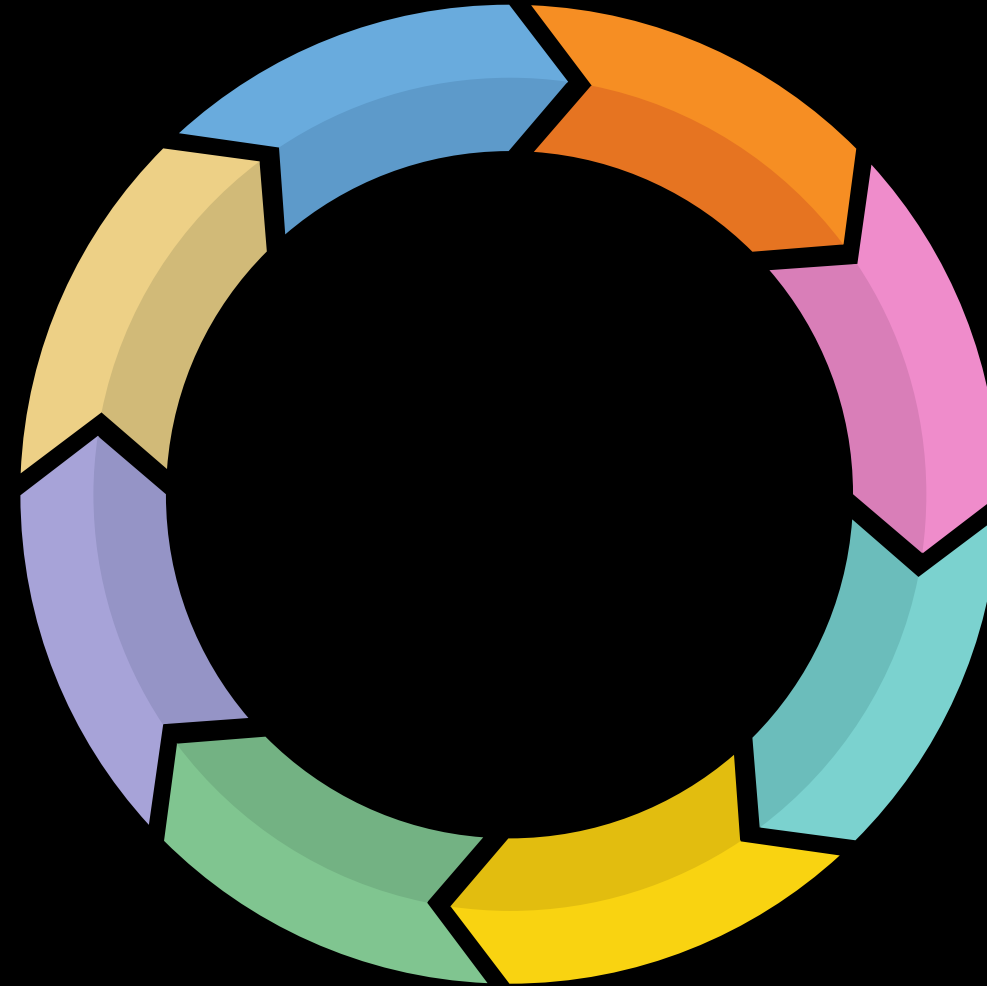


# BIM

## A UK Perspective



# Context – Computerisation & Employment



## THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?\*

Carl Benedikt Frey<sup>†</sup> and Michael A. Osborne<sup>‡</sup>

September 17, 2013



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Work  
2013

# Context



How much it costs

**BAXTER:**

**\$22,000**, all in

TYPICAL INDUSTRIAL ROBOT:

**\$100,000**

plus another

**\$200,000**

or more in programming costs

How long it takes  
to get running

**BAXTER:**

**1 hour**

to unpack and set up,  
plus five minutes to  
train on the first job

TYPICAL INDUSTRIAL ROBOT:

