private sectors.
- It has 25,000 employees and is responsible for the implementation of thousands of projects every year. Through its widespread network of regional offices.

The Group undertakes specialist construction and civil engineering projects in niche markets worldwide.



Our philosophy

We seek to offer real value to our clients and work in partnership with them over the long term, to achieve outstanding performance in relation to the maintenance, innovation and expansion of the built environment.

BAM is recognized for the quality and reliability of our products and services as well as for the commitment, knowledge and experience of our employees

BAM Construct UK

BAM is an industry leader who are responsible for delivering some of the UK's most prestigious buildings.

We support clients across the entire lifecycle of their assets through the experience and expertise of our Properties, Design, Construction and FM businesses.

Overview

We’ve been in business in Britain since 1874

In 2008, we adopted the BAM brand of our parent company Royal BAM Group.

Turnover in 2014 was £886.8m ($1330.2m)

Our biggest sectors are education, health and commercial (offices, retail, leisure and mixed use)

BAM was named one of the best UK companies to work for, in the annual Sunday Times “Best companies to work for” Survey

BIM@BAM

We are recognized as one of the UK's thought leaders in BIM and are committed to enabling clients to realize the benefits and opportunities BIM offers across the lifecycle of their assets/schemes.

Drivers for Change

UK Government Mandate 2016

2.32 Government will require fully **collaborative 3D BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016**.

A staged plan was published with mandated milestones showing measurable progress at the end of each year.

HM Government

Construction strategy

The construction industry is vital to this government's long term economic plan.

The government has been working with the construction industry to get better value from public spending.

2011
Government Construction Strategy was published

2014
It has **saved**
£1.4bn

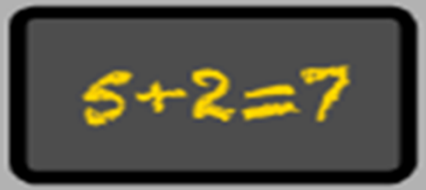
Government saved **£840m** last year on construction projects – **exceeding the target by 13%**

£840m

Department of Health **saved £60m** on construction projects last year – equal to the price of

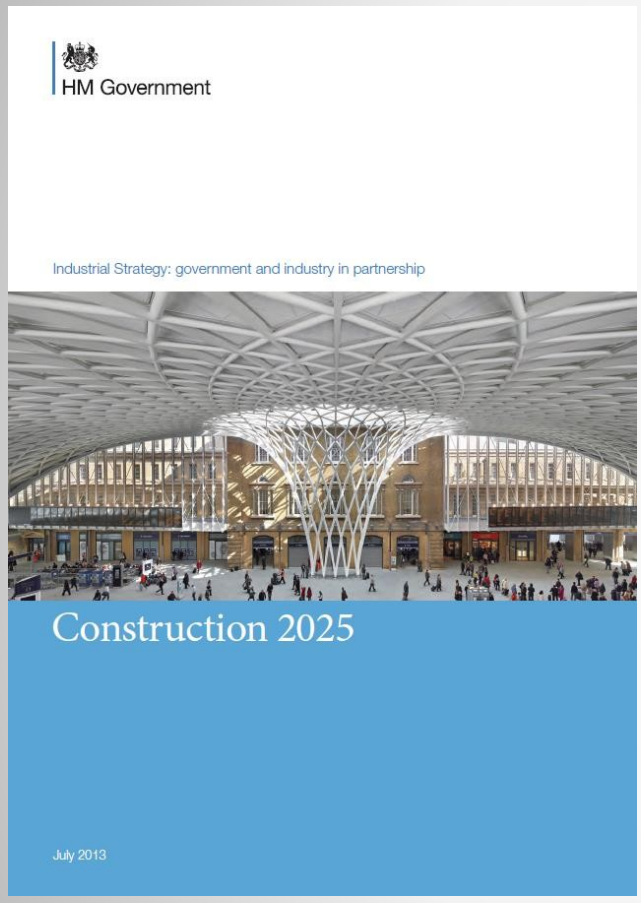
67
MRI scanners

We now build **7 schools for the old price of 5**



#BuildingBritain #GCSummitUK

Construction 2025



Lower costs

33%

reduction in the initial cost of construction and the whole life cost of built assets

Faster delivery

50%

reduction in the overall time, from inception to completion, for newbuild and refurbished assets

Lower emissions

50%

reduction in greenhouse gas emissions in the built environment

Improvement in exports

50%

reduction in the trade gap between total exports and total imports for construction products and materials

BAM's Strategy

bam

2003
Improvement
modelling
Multi-disc for
co-ordination

2011
Leeds Arena
Construction
3D co-ordination
4Dplanning

2012
Improvement
BIM360field
BIM

2000

2010

2020

2009
Pre-construction
planning for
tenders

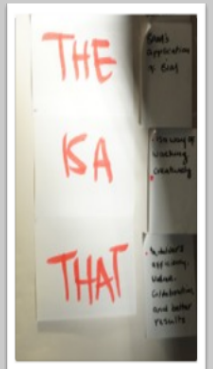
2011
UK Mandate

2012
Autodesk EBA

AUTODESK.

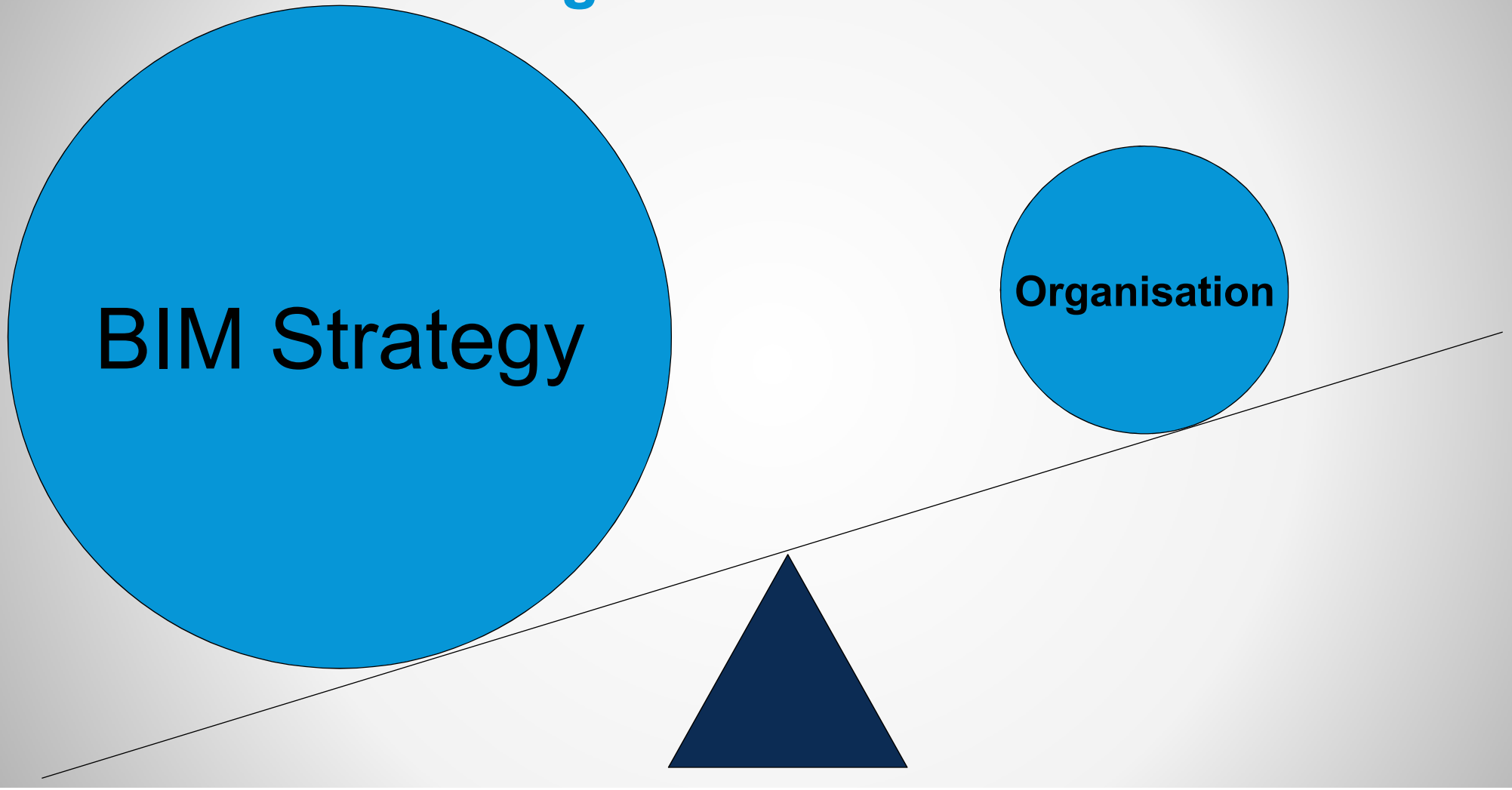
EBA 1.0 Executive Summary
Bold Steps to Change

1. 3 YR OBJECTIVES
2. REASON FOR CHANGE
3. STRATEGIC FOCUS
4. BAM VISION
5. CLARITY OF VISION
6. GOALS & STRATEGY
7. VALUE MAP
8. SUCCESS FACTORS
9. BAM MARKET POSITION
10. ACTION PLAN




Get the balance right



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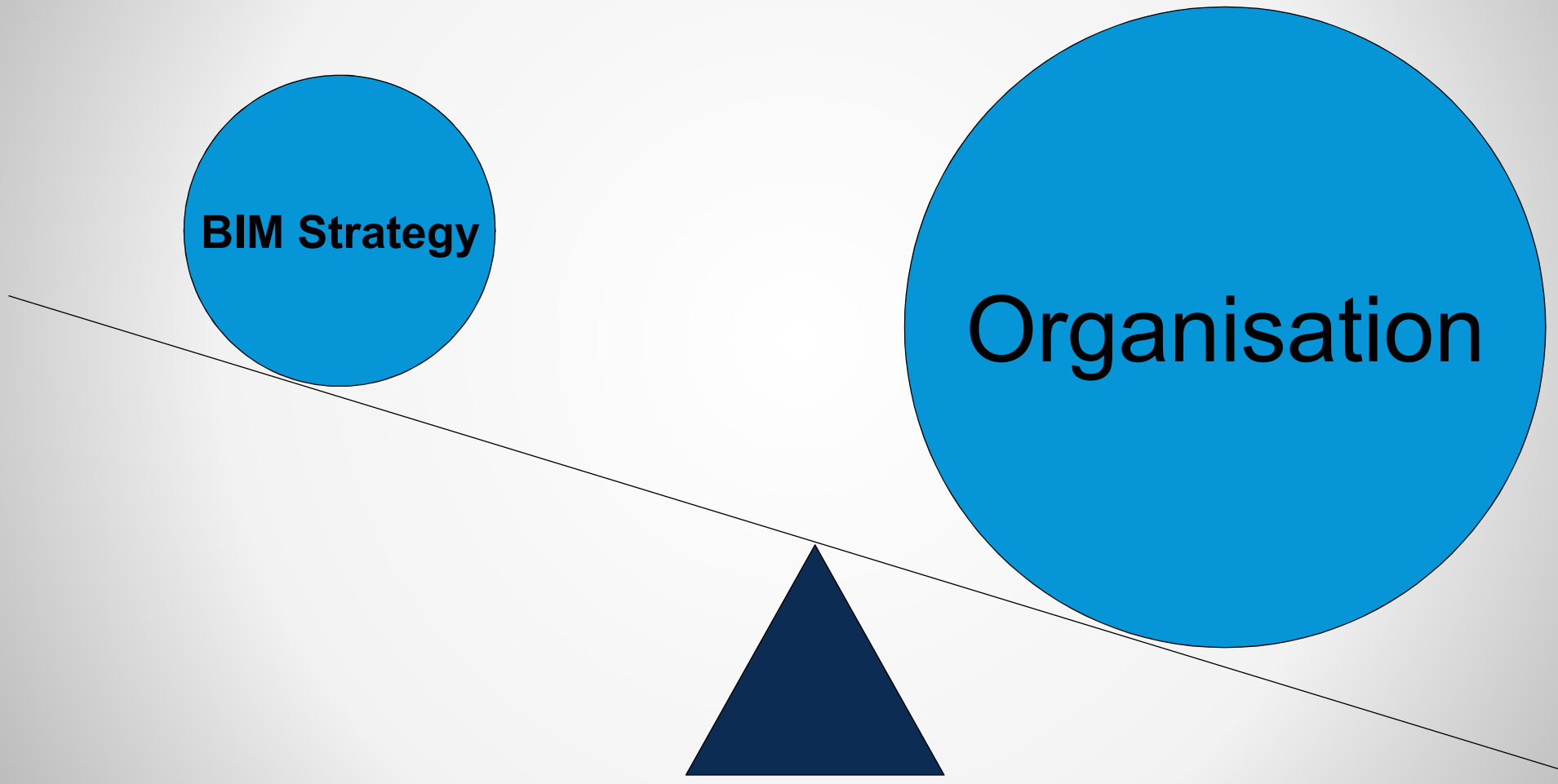


