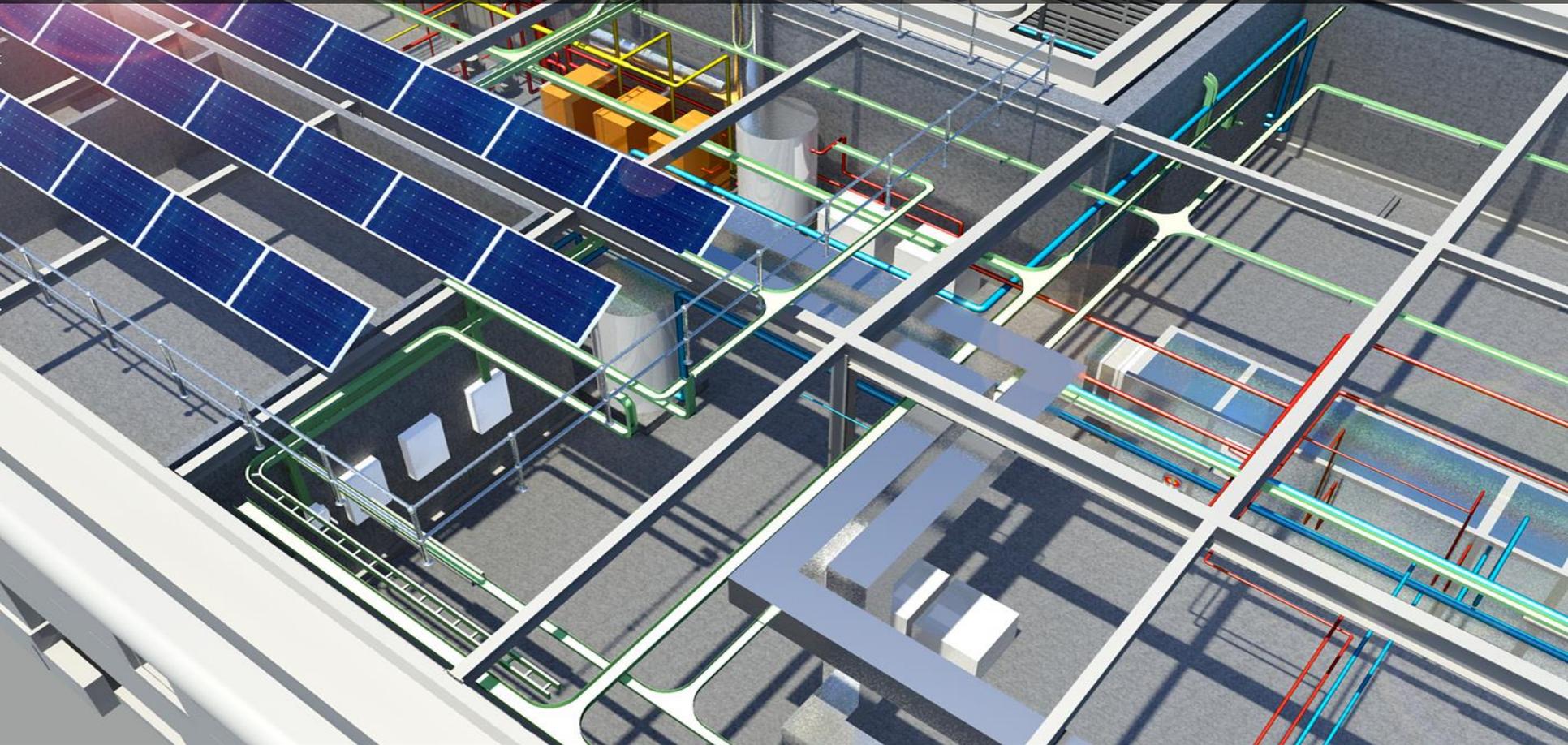


BIM Basics & Design Analysis

14th May 2015

Ben Roberts

BIM Delivery Leader, Hoare Lea



BIM Basics And Design Analysis



BIM basics

- Definition
- What is government “Level 2” BIM?
- Commonly used software tools

Using BIM models for MEP system design

- Spaces
- Pipe & duct sizing
- Adding “intelligence” to content

Linking BIM models to simulation software

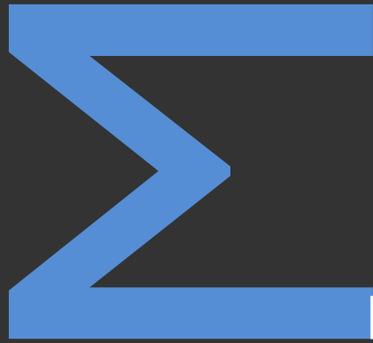
- Links between Revit and IES/TAS
- File formats for transferring models
- Plug-ins or export/import?

Key challenges of adopting BIM

So, what is BIM?

What is BIM?

BIM is an acronym...



BIM: Building Information Modelling



BIM: Building Information Management
Building Information Modelling

BIM: Better Information Management

BIM: Building Information Model

What is BIM?



Building information modeling (BIM) is a **process** involving the generation and management of **digital representations** of physical and functional characteristics of a facility. The resulting **building information models** become **shared knowledge resources** to support decision-making about a facility from earliest conceptual stages, through design and construction, through its operational life and eventual demolition.

What is BIM?

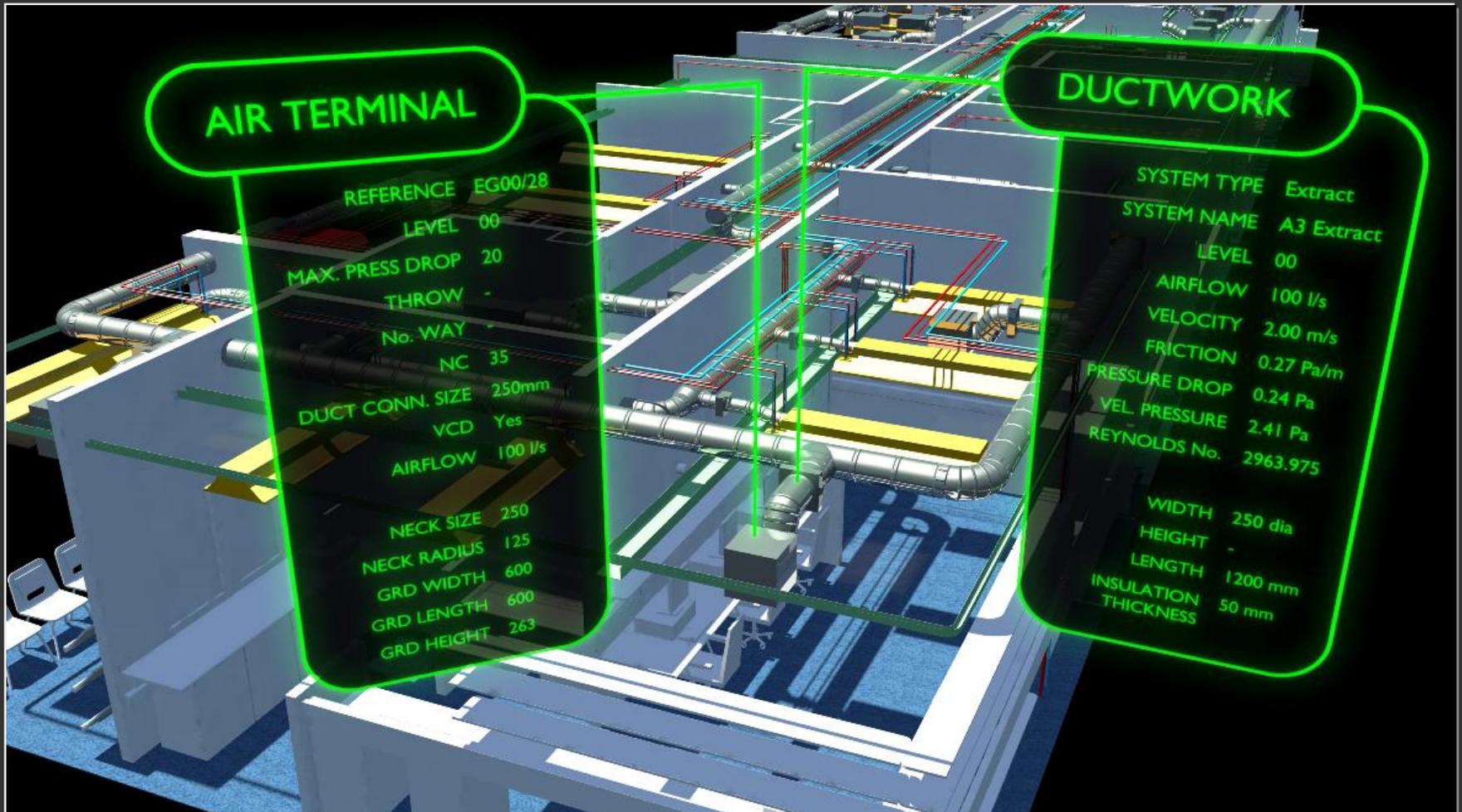


3D Modelling...



What is BIM?

...Embedded information (the *i* in BIM)



What does a BIM model look like?



The screenshot displays the Autodesk Revit software interface for a mechanical floor plan. The main view shows a complex network of ducts and equipment, including a fan coil unit (FCU-4) and several diffusers. The ducts are color-coded and labeled with specifications such as "20 mm CHW/R (0.048 L/s)" and "25 mm CHW/R (0.095 L/s)". The interface includes a ribbon at the top with tabs for Home, Insert, Annotate, Analyze, Architect, Collaborate, View, Manage, Add-Ins, and Modify. The Properties panel on the left shows the current view is "Floor Plan: 00 - Work" with a scale of 1:50. The Project Browser on the right lists various views and schedules, including "Schedules/Quantities" and "Duct Schedule". The status bar at the bottom indicates the current view is "Arch Models (Not Editable)".

