Engineering Documentation

Using BIM technologies to improve handover to FM

IAM Ireland

Presented by:

David Mullen – Oct. 2019

Introduction

Engineering Documentation

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Mechanical Engineering at NUI Galway
Post Grad Diploma in Energy Management at IT Sligo

Established Engineering Documentation 2006

Autodesk Certified Instructor

Co-Chair of CITA NW BIM Hub 2016-2018

Our Services

Engineering Documentation

Mechanical & Electrical O&M Manuals

Digital Safety Files

As Built Drawings

3D Modelling & MEP Co-Ordination

Point Cloud Scanning

Autodesk Authorised Training & Certification Centre

Basis for the Safety File

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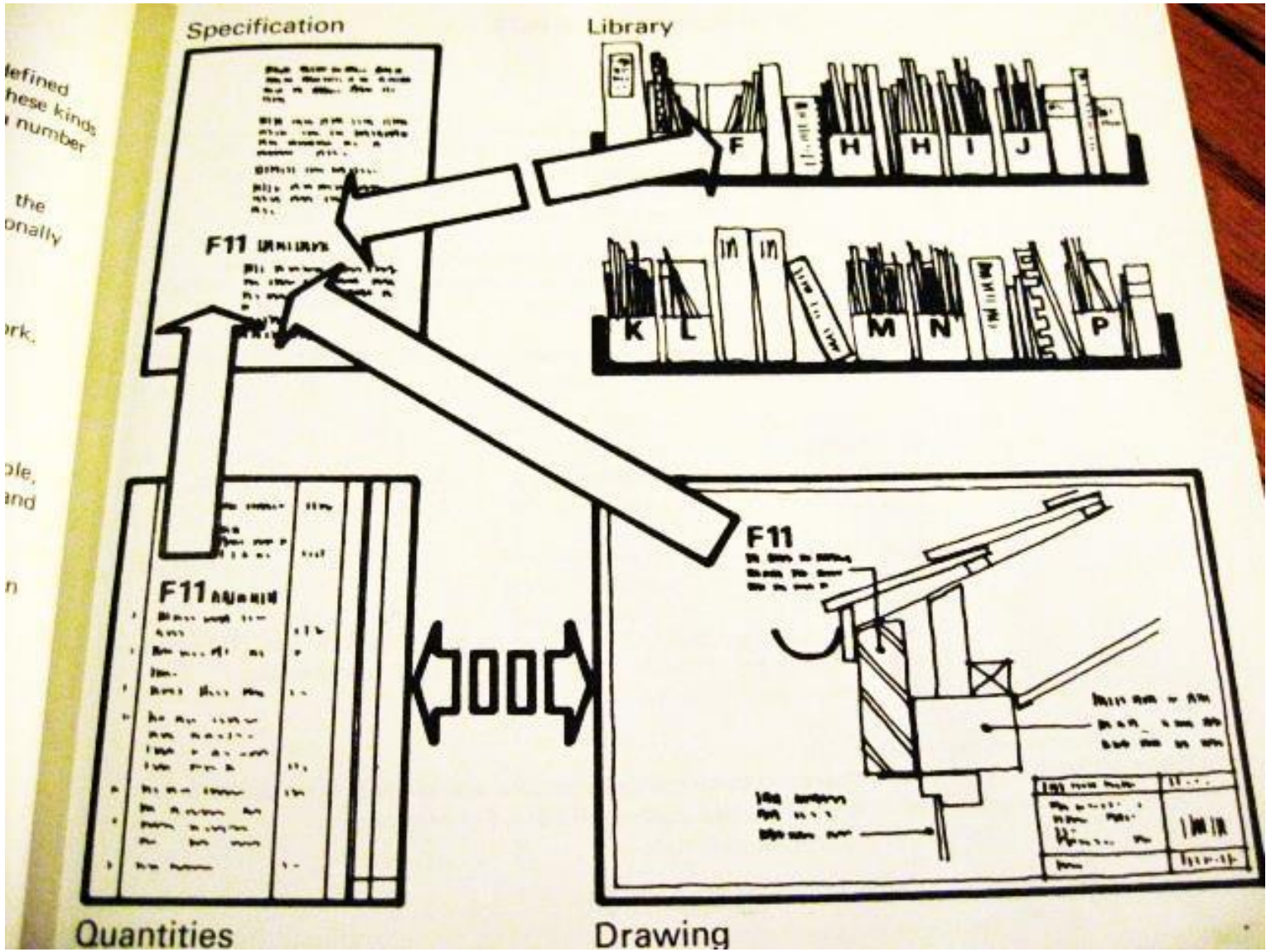
Technical Standards

- The digital safety file should comply with the following references
  - Safety, Health & Welfare at Work (Construction Regulations) – 8, 13 & 21
  - ‘Handover, O&M Manuals and Project Feedback, a toolkit for designers and contractors’ A BSRIA Guide by Paddy Hastings, Kevin Pennycook and Roderic Bunn - BG 1/2007
  - Industry best practice
  - Project specific requirements – contractual obligations – PSDP input
  - **Client specific requirements**

Traditional approach



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Information lifecycle

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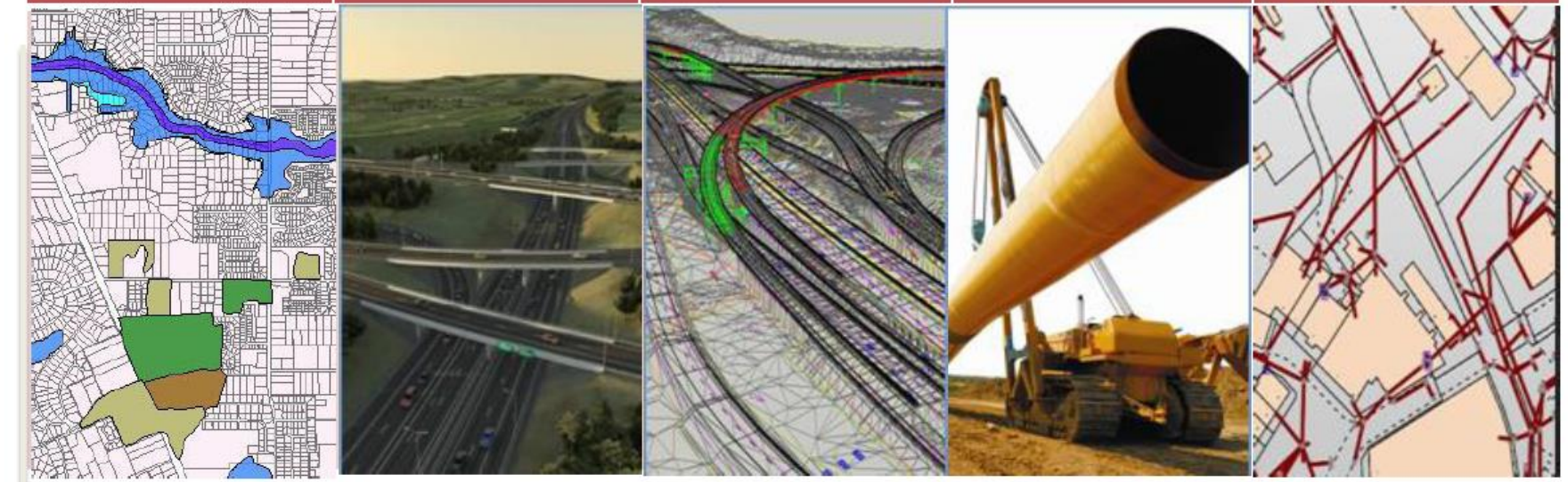
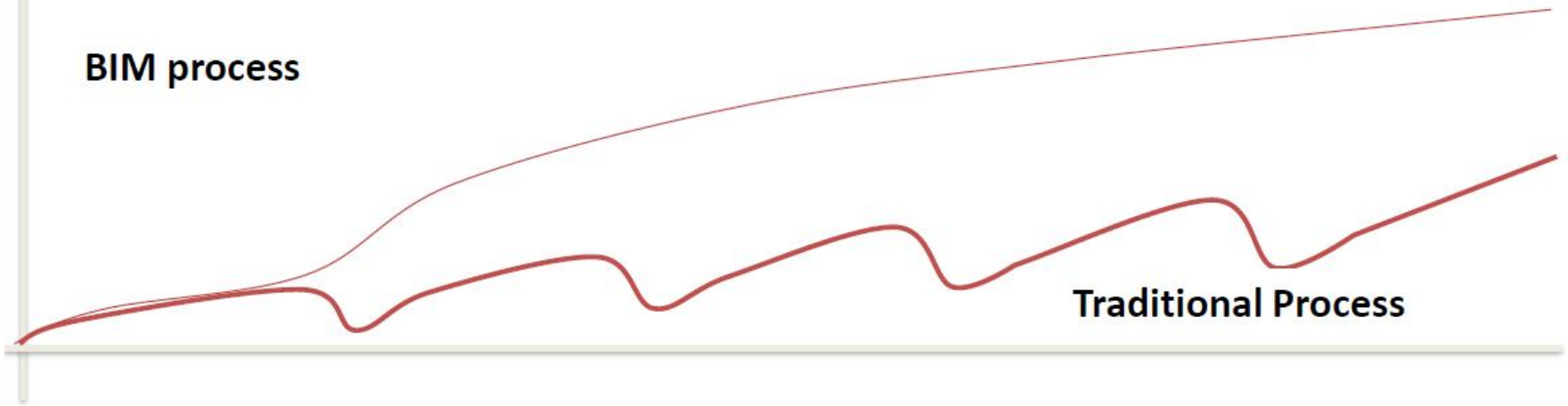
Planning	Conceptual Design	Detailed Design	Construction	Operation and Management