MEP Engagement | Objectives

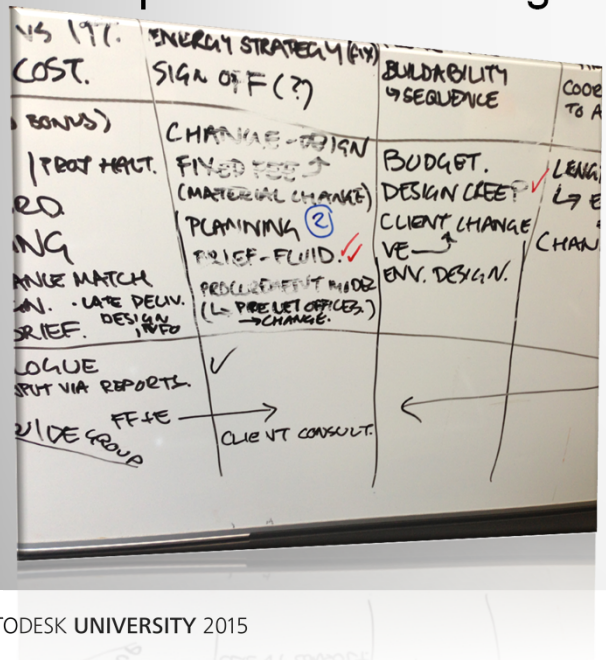
- Alignment of BAMD and BAMSE process – form a single route to BIM
- Align this process with BAM Construction
- Ensure that BIM adds value and efficiency to the process, reducing time and increasing quality of the end result
- Align BIM for MEP with the programme goals for BAM
  - (increase) Work Winning
  - Optimise Design Delivery
  - Optimise Construction Delivery
  - Improve Quality of Solution
  - Operate Buildings More Effectively

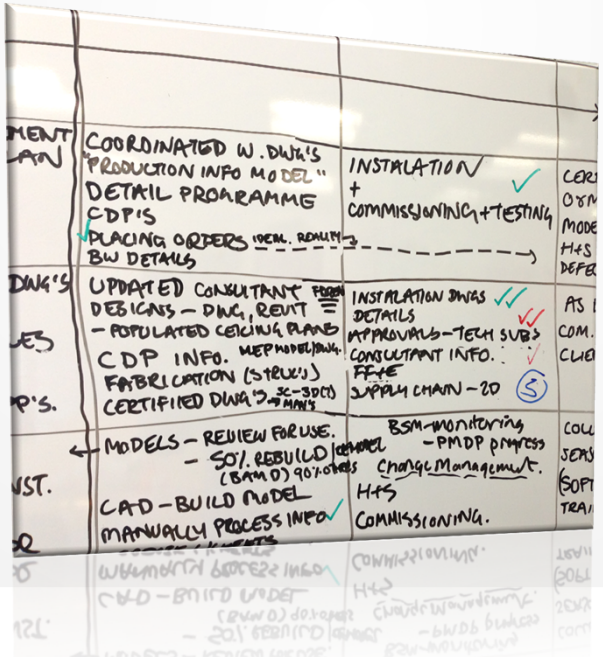
Workshop 01| Mapping the existing process

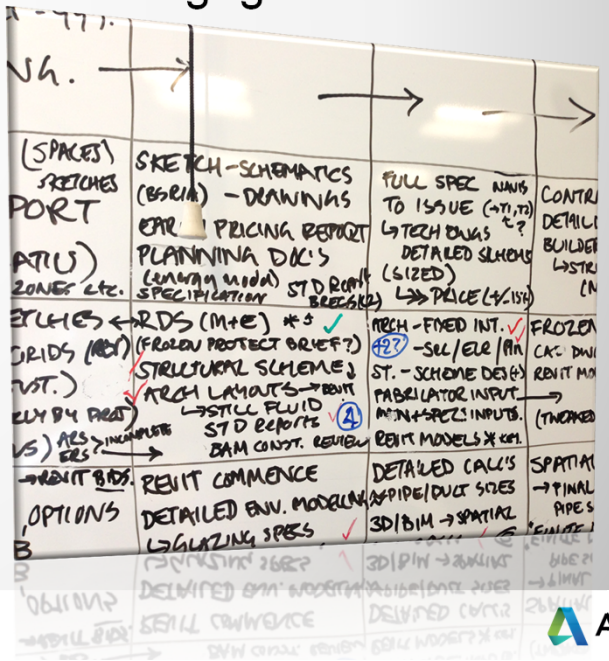
- The first workshop focussed on mapping the as-is process for MEP design in both BAM Design and BAM Services Engineering
- We mapped the activities, characters and observations of the teams for each phase of the construction project.
- This section explains each of the different swim-lanes used to map the process, the full version is appended to this report at the end

Workshop 02| Analysing the existing process

- This workshop completed the process map begun in the first workshop, then moved on to an exercise to draw out the major challenges.
- Each attendee was given 5 ‘ticks’. Each tick represented £10,000 of their own money. They could spend them wherever they felt needed it the most.
- The results of this exercise were then grouped to uncover the most commonly experienced challenges. These will form the focus of the MEP engagement.



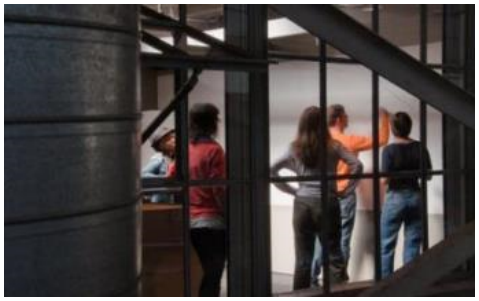
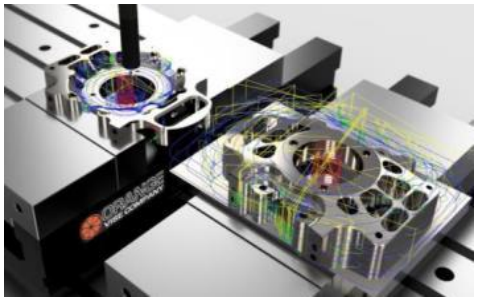




Autodesk Consulting
Project Methodology & Implementation

Autodesk Consulting

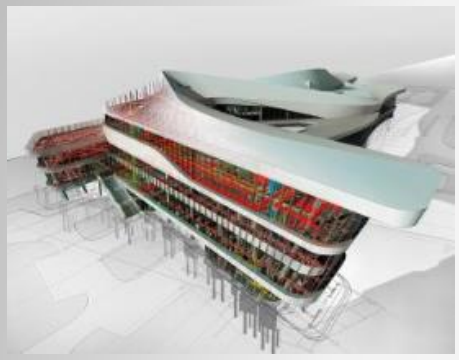
Business Solutions = People + Process + Technology

Innovate more quickly	Accelerate adoption	Manage change with minimal risk	Drive long-term success
			

Experts provide business solutions to help achieve
strategic goals and gain a competitive advantage from technology

What We Offer

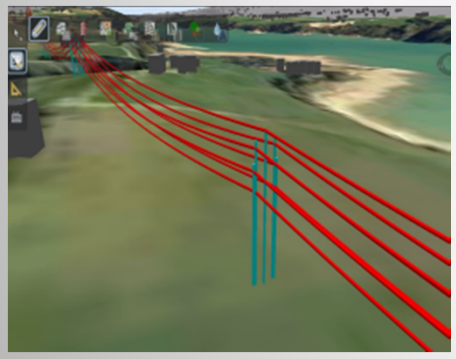
Consulting services for the building, infrastructure, manufacturing, and media & entertainment industries



BIM Transformation

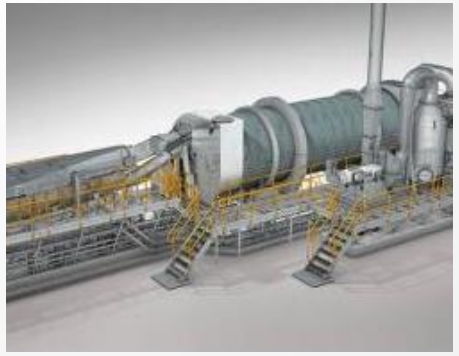
Collaboration and
Data Management

Visualization



Utilities Design Management

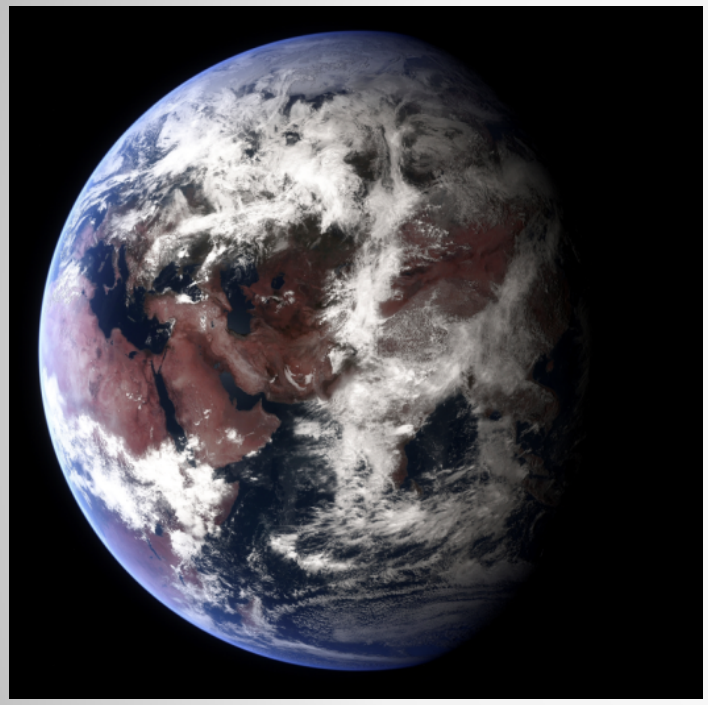
Smart Manufacturing



Engineer-to-Order

Customer Success
Manager Program

Autodesk Consulting Profile



Global

- 350+ consultants
- 22 countries worldwide
- Extensive partner network

Expertise

- Experts straight from industry
- Extensive knowledge of Autodesk portfolio
- Future technology trends
- Business Analysts
- Architects, Structural & MEP Engineers
- Civil Engineers
- BIM Managers
- Solution Architects, Technical Consultants
- Developers, Database specialists

Best practices from hundreds of engagements with Fortune 500 companies around the world.

The Autodesk Consulting Project Management

Skilled, professional Project Managers, certified in proven Project Management Methodology

Expert focused on the BIM/PLM/Manufacturing domain with deep experience in driving IT enabled business improvement projects

Leverages best practices and lessons learnt from similar engagements via Autodesk's Business Value methodology to ensure repeatable project success

Skilled and trained to build quality assurance into the project and drive out risk

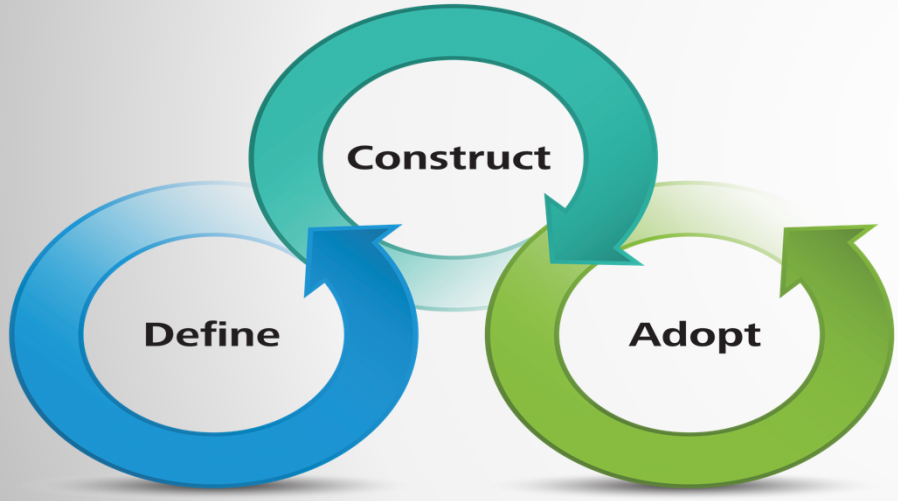
Guides the implementation and scope to focus on and deliver visible, measurable business improvement and economic benefit

Business Value Methodology | Benefits

- Defines how AC works to deliver value to customers
- Focused on key business needs