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

Arch Models (Not Editable) :0 Main Model

Editable Only Press & Drag

What does a BIM model look like?



Autodesk Revit MEP 2012 - HL-ProjectTEMPLATE 2012_robertsb

Home Insert Annotate Analyze Architect Collaborate View Manage Add-Ins Modify Modify Schedule/Quantities

Properties Group Ungroup New Delete Hide Unhide All Highlight in Model

Modify Schedule/Quantities

Properties

Schedule

Schedule: U41-1 Fan Edit Type

Identity Data

View Name: U41-1 Fan Co...

Dependency: Independent

Default View Templ...: None

Workset: View "Sche...

Edited by: robertsb

Phasing

Phase Filter: Show All

Phase: New Constr...

Other

Fields: Edit...

Filter: Edit...

Sorting/Grouping: Edit...

Formatting: Edit...

Appearance: Edit...

Properties help Apply

3D View: (3D - robertsb) - HL-ProjectTEMPLATE 2012_robertsb

Floor Plan: 00 - Working View - HL-ProjectTEMPLATE 2012_robertsb

Schedule: U41-1 Fan Coil Unit Schedule - HL-ProjectTEMPLATE 2012_robertsb

REF	Room Number	Room Name	Type	Floor area served	Room conditions				Room cooling load		Room heating load	Maximum fan gain	Fresh air supply
					Summer		Winter		Sensible	Latent			
					Temperature	RH	Temperature	RH					
FCU-00-01	001014	SU-14	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-02	001013	SU-13	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-03	1149	Space	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-04	001011	SU-11	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-05	001012	SU-12	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-06	1061	Space	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-07	1023	Space	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-08	1149	Space	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-09	1149	Space	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-10	001010	SU-10	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-11	001009	SU-09	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-12	001008	SU-08	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-13	001007	SU-07	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s
FCU-00-14	001006	SU-06	HL_FCU-4 Spigot	60	24	50	21	50	800	160	800	1	80 L/s

U41-1 Fan Coil U

Views (Discipline)

Legends

Schedules/Quantities

- 00 - Space loading calculations
- COBie2-Component
- COBie2-Component-Door
- COBie2-Component-Window
- COBie2-ComponentsToSchedule
- COBie2-Space-FromSpaceObjects
- COBie2-SpaceFromRooms
- COBie2-System
- COBie2-Type
- COBie2-Zone
- Document Issue sheet
- Duct Schedule
- Pipe Schedule
- S11-1 Electric Water Heater Schedule
- S11-2 Gas Water Heater Schedule
- T31-1 Radiator Schedule
- T31-4 Trench Heater Schedule
- T31-5 Underfloor Heating Manifold Sch
- U41-1 Fan Coil Unit Schedule**
- U61-1 Passive Chilled Beam Schedule
- U61-2 Active Chilled Beam Schedule
- Y43-1 Duct Mounted Heating Coils Sch
- Y45-1 Attenuator schedule
- Y46-1 Supply Diffuser / Grille Schedule
- Y46-2 Extract Grille Schedule

Sheets (all)

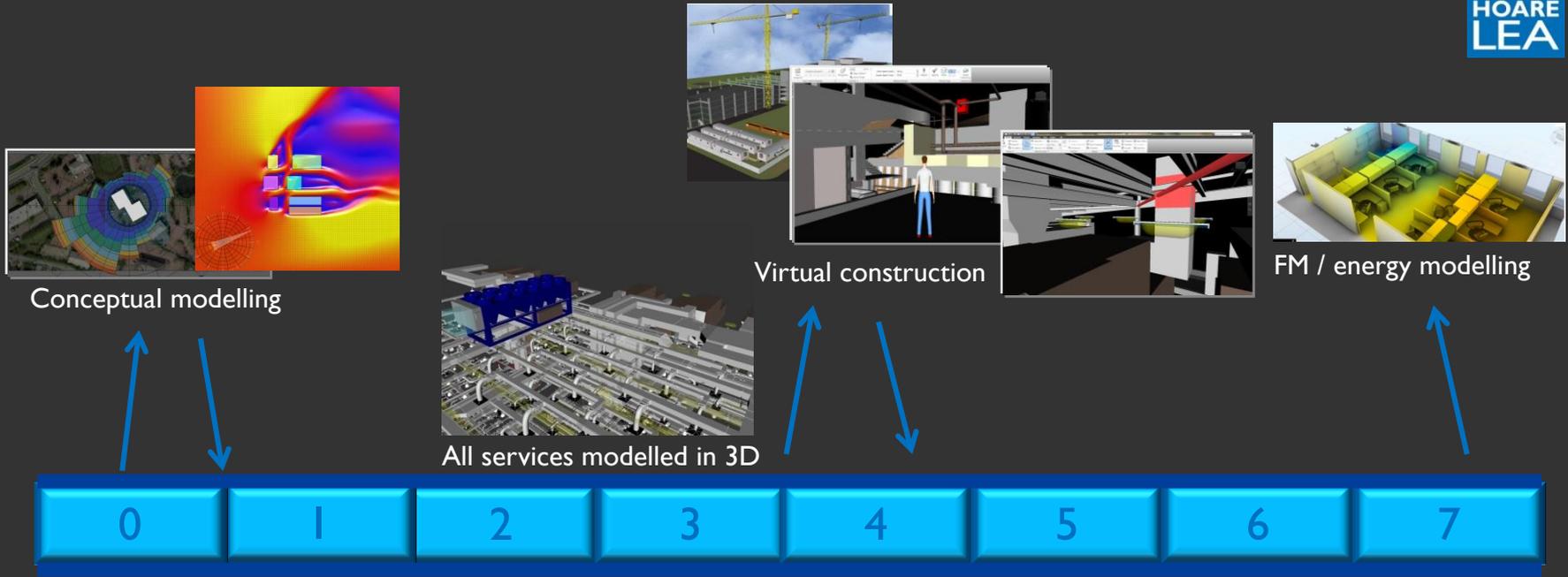
Families

Groups

Revit Links

Ready Mechanical General (Not E) Main Model

MEP BIM through the building lifecycle



Conceptual modelling

Virtual construction

FM / energy modelling

All services modelled in 3D

Space planning in 3D

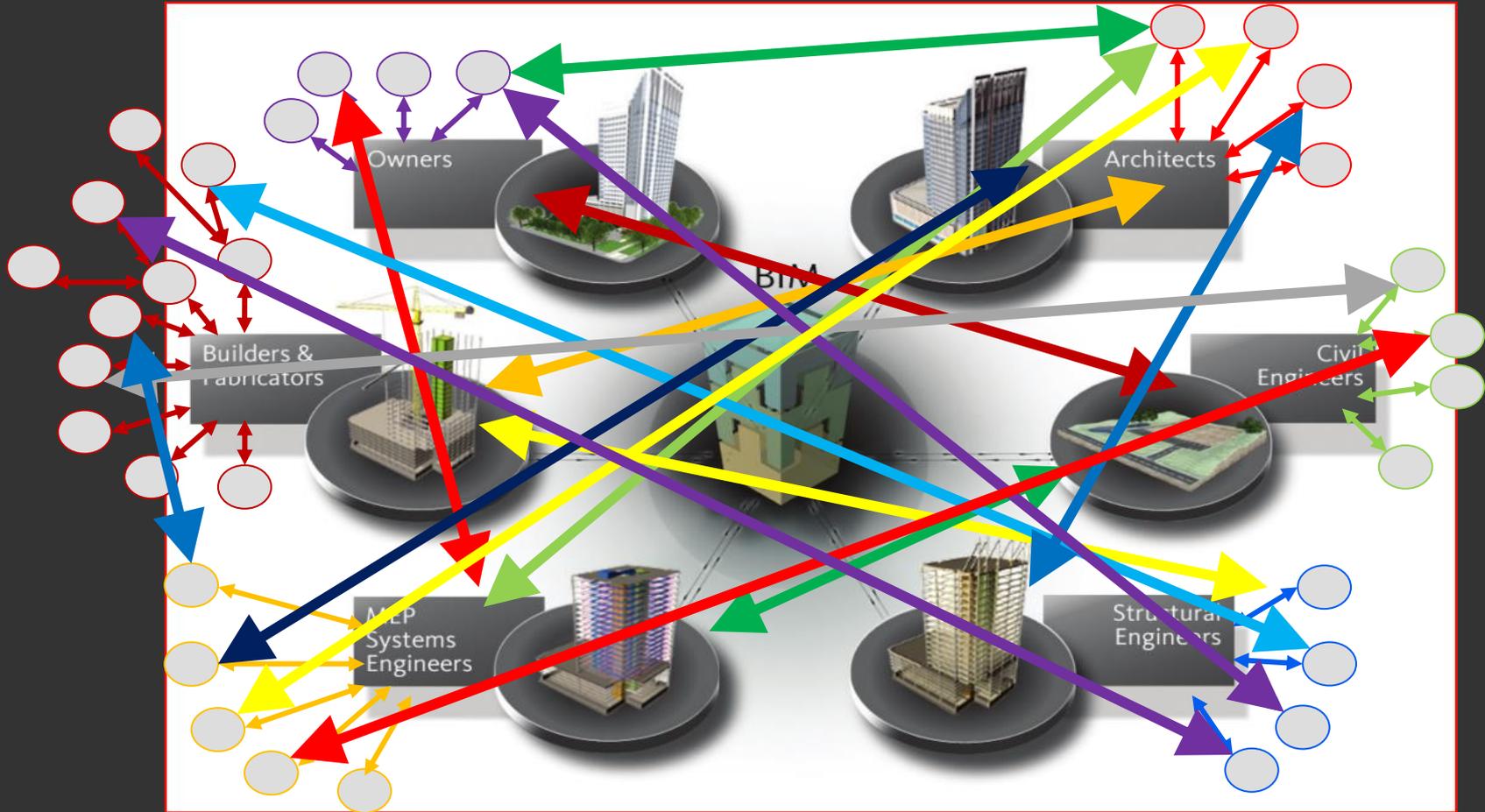
Design model linked to schedules & calcs