Data Integration

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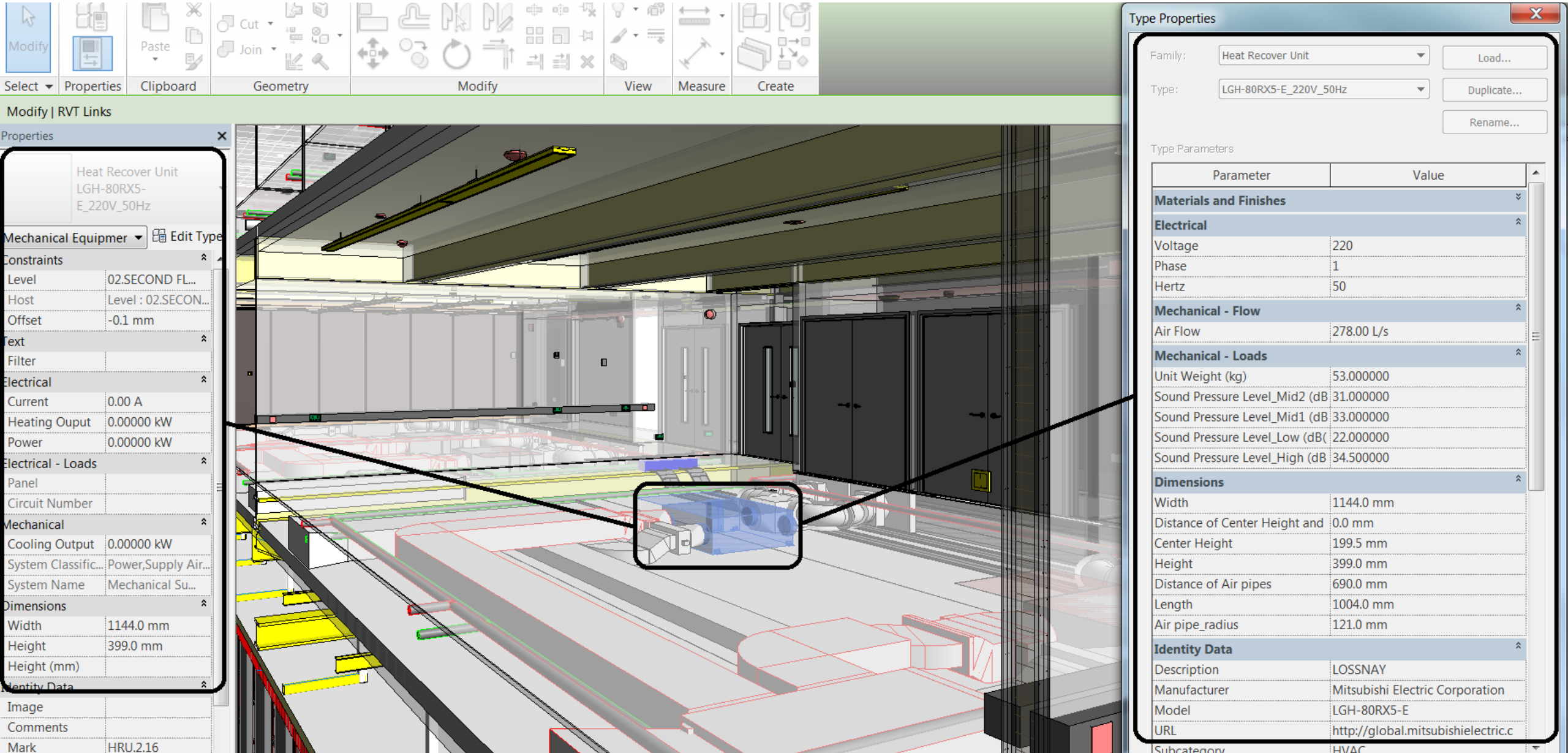

