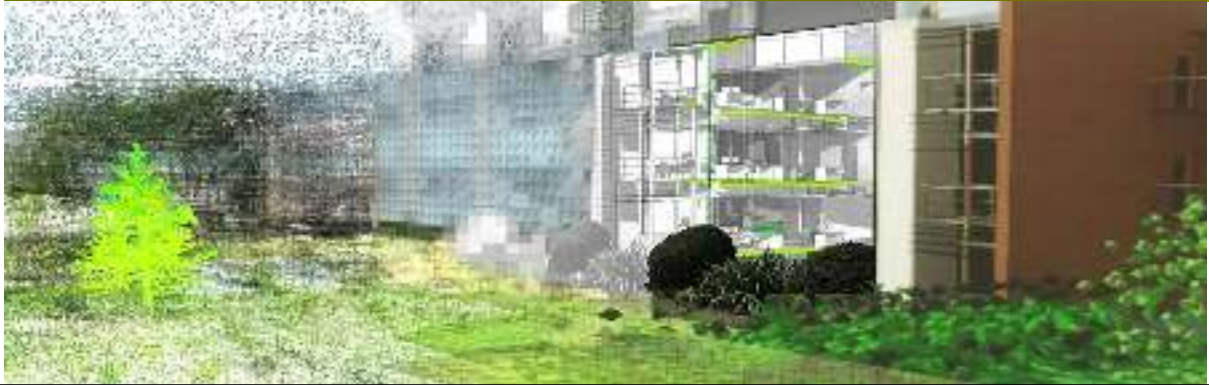


Standardisation: The Value of Digital BIM

Paul Oakley BA(Hons) Dip Arch RIBA

Building a better world together



BIM

What is it?

BIM is...

- not just 3D CAD;
- not just a new technology application; and
- not next generation, it here and now!

“

BIM is essentially **value creating collaboration** through the entire life-cycle of an asset, underpinned by the **creation, collation and exchange of shared 3D models and intelligent, structured data** attached to them.

<http://www.bimtaskgroup.org/bim-faqs/>

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Building Information Model

(*What things is produced*)

Building Information Modelling

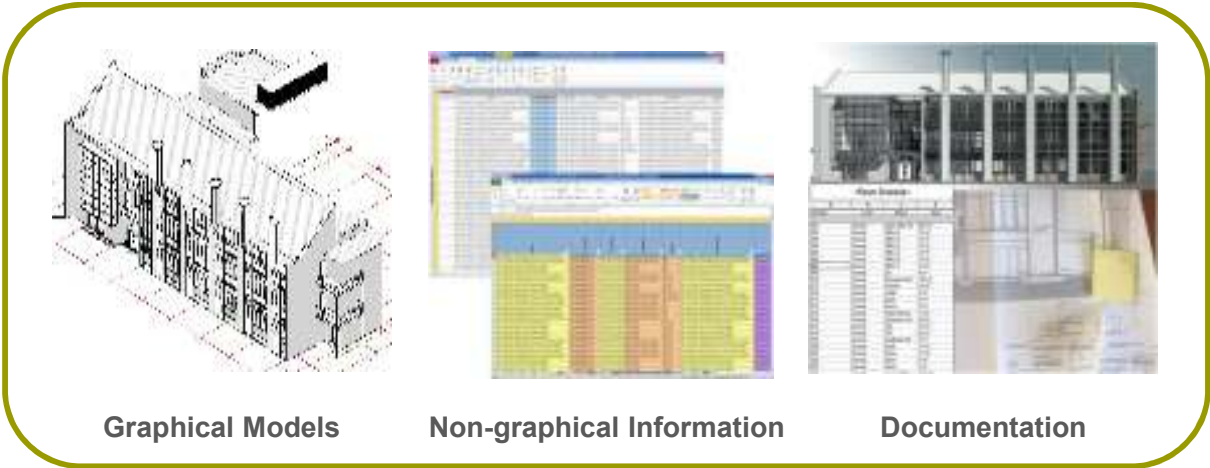
(*How the thing is produced*)

Building Information Management

(*Who produces What thing and When*)

Copyright © BRE

Building Information Model



Graphical Models

Non-graphical Information

Documentation

UK BIM Drivers

Notable Reports

1994 Constructing the Team

- Target: 30% Real cost reduction

1998 Rethinking Construction

2002 Accelerating Change

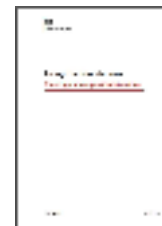
2009 Never Waste a Good Crisis

- Target: Annual 10% Time and Cost reduction
- Target: Annual 20% Reduction in defects

2015 Fixing the Foundations

2016 Modernise or Die

2018 Hackitt Report



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Rethinking Construction



Up to **30%** of construction is rework

Labour is only utilized at **40-60%** efficiency



At least **10%** of site materials are wasted

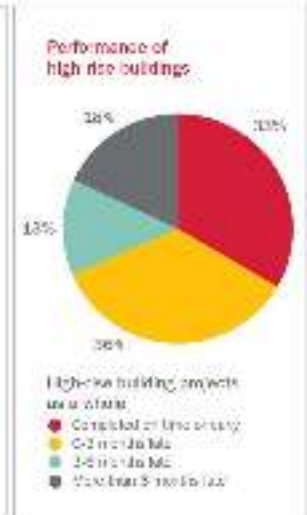
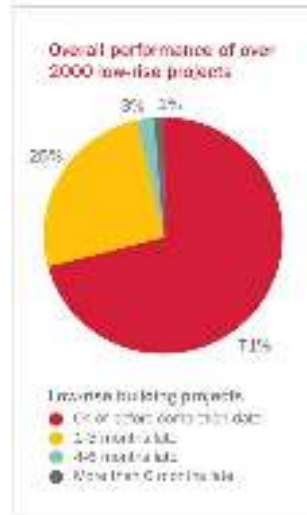
Accidents account for **3-6%** of project costs.