Autodesk Business Value Methodology

AUTODESK®
BUSINESS VALUE
METHODOLOGY

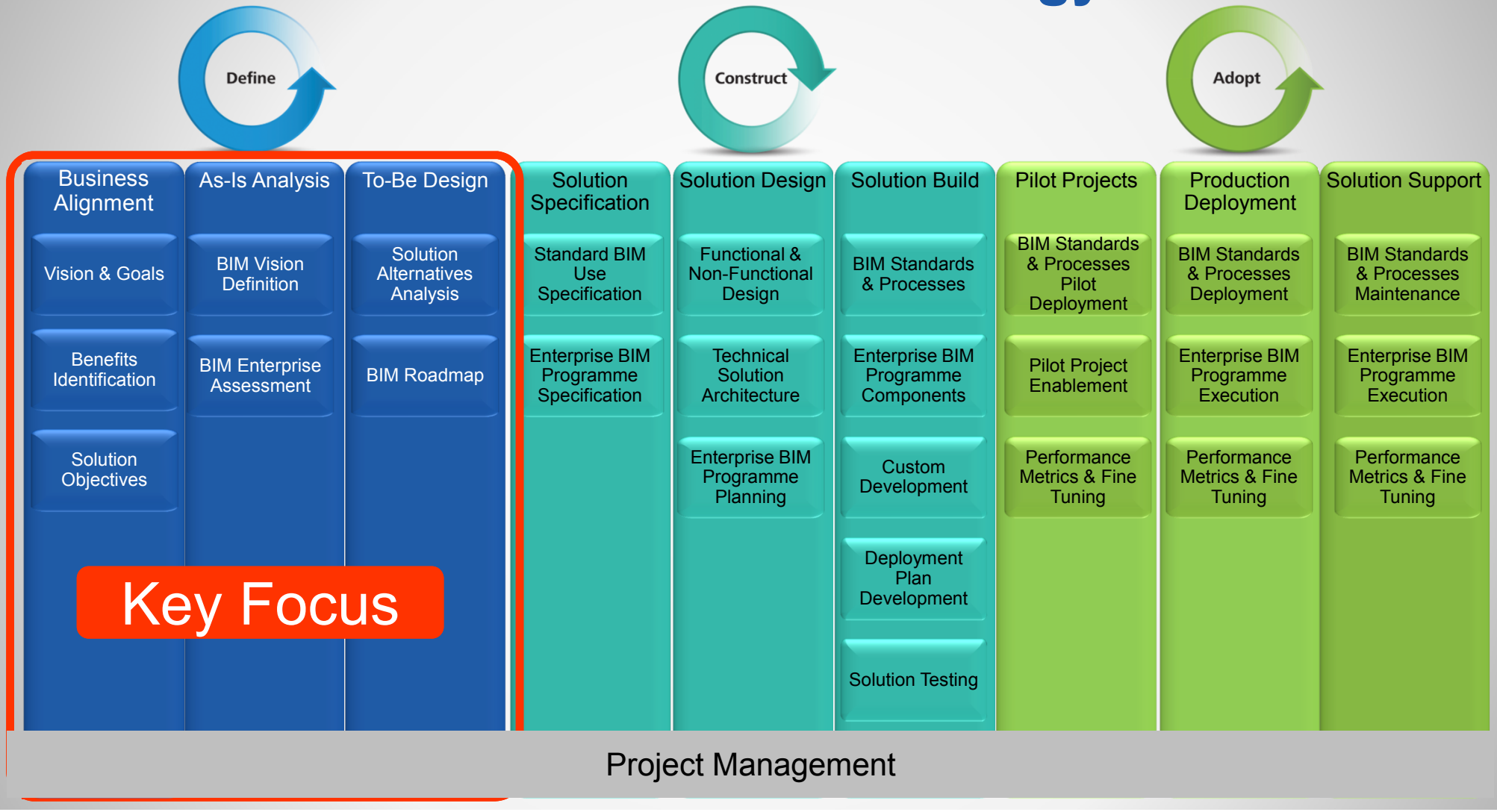


Define Phase
Business value has been agreed. A roadmap and high-level plan are in place. Success metrics have been identified.

Construct Phase
Solution has been designed, developed, and tested. All data has been migrated. Baseline metrics are available. An adoption plan has been created.

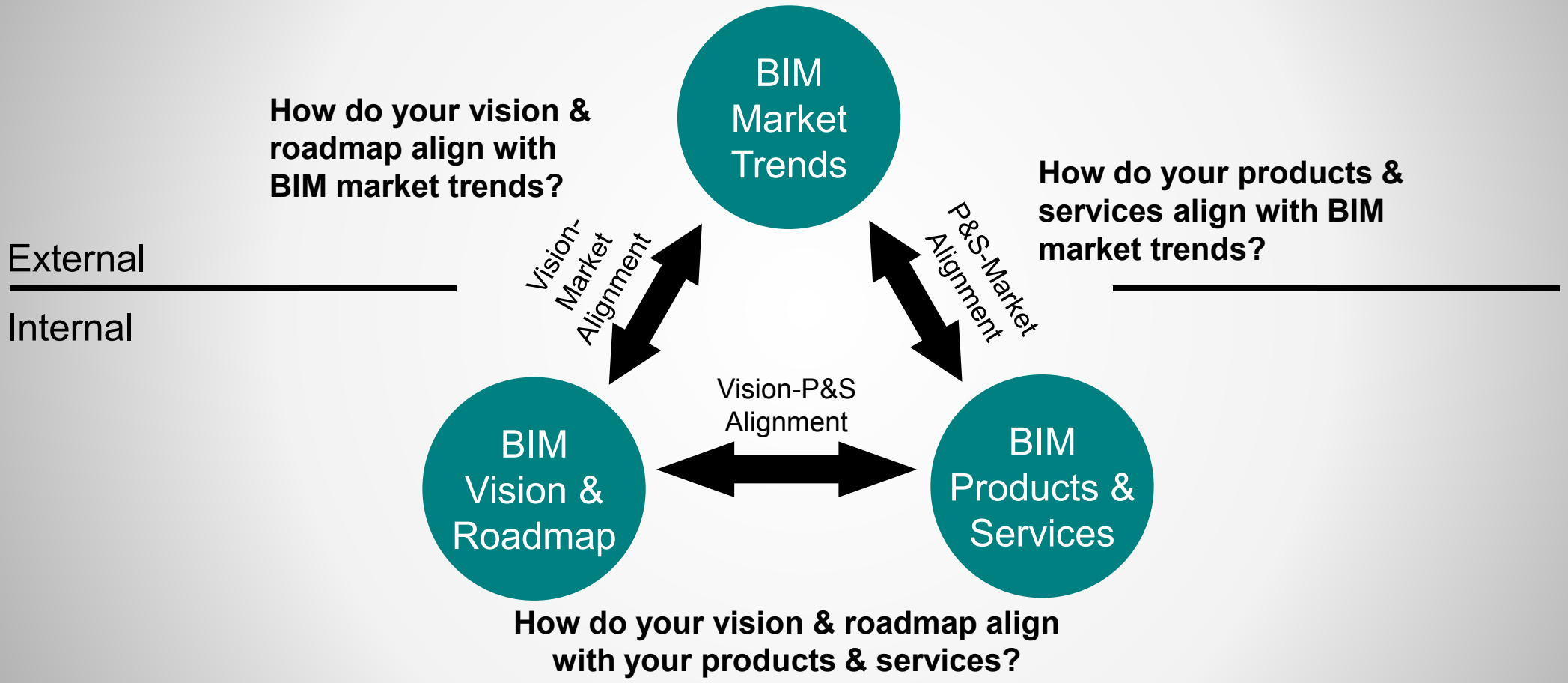
Adopt Phase
All users are trained and the solution is in production with ongoing mentoring to ensure productive use. Metrics demonstrate business value.

Autodesk Business Value Methodology



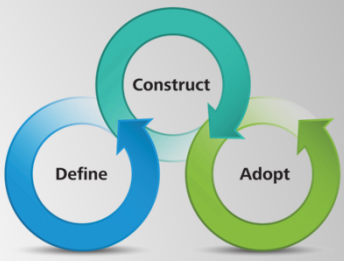
Project Lifecycle
BAM MEP BIM Implementation

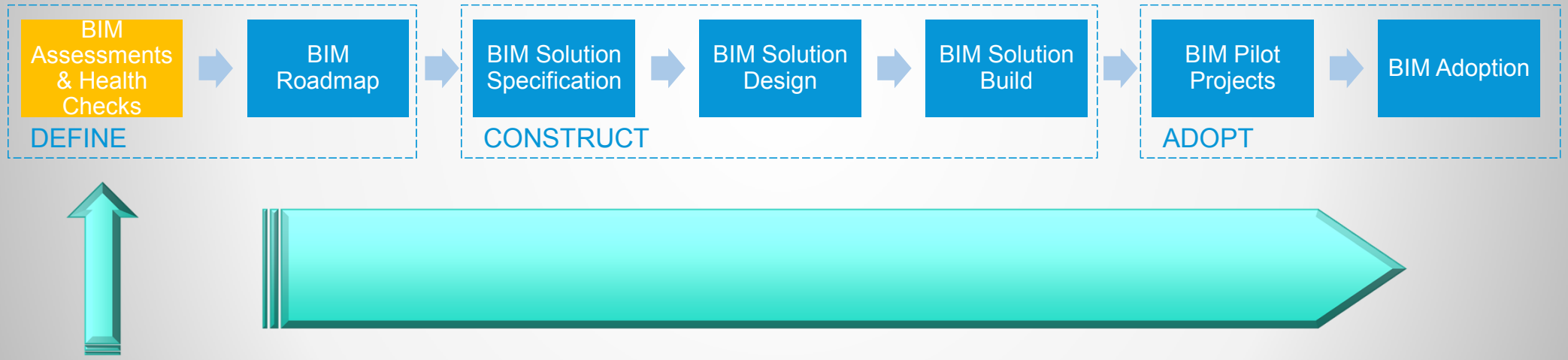
BIM Business Transformation



Enterprise Implementation Model

AUTODESK®
BUSINESS VALUE
METHODOLOGY





- ✓ Workflow Discovery
- ✓ Health Checks

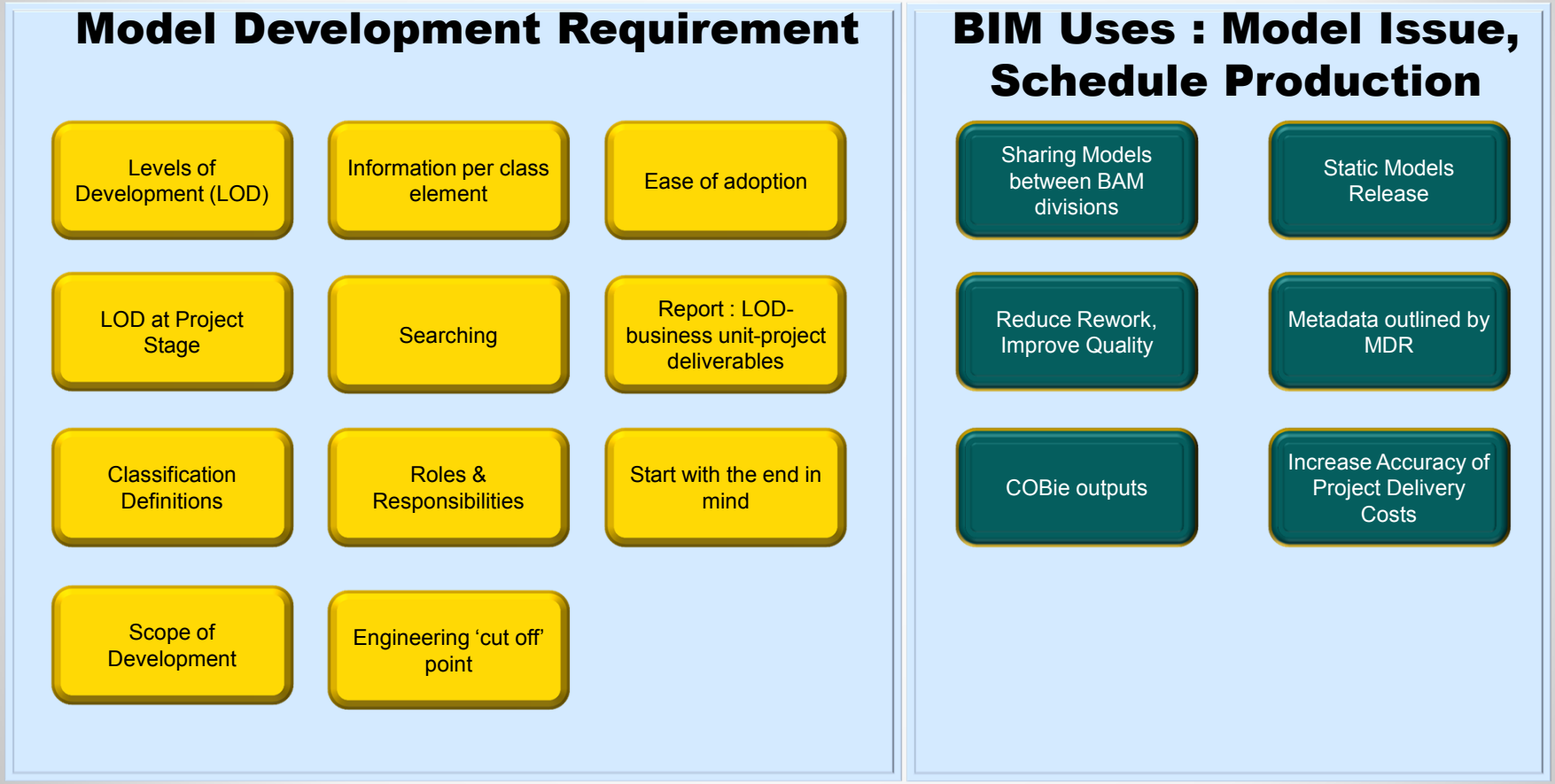
Vision & Objectives

What is this project team doing and why?