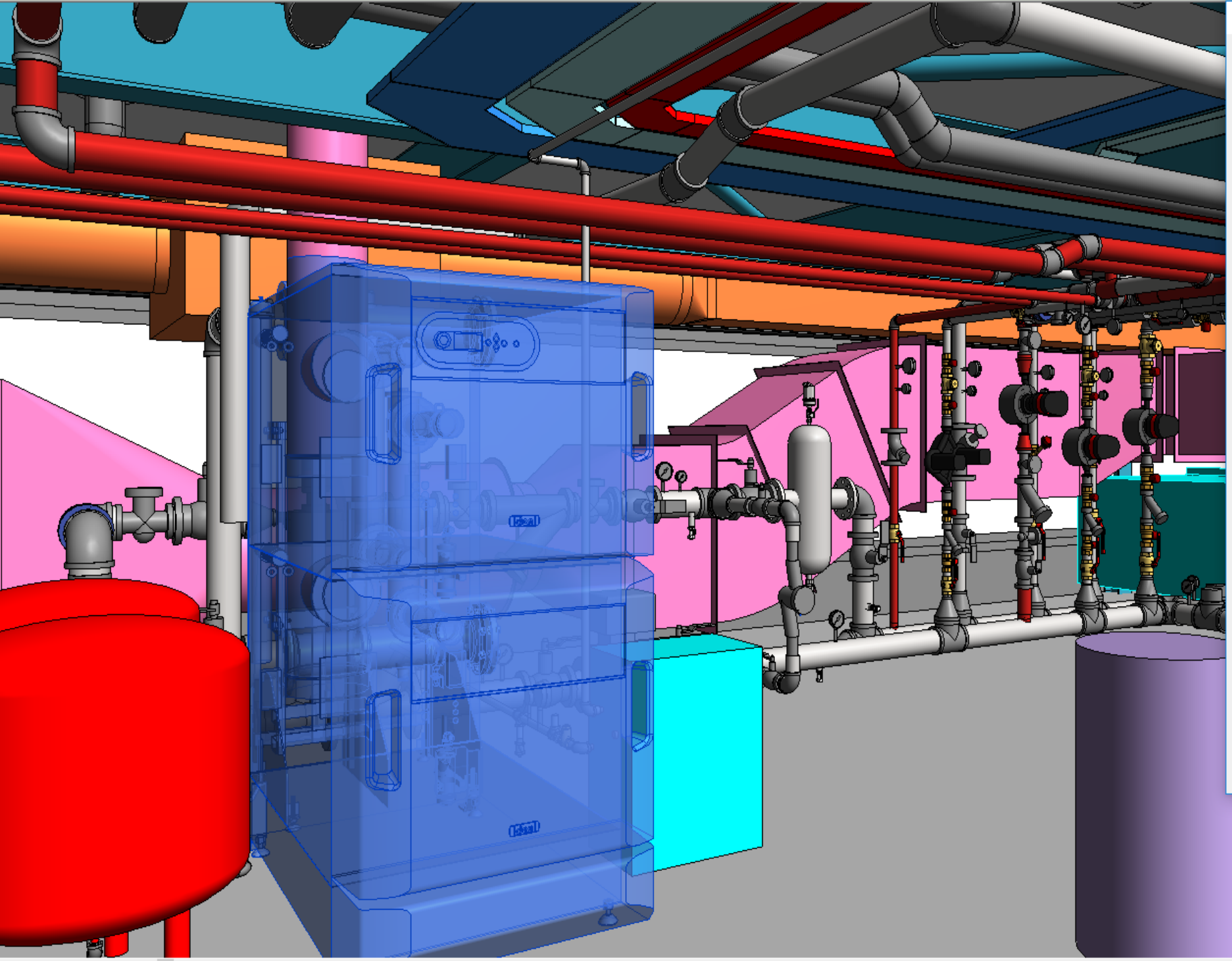

Type Properties

Family: MEP-Boiler-Ideal_Heating-Evomod_Floor_Standing_C

Type: 500

Load...

Duplicate...

Rename...

Type Parameters

Parameter	Value
Data	
Seasonal Boiler Efficiency (Bulding Regs L2) %	95.900000
NOx with 02 = 0% - ppm	22.500000
NOx with 02 = 0% - mg/kWh	39.700000
Max Flue Resistance - Pa	105.000000
Gas Rate - Max Rate m^3/hr	50.400000
Gas Rate - Max Rate ft^3/hr	1779.800000
Flue Gas CO^2 G20/LNG - Min Rate %	8.4 ±0.2
Flue Gas CO^2 G20/LNG - Max Rate %	9.1 ±0.2
Boiler Output (non-condensing) Mean 70 degre	46.700000
Boiler Output (non-condensing) Mean 70 degre	159325.000000
Boiler Output (non-condensing) Mean 70 degre	465.000000
Boiler Output (non-condensing) Mean 70 degre	1586774.000000
Boiler Output (condensing) Mean 40 degree C	51.400000
Boiler Output (condensing) Mean 40 degree C	175404.000000
Boiler Output (condensing) Mean 40 degree C	505.000000
Boiler Output (condensing) Mean 40 degree C	1723060.000000
Boiler Input Min Rate - Nett kW	47.600000
Boiler Input Min Rate - Nett Btu/hr	162411.000000
Boiler Input Min Rate - Gross kW	52.800000
Boiler Input Min Rate - Gross Btu/hr	180256.000000
Boiler Input Max Rate - Nett kW	476.000000
Boiler Input Max Rate - Nett Btu/hr	1624112.000000
Boiler Input Max Rate - Gross kW	523.200000
Boiler Input Max Rate - Gross Btu/hr	1802218.000000
Approx flue gas volume (@80 degree C) - Max	783.000000
Approx flue gas volume (@80 degree C) - Max	27615.000000

<< Preview

OK

Cancel

Apply

What is BIM?

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"An integrated digital process providing co-ordinated, reliable, shareable data throughout all project phases, from design through construction and into operation"

What BIM is not…

- BIM is not 3D CAD
- BIM is not a single building model
- BIM is as much about the right data as it is about geometry
- BIM is not a single software tool
- BIM is not a replacement for good communication, team working, forward planning and due diligence

Why use BIM for FM?

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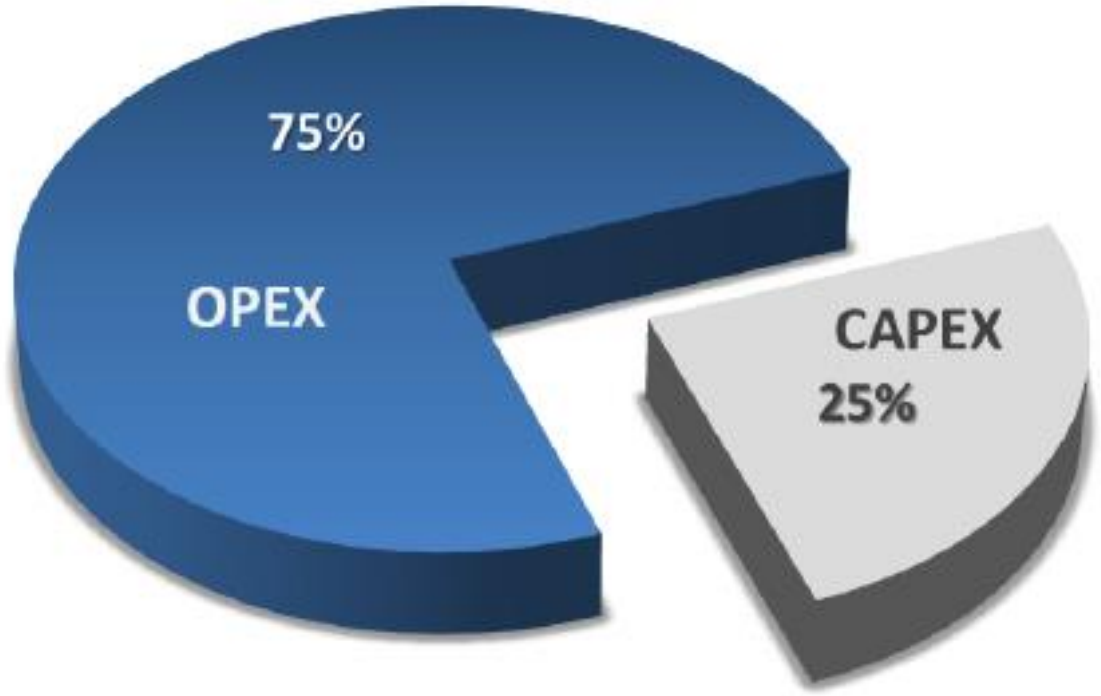

Why use BIM for FM?

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Difficulties with Existing Estates

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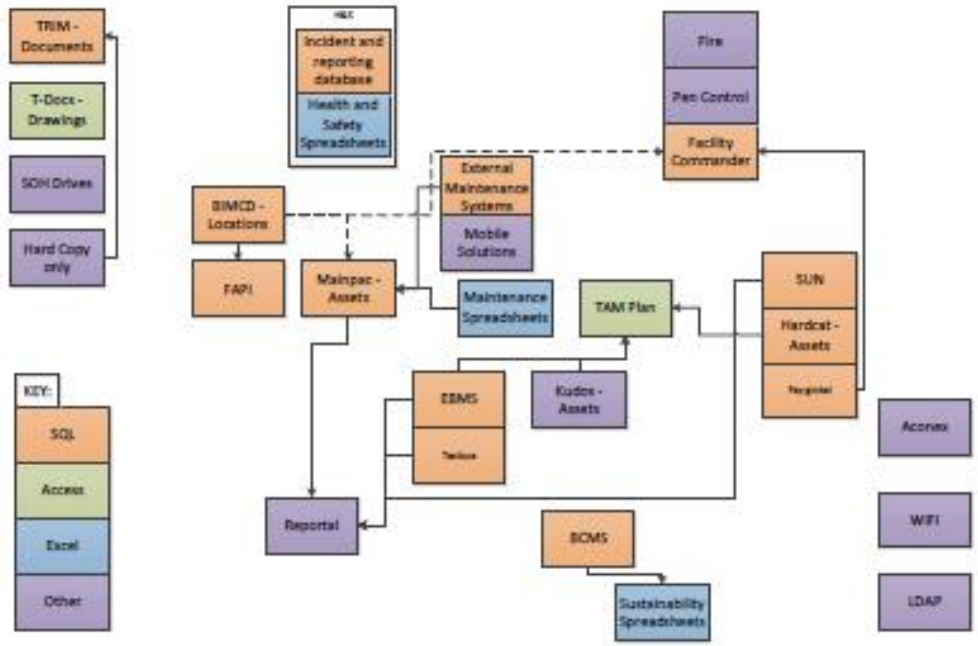