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SYMPTOMS

The critical symptoms of BLM's poor performance have been identified in this table as:



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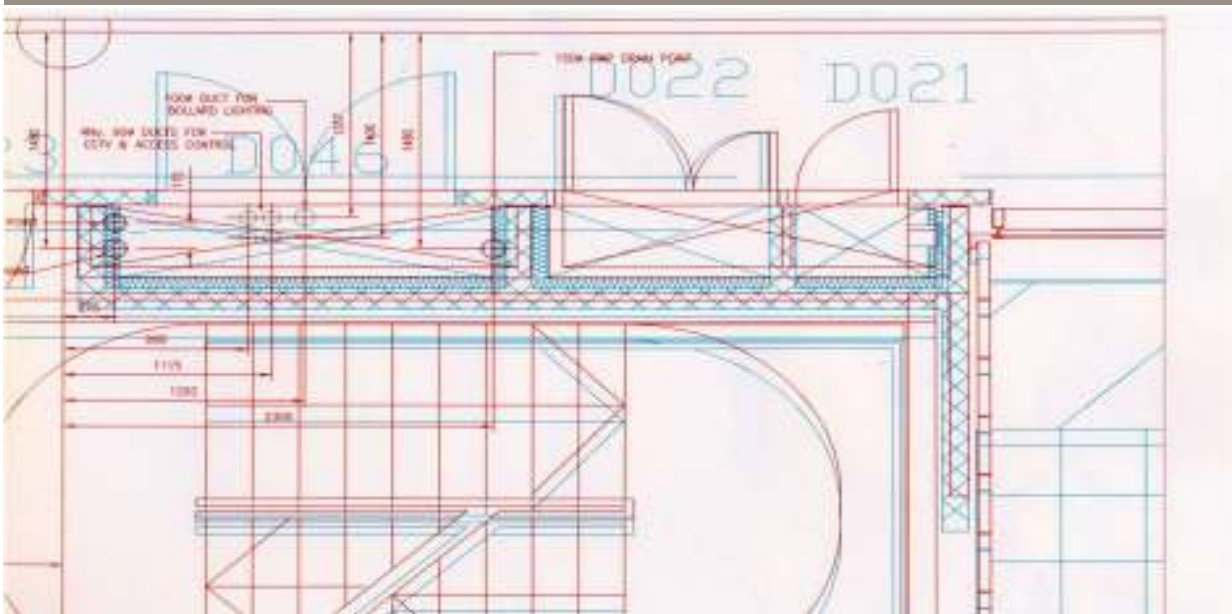
“ Information is invariably inaccurate, ambiguous, and incomplete.

How do we know ?

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bre

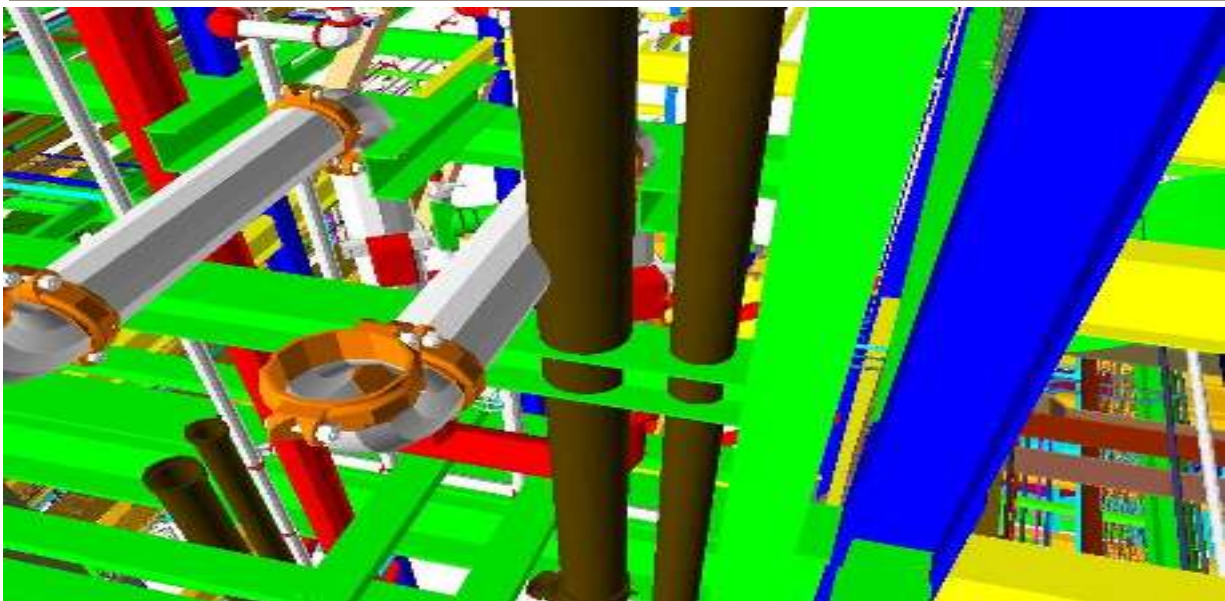
Uncoordinated Information (2D)



Copyright © BRE

bre

Uncoordinated Information (3D)



Copyright © BRE

bre

Uncoordinated Information



Copyright © BRE

bre

Poor Spatial Coordination



Copyright © BRE

"This Government's four year strategy for BIM implementation will change the dynamics and behaviours of the construction supply chain, unlocking new, more efficient and collaborative ways of working. This whole sector adoption of BIM will put us at the vanguard of a new digital construction era and position the UK to become the world leaders in BIM."

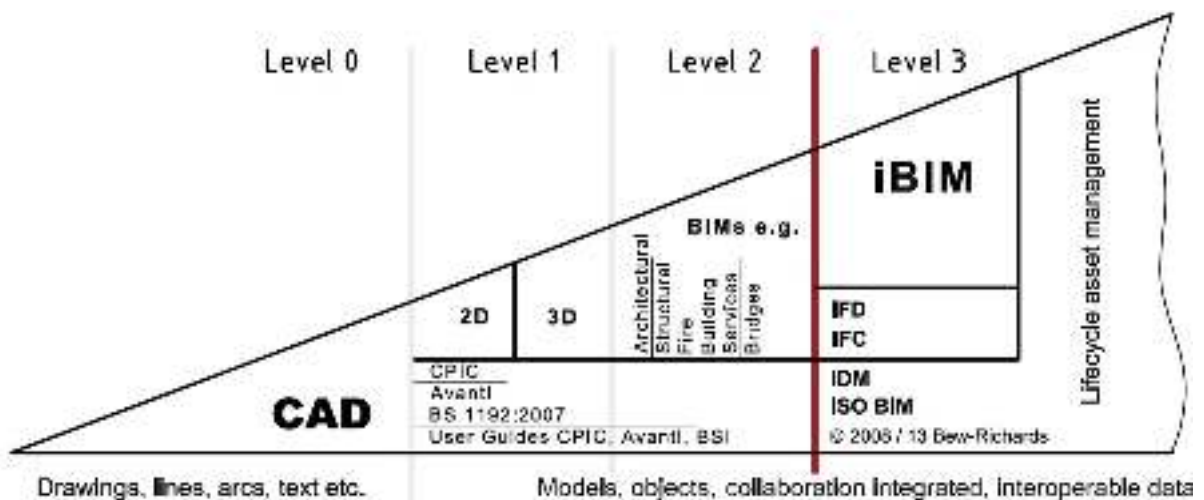
Francis Maude
Minister for the Cabinet Office



“

reducing capital cost and the carbon burden from the construction and operation of the built environment by 20%...