There is an opportunity…

- For a more profitable business for BAM
- To create one BIM (model-based) workflow
- BAM and phases of asset lifecycle
- Enable BAM to increase efficiency/reduce waste
- Improve morale/project experience of BAM staff

Business Requirement Areas



Outputs

Model Development Requirement (MDR)

- BIM Use diagram and process model
- LOD Template, Deliverables Matrix
- MDR Database & Attributes
- MDR reports configured to BAM
- Training & Mentoring

Schedules

- MEP Application Templates
- Classification Coding system
- Training, Materials & Mentoring
- Schedule Data Exchange

Static Model Issue

- Workflow Protocols
- Release Scheduling
- Procedure Guidance Notes

Model Development Requirement

2003
Improvement
modelling
Multi-disc for
co-ordination

2000

2009
Pre-construction
planning for
tenders

2010

2011
Leeds Arena
Construction
3D co-ordination
4Dplanning

2011
UK Mandate

2012
Improvement
BIM360field
BIM

2012
Autodesk EBA

AUTODESK.

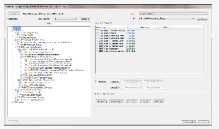
2013
Project Robin
BIM for FM

2013
50+ projects
BIM deliverables

2014
BIM360Glue

2014
BIM training

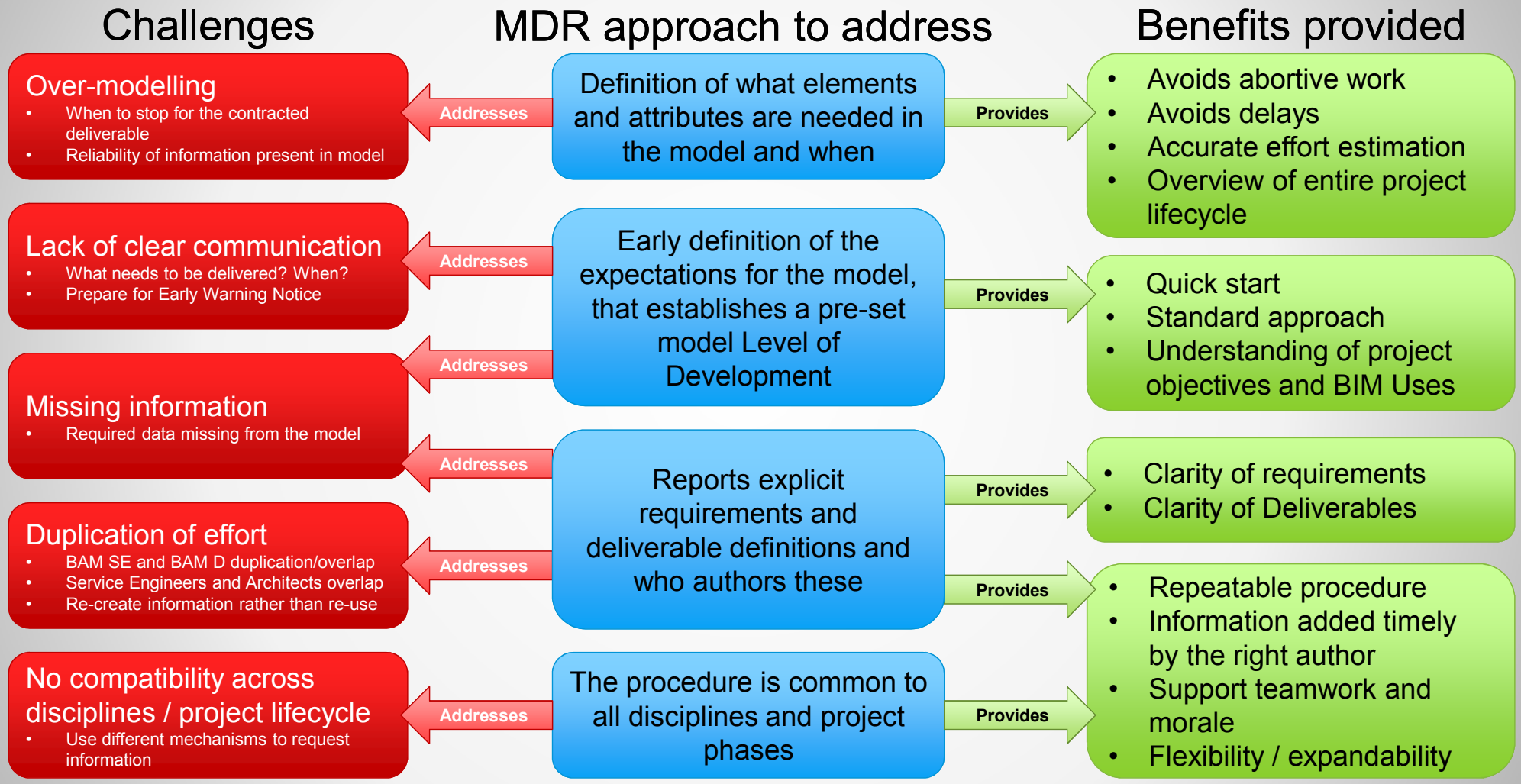
2014
MDR Development



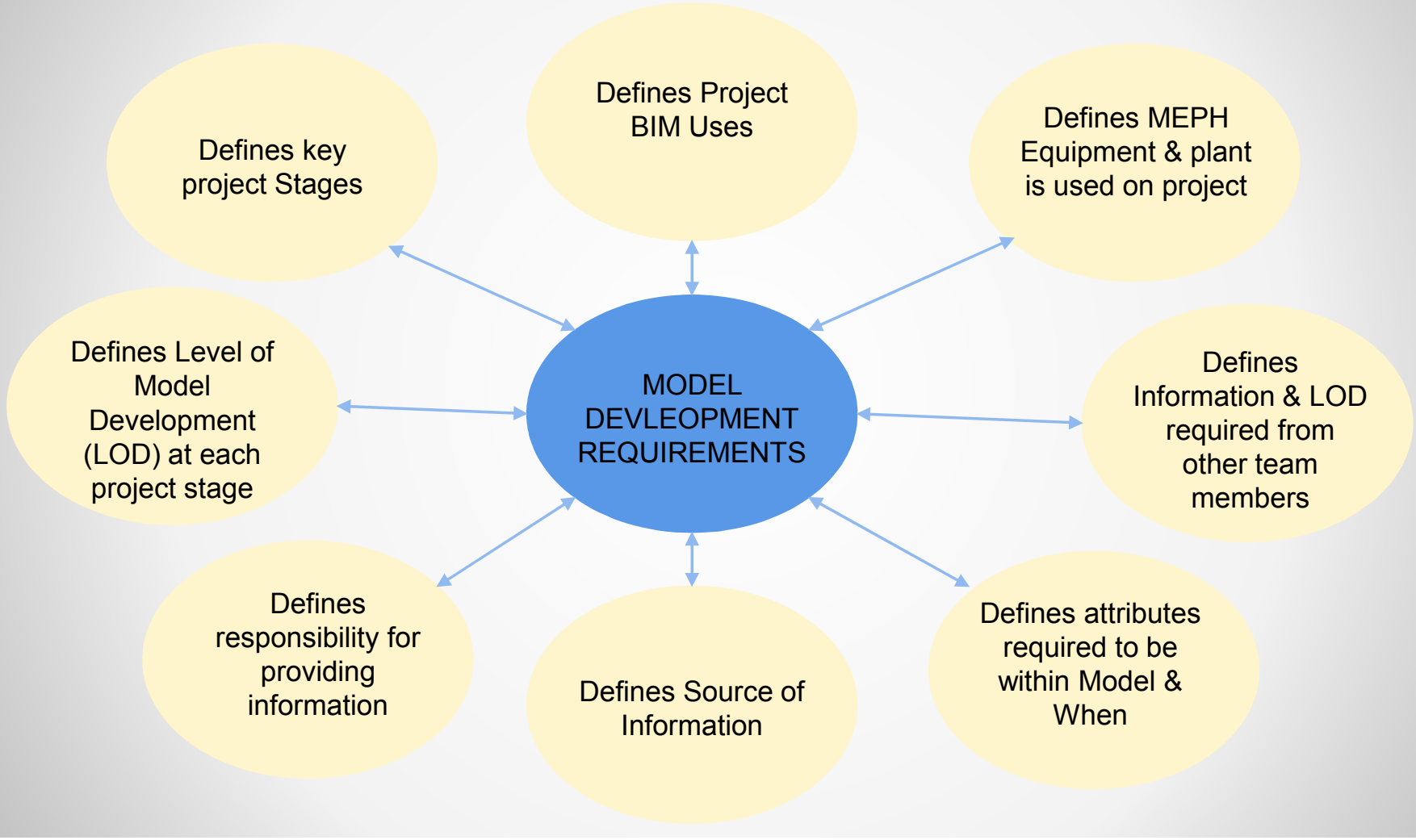
2014
Procedures

2020

BAM MEP – Challenges, Benefits

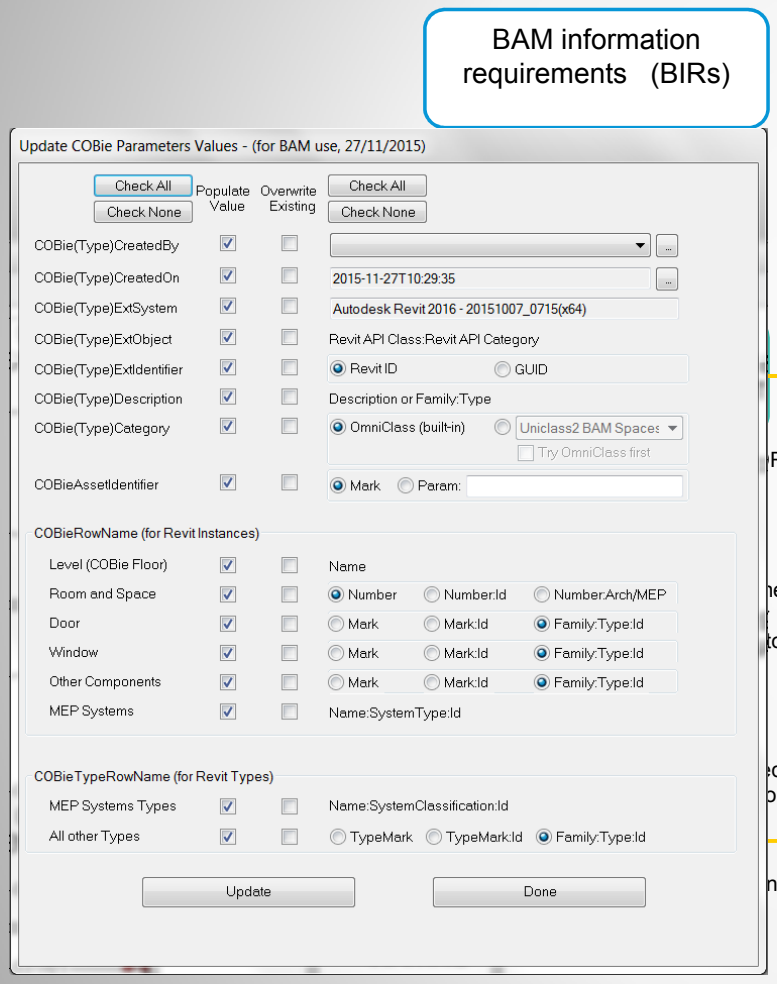


Model Development Requirements



Model Checker Tool

BAM Services Engineering MDR to COBie Workflow



BAM information requirements (BIRs)