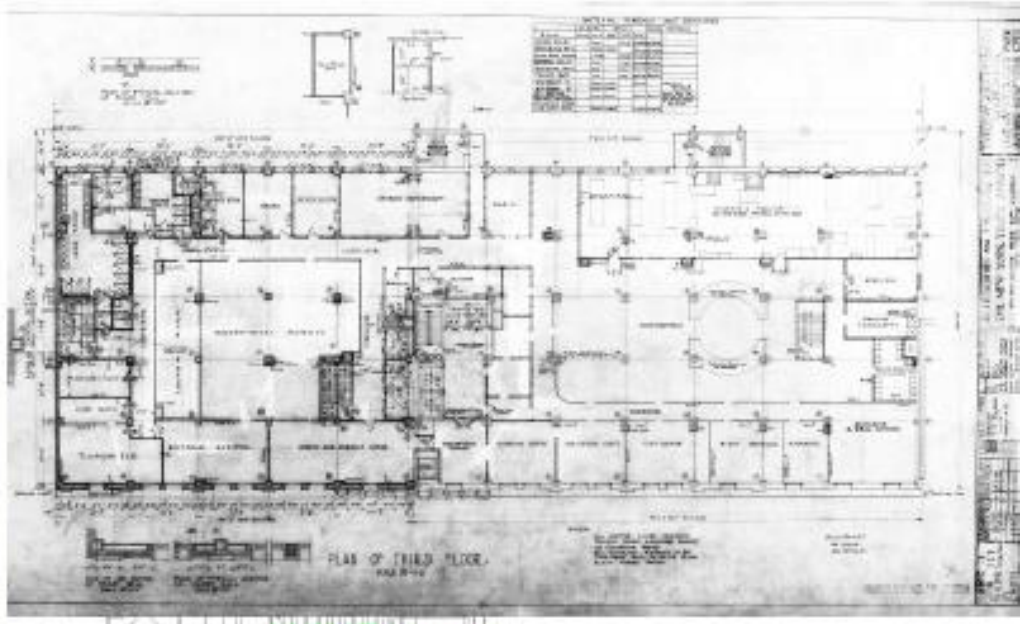

2D to 3D development

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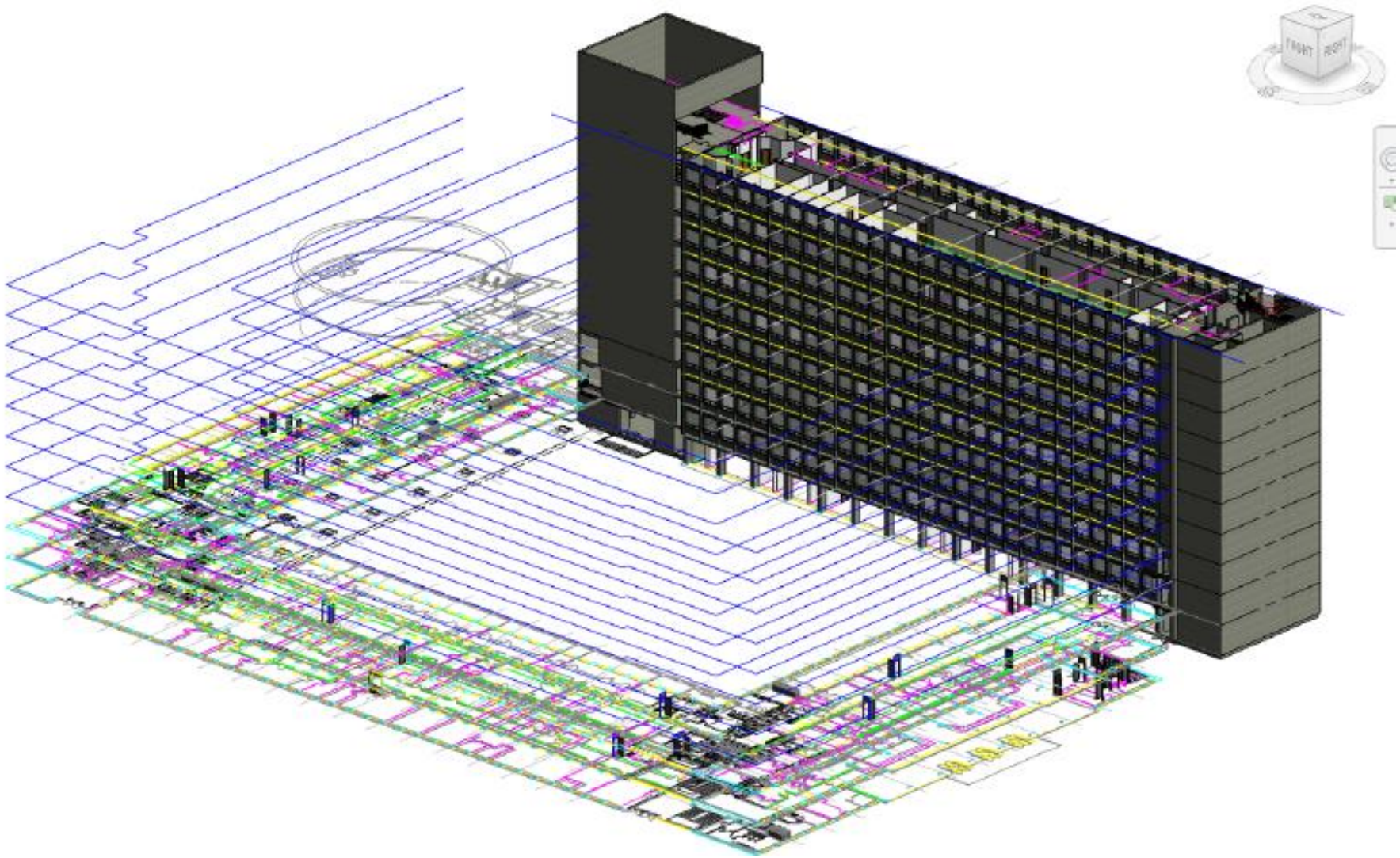
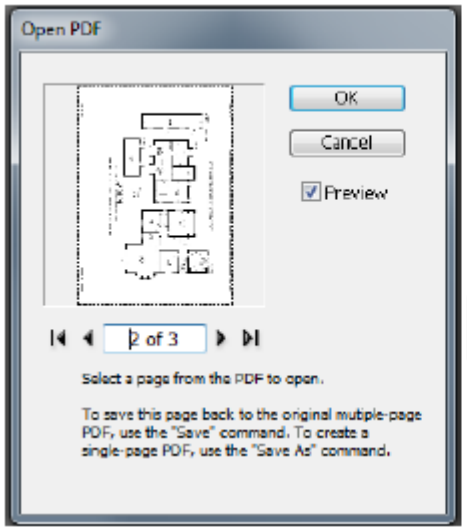
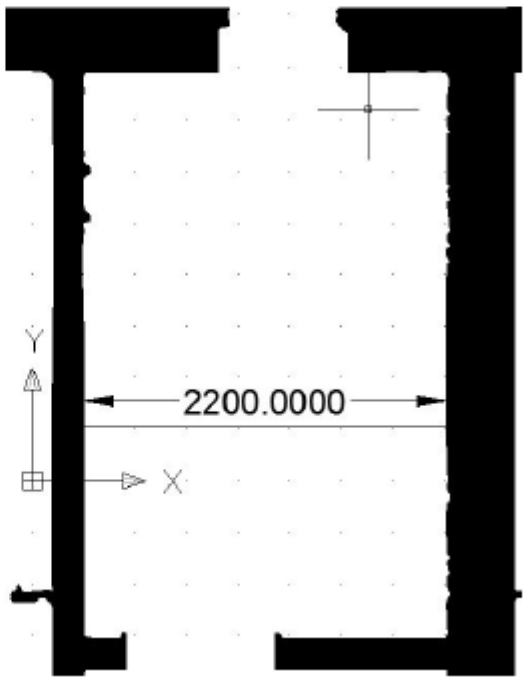


PDF to Revit conversion





We recognise that often clients only have old PDF plans of the building they are operating.