Copyright © BRE



Copyright © BRE

Removing the BIM Blockers

Blockers to BIM Level 2 adoption

Perceived Blockers

- Cost
- Legal
- Technology
- Standards
- Cultural
- Education
- Training





BS 1192



BS 1192-4



BS 8536-1 & 2



PAS 1192-2



PAS 1192-3



PAS 1192-5

Copyright © BRE



PAS91



BS7000-4



BS8541 Series

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CIC BIM Protocol



CPIx BEP Templates



CPIx Assessment Forms

BIM Level 2 International

As a response to an International drive for BIM level 2, **ISO 19650-1** and **ISO 19650-2** are being developed.

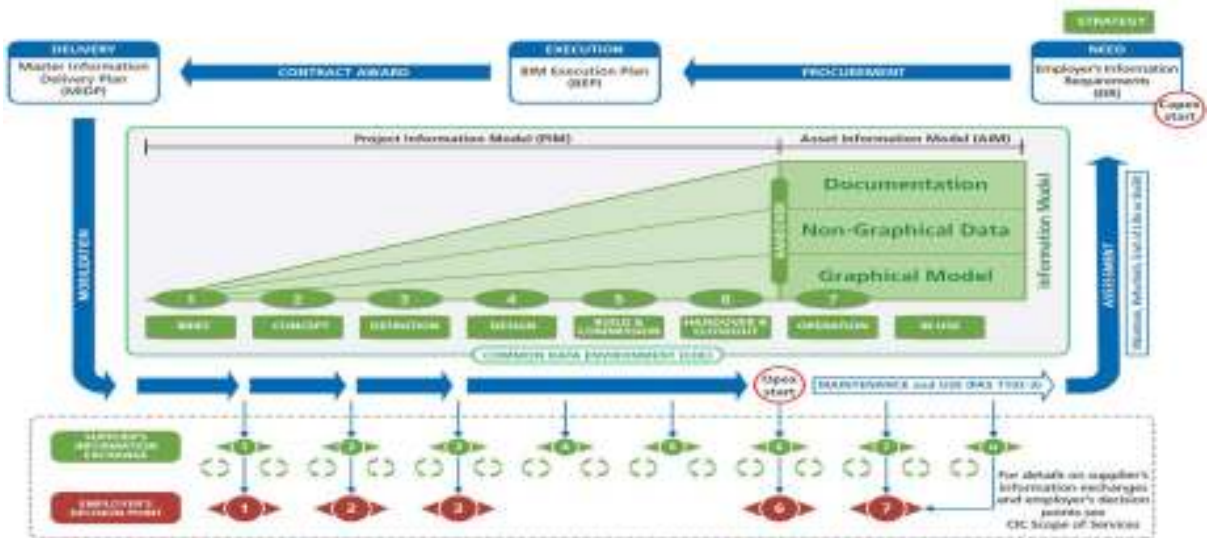
These initial International standards will incorporate:

- BS 1192
- PAS 1192-2

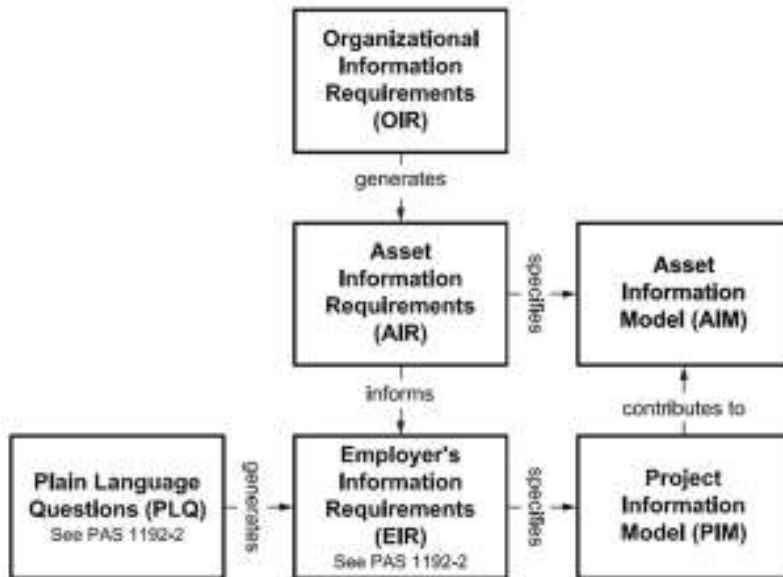


BIM Level 2 Key Components

Information Delivery Cycle



Beginning with the end in mind



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Common Data Environment

Key Elements

- **WORK IN PROGRESS** is where deliverables are developed;
- **SHARED** Information must be approved;
- **PUBLISHED** Information must be authorised; and
- **ARCHIVE** contains a copy of all transactions and deliverables to the client must be verified.



Image: PAS 1192-2

Copyright © BRE

bre

BIM Level 2 Driver – Reducing Waste

bre

Waste

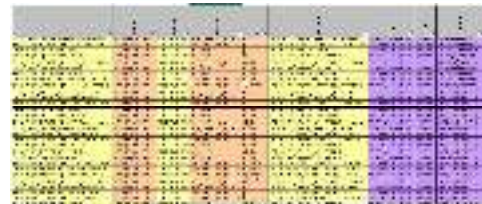
ENGLISH OXFORD DICTIONARY

ADJECTIVE

eliminated or discarded as no longer useful or required after the completion of a process.

NOUN

An act or instance of using or expending something carelessly, extravagantly, or to no purpose.