Collect equipment data in field + addition of 3rd party data. Aligned to MDR

Design Model creation aligned to MDR

BIM360Field

Revit

Additional Data

Additional client data linked to design data prior to export to glue

BIM 360 Glue

Aggregated Model Database in BIM 360

R database

Sync equipment data to Revit Model

RVT

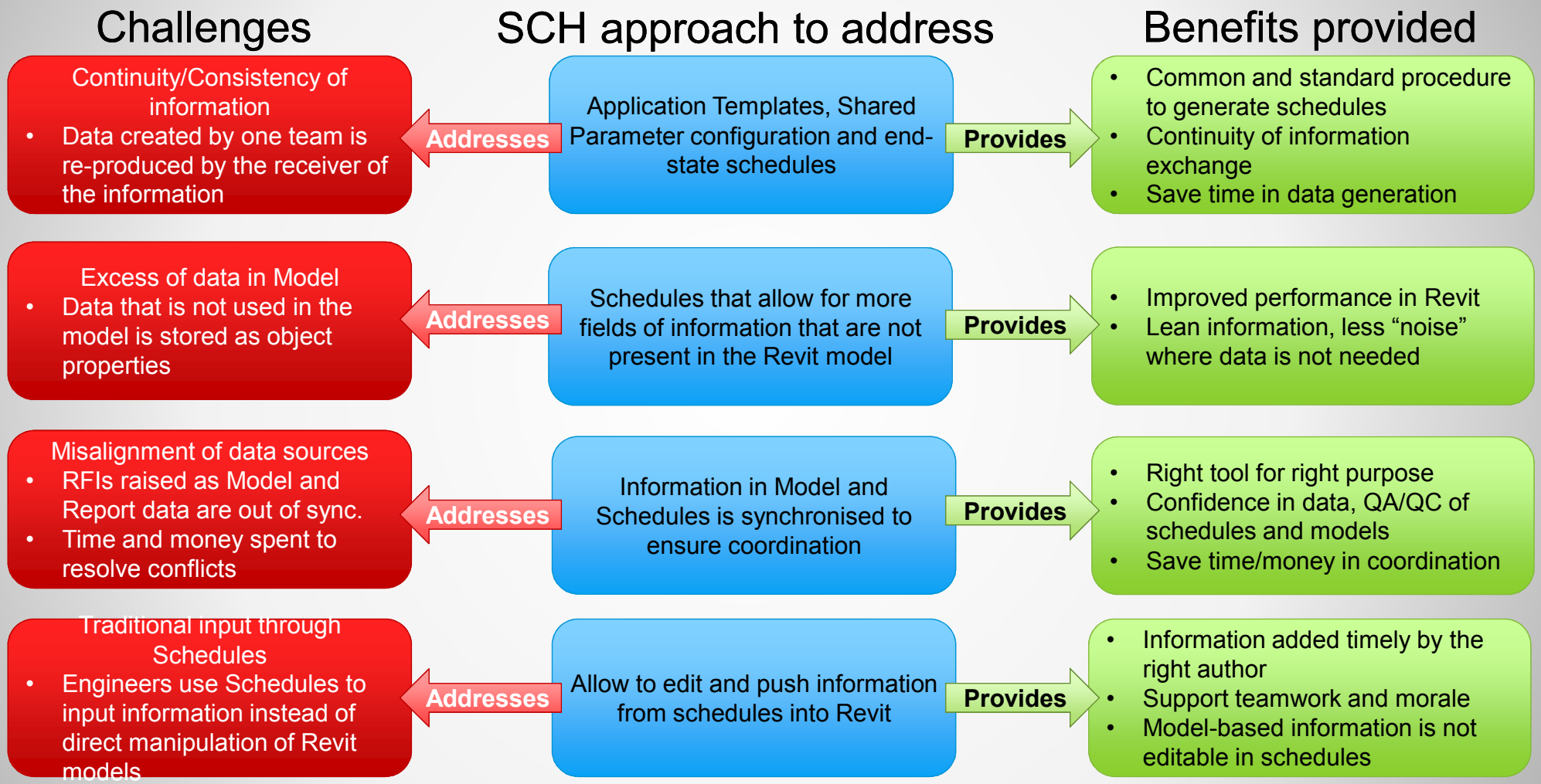
COBie Revit Plug-In

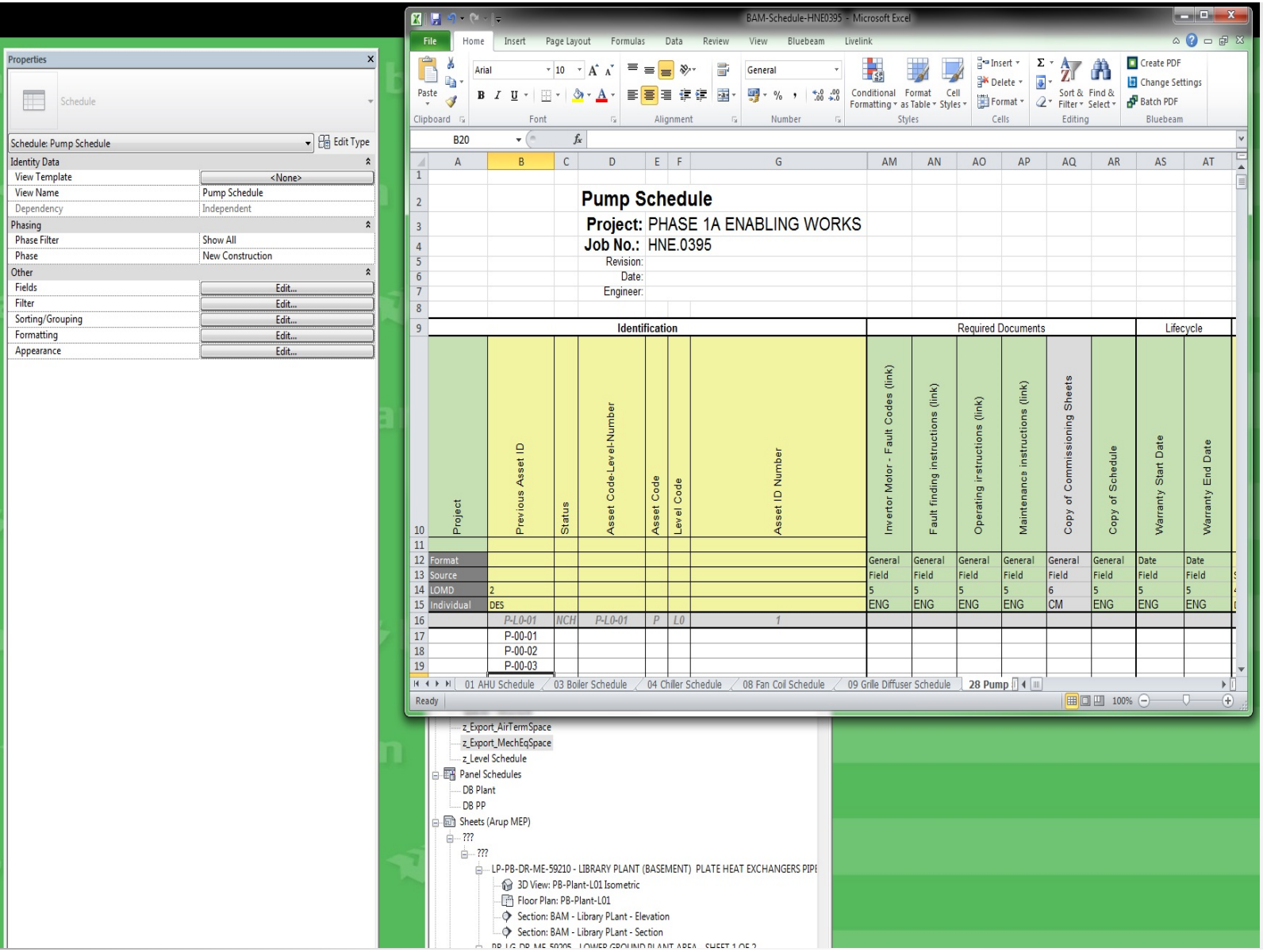
Report Generator

Validation against MDR using model checker

Schedule Production Tools

Schedule Production – Current Challenges



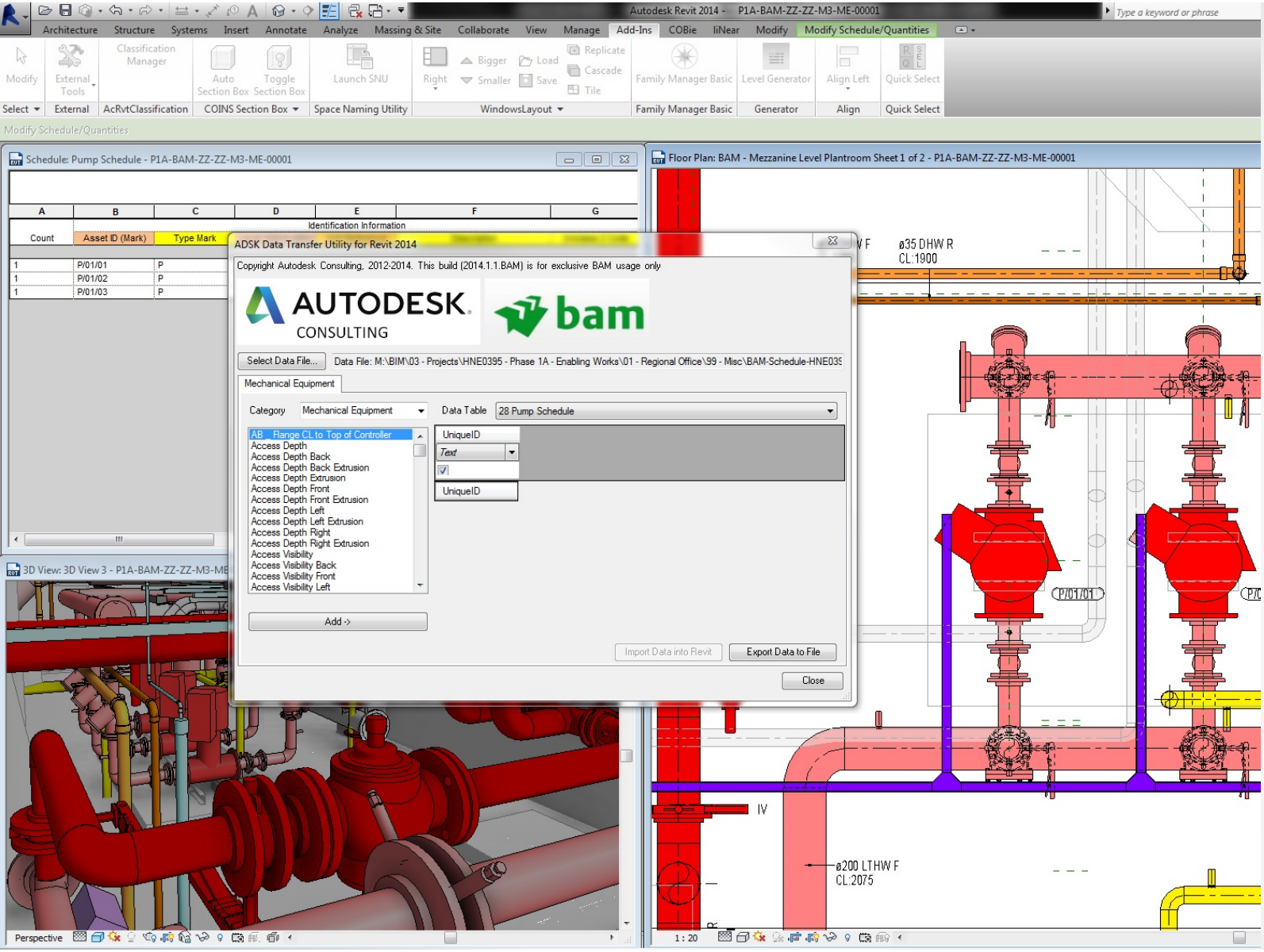


bam

DATA Management

Design data from bespoke Revit content can pushed back into Schedules if required for analysis if so required.

Working with BAM's Data Management tools we transfer Data from Engineering Schedules & BIM 360 Field Directly to / from Revit MEP
Commissioning Data is primarily collected through BIM 360 field but can be also be put into Excel and pushed into Revit.
Data is collected in Revit so that COBie data can be harvested from it.