**Months**

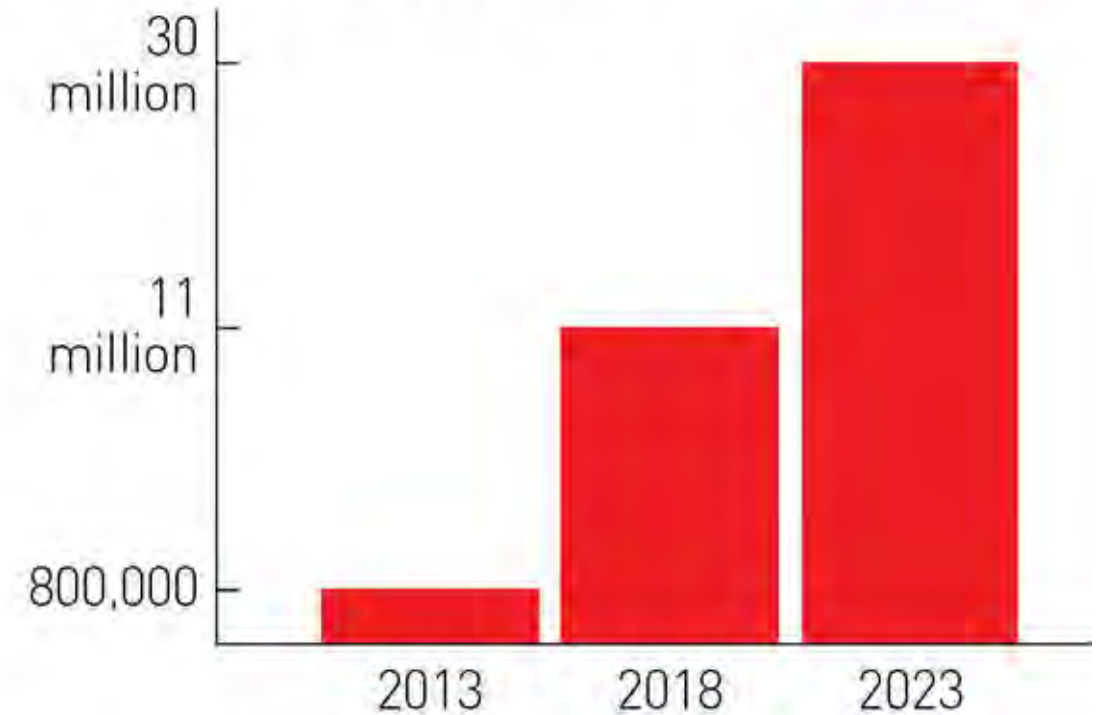


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# Context



### How many jobs Baxter could potentially replace in the U.S.



# Context – Computerisation & Employment

<u>Occupation</u>	<u>Probability</u>	<u>Occupation</u>	<u>Probability</u>
Mechanical Engineers	0.011	Construction & Related Workers	0.71
Architectural & Engineering Managers	0.017	Carpenters	0.72
Architects	0.018	Glaziers	0.73
Civil Engineers	0.019	Tile & Marble Setters	0.75
Interior Designers	0.022	Painters	0.75
Lawyers	0.035	Civil Engineering Technicians	0.75
Landscape Architects	0.045	Drywall and Ceiling Installers	0.79
Construction Managers	0.071	Floor layers	0.79
Electrical Engineers	0.1	Brick masons	0.82
Electricians	0.15	Labourers	0.88
Construction Trades Supervisors	0.17	Terrazzo workers	0.88
Engineering Technicians	0.24	Roofers	0.9
Plumbers & Pipefitters	0.35	Crane and tower operators	0.9
Surveyors	0.38	Electrical Installers (inc lifts)	0.91
Mechanical Engineering Technicians	0.38	Model makers	0.93
Architect and Civil Draftsmen	0.52	Accountants	0.94
Tapers	0.62	Surveying and mapping technicians	0.96
Construction & Building Inspectors	0.63	Estate agents	0.97
Mechanical Insulation Workers	0.64	Insurance underwriters	0.99
Mechanical Draftsmen	0.68		