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Employers Information Requirements

Employers Information Decision Capture:

- What the Employers Wants?
- What they want included?
- What they want excluded?
- When do they want it?
- What formats do they want it?
- What Tools will they use with it?
- Etc...

Reduce Waste



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BIM Execution Plan (BEP)

Supply Chain Response

- Response to the EIR
- Opportunity for Employer to evaluate what information is being delivered
- Defines project delivery:
 - Standards
 - Methods
 - Procedures

Reduce Waste



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Information Delivery Requirements

What is the information being produced?

Who by?

When?

Is it named correctly?

Do we need that information?

Is it appropriate?

Do we need additional Information?

Reduce Waste

Table 10 – Template for Information Delivery Plans

File Identifier							Model / Information Title		Delivery dates				
Project	Contract	Phase	Level	File Name	Extension	Version			Weekend	Weekend	Weekend	Weekend	Weekend
									1	2	3	4	5



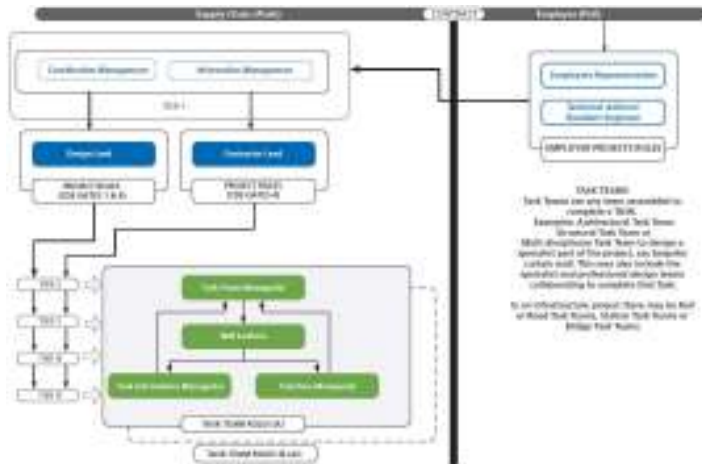
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BIM Managers / Consultants

Vs Information Management Responsibilities



Reduce Waste



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Clash Detection Vs Clash Avoidance

Clash Detection (Additional Service):

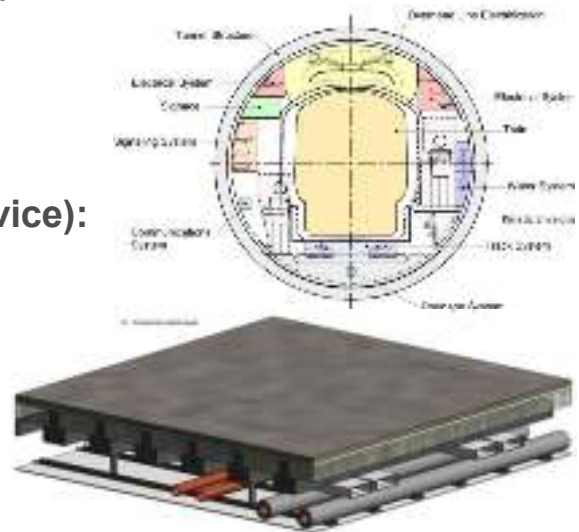
Weekly posting of Information

- Software Clash reports
- Clash Error Lists

V's Clash Avoidance (Inclusive Service):

- MIDPs Information Delivery
- Volume Strategy
- Roles and Responsibilities

Reduce Waste



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CDE, Naming, Revision and Status Codes

Unclear / Missing Project Information

- Use of Naming Standards
- Standardised Fields
- Use of Status Codes
- Use of Revisions Codes
- Delivery Through CDE process
 - Check
 - Review
 - Approve

Reduce Waste



File Naming

Project No. Volume File Type Number
 7001-BRE-16-00-DR-A-0001.pdf
 Originator Level Role
 Location

Revision and Status Codes

Status	Description	Revision
Mark as Progress		
SI	Initial review or WIP Master document under file identifier generated from the original.	PS 001 etc to PS 010 etc
SI	Submitted (For construction)	
SI	Submit for Co-ordination. This file is available to be shared and used by other disciplines as a background for their information.	PS 101 to PS 010

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BIM Level 2 International

As a response to an International drive for BIM level 2, **ISO 19650-1** and **ISO 19650-2** are being developed.

These initial International standards will incorporate:

- BS 1192
- PAS 1192-2

Reduce Waste



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Delivering Structure Information

PAS1192-2:2013

- 9.1.4 Data delivery shall include some all of the following data entities:
native (product-proprietary) file formats,
COBie-UK-2012 and read-only PDF;
to enable a complete Level 2 project.



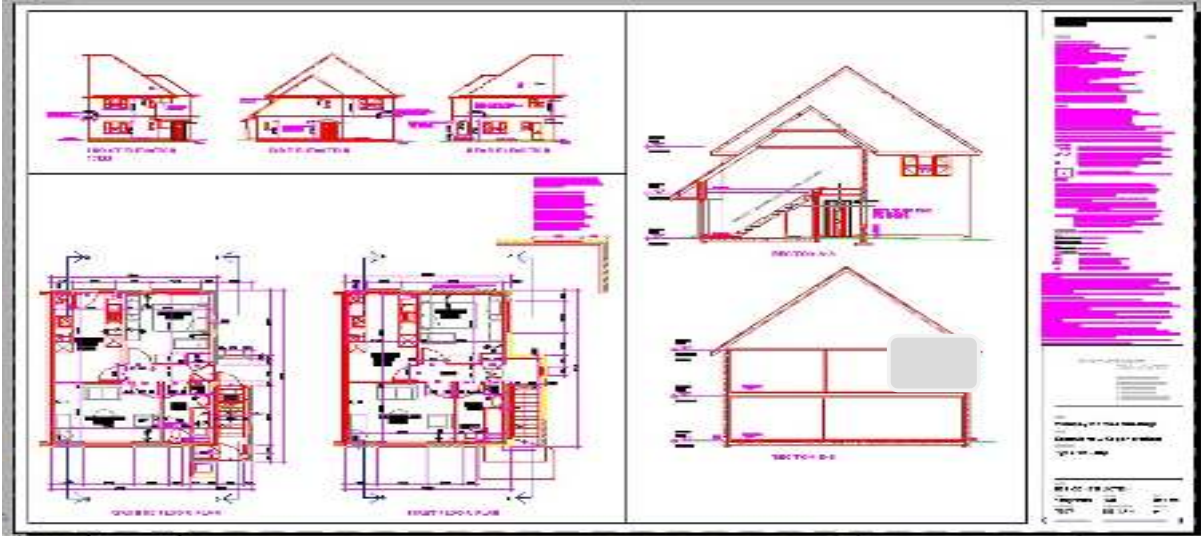
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PAPER DELIVERABLES