Fabrication & off site manufacture

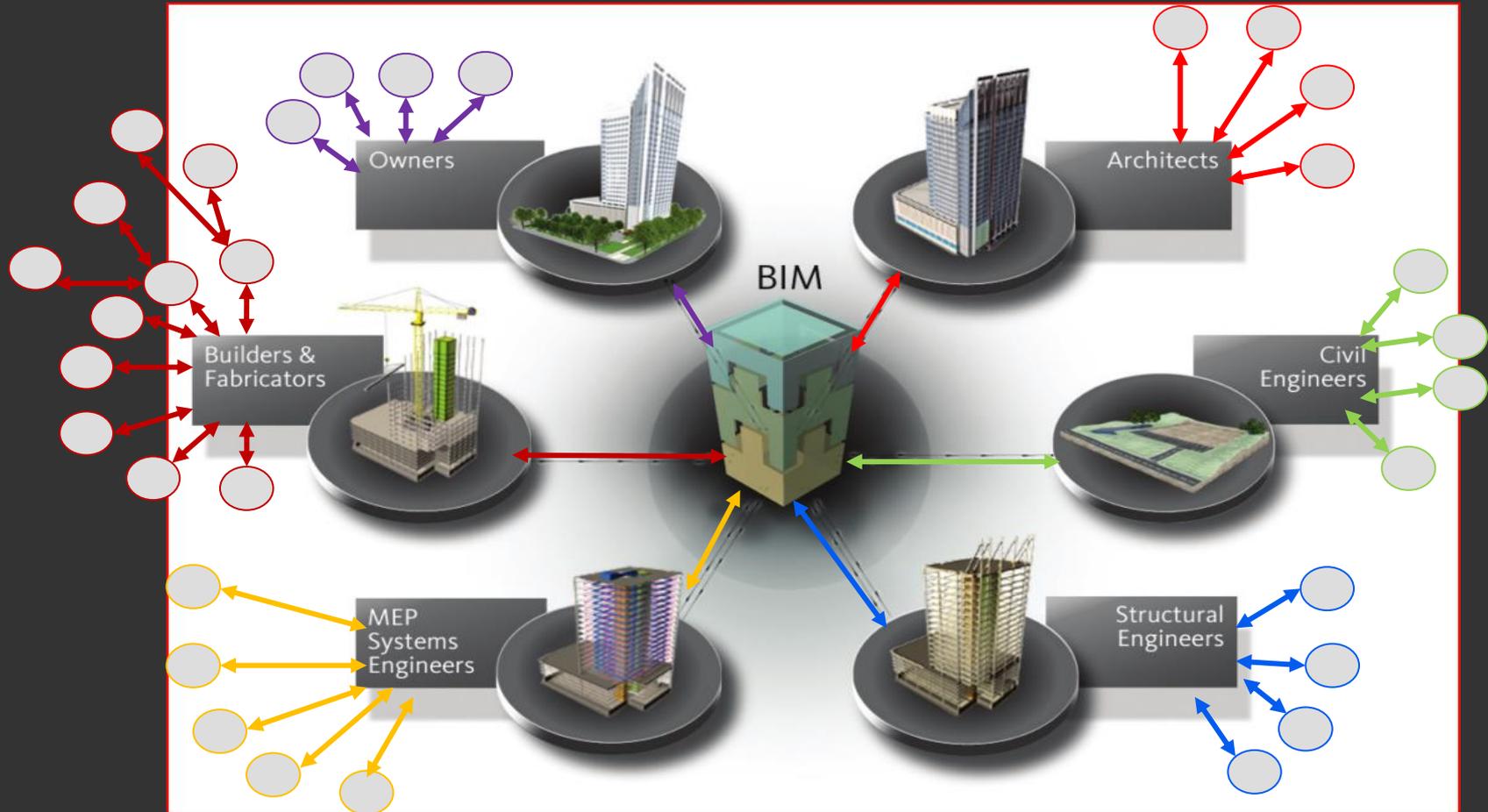
Thermal modelling / compliance

HEATER BATTERY SCHEDULE											
PROJECT		NO. Project Number									
NO.	LOCATION	TYPE	WATER SUPPLY	WATER RETURN	WATER SUPPLY TEMP	WATER RETURN TEMP	WATER SUPPLY PRESS	WATER RETURN PRESS	WATER SUPPLY FLOW	WATER RETURN FLOW	WATER SUPPLY WEIGHT
1	101	HEATER BATTERY	101	101	101	101	101	101	101	101	101
2	102	HEATER BATTERY	102	102	102	102	102	102	102	102	102
3	103	HEATER BATTERY	103	103	103	103	103	103	103	103	103
4	104	HEATER BATTERY	104	104	104	104	104	104	104	104	104
5	105	HEATER BATTERY	105	105	105	105	105	105	105	105	105
6	106	HEATER BATTERY	106	106	106	106	106	106	106	106	106
7	107	HEATER BATTERY	107	107	107	107	107	107	107	107	107
8	108	HEATER BATTERY	108	108	108	108	108	108	108	108	108
9	109	HEATER BATTERY	109	109	109	109	109	109	109	109	109
10	110	HEATER BATTERY	110	110	110	110	110	110	110	110	110

What is BIM?



What is BIM?



So, what is Level 2 BIM?

Level 2 BIM

Required on all government funded projects starting after 1st January 2016



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BUSINESS PLAN

Digital Built Britain Level3
Building Information Modelling

DIGITAL BUILT BRITAIN

SECURING THE FUTURE OF THE UK CONSTRUCTION INDUSTRY.

www.hoarelea.com

7 Pillars of BIM Wisdom

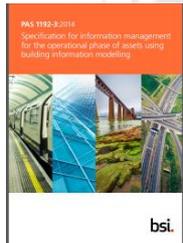
To comply with Level 2 BIM, you must adhere to all of these documents...



Pillar 1
PAS 1192-2



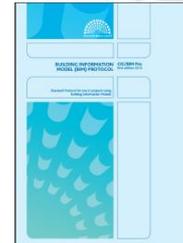
Pillar 2
PAS 1192-3



Pillar 3
BSI 1192-4
(COBie)



Pillar 4
CIC BIM
Protocol



Pillar 5
Government Soft Landings
(GSL)



Pillar 6
Classification
(e.g. Uniclass)

Code	Description	Parent Code
PS_01_01_01	Services (Water, Gas, Electricity, etc.)	PS_01_01
PS_01_01_02	Structural Steelwork	PS_01_01_01
PS_01_01_03	Structural Concrete	PS_01_01_01
PS_01_01_04	Structural Masonry	PS_01_01_01
PS_01_01_05	Structural Timber	PS_01_01_01
PS_01_01_06	Structural Glass	PS_01_01_01
PS_01_01_07	Structural Aluminium	PS_01_01_01
PS_01_01_08	Structural Steelwork (Other)	PS_01_01_01
PS_01_01_09	Structural Concrete (Other)	PS_01_01_01
PS_01_01_10	Structural Masonry (Other)	PS_01_01_01
PS_01_01_11	Structural Timber (Other)	PS_01_01_01
PS_01_01_12	Structural Glass (Other)	PS_01_01_01
PS_01_01_13	Structural Aluminium (Other)	PS_01_01_01

Pillar 7
digital
Toolkit



Software

Commonly Used Software Tools

BRIEFING



DESIGN



ANALYSE



MANAGE



REVIEW



Commonly Used Software Tools

IES
 TAS
 HevaComp
 Dialux
 Fluent
 Amtech
 MicroDrainage
 CFX
 Ekahau (Comms)
 FEMM (Comms)
 Odeon (Acoustics)
 Immi (Acoustics)

Thermal Analysis / Part L Compliance
 Energy Performance Certificates (EPC)
 Wind Studies
 Computational Fluid Dynamics
 Solar Shading
 Lighting Visualisation
 Daylighting
 Acoustic Modelling
 Evacuation Modelling
 Smoke Modelling
 Vertical Transportation Modelling ...