We have a process in place to convert these PDF's into dynamic Revit plans or models depending on the level of detail required.

Laser Scanning to 3D Modelling

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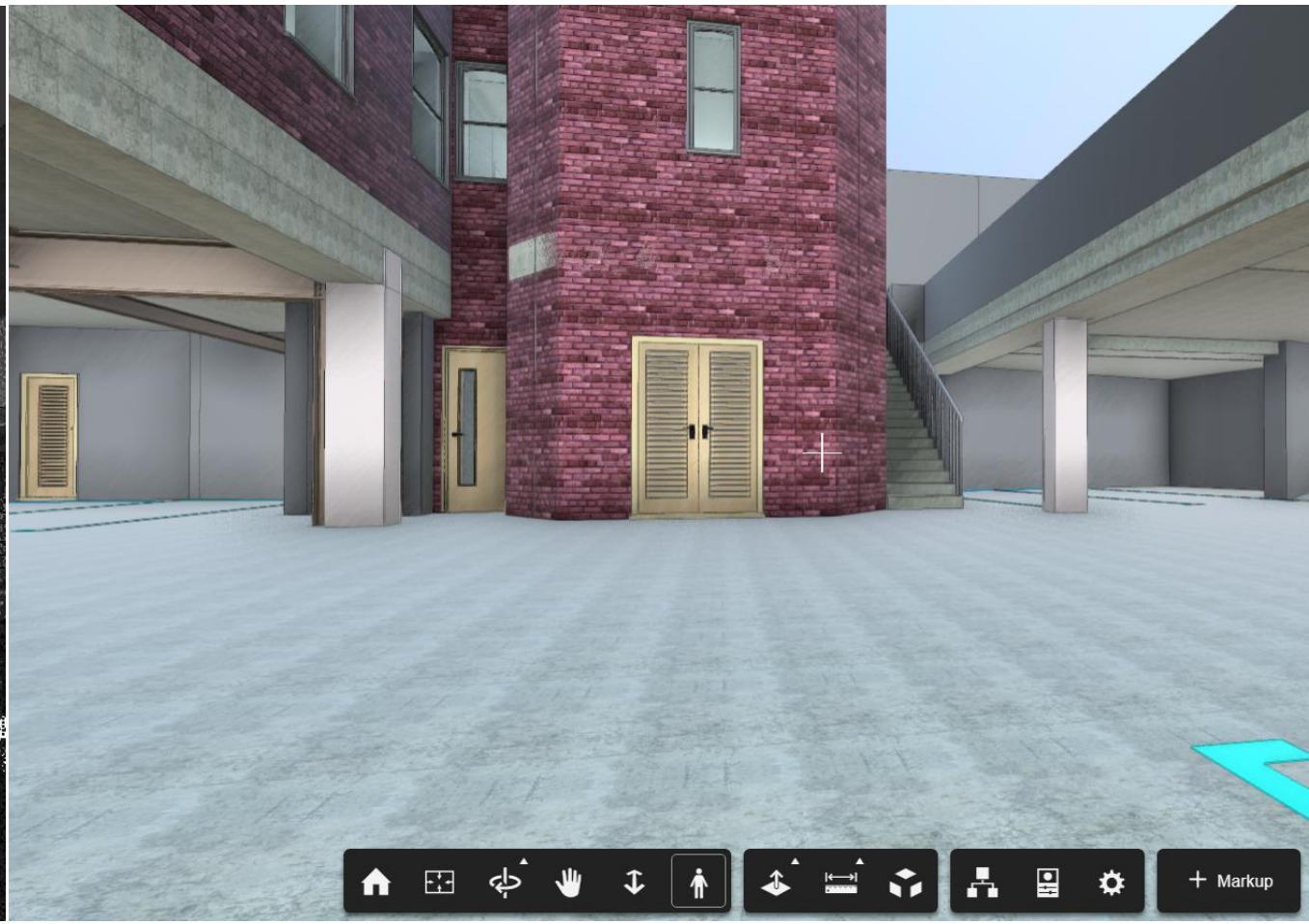

Asbestos Management

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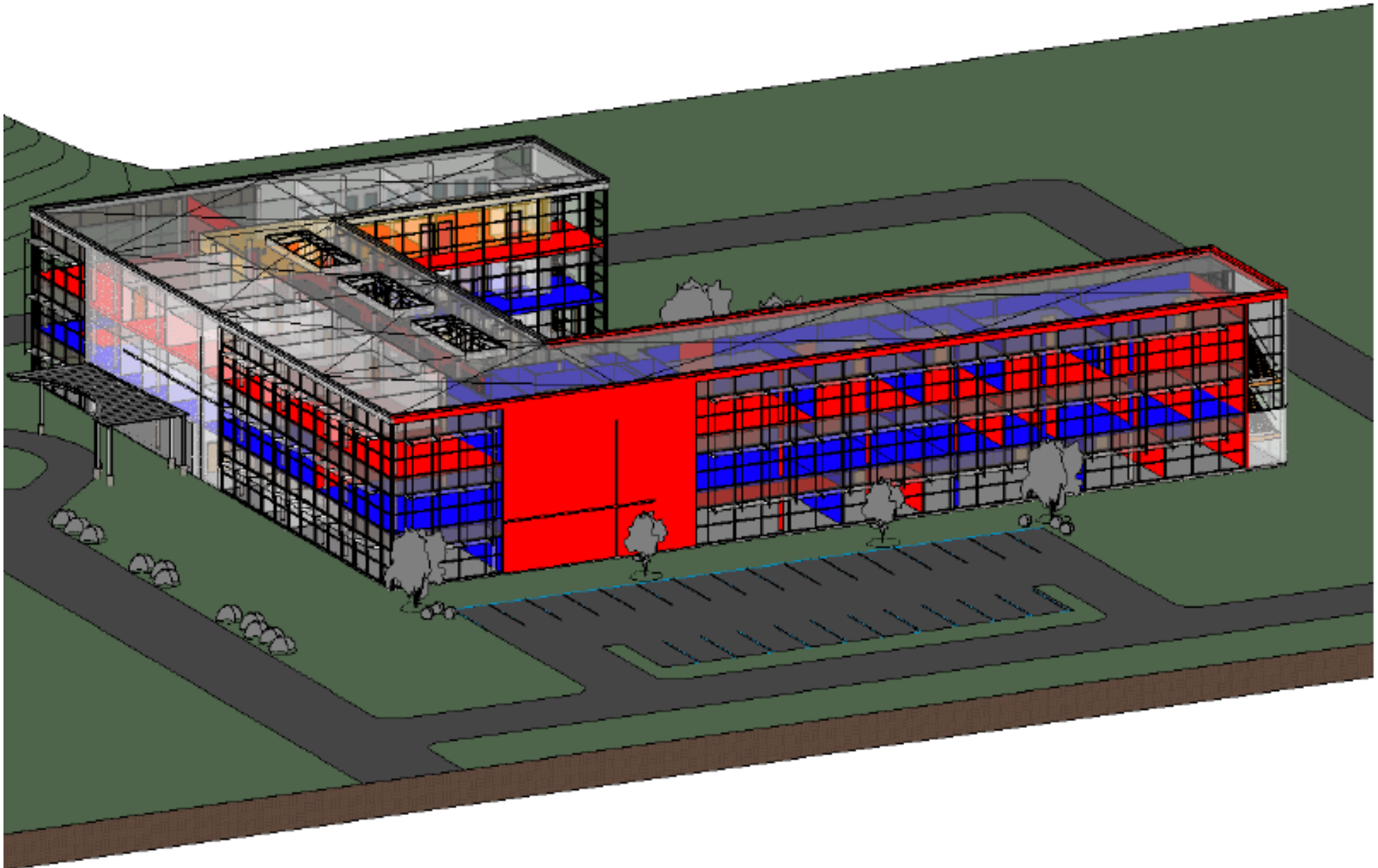