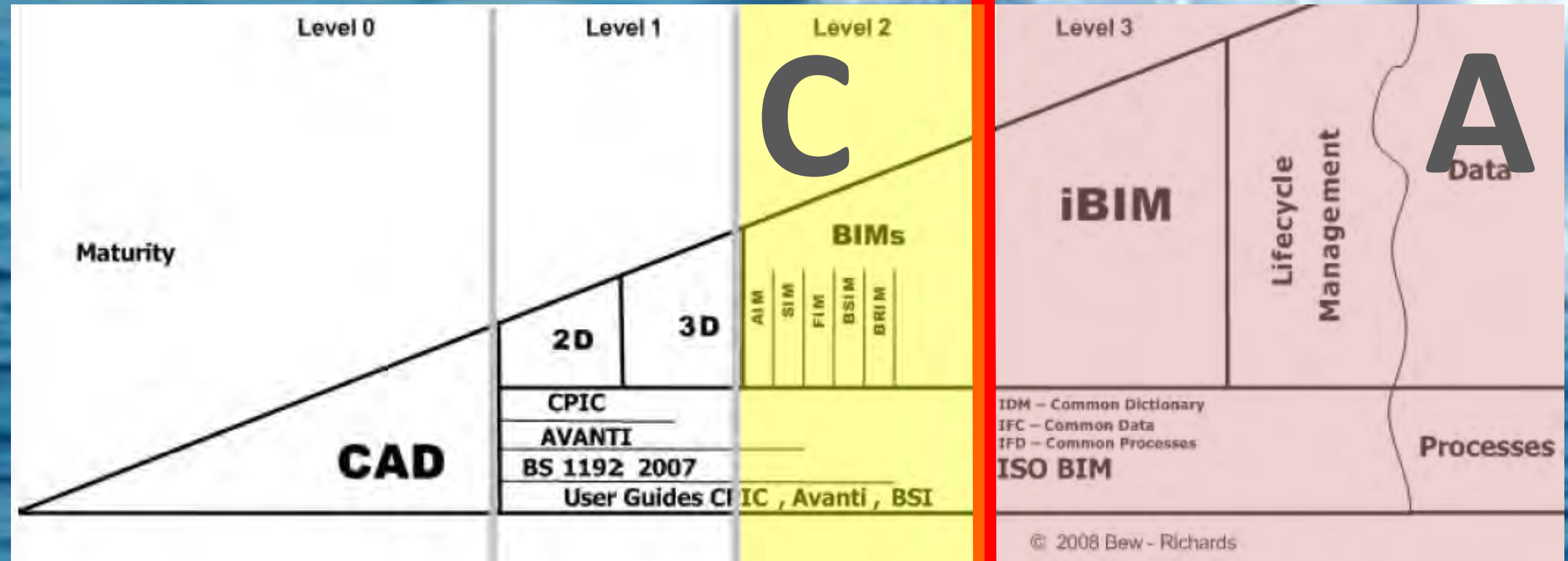
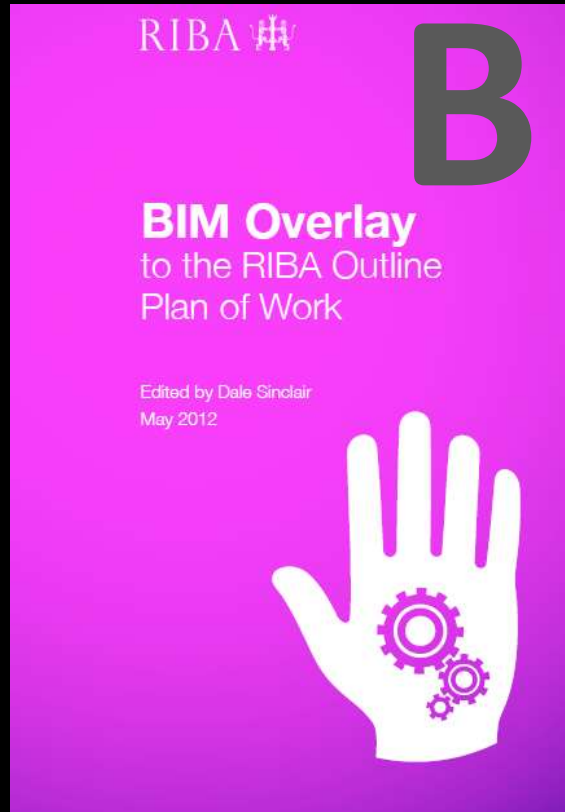