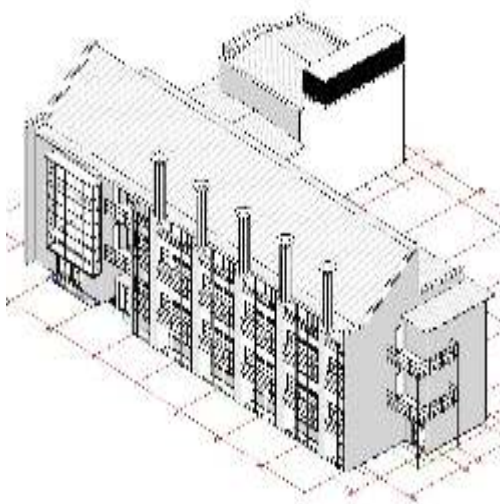
Copyright © BRE

PAPER DELIVERABLES



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PAPER DELIVERABLES



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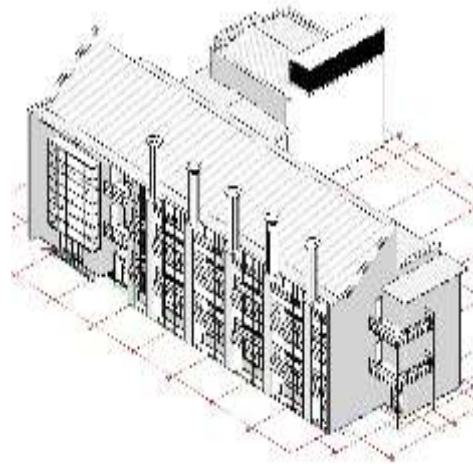
STRUCTURED DATA
Construction

Operation

Building

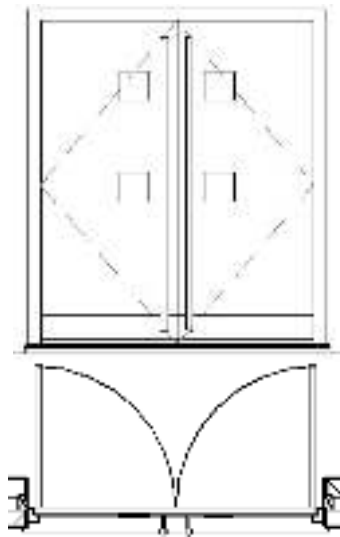
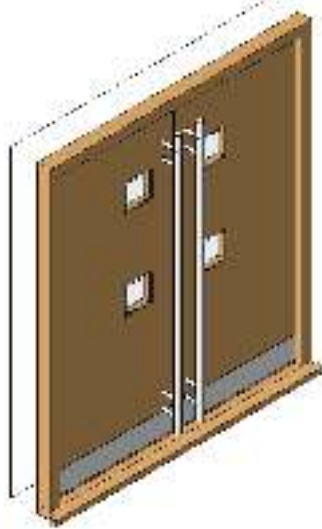
information

exchange



Construction Operations Building Information exchange

Visual, Symbol, Graphical & Non Graphical Data

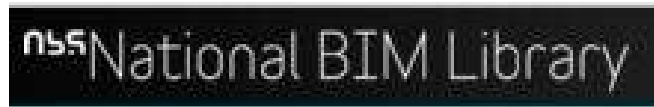


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The BIM Object Issue

BIM Object Providers

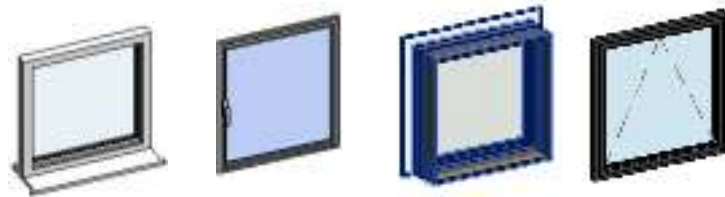
- All use different standards
- No complete range of products
- Differing Quality
- Not compliant with BS8541



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Revit Standardised Parameters

Waste



No	Window Type	REVIT AcousticRating	NBL AcousticRating	BIM Store AcousticRating	BIM Object Acoustic
1	Windows_Sgl_Plain	27	-	-	-
2	NBS_SelectaglazeLtd_AlumWndwUnits_Series45Slimline HingedCasement_SingleSideHungCasement	-	Secondary glazing can vastly improve the noise reduction of the window opening, performance will depend upon the primary window, the secondary glazing selected and the cavity. Please see website for indicative acoustic ratings	-	-
3	Window_Wall_Aluk_58BWST_OpenOutVent	-	-	Rw(C;Ctr) 42(-1;-5)dB	-
4	Window-Casement-JELD-WEN-EpicVue	-	-	-	http://www.jeld-wen.com/en-us/professional/technical-documents/acoustic-ratings

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Typical BIM Object



Copyright © BRE

Properties – Sheet 6

Waste

Type Comments	
Type IfcGUID	
Type Image	
Type Mark	50
Uniclass2	45-60-72/436
Uniclass2015Description	Wood window units
Uniclass2015Reference	Pr_30_59_98_96
Uniclass2015Version	Products v1.1
URL	
VentColourExternalOptions	Signal White - RAL 9003 (standard), RAL colours, Stain colours
VentColourInternalOptions	Signal White - RAL 9003 (standard), RAL colours, Stain colours
VentFinishExternalOptions	Micro-porous water based paint (three coats, standard), Stain (three coats)
VentFinishInternalOptions	Micro-porous water based paint (three coats, standard), Stain (three coats)
VentilationBackgroundVentilation	4600 mm ² (standard)
VentWoodSpeciesOptions	Engineered Accoya, Engineered European Oak, Engineered Hardwood Red Grandis, Engineered Sapele, Engineered Siberian Larch (standard)
Version	1
Visual Light Transmittance	
WarrantyDescription	Timber: 30; Glazing, ironmongery and seals: 10; Paint finish: 10; Stain finish: 5
WarrantyDurationLabor	n/a
WarrantyDurationParts	Timber: 30; Glazing, ironmongery and seals: 10; Paint finish: 10; Stain finish: 5
WarrantyDurationUnit	year
WarrantyGuarantorLabor	n/a
WarrantyGuarantorParts	n/a
WarrantyStartDate	1900-12-31T23:59:59
WeatherPerformanceAirPermeability	Class 4
WeatherPerformanceResistanceToWindLoad	Class C5
WeatherPerformanceUKExposureCategory	Class A5 P1 at 2000pa
WeatherPerformanceWatertightness	Class 9A
Weatherseal	Deventer TPE Thermoplastic Elastomer
Width	2000