Linking to existing CAFM systems

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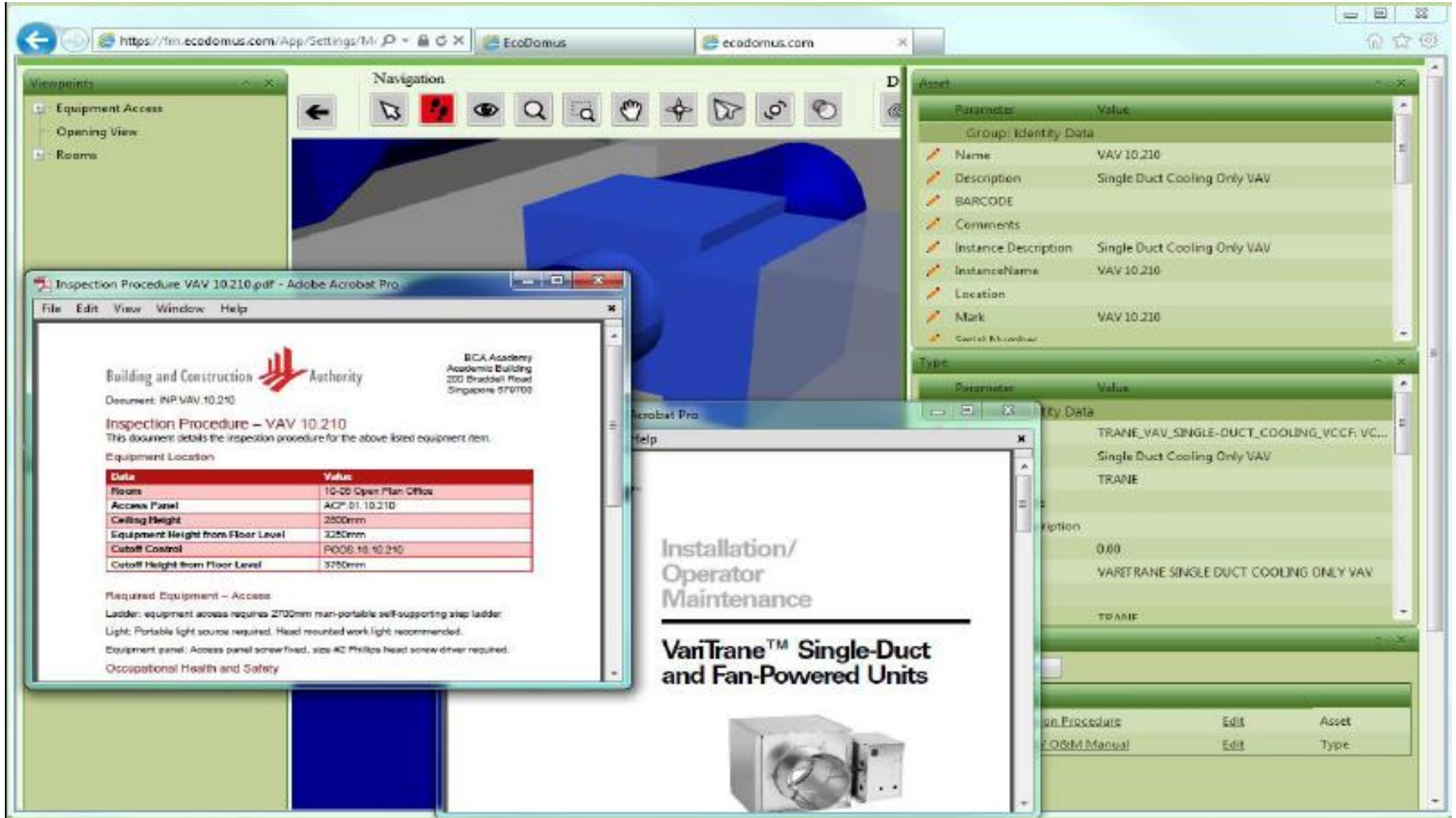

Site Mark-Up

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2D Red-Lined Drawings

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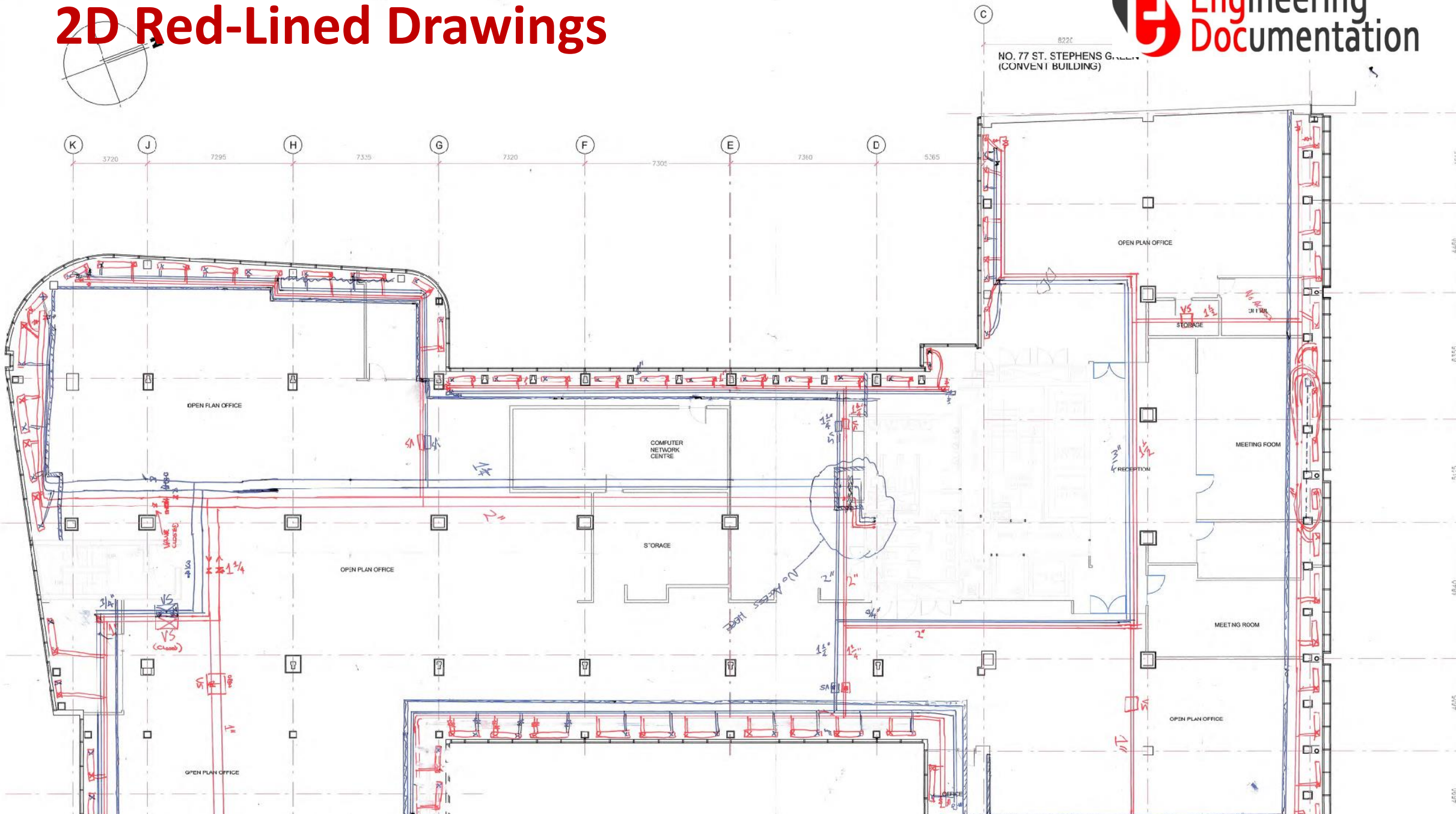