# BIM Maturity

2016

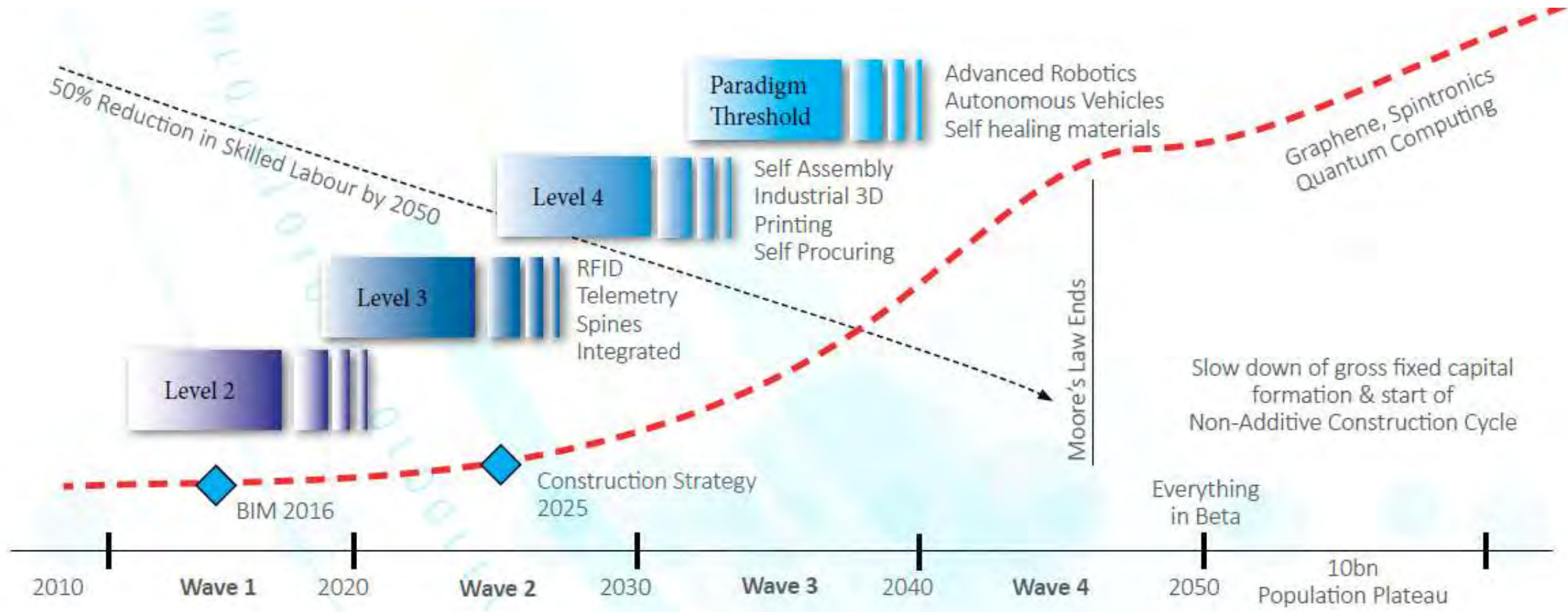
D

- L0 – Processes & protocol
- L1 – Geometry & data
- L2 – Analogue to digital



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# Level 3



Feedback Cycle Wave: ©Philp, Thompson 2013

## Level 3

1. L2 with improved contracts and IFC (instead of COBie)
2. New Contracts
3. Internet of Things
4. International

..... Geared to parliamentary cycles



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The Outline Plan of Work organises the process of managing and designing building projects and administering building contracts into a number of key Work Stages. The sequence or content of Work Stages may vary or they may overlap to suit the particular project (see pages 2 and 3).

RIBA Work Stages	Description of key tasks	QOC Gateways
Preparation	<b>Appraisal</b> Identification of client's needs and objectives, business case and possible combinations on development. Preparation of feasibility studies and assessment of factors to enable the client to make selection to proceed.	1 Client Approval
	<b>Design Brief</b> Development of initial statement of requirements into the Design Brief by or on behalf of the client, confirming key requirements and constraints. Identification of procurement method, procedures, organisational structure and range of consultants and others to be engaged for the project.	2 Design Brief
Design	<b>Concept</b> Implementation of Design Brief and preparation of additional data. Preparation of Concept Design including outline proposals for structural and building services systems, outline specifications and preliminary cost plan. Review of procurement route.	3 Concept Design
	<b>Design Development</b> Development of concept design to include structural and building services systems, updated outline specifications and cost plan. Completion of Project Brief. Application for detailed planning permission.	4 Design Development
	<b>Technical Design</b> Preparation of technical design and specifications, sufficient to construct components and elements of the project and information for statutory standards and construction safety.	5 Technical Design
Procurement	<b>Production Information</b> F1 Preparation of detailed information for construction. Application for statutory approval.	6 Production Information
	<b>Tender Documentation</b> F2 Preparation of further information for construction required under the building contract. Issue of information required by specialists.	
	<b>Tender Action</b> Preparation and final collation of tender documentation in sufficient detail to enable tender or issues to be obtained for the project. Identification and evaluation of potential contractors and/or specialists for the project. Obtaining and appraising tenders; administration of procurement process to date.	
Construction	<b>Mobilisation</b> Letting the building contract; appointing the contractor. Issuing of information to the contractor. Arranging site hand over to the contractor.	7 Mobilisation
	<b>Construction to Practical Completion</b> Administration of the building contract to Practical Completion. Provision to the contractor of further information as and when reasonably required. Review of information provided by contractor and specialists.	
Use	<b>End Practical Completion</b> 11 Administration of the building contract after Practical Completion and making final inspections.	8 End Practical Completion
	12 Awaiting building user during initial occupation period.	
	13 Review of project performance to date.	

These letters in bold may be omitted to suit project requirements, i.e.:

- D Application for detailed planning approval;
- E Statutory standards and construction safety;
- F1 Application for statutory approval; and
- F2 Further information for construction;
- G-H Issuance and approval of tenders.

# 1963

## Plan of Work for Design Team Operations

# 1967

# 1973

# 1998

# 2007

# 2013



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# Context – Paradigm Shifts



project outcomes

information in-use



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# RIBA Plan of Work 2013: Unified Industry Stages



UK Government Digital Plan of Work



RIBA Outline Plan of Work 2007



# Whole Life and the Project Team



# RIBA Plan of Work 2013



## RIBA Plan of Work 2013

First developed in 1963, the RIBA Plan of Work 2013 is a guide for the building design and construction process. It includes this online resource and you can also download a plan of work. It is intended for use by all those involved in the building process.

-  View the Plan of Work
-  About the Plan of Work
-  Plan of Work Tools

The RIBA Plan of Work 2013 is endorsed by RIAS and RSAW.