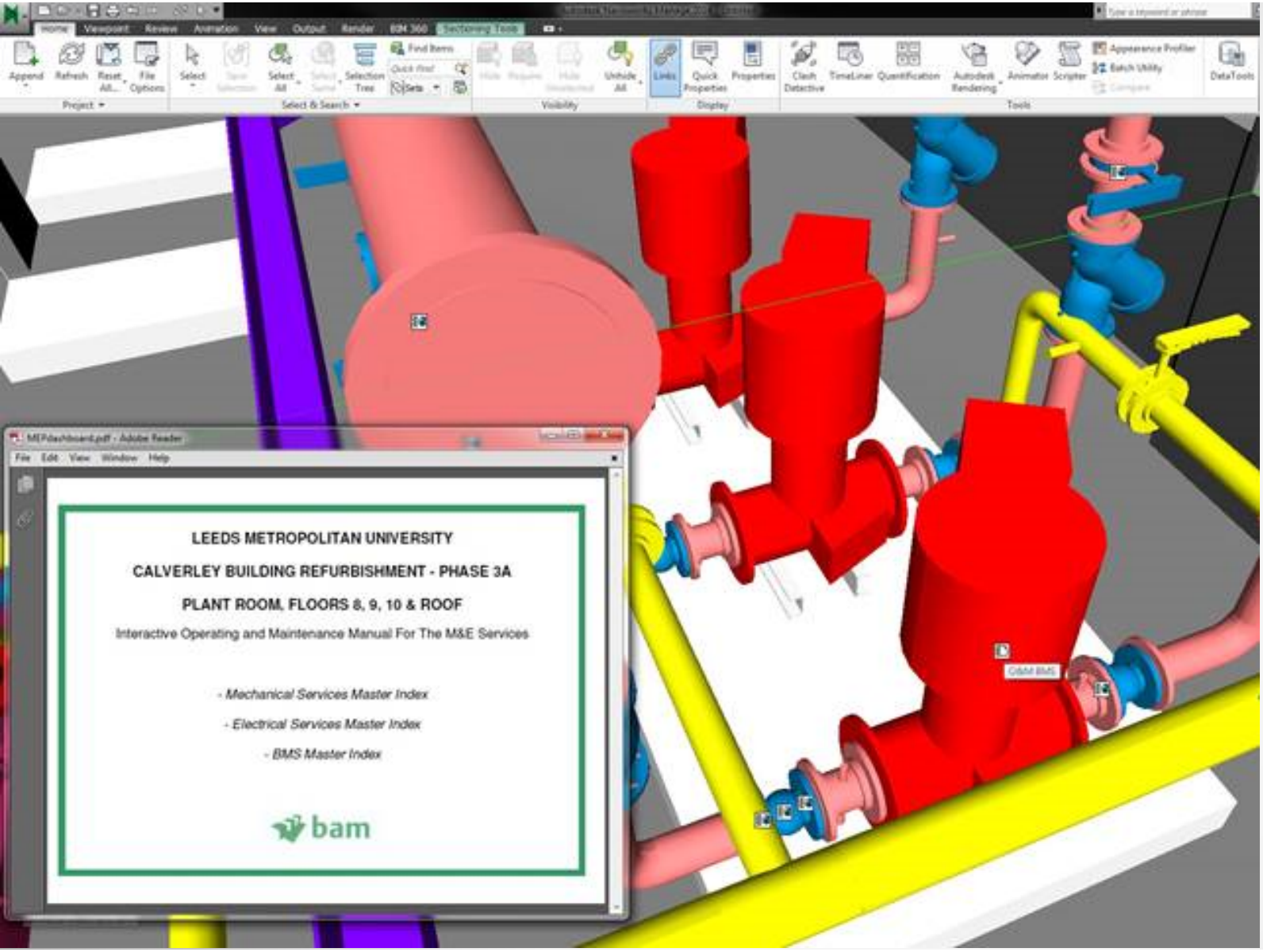


bam

DATA Management

Commissioning Data from Excel/Revit into COBie

Using The model to link to O&M Commissioning Sheets.

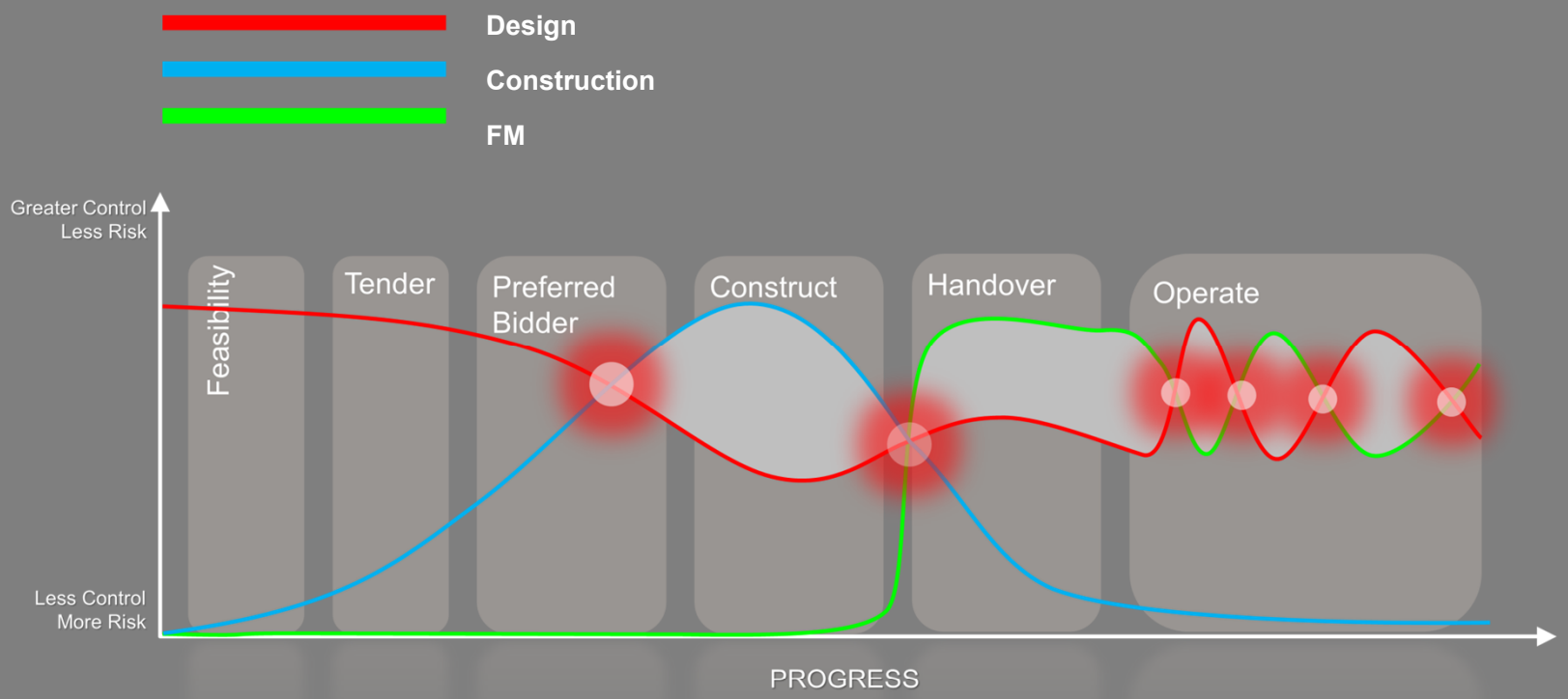


DATA Management

Using the model in Autodesk Navisworks to navigate through the BIM model links are highlighted to connect to the Operating & Maintenance documentation. Links to Commissioning Data, Schedules, Data sheets and hyperlinks to BMS information are applied.

Operational Requirements

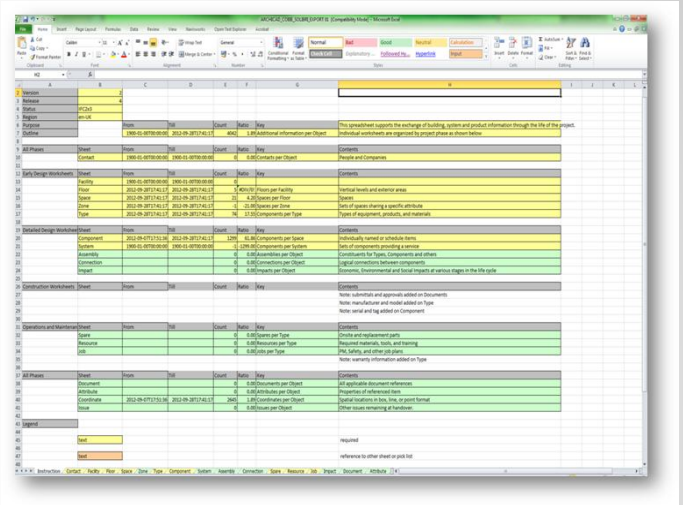
The Challenges for FM in information transfer……
A good reason for BIM


Design
Construction
FM
Greater Control
Less Risk
Less Control
More Risk
Feasibility
Tender
Preferred
Bidder
Construct
Handover
Operate
PROGRESS

BIM to FM – Assets to CAFM

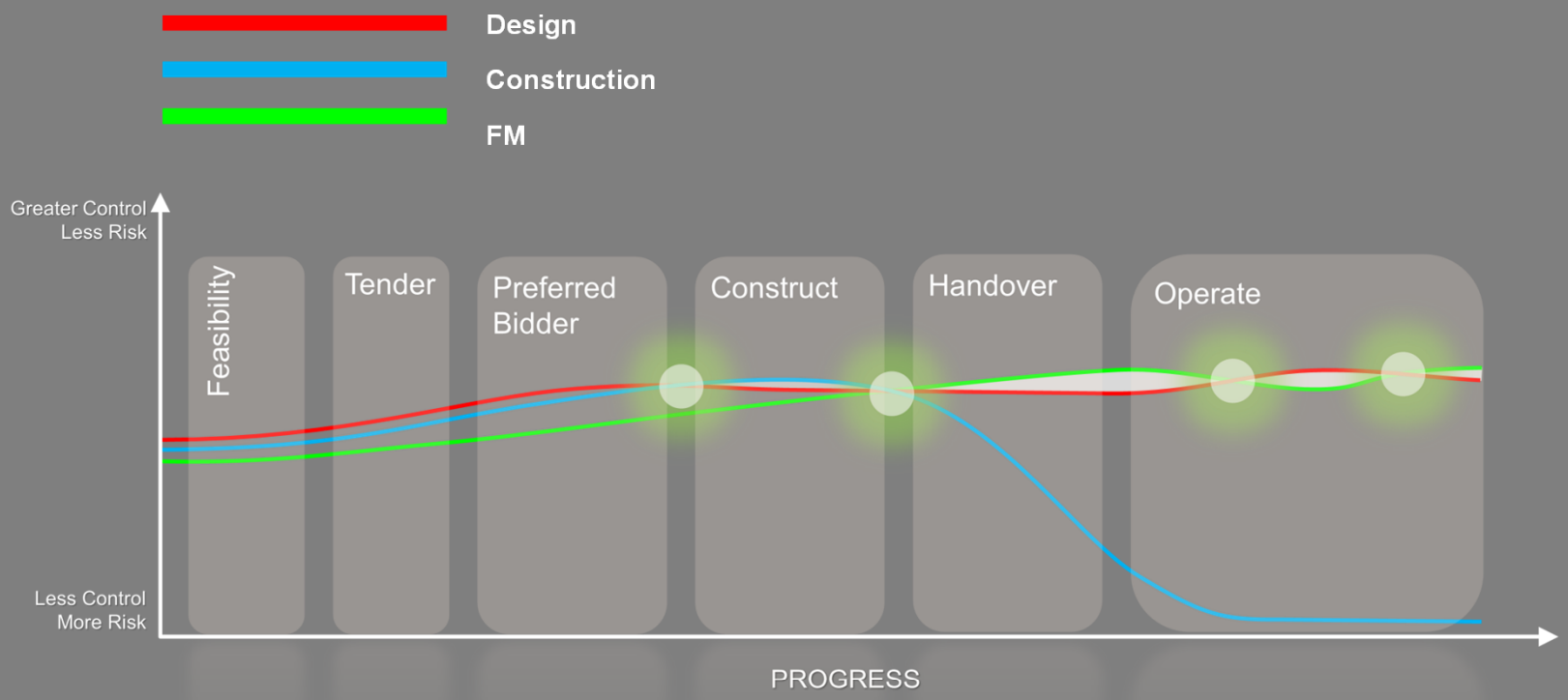
Manual Data gather transfer to CAFM

Time taken: 5-10 days
Cost: £5k approx. – subject to facility type
Accuracy: 95%



Digital Data transfer COBie schema to CAFM

Time taken: minutes(automated)
Cost: £1.70 per m2 to £0.36 per m2
Accuracy: 100%


Design
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Greater Control
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Operate
PROGRESS

bam

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AUTODESK.