Energy Performance Asset Rating

More energy efficient

A+

43 This is low energy efficient the building is.

Less energy efficient

Technical information

Main heating fuel: Natural Gas
 Building environment: Heating and Natural Ventilation
 Total useful floor area (m²): 2409
 Building complexity (MCS level): 5

Benchmarks

Buildings similar to this one could have ratings as follows:

50 If newly built
 60 If typical of the existing stock

Using BIM models for MEP Systems Design

Using BIM Models for MEP Systems Design



Information from architectural model

Information from MEP model for design checks

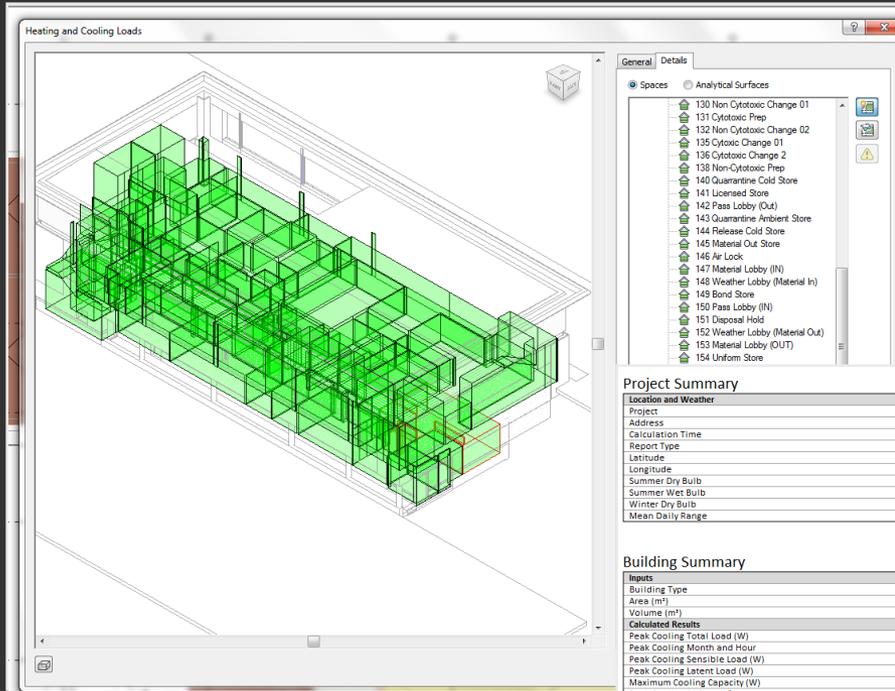
Number	Name	Level	Area	Height	Volume	SUPPLY AIR FLO		EXTRACT AIR FL		Zone	Actual ventilation flows			Actual ve...			Number of People	Supply Airflow per	Supply Airflow	Calculated Heating	
						ACH	Flow (l/s)	ACH	Flow (l/s)		Supply Airflow	Return Airflow	Exhaust Airflow	Supply ACH	Extract ACH	Exhaust ACH				Load (W)	W per m2
22-6-066-1	4p Office(Nurses)	Level 06	25 m²	2700	68.39 m³	4	76	4	76	AHU ICU A1	86 L/s	86 L/s	0 L/s	4.5	4.5	0.00 L/(s·m²)	2.53	16.67 L/(s·m²)	422 L/s	1666 W	65.76 W/m²
22-6-004	Bereavement roo	Level 06	15 m²	2700	39.23 m³	4	44	4	44	AHU ICU A1	43 L/s	43 L/s	0 L/s	3.9	3.9	0.00 L/(s·m²)	1.45	12.28 L/(s·m²)	178 L/s	405 W	27.86 W/m²
22-6-010-1	Bulk store/clinical	Level 06	83 m²	2700	225.03 m³	4	250	4	250	AHU ICU A1	249 L/s	248 L/s	0 L/s	4.0	4.0	0.00 L/(s·m²)	8.33	2.85 L/(s·m²)	238 L/s	522 W	6.26 W/m²
22-6-011	Clean utility blood	Level 06	16 m²	2700	43.07 m³	6	72	6	72	AHU ICU A1	71 L/s	71 L/s	0 L/s	5.9	5.9	0.00 L/(s·m²)	1.60	12.52 L/(s·m²)	200 L/s	514 W	32.19 W/m²
22-6-007	Cleaner	Level 06	7 m²	2701	19.67 m³	6	33	6	33	AHU ICU A1	0 L/s	31 L/s	0 L/s	0.0	5.7	0.00 L/(s·m²)	0.73	2.51 L/(s·m²)	18 L/s	51 W	6.98 W/m²
22-6-089-1	Clinical equipment	Level 06	24 m²	2707	56.32 m³	4	63	4	63	AHU ICU A1	62 L/s	62 L/s	0 L/s	4.0	4.0	0.00 L/(s·m²)	2.08	2.49 L/(s·m²)	52 L/s	109 W	5.24 W/m²
22-2-1820	Corridor	Level 06	182 m²	2429	442.99 m³	3	369	3	369	AHU ICU A1	375 L/s	375 L/s	0 L/s	3.0	3.0	0.00 L/(s·m²)	18.23	2.63 L/(s·m²)	480 L/s	1131 W	6.20 W/m²
22-6-022	Dirty utility	Level 06	15 m²	2731	40.47 m³	4	45	6	67	AHU ICU A1	43 L/s	65 L/s	0 L/s	3.8	5.8	0.00 L/(s·m²)	1.48	2.53 L/(s·m²)	37 L/s	381 W	25.69 W/m²
22-6-080	Dis WC	Level 06	3 m²	2700	9.27 m³	0	0	6	15	AHU ICU A1	0 L/s	15 L/s	0 L/s	0.0	5.8	0.00 L/(s·m²)	0.69	51.02 L/(s·m²)	175 L/s	521 W	151.63 W/m²
22-6-070	Disposal	Level 06	4 m²	2787	11.31 m³	0	0	6	19	AHU ICU A1	0 L/s	18 L/s	0 L/s	0.0	5.7	0.00 L/(s·m²)	0.41	3.25 L/(s·m²)	13 L/s	167 W	41.16 W/m²
22-6-069	Disposal	Level 06	4 m²	2787	11.31 m³	0	0	6	19	AHU ICU A1	0 L/s	18 L/s	0 L/s	0.0	5.7	0.00 L/(s·m²)	0.41	2.49 L/(s·m²)	10 L/s	20 W	4.90 W/m²
22-6-013	Gowning lobby	Level 06	10 m²	2711	26.37 m³	42	308			AHU ICU A1	300 L/s	0 L/s	0 L/s	41.0	0.0	0.00 L/(s·m²)	0.97	2.53 L/(s·m²)	25 L/s	87 W	8.94 W/m²
22-6-011	Gowning lobby	Level 06	10 m²	2711	26.38 m³	42	308			AHU ICU A1	300 L/s	0 L/s	0 L/s	40.9	0.0	0.00 L/(s·m²)	0.97	2.52 L/(s·m²)	24 L/s	65 W	6.64 W/m²
22-6-019	Gowning lobby	Level 06	9 m²	2709	25.01 m³	42	292			AHU ICU A1	300 L/s	0 L/s	0 L/s	43.2	0.0	0.00 L/(s·m²)	0.92	2.54 L/(s·m²)	23 L/s	96 W	10.36 W/m²
22-6-033	Interview	Level 06	10 m²	2700	26.86 m³	6	45	6	45	AHU ICU A1	44 L/s	44 L/s	0 L/s	5.9	5.9	0.00 L/(s·m²)	0.99	2.58 L/(s·m²)	26 L/s	94 W	9.45 W/m²
22-6-085	IPS/UPS	Level 06	3 m²	3477	8.70 m³	0	0	0	0	AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	0.25	2.44 L/(s·m²)	6 L/s	6 W	2.37 W/m²
22-6-014	Isolation single be	Level 06	28 m²	3095	87.94 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	2.84	2.51 L/(s·m²)	71 L/s	199 W	7.02 W/m²
22-6-017	Isolation single be	Level 06	28 m²	3095	88.13 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	2.85	2.57 L/(s·m²)	73 L/s	272 W	9.55 W/m²
22-6-020	Isolation single be	Level 06	29 m²	3095	88.45 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	2.86	2.60 L/(s·m²)	74 L/s	320 W	11.19 W/m²
22-6-075	Lift lobby	Level 06	70 m²	2704	189.64 m³	3	158	3	158	AHU ICU A1	145 L/s	250 L/s	0 L/s	5.4	7.01	0.00 L/(s·m²)	1.11	2.49 L/(s·m²)	177 L/s	736 W	10.49 W/m²
22-6-029	Linen	Level 06	4 m²	2717	11.96 m³	0	0	4	13	AHU ICU A1	0 L/s	14 L/s	0 L/s	0.0	4.2	0.00 L/(s·m²)	0.44	2.79 L/(s·m²)	12 L/s	86 W	19.47 W/m²
22-6-001	Pantry	Level 06	27 m²	2700	73.38 m³	6	121	6	121	AHU ICU A1	120 L/s	120 L/s	0 L/s	6.0	6.0	0.00 L/(s·m²)	2.68	5.76 L/(s·m²)	154 L/s	528 W	19.68 W/m²
22-6-003-1	Reception office-1	Level 06	11 m²	2700	30.00 m³	6	50	6	50	AHU ICU A1	45 L/s	45 L/s	0 L/s	5.4	5.4	0.00 L/(s·m²)	1.11	2.49 L/(s·m²)	28 L/s	58 W	5.26 W/m²
22-4-73	Riser E3	Level 06	2 m²	3960	8.14 m³	0	0	0	0	AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	0.21	2.33 L/(s·m²)	5 L/s	0 W	0.00 W/m²
22-6-024	Single cubicle	Level 06	25 m²	3000	76.38 m³	6	127	6	127	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.55	7.65 L/(s·m²)	195 L/s	530 W	20.81 W/m²
22-6-026	Single cubicle	Level 06	25 m²	3000	76.47 m³	6	127	6	127	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.55	7.65 L/(s·m²)	195 L/s	533 W	20.89 W/m²
22-6-028	Single cubicle	Level 06	25 m²	3013	76.62 m³	6	128	6	128	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.54	6.38 L/(s·m²)	162 L/s	439 W	17.25 W/m²
22-6-035	Single cubicle	Level 06	36 m²	3000	108.42 m³	6	181	6	181	AHU ICU A1	162 L/s	162 L/s	0 L/s	5.4	5.4	0.00 L/(s·m²)	3.61	3.27 L/(s·m²)	118 L/s	496 W	13.73 W/m²
22-6-036	Single cub		80.10 m²		6	134	6	134	AHU ICU A1	117 L/s	117 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.96	2.72 L/(s·m²)	81 L/s	272 W	9.19 W/m²	
22-6-023-1	Single cub		76.24 m³		6	127	6	127	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.54	6.42 L/(s·m²)	163 L/s	483 W	19.01 W/m²	
22-6-025-1	Single cub		76.28 m³		6	127	6	127	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.54	6.40 L/(s·m²)	163 L/s	482 W	18.96 W/m²	
22-6-027-1	Single cub		76.45 m³		6	127	6	127	AHU ICU A1	113 L/s	113 L/s	0 L/s	5.3	5.3	0.00 L/(s·m²)	2.55	7.65 L/(s·m²)	195 L/s	529 W	20.76 W/m²	
22-6-015	Sluice		6.91 m²							AHU ICU A1	0 L/s	0 L/s	250 L/s	0.0	0.0	130.27 L/(s·m²)	0.26	2.82 L/(s·m²)	7 L/s	76 W	29.73 W/m²
22-6-018	Sluice		9.46 m²							AHU ICU A1	0 L/s	0 L/s	250 L/s	0.0	0.0	95.14 L/(s·m²)	0.34	2.75 L/(s·m²)	9 L/s	70 W	20.68 W/m²
22-6-021	Sluice		9.46 m²							AHU ICU A1	0 L/s	0 L/s	250 L/s	0.0	0.0	95.14 L/(s·m²)	0.34	2.52 L/(s·m²)	9 L/s	32 W	9.36 W/m²
22-2-1816	Space	Level 06	0 m²	3960	1.54 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)					0.00 W/m²
22-2-1835	Space	Level 06	0 m²	3960	1.56 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)					14.15 W/m²
22-2-1839	Space	Level 06	0 m²	3960	1.56 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)					0.00 W/m²
22-2-1842	Space	Level 06	1 m²	3960	4.84 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)					0.00 W/m²
22-2-1876	Space	Level 06	0 m²	3960	1.84 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)					0.00 W/m²
22-2-1902	Space	Level 06	21 m²	2418	49.84 m³	4	55	4	55	AHU ICU A1	62 L/s	0 L/s	0 L/s	4.5	0.0	0.00 L/(s·m²)	2.06	3.68 L/(s·m²)	76 L/s	427 W	20.70 W/m²
22-2-1906	Space	Level 06	0 m²	3960	1.35 m³					AHU ICU A1	0 L/s	0 L/s	0 L/s	0.0	0.0	0.00 L/(s·m²)	0.03	2.33 L/(s·m²)	1 L/s	0 W	0.00 W/m²
22-6-057	Staff rest(20 pers	Level 06	42 m²	2700	112.98 m³	4	126	4	126	AHU ICU A1	200 L/s	200 L/s	0 L/s	6.4	6.4	0.00 L/(s·m²)	4.18	6.06 L/(s·m²)	253 L/s	1876 W	44.84 W/m²
22-6-002-1	Visitor sitting room	Level 06	59 m²	2557	151.06 m³	4	168	4	168	AHU ICU A1	170 L/s	170 L/s	0 L/s	4.1	4.1	0.00 L/(s·m²)	5.91	4.64 L/(s·m²)	274 L/s	787 W	13.31 W/m²
22-2-1823	WC	Level 06	11 m²	2700	29.38 m³			3	24	AHU ICU A1	0 L/s	24 L/s	0 L/s	0.0	2.9	0.00 L/(s·m²)	1.09	2.80 L/(s·m²)	30 L/s	227 W	20.88 W/m²
22-10-44	WC	Level 06	3 m²	2700	7.59 m³			6	13	AHU ICU A1	0 L/s	13 L/s	0 L/s	0.0	6.2	0.00 L/(s·m²)	0.28	3.20 L/(s·m²)	9 L/s	120 W	42.67 W/m²
22-10-45	WC	Level 06	3 m²	2700	7.59 m³			6	13	AHU ICU A1	0 L/s	13 L/s	0 L/s	0.0	6.2	0.00 L/(s·m²)	0.28	3.52 L/(s·m²)	10 L/s	160 W	57.01 W/m²