RIBA Plan of Work 2013



## Assembling a Collaborative Project Team

Practical tools including Multi-disciplinary Schedules of Services




Project Team





RIBA Plan of Work 2013

Royal Institute of British Architects




## Guide to using the RIBA Plan of Work 2013





RIBA Plan of Work 2013

Royal Institute of British Architects



## RIBA Plan of Work 2013 Overview



RIBA Plan of Work 2013

[www.ribaplanofwork.com](http://www.ribaplanofwork.com)



[www.ribaplanofwork.com](http://www.ribaplanofwork.com)



# Level 2

# seven core documents



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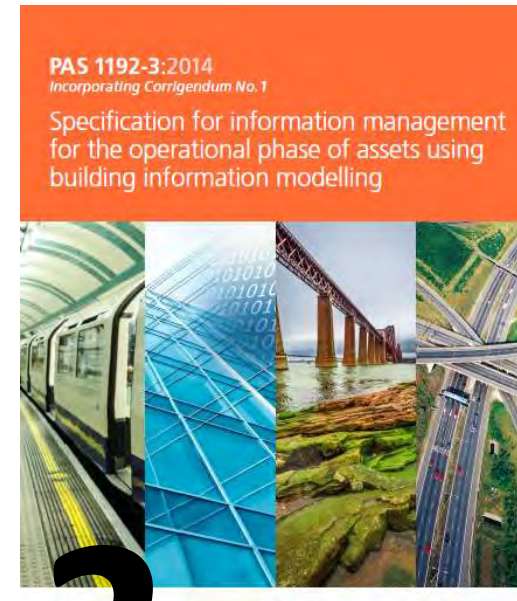
PAS 1192-2:2013  
Specification for information management for the capital/delivery phase of construction projects using building information modelling



1

bsi.


PAS 1192-3:2014  
Incorporating Corrigendum No. 1  
Specification for information management for the operational phase of assets using building information modelling



2

bsi.

BS 1192-4:2014



BSI Standards Publication

**Collaborative production of information**  
Part 4: Fulfilling employer's information exchange requirements using COBie – Code of practice