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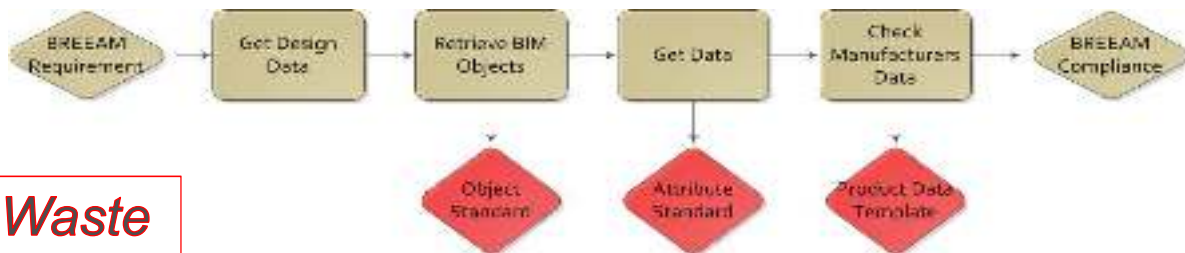
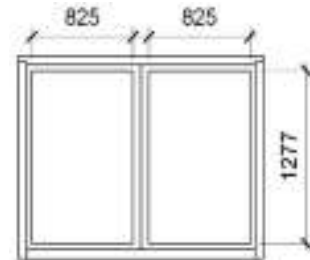
“Beginning with the End in Mind...”

How do I get the Objects?

How do I get the Data?

How do I calculate BREEAM HEA 01?

How do I replace the glass and what size is it?



Waste

<http://bretemplater.com>



Based Upon IFC 4x Data Types
110 Standard IFC Templates included:



BRE Data Ecosystem

- BRE Templater
- BRE DataBook
- PLUGins
- COBie
- Asset Management



© BRE 2017



BIM: What is possible?

Avanti Management Team
Over 30 Real Projects



Case Studies

- St Helens
- Palace Xchange

The Standard Methods and Procedures used became BS 1192:2007

Reduced Waste

Measured Time / Cost Savings of 20% Identified



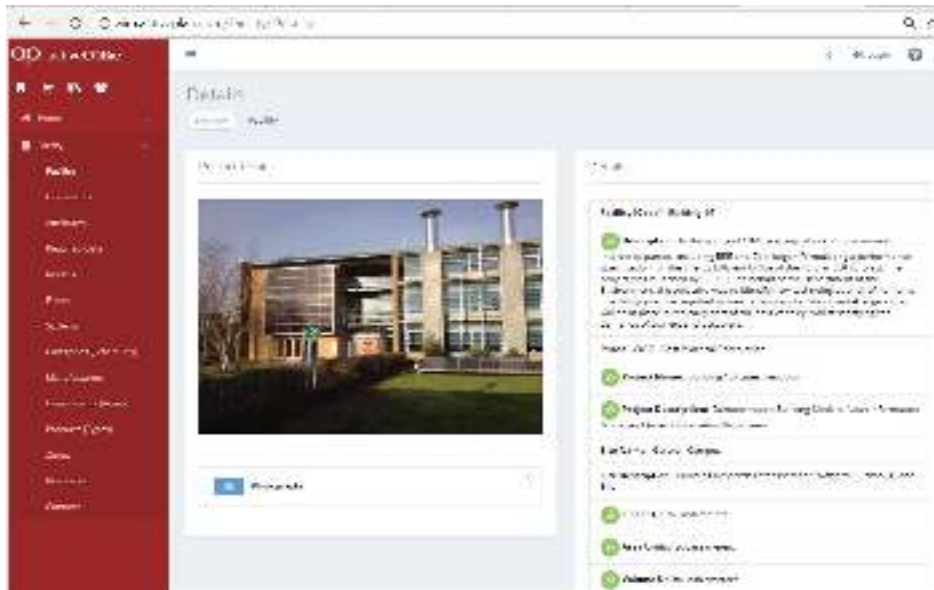
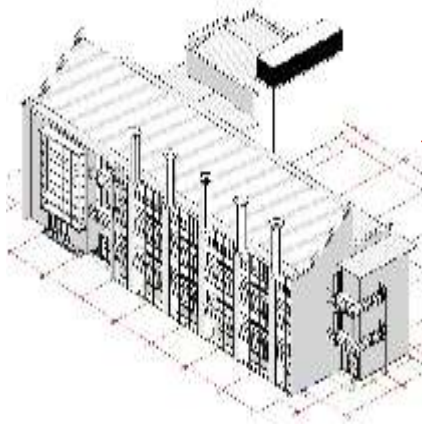
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<http://pano.autodesk.com/pano.html?url=jpgs/0e32a506-f39e-484c-8f0d-f791ad9e66e1>