Laser scanning & site validation

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Laser scanning & site validation

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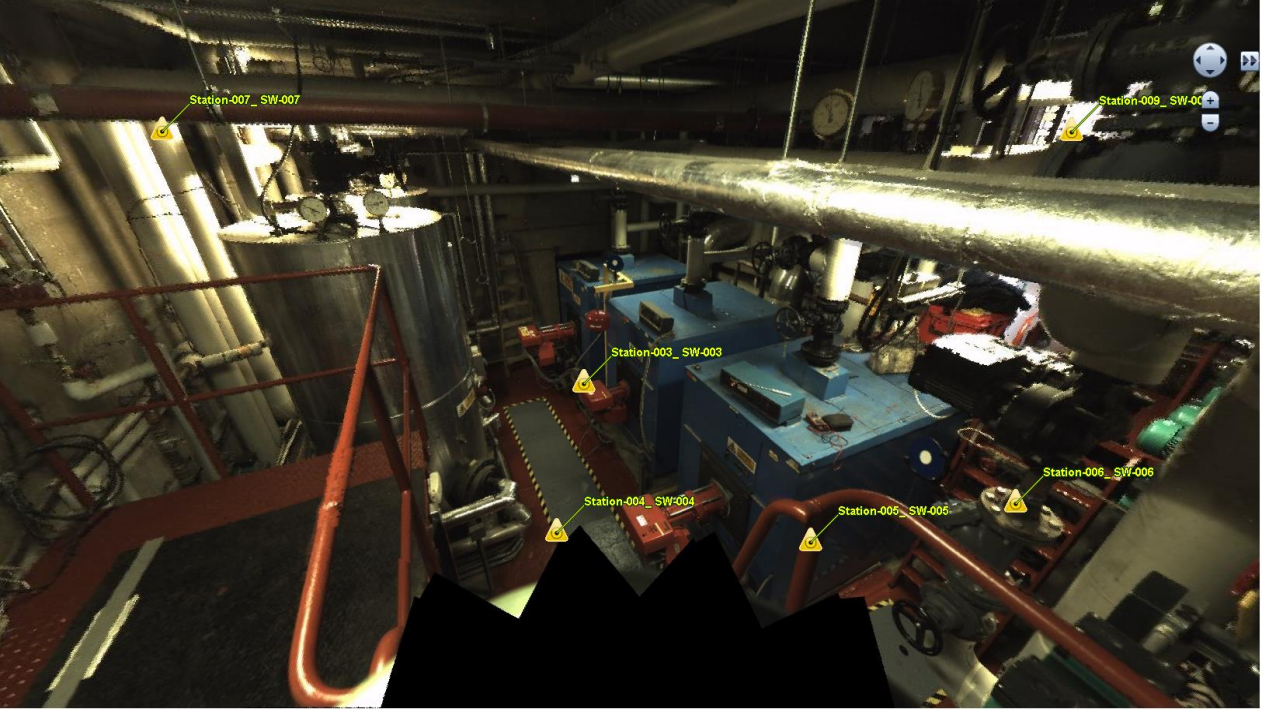
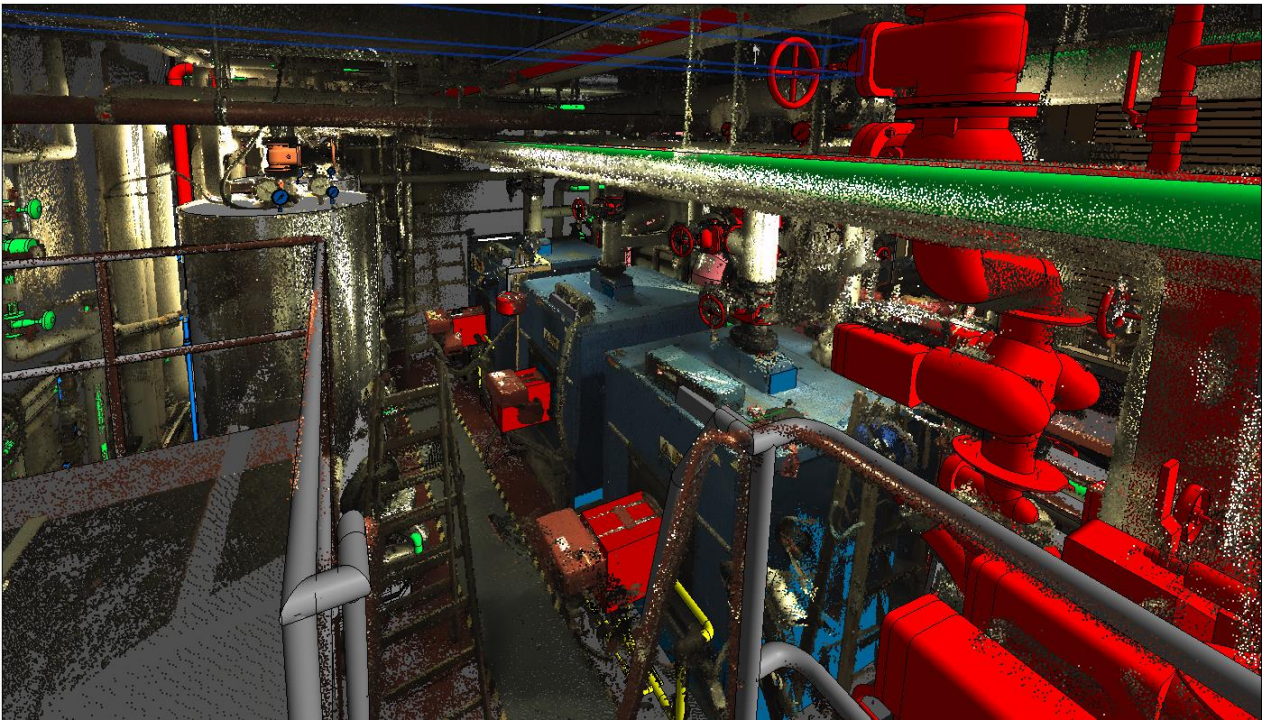
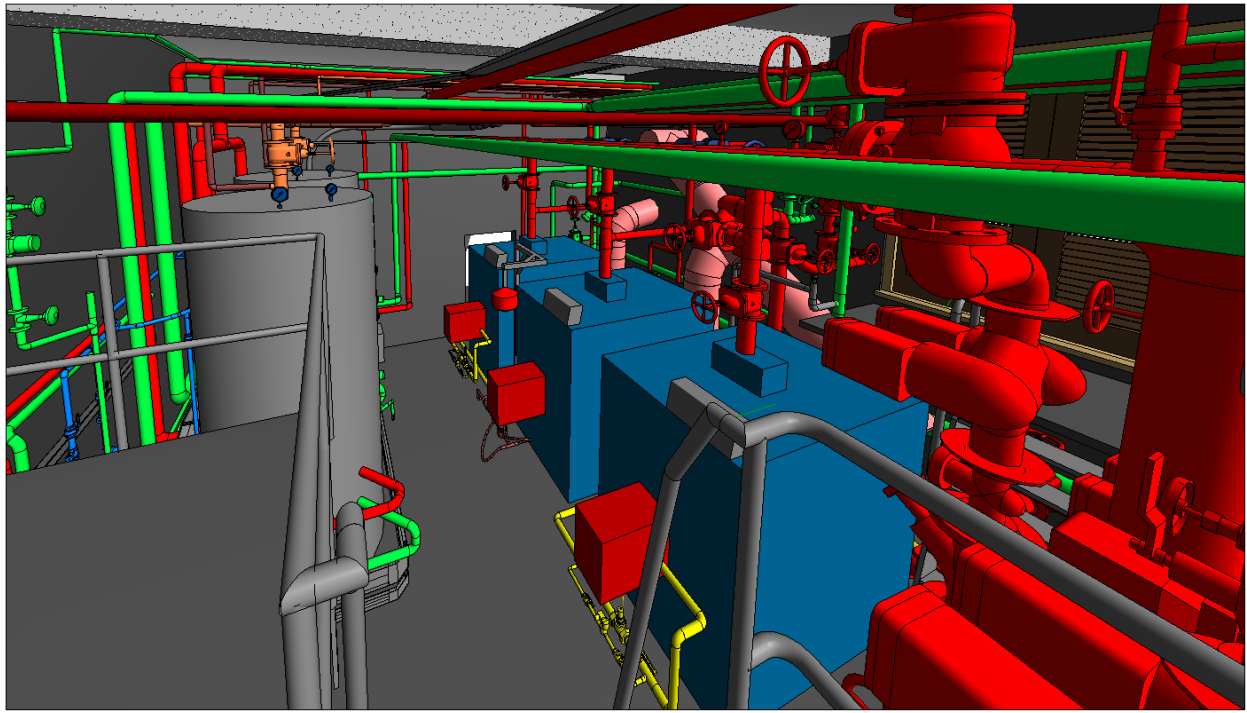