Occupancy / internal gains

Manual calculations / rules of thumb / design margins

Thermal modelling results

Using BIM Models for MEP Systems Design

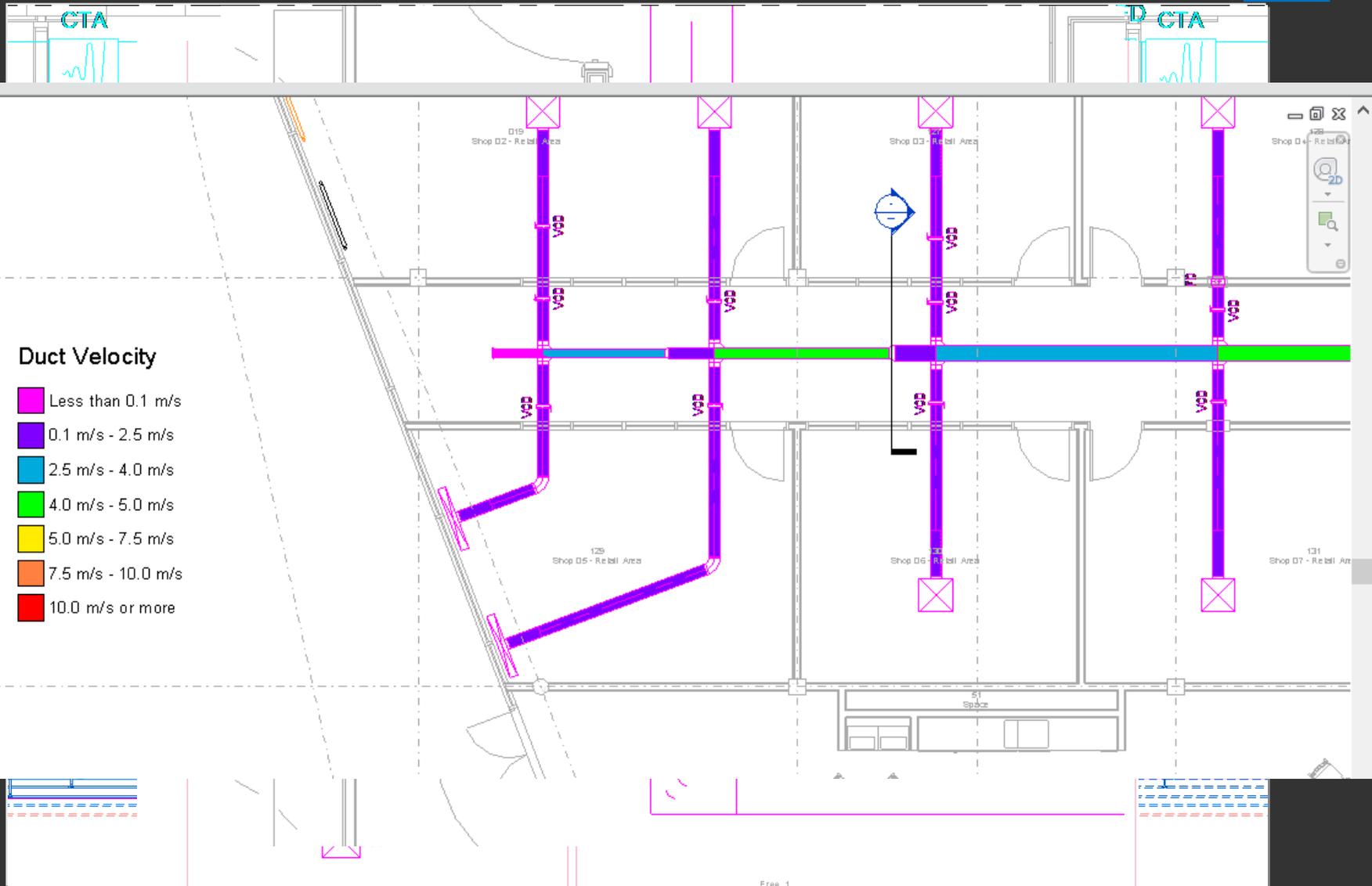


Revit – Inbuilt heating & cooling loads

- Based on American tool, Carmel
- Based on American calculations methods – radiant time series
- Requires accurate but simple model

Project Summary	
Location and Weather	
Project	RD&E Aseptic Unit
Address	
Calculation Time	12 May 2011 08:57
Report Type	Detailed
Latitude	51.50°
Longitude	-0.12°
Summer Dry Bulb	29 °C
Summer Wet Bulb	20 °C
Winter Dry Bulb	-2 °C
Mean Daily Range	-10 °C
Building Summary	
Inputs	
Building Type	Office
Area (m ²)	958
Volume (m ³)	2,667.38
Calculated Results	
Peak Cooling Total Load (W)	52,710
Peak Cooling Month and Hour	July 15 00
Peak Cooling Sensible Load (W)	49,809
Peak Cooling Latent Load (W)	2,901
Maximum Cooling Capacity (W)	52,710
Peak Cooling Airflow (L/s)	3,690
Peak Heating Load (W)	59,651
Peak Heating Airflow (L/s)	3,170
Checksums	
Cooling Load Density (W/m ²)	55.03
Cooling Flow Density (L/s-m ²)	3.85
Cooling Flow / Load (L/s-kW)	70.01
Cooling Area / Load (m ² /kW)	18.17
Heating Load Density (W/m ²)	62.27
Heating Flow Density (L/s-m ²)	3.31
Level Summary - Level 1	
Inputs	
Area (m ²)	619
Volume (m ³)	1,739.84
Calculated Results	
Peak Cooling Total Load (W)	33,228
Peak Cooling Month and Hour	July 15 00
Peak Cooling Sensible Load (W)	31,288
Peak Cooling Latent Load (W)	1,939
Peak Cooling Airflow (L/s)	2,388
Peak Heating Load (W)	37,186
Peak Heating Airflow (L/s)	1,976
Checksums	
Cooling Load Density (W/m ²)	53.64
Cooling Flow Density (L/s-m ²)	3.85
Cooling Flow / Load (L/s-kW)	71.86
Cooling Area / Load (m ² /kW)	18.64
Heating Load Density (W/m ²)	60.03
Heating Flow Density (L/s-m ²)	3.15

Using BIM Models for MEP Systems Design



Using BIM Models for MEP Systems Design

The screenshot shows the Revit software interface with the 'Analyze' tab selected. A red box highlights the 'Energy Analysis' sub-tab, which includes options for 'Energy Settings', 'Enable Energy Model', 'Run Energy Simulation', and 'Results & Compare'. A red arrow points from the text 'Revit – Early stage design models' to this box. The interface also shows a floor plan view of a duct system with color-coded flow rates and a Project Browser on the right.