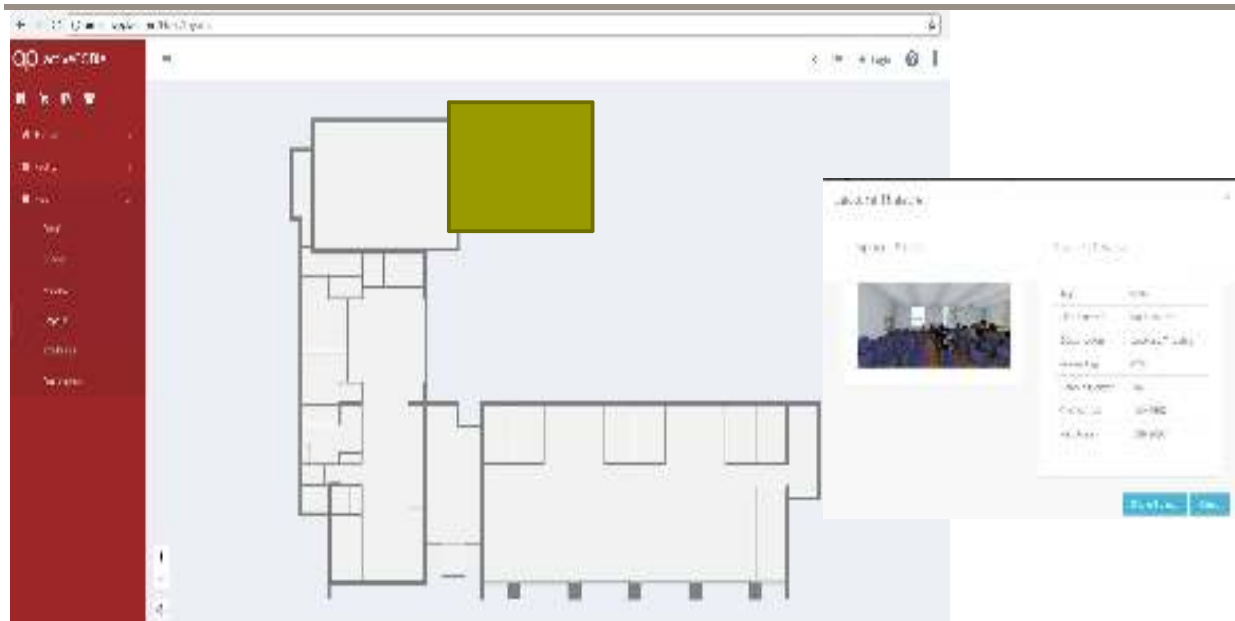
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Construction
Operation
Building
information
exchange





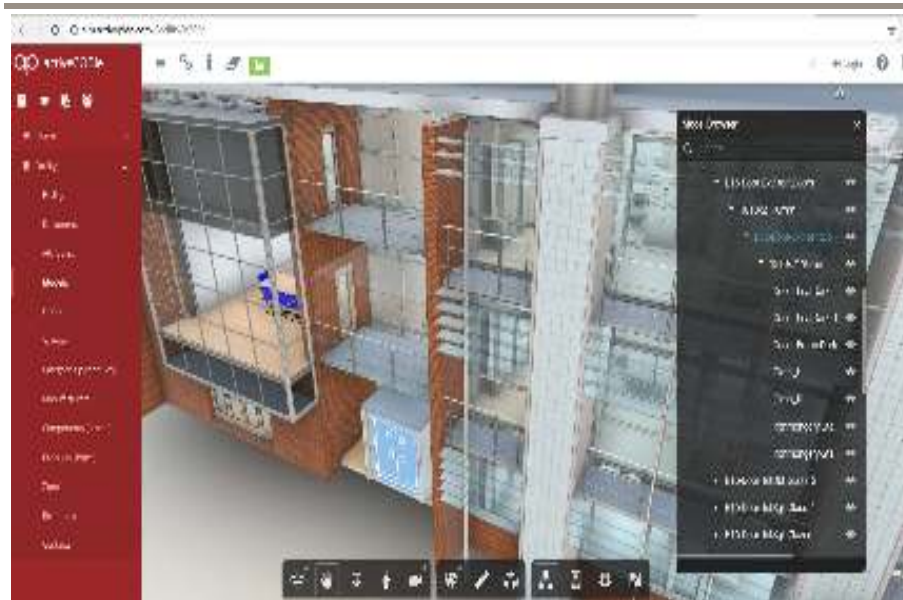
Space Management



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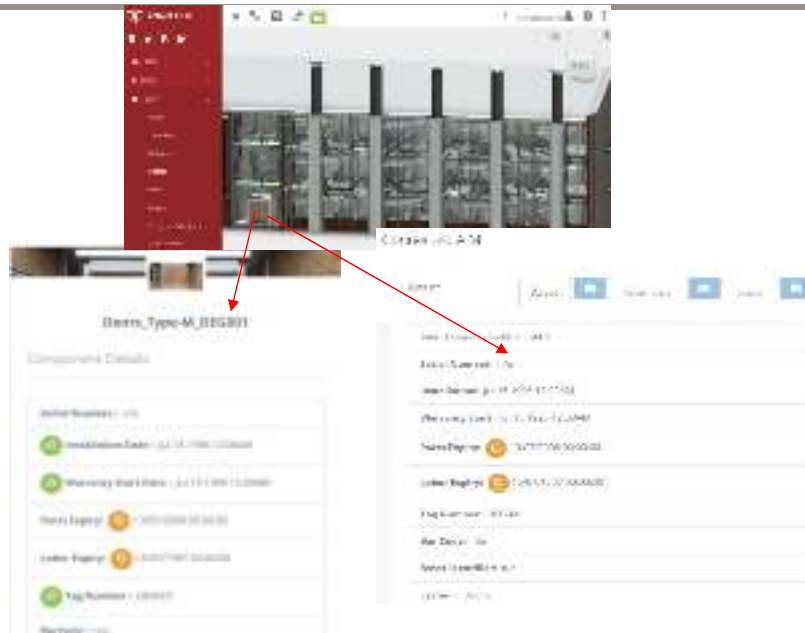
Asset Model – Forge Viewer



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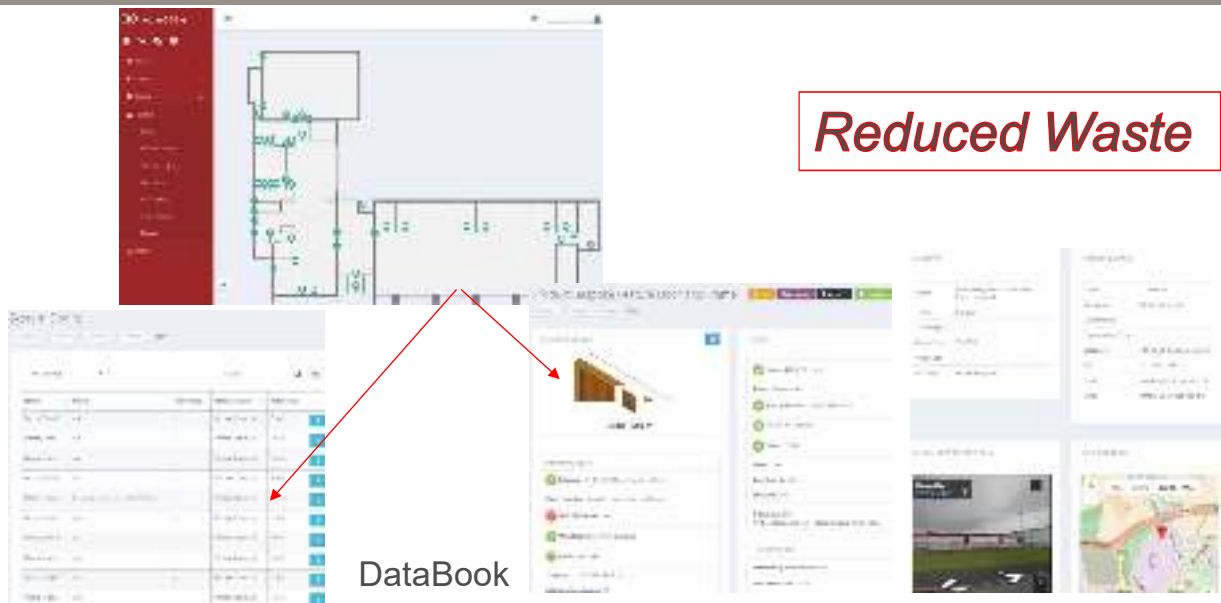
Door Asset Properties