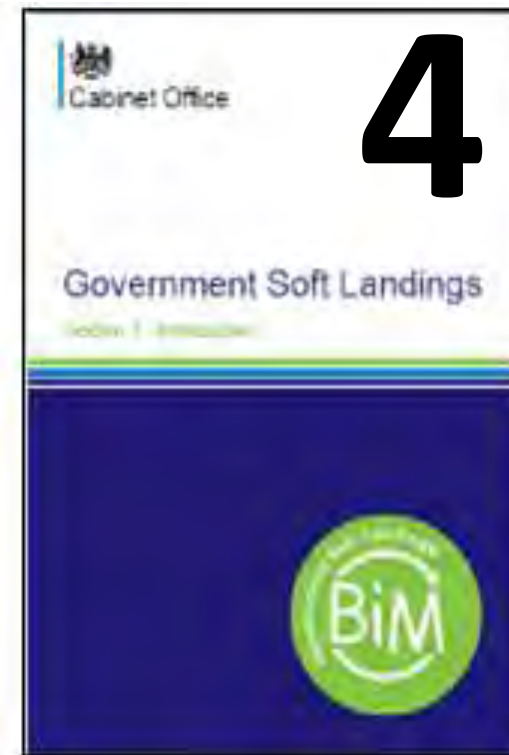
3

bsi. ...making excellence a habit™

Cabinet Office

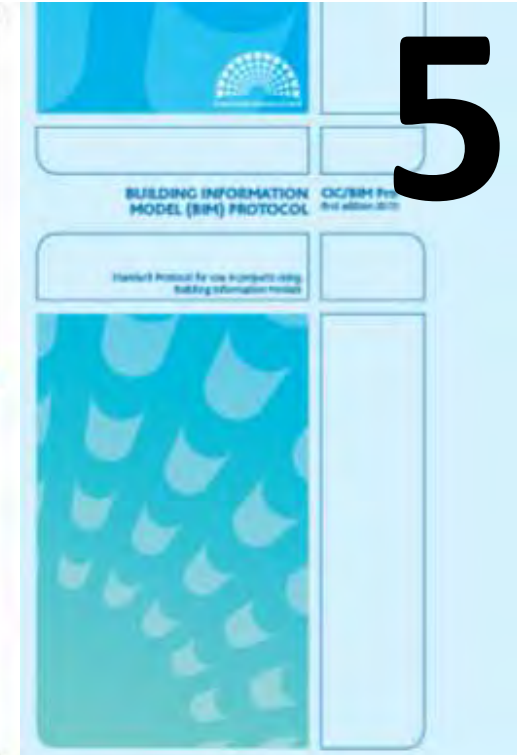
4

Government Soft Landings



5

BUILDING INFORMATION MODEL (BIM) PROTOCOL

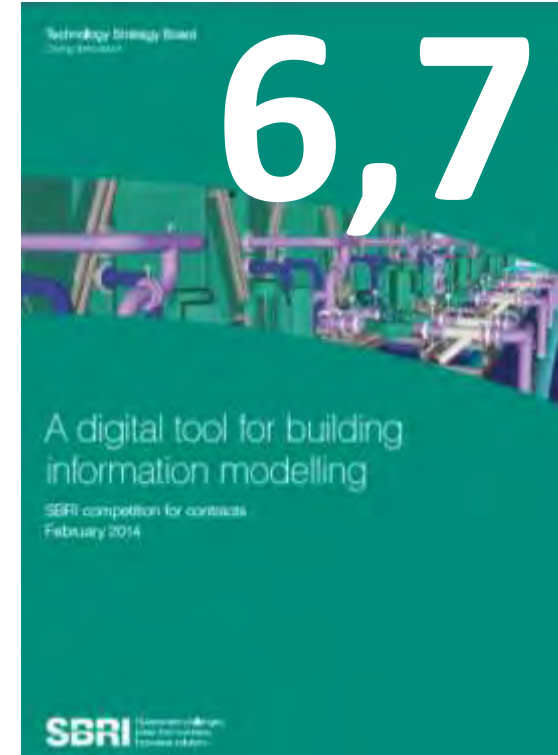


6,7

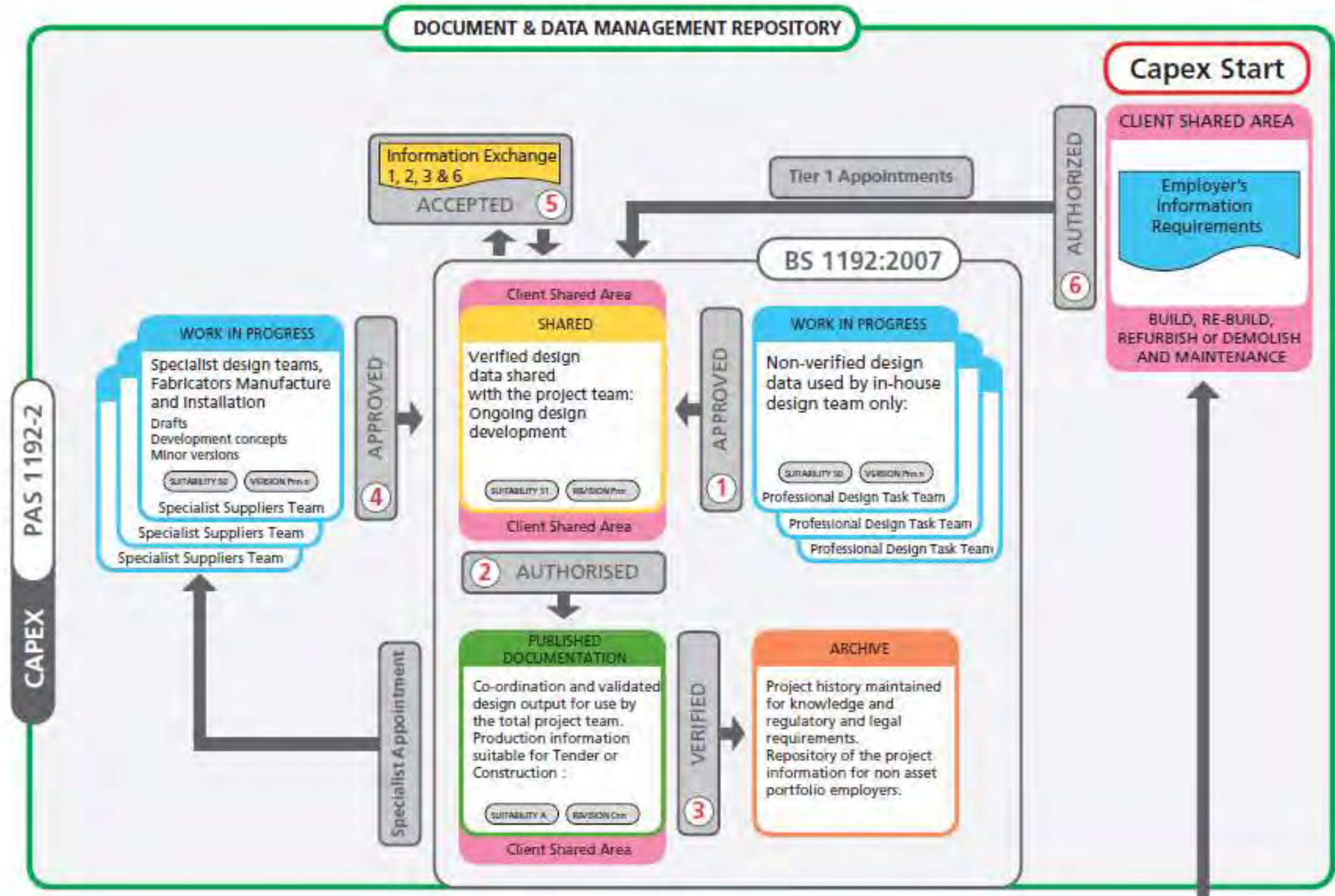
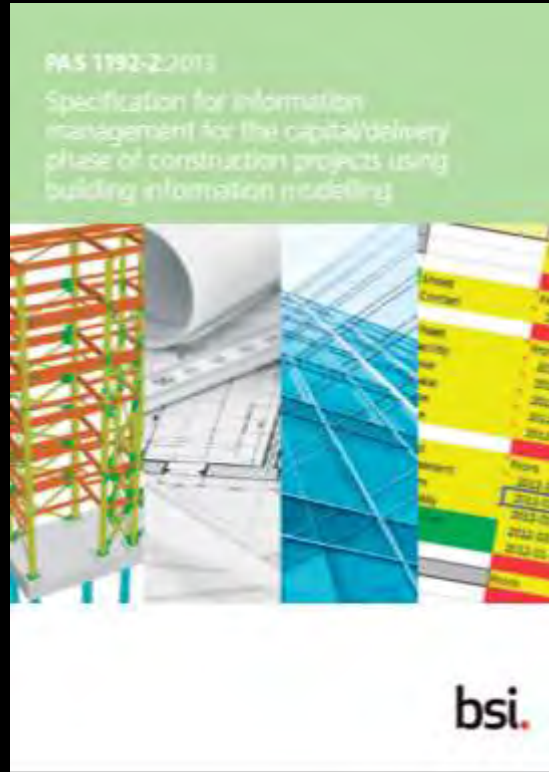
A digital tool for building information modelling