Revit – Early stage design models

- Features from Ecotect and green building studio
- Calculations in the cloud
- Uses Energy Plus

The bottom left shows a color-coded energy flow visualization of a duct system, with a legend indicating flow rates: 0.1 m/s - 2.5 m/s (purple) and 2.5 m/s - 4.0 m/s (blue). The bottom right shows an aerial site plan with a circular building footprint overlaid with a color-coded zoning or energy analysis grid.

Using BIM Models for MEP Systems Design



Add-ins...

The screenshot displays the Revit software interface for a duct analysis. The main view shows a floor plan with ductwork color-coded by velocity. A legend titled "Duct Velocity" provides the following scale:

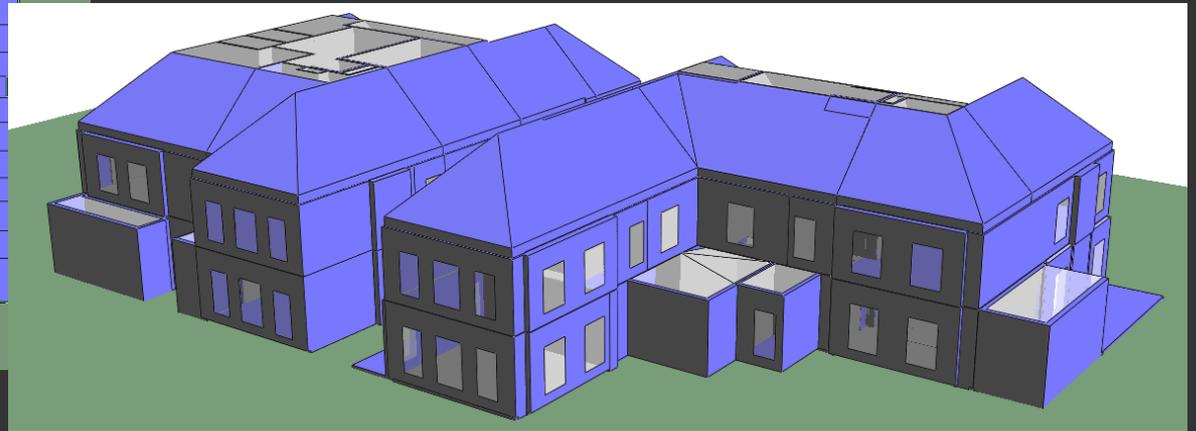
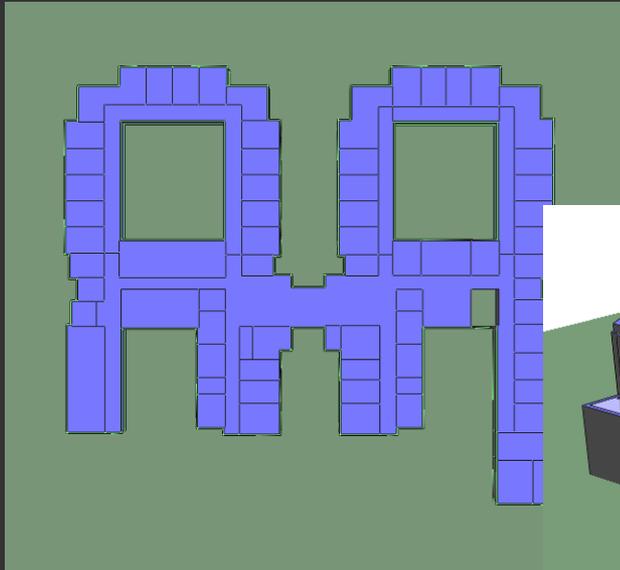
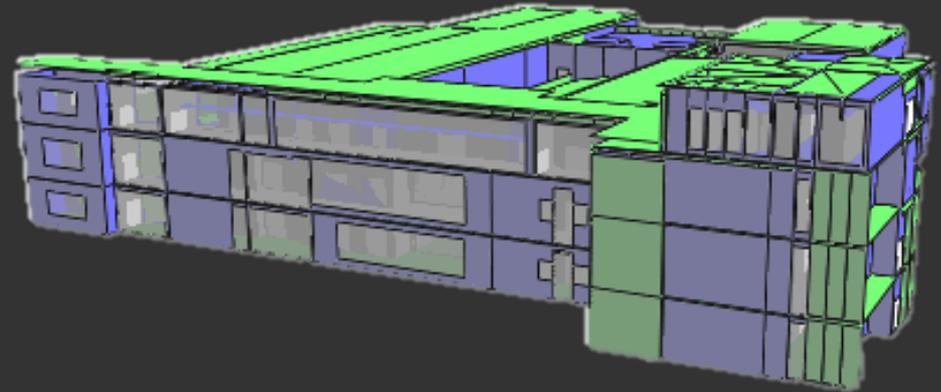
- Less than 0.1 m/s (Pink)
- 0.1 m/s - 2.5 m/s (Purple)
- 2.5 m/s - 4.0 m/s (Blue)
- 4.0 m/s - 5.0 m/s (Green)
- 5.0 m/s - 7.5 m/s (Yellow)
- 7.5 m/s - 10.0 m/s (Orange)
- 10.0 m/s or more (Red)

The Properties panel on the left shows the current view is "Floor Plan: 00 - Duct Analysis" with a scale of 1:50. The Project Browser on the right shows a tree structure under "Views (Discipline)" with "00 - Duct Analysis" selected. The "Add-ins" ribbon is highlighted, showing "Dynamo 7" and "Visual Programming" options.

Using BIM models for Export to Simulation

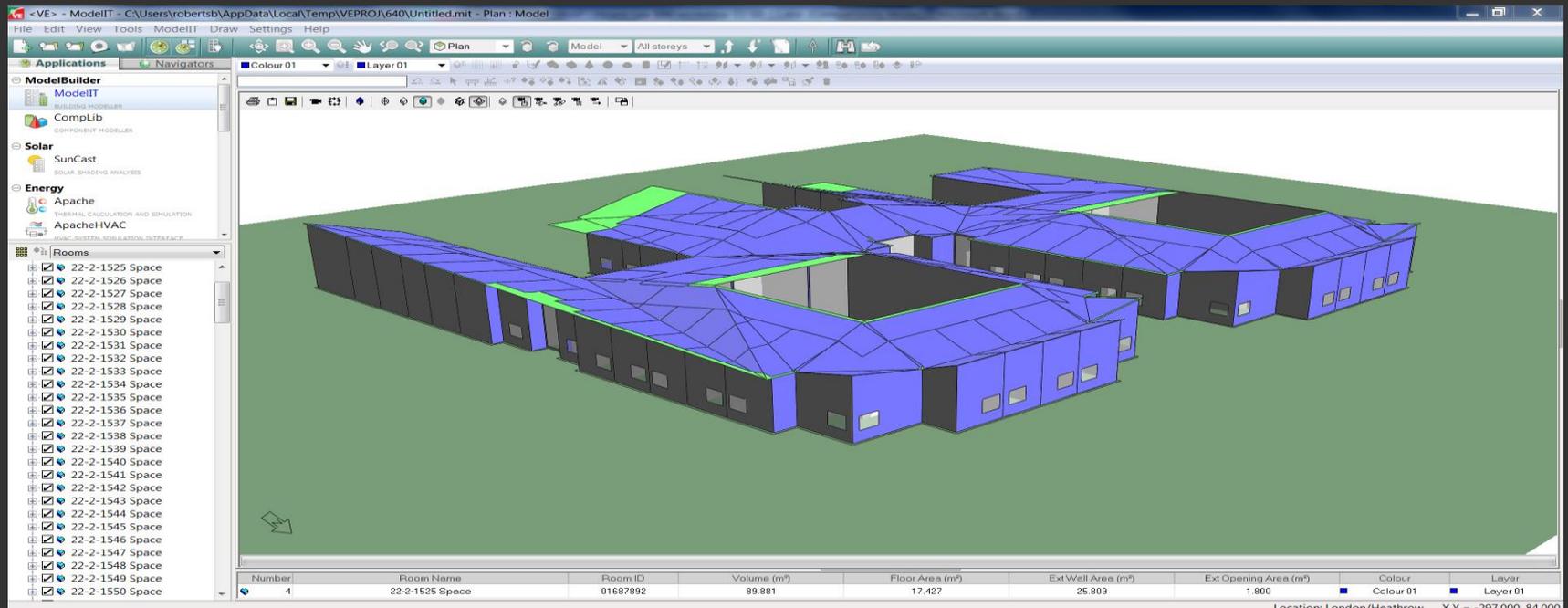
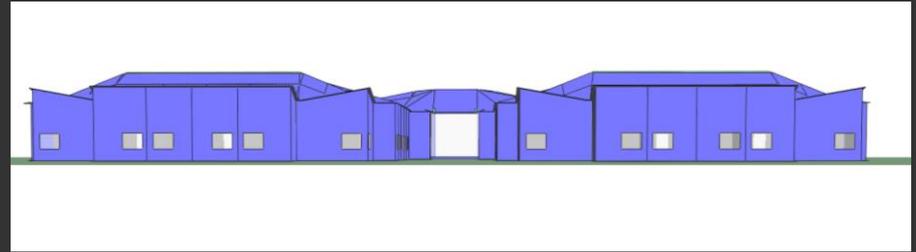
Using BIM Models for Export to Simulation