Copyright © BRE



Asset Information Requirements



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- CIRCULAR ECONOMY IN THE BUILT ENVIRONMENT
- SUSTAIN AND INCREASE THE VALUE OF MATERIALS IN BUILDINGS

• WWW.BAMB2020.EU

Reduced Waste



BIM



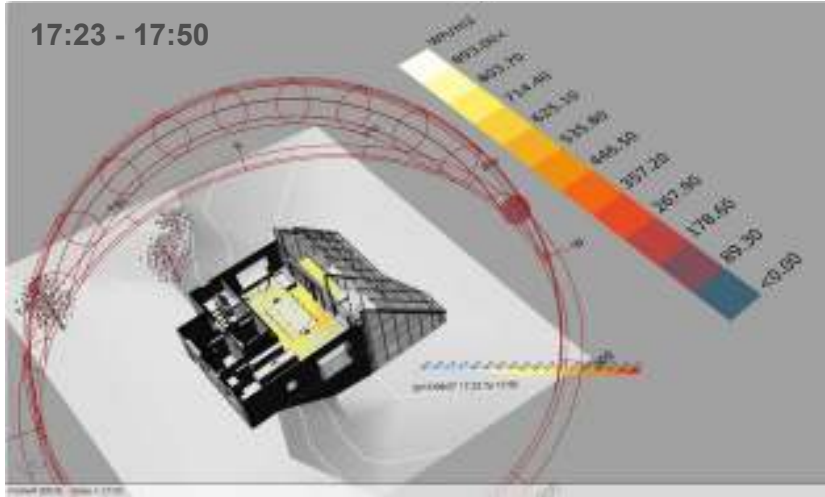
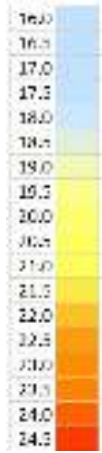
Interoperability Home Area Network (HAN)



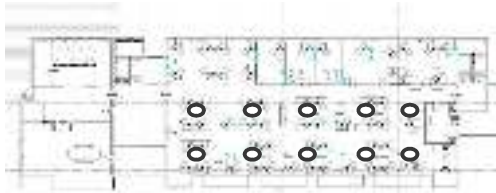
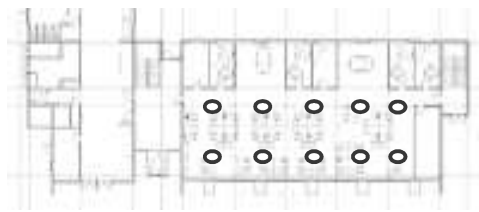
IoT Product Template	
Product Class:	Temperature sensor
Sensor Class:	Multi-sensor
Product Type:	Smart thermostat
Units:	Degrees Celcius
Value:	20.5
Time:	16:53:32
Dimensions:	X, Y, Z
Contextual Data	
Sensor Group:	Living room T sensors
Location:	X, Y, Z
Orientation:	
Associated Room:	Living room
Associated Surface:	Wall 1
Associated System:	Heating system
Linked Devices:	Boiler, Radiator Valves

IoT Product Template	
Product Class:	Temperature sensor
Sensor Class:	Single sensor
Product Type:	Analogue Temperature Sensor
Units:	Degrees Celcius
Value:	22.2
Time:	12:03:16
Dimensions:	X, Y, Z
Contextual Data	
Sensor Group:	Living room T sensors
Location:	X, Y, Z
Orientation:	
Associated Room:	Living room
Associated Surface:	Wall 1
Associated System:	None
Linked Devices:	Raspberry Pi

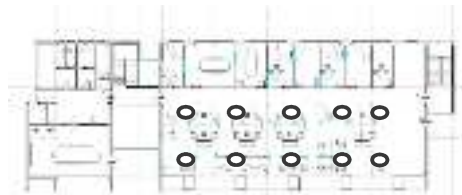
Internal Temp
(° C)



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- Temperature
- Luminance
- Humidity
- Motion

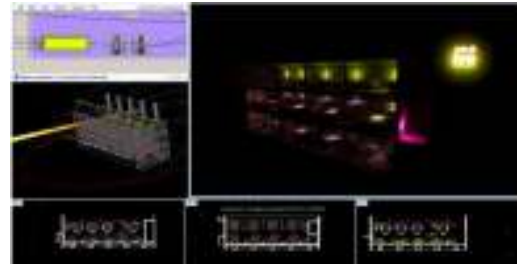


Copyright © BRE

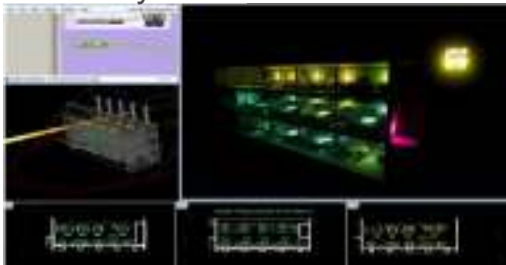
Temperature



Illuminance



Humidity



Copyright © BRE

Temperature





BIM is the future...

BIM Level 2: Back to Basics

Embrace the possibilities:

Delivery Good Information

Facilitate Good Decisions



Reduced Waste



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Thank you

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