SGRI competition for contracts  
February 2014

SGRI



# Information Management - Capex



# Collaborative working



*Adopting BS11000 was a “no-brainer” and doing so will demonstrate to our customers that we do what we say- Costain*

*BS11000 provides a framework and a language to improve the way we create and sustain our collaborative business relationships  
- Skanska*

*BS 11000 gives us a ‘universally’ recognised structure and the catalyst to develop the next stage of our collaborative working capabilities  
– Balfour Beatty*



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## Collaborative working

- How can goals & objectives be aligned?
- Who is the best person to lead the team?
- How can more data be shared?
- Can the project team raise issues honestly and openly?
- Who defines value?

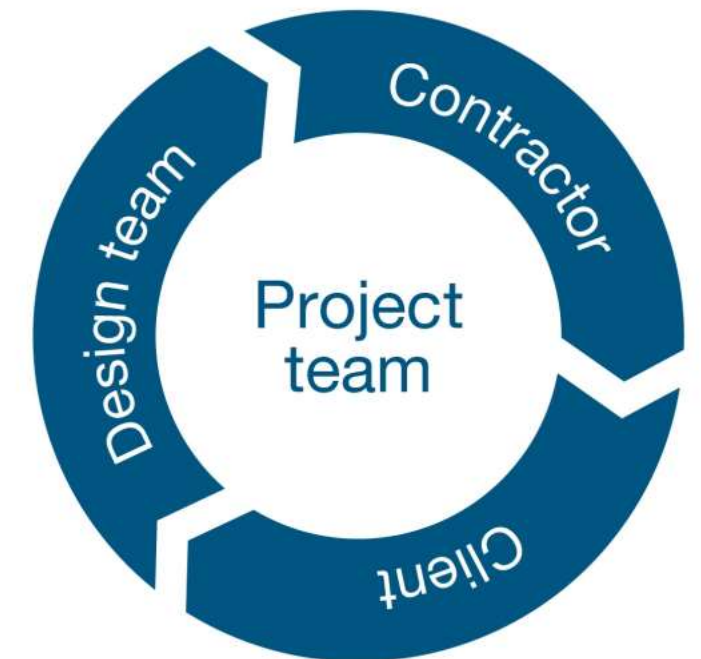


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Work  
2013

# TEAMWORK

coming together is a beginning  
keeping together is progress  
working together is success

- Henry Ford



# Collaborative working

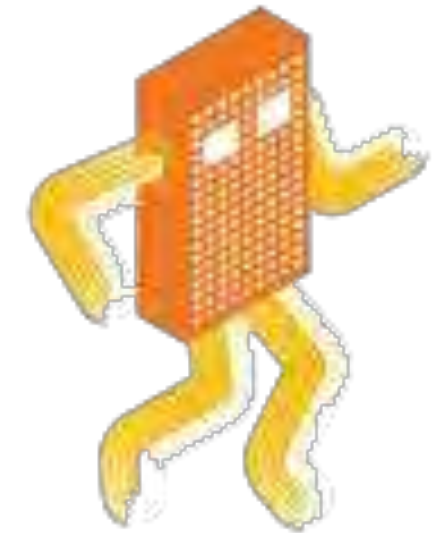
- Physiologists
- Sport scientists
- Psychologists
- Epidemiologists
- Mathematicians
- Statisticians