...Detailed thermal modelling / compliance analysis via export to IES / TAS



Using BIM Models for Export to Simulation

...Detailed thermal modelling / compliance analysis via export to IES / TAS

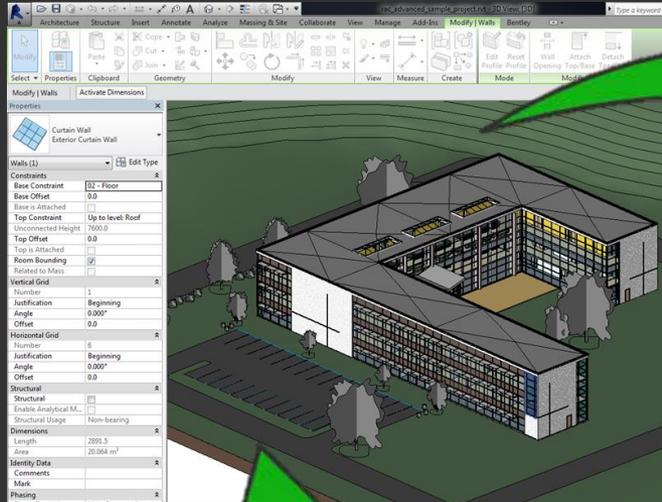


The screenshot displays the ModelIT software interface. The main window shows a 3D perspective view of a building model with blue walls and a green roof. The left-hand pane contains a 'Rooms' list with checkboxes for various spaces. The bottom of the interface features a data table with the following columns: Number, Room Name, Room ID, Volume (m³), Floor Area (m²), Ext Wall Area (m²), Ext Opening Area (m²), Colour, and Layer.

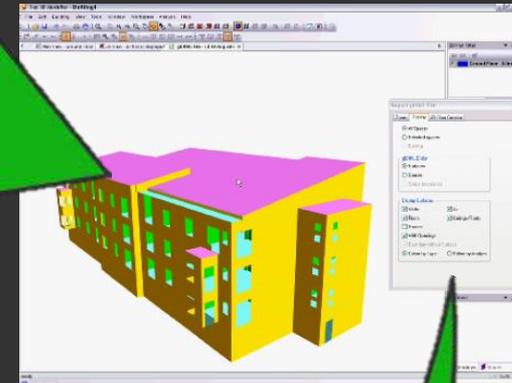
Number	Room Name	Room ID	Volume (m³)	Floor Area (m²)	Ext Wall Area (m²)	Ext Opening Area (m²)	Colour	Layer
4	22-2-1525 Space	01687892	89.881	17.427	25.809	1.800	Colour 01	Layer 01

Location: London/Heathrow X Y = -297.000, 84.000

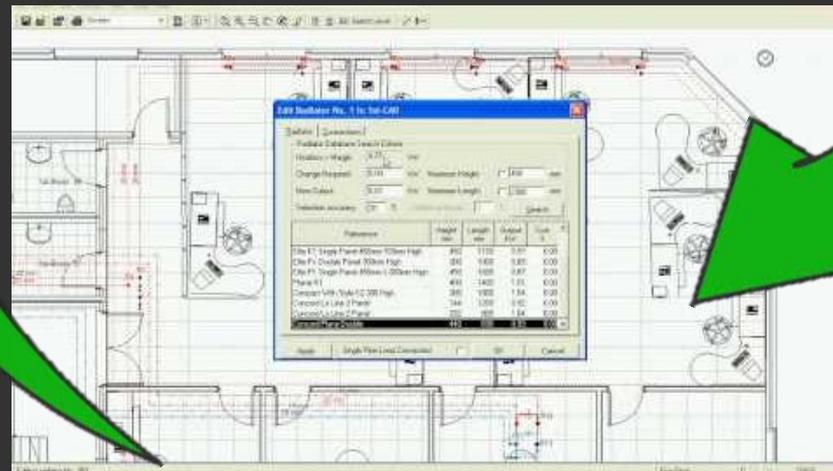
Using BIM Models for Export to Simulation



Revit

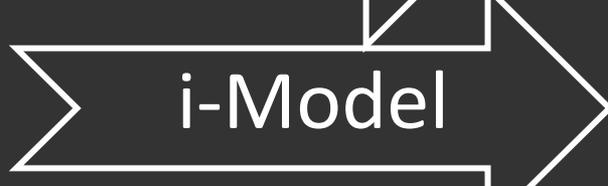
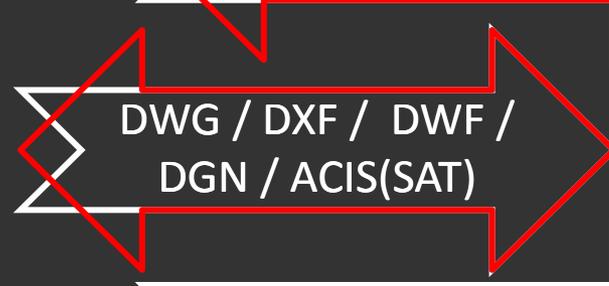


EDSL:TAS

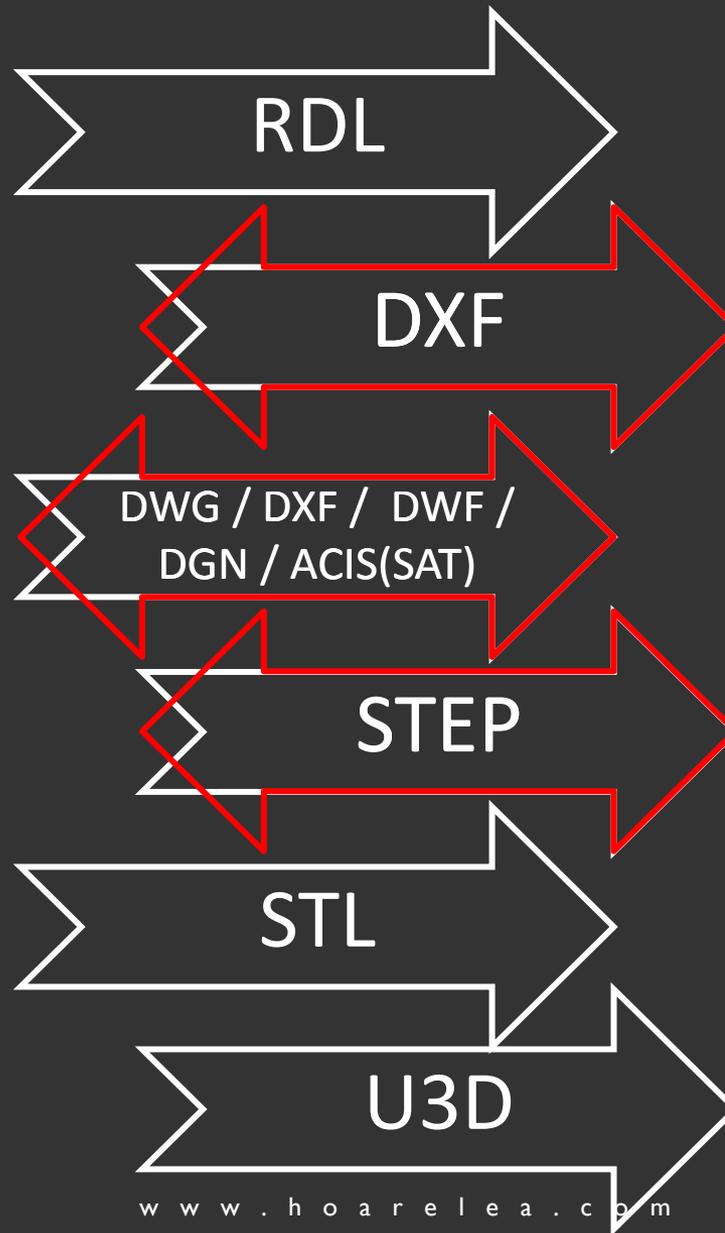


Cymap

Using BIM Models for Export to Simulation



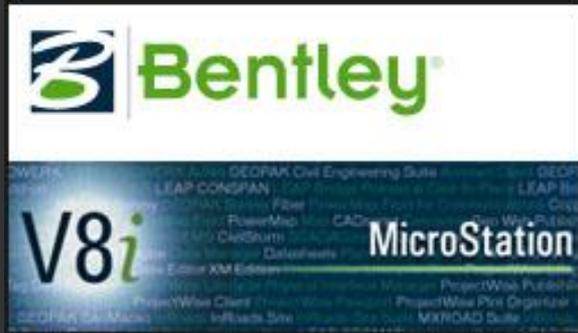
Using BIM Models for Export to Simulation