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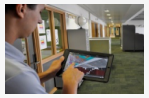
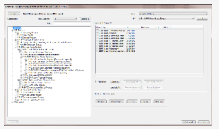


2013
50+ projects
BIM deliverables

2014
BIM360Glue

2014
BIM training

2014
MDR Development



2014
Procedures

2015
BAM CDE

2015
BIM360layout trials

2015
Wharfedale
BIM2FM
Ops

2015
Queen Street
Exemplar

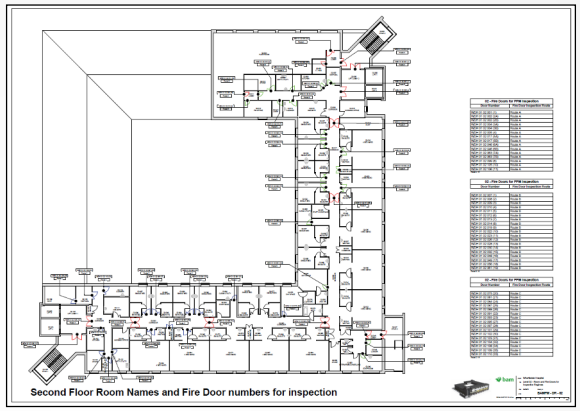
2020

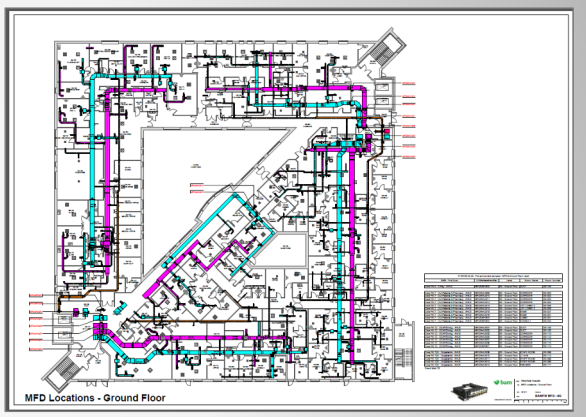
BIM to FM Operations

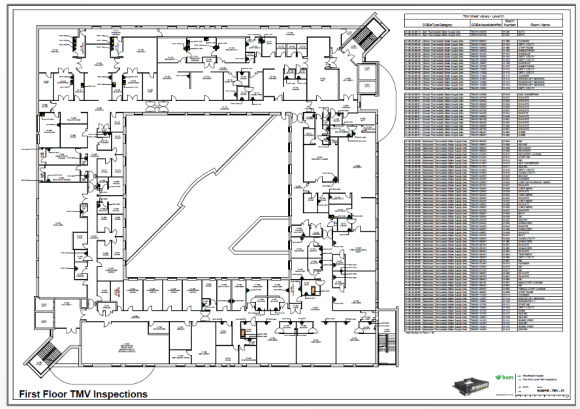
The building type

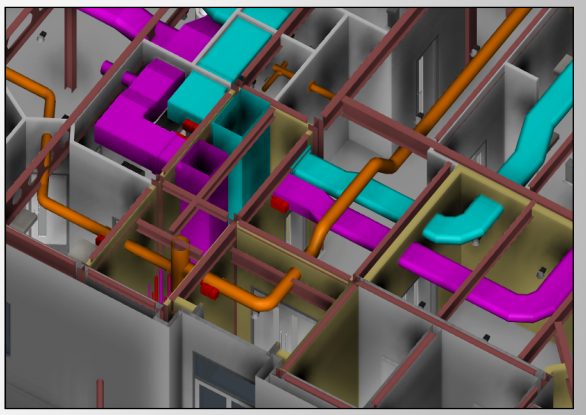
Major FM ops considerations

- Fire Safety
- Doors – Inspection Regimes
- Fire Dampers – PPM Regimes
- Hot Water Scalding
- TMV – Mixer Valves PPM Regimes

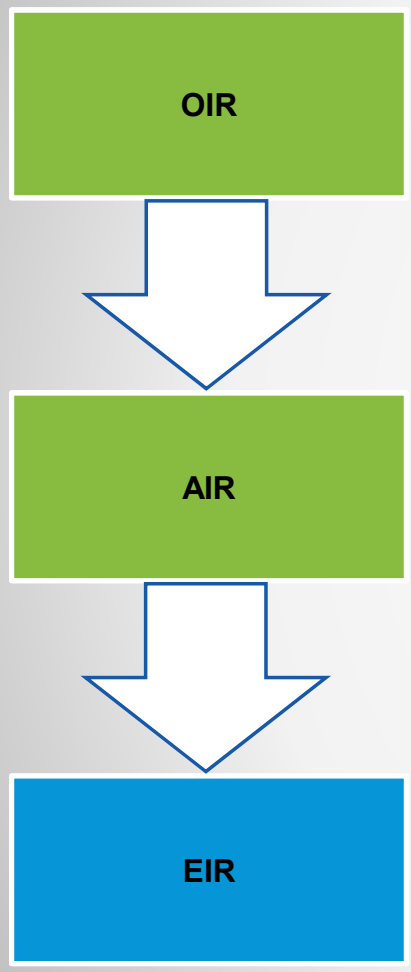








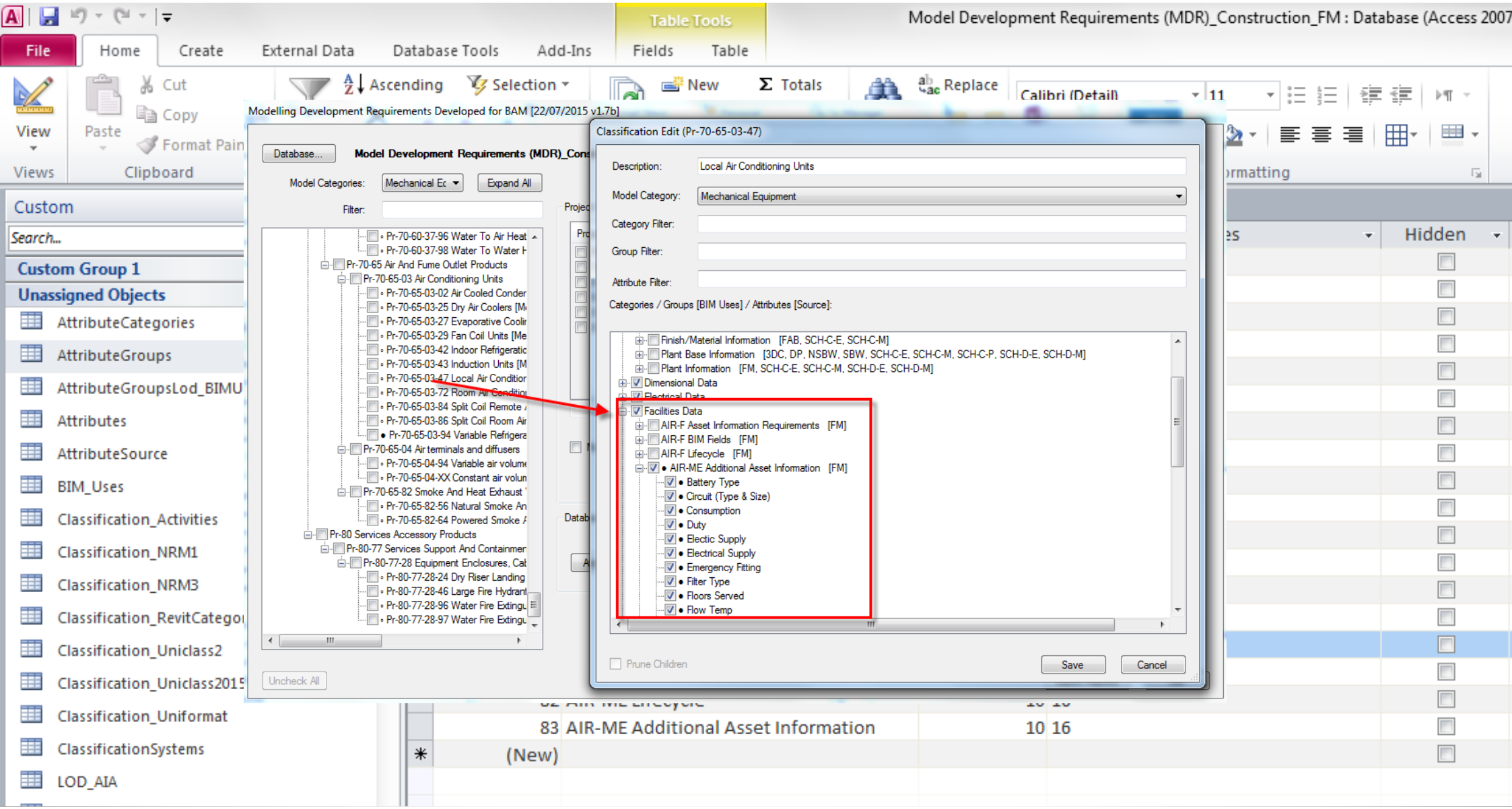
What do FM want?



Organisational Information Requirements:
Data and information required to achieve the organisation's objectives

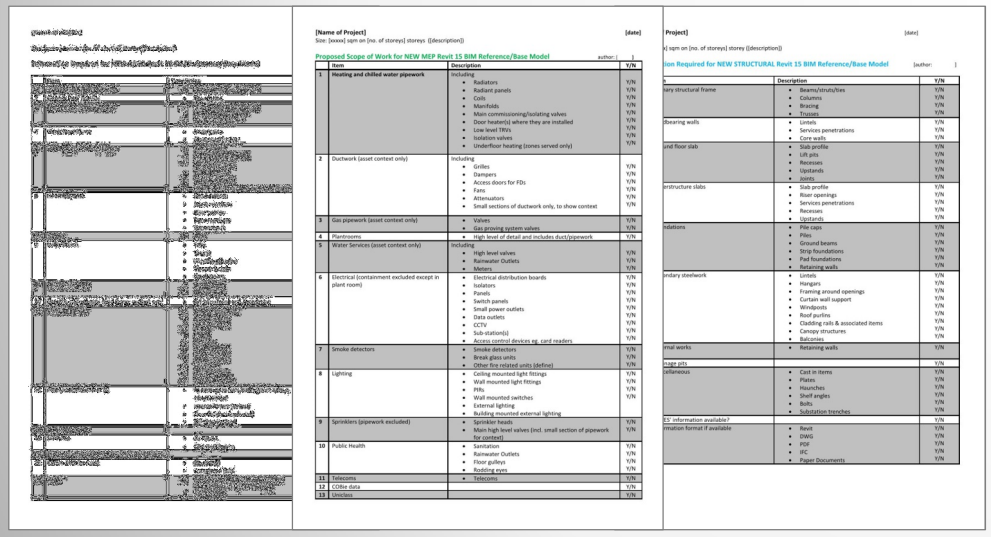
Asset Information Requirements:
Data and information requirements of the organisation in relation to the asset(s) it is responsible for

Employer's Information Requirements:
Pre-tender document setting out the information to be delivered, and the standards and processes to be adopted by the supplier as part of the project delivery process


Model Development Requirements (MDR)_Construction_FM : Database (Access 2007
Table Tools
File
Home
Create
External Data
Database Tools
Add-Ins
Fields
Table
Ascending
Selection
New
Totals
Replace
Calibri (Detail)
11
Cut
Copy
Format Pain
Paste
View
Views
Clipboard
Modelling Development Requirements Developed for BAM [22/07/2015 v1.7b]
Database...
Model Development Requirements (MDR)_Cons
Model Categories:
Mechanical Ec
Expand All
Filter:
Pr-70-60-37-96 Water To Air Heat
Pr-70-60-37-98 Water To Water H
Pr-70-65 Air And Fume Outlet Products
Pr-70-65-03 Air Conditioning Units
Pr-70-65-03-02 Air Cooled Conder
Pr-70-65-03-25 Dry Air Coolers [M
Pr-70-65-03-27 Evaporative Coolir
Pr-70-65-03-29 Fan Coil Units [Me
Pr-70-65-03-42 Indoor Refrigeratic
Pr-70-65-03-43 Induction Units [M
Pr-70-65-03-47 Local Air Conditior
Pr-70-65-03-72 Room Air Conditiou
Pr-70-65-03-84 Split Coil Remote
Pr-70-65-03-86 Split Coil Room Air
Pr-70-65-03-94 Variable Refrigera
Pr-70-65-04 Air terminals and diffusers
Pr-70-65-04-94 Variable air volume
Pr-70-65-04-XX Constant air volun
Pr-70-65-82 Smoke And Heat Exhaust
Pr-70-65-82-56 Natural Smoke An
Pr-70-65-82-64 Powered Smoke A
Pr-80 Services Accessory Products
Pr-80-77 Services Support And Containmer
Pr-80-77-28 Equipment Enclosures, Cat
Pr-80-77-28-24 Dry Riser Landing
Pr-80-77-28-46 Large Fire Hydrant
Pr-80-77-28-96 Water Fire Extingu
Pr-80-77-28-97 Water Fire Extingu
Uncheck All
Classification Edit (Pr-70-65-03-47)
Description:
Local Air Conditioning Units
Model Category:
Mechanical Equipment
Category Filter:
Group Filter:
Attribute Filter:
Categories / Groups [BIM Uses] / Attributes [Source]:
Finish/Material Information [FAB, SCH-C-E, SCH-C-M]
Plant Base Information [3DC, DP, NSBW, SBW, SCH-C-E, SCH-C-M, SCH-C-P, SCH-D-E, SCH-D-M]
Plant Information [FM, SCH-C-E, SCH-C-M, SCH-D-E, SCH-D-M]
Dimensional Data
Facilities Data
AIR-F Asset Information Requirements [FM]
AIR-F BIM Fields [FM]
AIR-F Lifecycle [FM]
AIR-ME Additional Asset Information [FM]
Battery Type
Circuit (Type & Size)
Consumption
Duty
Electic Supply
Electrical Supply
Emergency Fitting
Filter Type
Floors Served
Flow Temp
Prune Children
Save
Cancel
Custom
Search...
Custom Group 1
Unassigned Objects
AttributeCategories
AttributeGroups
AttributeGroupsLod_BIMU
Attributes
AttributeSource
BIM_Uses
Classification_Activities
Classification_NRM1
Classification_NRM3
Classification_RevitCatego
Classification_Uniclass2
Classification_Uniclass2015
Classification_Uniformat
ClassificationSystems
LOD_AIA
Hidden
83 AIR-ME Additional Asset Information 10 16
(New)

BIM to FM Operations

- What determines an Asset
  - Operational and Lifecycle requirements
  - BAM MDR – Model and Asset development DATA requirements
- Classification – Uniclass or NRM