Station-007_ SW-007
Station-009_ SW-00
Station-003_ SW-003
Station-006_ SW-006
Station-004_ SW-004
Station-005_ SW-005





Property at North Frederick St.

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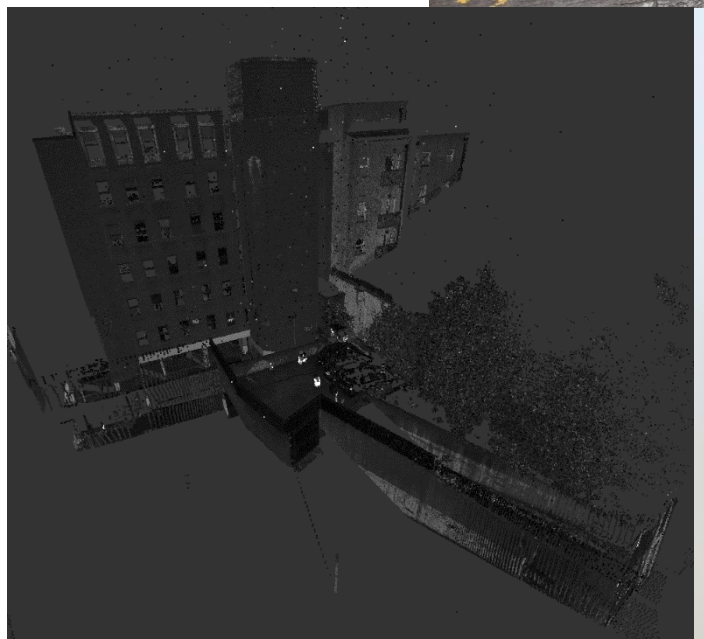
Laser Scan on Building
Leica Scan Station used
Multiple scans stitched using ‘Cyclone’

Point Cloud Created
Edited & cleaned in point cloud viewer

Model from Point Cloud
Model ‘traced’ from point cloud in Revit
Parameters tailored to client’s needs



Property at North Frederick St.

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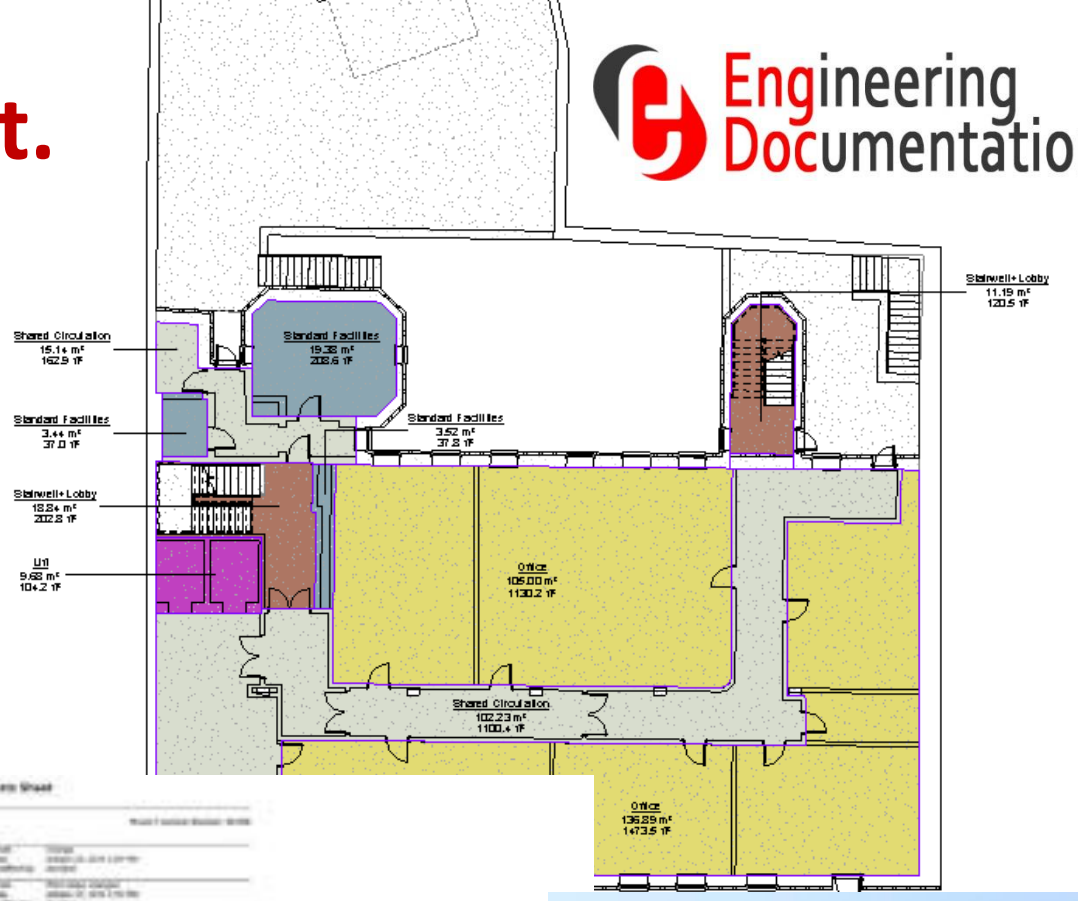
Building Planning
Rental areas calculated on a per-tenant basis
Visualisation for potential clients

Room Data Sheets
Asset information inputted into model
Create detailed room data sheets
Log of past issues and actions

Facilities Management
Review data at point of use
No loss of information
Input once, use many times
Responsibilities & issues assigned



Benefits for FM

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Cost savings at both delivery and operational stages: BIM can help organisations strip waste from their processes, as they can virtually build the facility as many times as necessary to create the perfect model. This also provides cost certainty.

Improved efficiency and faster project delivery: As all parties work together collaboratively, mistakes, discrepancies and duplicate work is avoided.

Improved client satisfaction: The client receives a building which matches their expectations and needs.

Reduced safety risk: BIM allows crowd behaviour to be analysed and fire modelling capability to be predicted to enable designs to be optimised for public safety.

Greater project predictability and early modification: Projects can be visualised at an early stage, giving owners and operators a clear idea of design intent and allowing them to modify the design to achieve the outcomes they want.

Challenges

Need for understanding of the BIM process Better forward planning Demands client leadership Not a panacea Initial investment in software Software needs to be carefully selected Business case for BIM needs to be identified Need to adapt traditional procurement for digital outputs Short term maintenance contracts Better understanding of information exchanges Poor as-built handover records Model ownership Updating the model and data Supply chain needs to be aligned Interoperability with legacy systems Standard classification of information Clients don't currently always own all of their data Poor feedback mechanisms Clients have to specify what data outcomes they want at the outset Can add risk if requirements aren't correctly articulated and supply chain tested.

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SAFETY FILES | O&M MANUALS
3D MODELLING | BIM | AUTOCAD

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