Key Challenges of BIM

- Technical
- Managerial
- Cultural

Key Challenges - Interoperability



Industry Foundation Classes



Using BIM Models for Export to Simulation

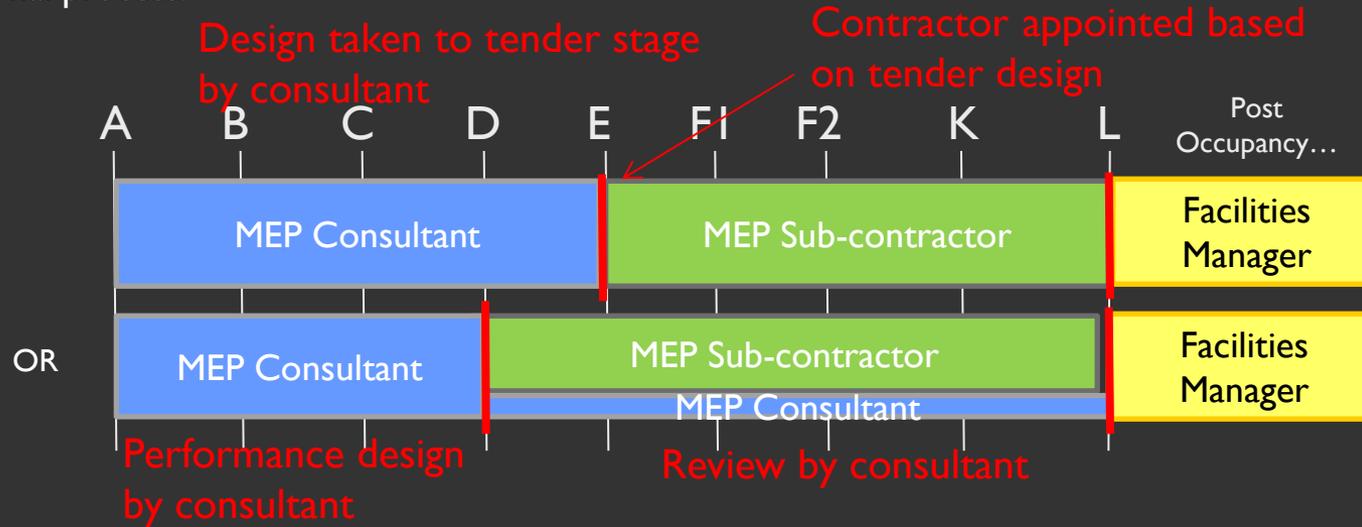


Problems with Industry Foundation Classes (IFC)

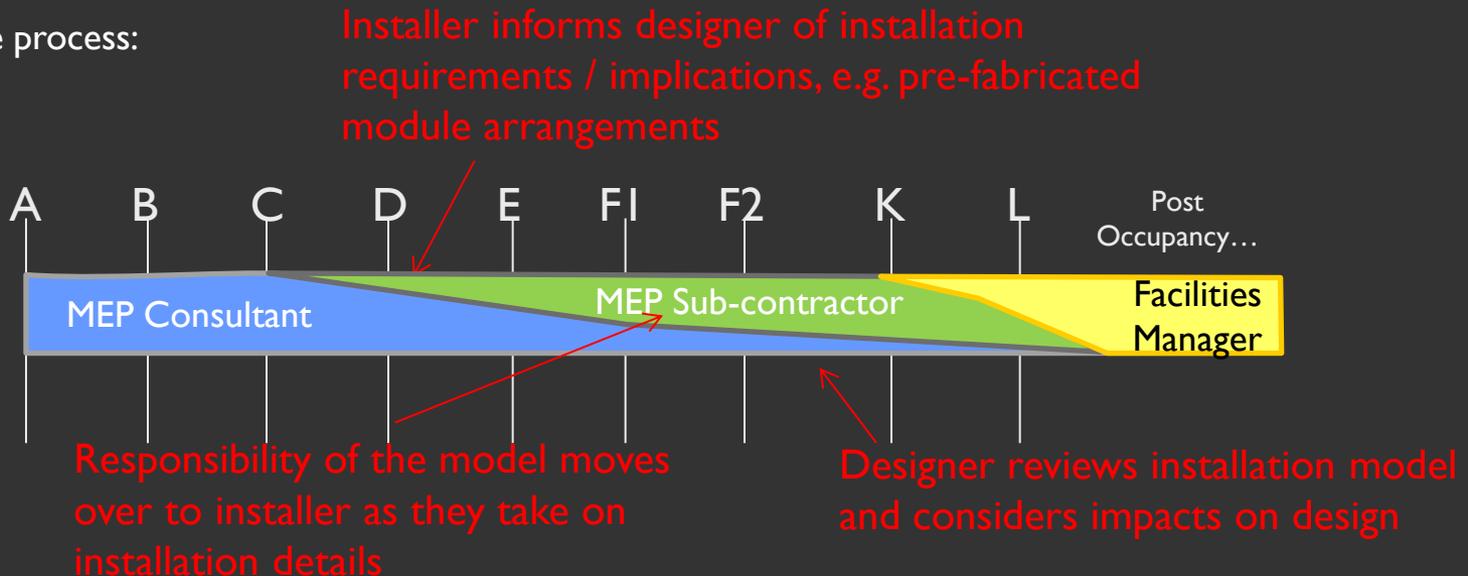
- Exporting works well from most software, but requires some setup
- Importing IFC files generally doesn't work very well...
 - Curtain walling
 - Windows
 - Spaces / rooms
 - Hosting elements on surfaces
 - Curved surfaces become complex polymeshes

Collaborative approach – Changing the shape of procurement

Traditional process:



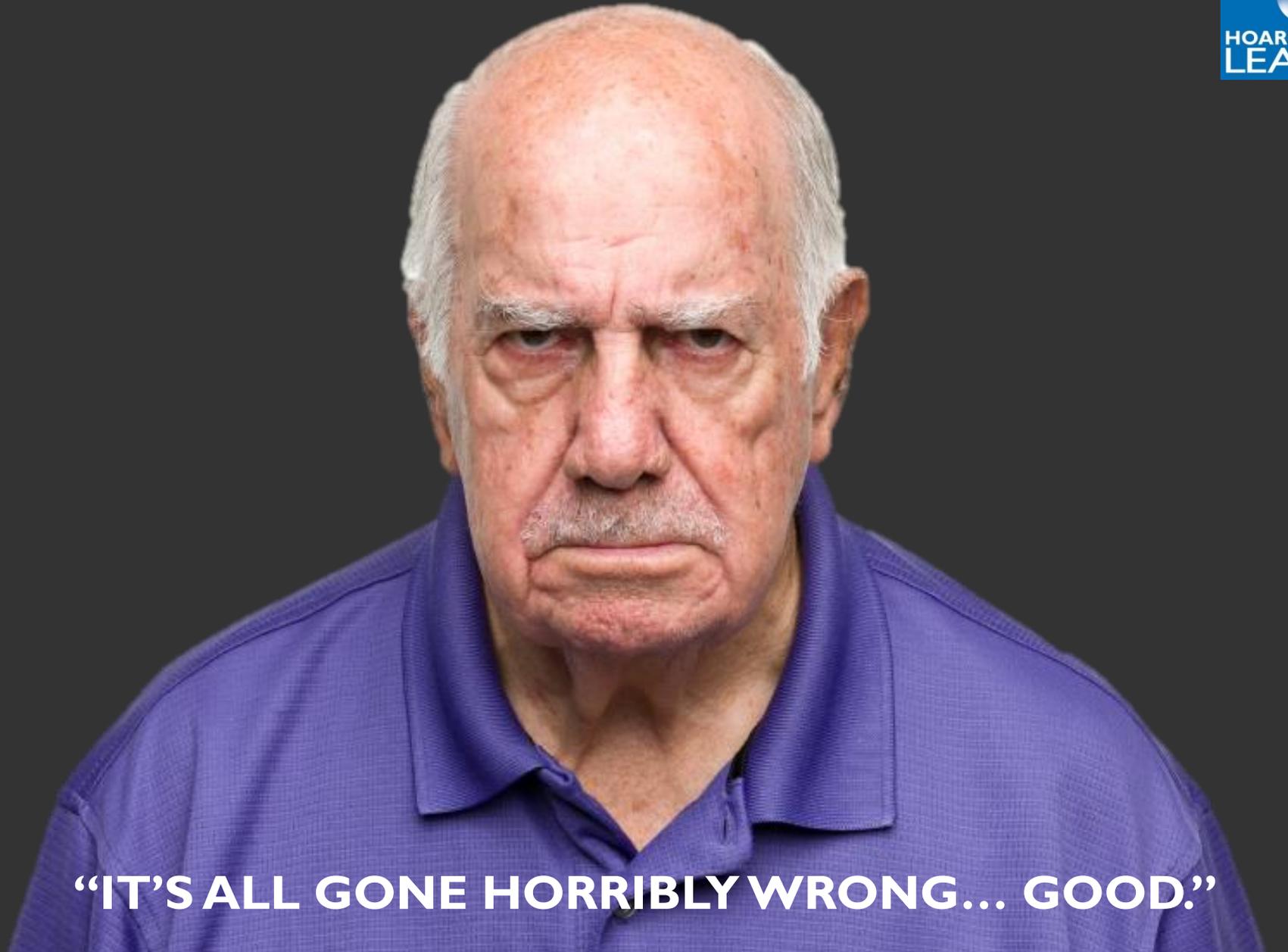
Collaborative process:



Key Challenges - Culture



- We are begrudgingly accepting the existence of technology;
- We can't work out how to live with it, yet somehow we're entirely reliant upon it;
- We don't really know how to talk to it, and we certainly don't like the way it talks to us;
- Gradually we are realising that we have to be aware of what it can do;
- In fact, in some ways, there are things that it can do better than us; but we don't say that out loud.

A close-up portrait of an elderly man with white hair and a mustache, wearing a blue polo shirt. He has a serious, somewhat stern expression and is looking directly at the camera. The background is dark and out of focus.

“IT’S ALL GONE HORRIBLY WRONG... GOOD.”

BIM Basics And Design Analysis



BIM basics

- Definition
- What is government “Level 2” BIM?
- Commonly used software tools

Using BIM models for MEP system design

- Spaces
- Pipe & duct sizing
- Adding “intelligence” to content

Linking BIM models to simulation software

- Links between Revit and IES/TAS
- File formats for transferring models
- Plug-ins or export/import?

Key challenges of adopting BIM

- Technical
- Managerial
- Cultural