[Name of Project] [date]

Size: [xxxxx] sqm on [no. of storeys] storeys ([description])

Proposed Scope of Work for NEW MEP Revit 15 BIM Reference/Base Model

author: [ ]

	Item	Description	Y/N
1	Heating and chilled water pipework	Including • Radiators • Radiant panels • Coils • Manifolds • Main commissioning/isolating valves • Door heaters(s) where they are installed • Low level TRVs • Isolation valves • Underfloor heating (zones served only)	Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N
2	Ductwork (asset context only)	Including • Grilles • Dampers • Access doors for FDs • Fans • Attenuators • Small sections of ductwork only, to show context	Y/N Y/N Y/N Y/N Y/N Y/N
3	Gas pipework (asset context only)	• Valves • Gas proving system valves	Y/N Y/N
4	Plantrooms	• High level of detail and includes duct/pipework	Y/N
5	Water Services (asset context only)	Including • High level valves • Rainwater Outlets • Meters	Y/N Y/N Y/N
6	Electrical (containment excluded except in plant room)	• Electrical distribution boards • Isolators • Panels • Switch panels • Small power outlets • Data outlets • CCTV • Sub-station(s) • Access control devices eg. card readers	Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N
7	Smoke detectors	• Smoke detectors • Break glass units • Other fire related units (define)	Y/N Y/N Y/N
8	Lighting	• Ceiling mounted light fittings • Wall mounted light fittings • PIRs • Wall mounted switches • External lighting • Building mounted external lighting	Y/N Y/N Y/N Y/N Y/N Y/N
9	Sprinklers (pipework excluded)	• Sprinkler heads • Main high level valves (incl. small section of pipework for context)	Y/N Y/N
10	Public Health	• Sanitation • Rainwater Outlets • Floor gulleys • Rodding eyes	Y/N Y/N Y/N Y/N
11	Telecoms	• Telecoms	Y/N
12	COBie data		Y/N
13	Uniclass		Y/N

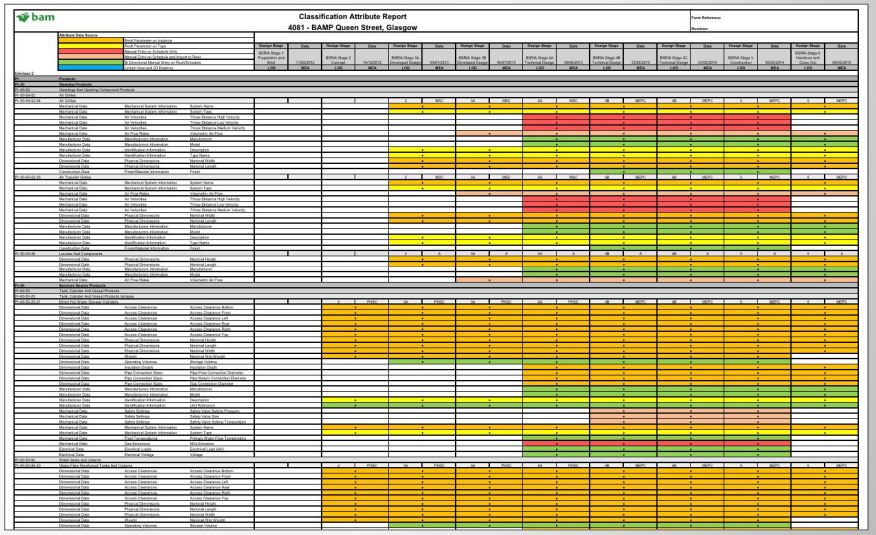
[Project] [date]

[ ] sqm on [no. of storeys] storey ([description])

ion Required for NEW STRUCTURAL Revit 15 BIM Reference/Base Model

[author:]

	Description	Y/N
ary structural frame	• Beams/struts/ties • Columns • Bracing • Trusses	Y/N Y/N Y/N Y/N
/bearing walls	• Lintels • Services penetrations • Core walls	Y/N Y/N Y/N
and floor slab	• Slab profile • Lift pits • Recesses • Upstands • Joints	Y/N Y/N Y/N Y/N Y/N
erstructure slabs	• Slab profile • Riser openings • Services penetrations • Recesses • Upstands	Y/N Y/N Y/N Y/N Y/N
ndations	• Pile caps • Piles • Ground beams • Strip foundations • Pad foundations • Retaining walls	Y/N Y/N Y/N Y/N Y/N Y/N
ndary steelwork	• Lintels • Hangers • Framing around openings • Curtain wall support • Windposts • Roof purlins • Cladding rails & associated items • Canopy structures • Balconies	Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N
rnal works	• Retaining walls	Y/N
nage pits		Y/N
ellaneous	• Cast in items • Plates • Haunches • Shelf angles • Bolts • Substation trenches	Y/N Y/N Y/N Y/N Y/N Y/N
CS' information available?		Y/N
rmation format if available	• Revit • DWG • PDF • IFC • Paper Documents	Y/N Y/N Y/N Y/N Y/N



bam

Classification Attribute Report

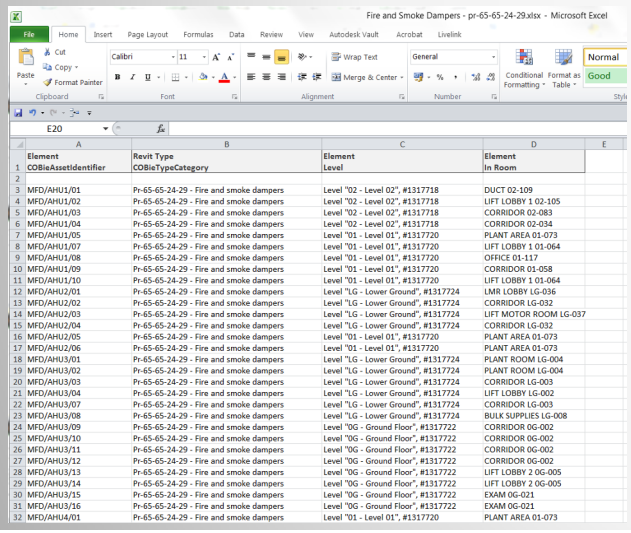
4081 - BAMP Queen Street, Glasgow

Client Feedback

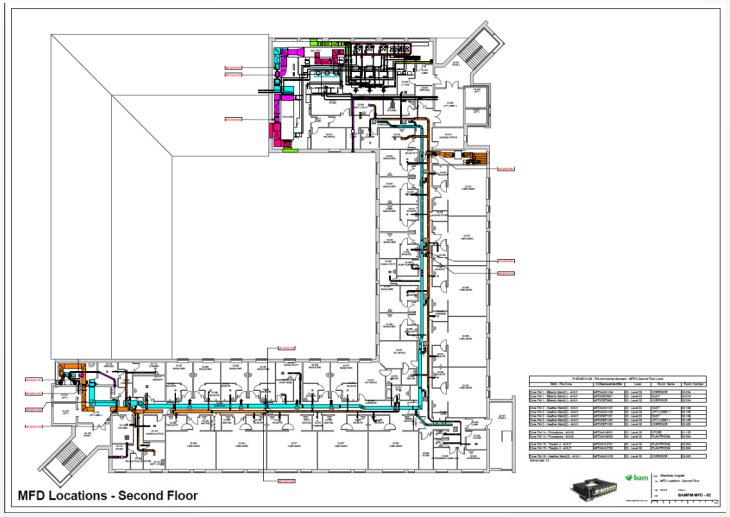
Quote from Fire & Safety Manager

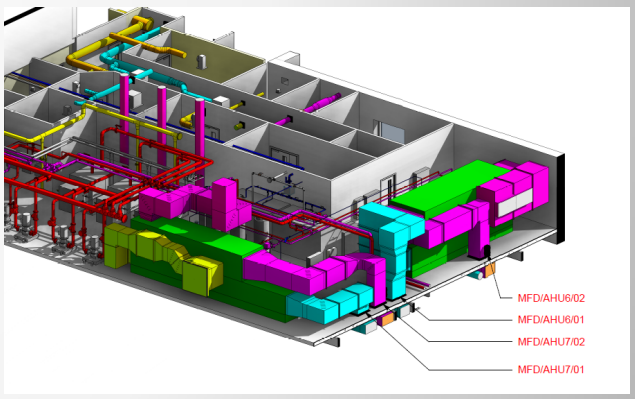
'During recent checks of smoke and fire dampers, as fire safety manager for LTHT, I noted how BAM FM's use of BIM in our hospital at Wharfedale was able to provide fast and accurate data for all fire and smoke dampers throughout the facility'

Peter Aldridge, Fire & Safety Manager, Leeds Teaching Hospitals NHS Trust



	Element COBieAssetIdentifier	Revit Type COBieTypeCategory	Element Level	Element In Room
3	MFD/AHU1/01	Pr-65-65-24-29 - Fire and smoke dampers	Level "02 - Level 02", #1317718	DUCT 02-109
4	MFD/AHU1/02	Pr-65-65-24-29 - Fire and smoke dampers	Level "02 - Level 02", #1317718	LIFT LOBBY 1 02-105
5	MFD/AHU1/03	Pr-65-65-24-29 - Fire and smoke dampers	Level "02 - Level 02", #1317718	CORRIDOR 02-083
6	MFD/AHU1/04	Pr-65-65-24-29 - Fire and smoke dampers	Level "02 - Level 02", #1317718	CORRIDOR 02-034
7	MFD/AHU1/05	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	PLANT AREA 01-073
8	MFD/AHU1/07	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	LIFT LOBBY 1 01-064
9	MFD/AHU1/08	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	OFFICE 01-117
10	MFD/AHU1/09	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	CORRIDOR 01-058
11	MFD/AHU1/10	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	LIFT LOBBY 1 01-064
12	MFD/AHU2/01	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	LMR LOBBY LG-036
13	MFD/AHU2/02	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	CORRIDOR LG-032
14	MFD/AHU2/03	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	LIFT MOTOR ROOM LG-037
15	MFD/AHU2/04	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	CORRIDOR LG-032
16	MFD/AHU2/05	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	PLANT AREA 01-073
17	MFD/AHU2/06	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	PLANT AREA 01-073
18	MFD/AHU3/01	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	PLANT ROOM LG-004
19	MFD/AHU3/02	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	PLANT ROOM LG-004
20	MFD/AHU3/03	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	CORRIDOR LG-003
21	MFD/AHU3/04	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	LIFT LOBBY LG-002
22	MFD/AHU3/07	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	CORRIDOR LG-003
23	MFD/AHU3/08	Pr-65-65-24-29 - Fire and smoke dampers	Level "LG - Lower Ground", #1317724	BULK SUPPLIES LG-008
24	MFD/AHU3/09	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	CORRIDOR 0G-002
25	MFD/AHU3/10	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	CORRIDOR 0G-002
26	MFD/AHU3/11	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	CORRIDOR 0G-002
27	MFD/AHU3/12	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	CORRIDOR 0G-002
28	MFD/AHU3/13	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	LIFT LOBBY 2 0G-005
29	MFD/AHU3/14	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	LIFT LOBBY 2 0G-005
30	MFD/AHU3/15	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	EXAM 0G-021
31	MFD/AHU3/16	Pr-65-65-24-29 - Fire and smoke dampers	Level "0G - Ground Floor", #1317722	EXAM 0G-021
32	MFD/AHU4/01	Pr-65-65-24-29 - Fire and smoke dampers	Level "01 - Level 01", #1317720	PLANT AREA 01-073





Lessons Learnt

Lessons Learnt

What went well

- Good teamwork, collaborative approach
- Clear, shared goals and vision
- Open communications and risk management
- Business objectives driving work and priorities
- Flexible approach on schedule, workshops
- Flexible outputs & configured to BAM's key needs
- BAM members administrating tools and processes
- Successful initial pilot implementations

What didn't go well

- Initial workshops' scheduling
- Availability of resources
- Continuation of communications

Next Steps

2000

2003
Improvement modelling
Multi-disc for co-ordination

2009
Pre-construction planning for tenders

2010

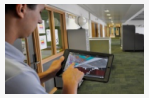
2011
Leeds Arena Construction
3D co-ordination
4Dplanning

2012
Improvement BIM360field BIM

2012
Autodesk EBA

AUTODESK.

2013
Project Robin BIM for FM

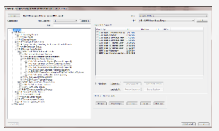


2013
50+ projects BIM deliverables

2014
BIM360Glue

2014
BIM training

2014
MDR Development



2014
Procedures

2015
BAM CDE

2015
BIM360layout trials

bsi. Verified

2015
Wharfedale BIM2FM Ops

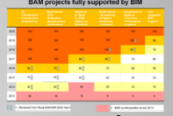
2015
Queen Street Exemplar

2016
UK Gov. BIM mandate

2017
Digital Construction

2017
Build Offsite

2020
Vision all staff upskilled



2020

‘’BIM is an opportunity to understand our clients requirements better and adopt a unified approach to the management and collaborative production of information’’

James Wimpenny - Executive Director Construction

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