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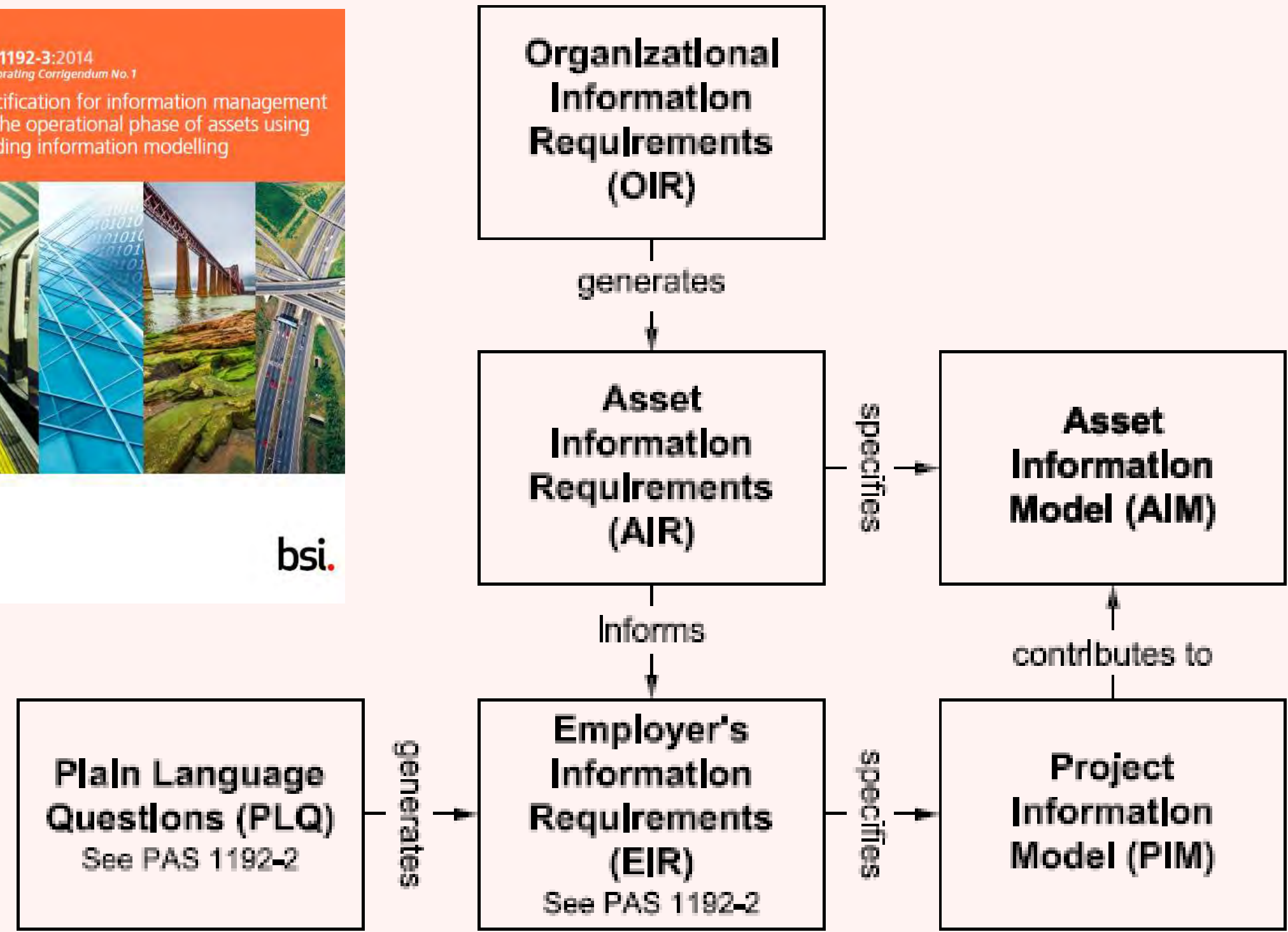
UCL



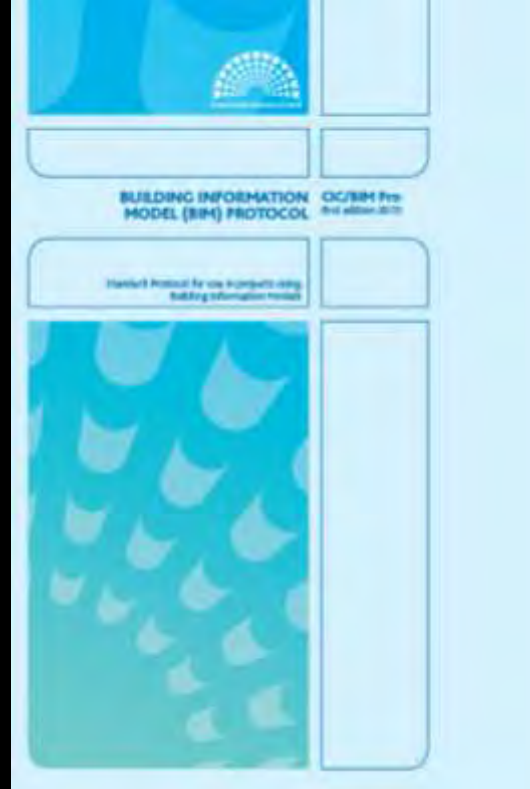
ActiveBuildings



# Information Management Opex



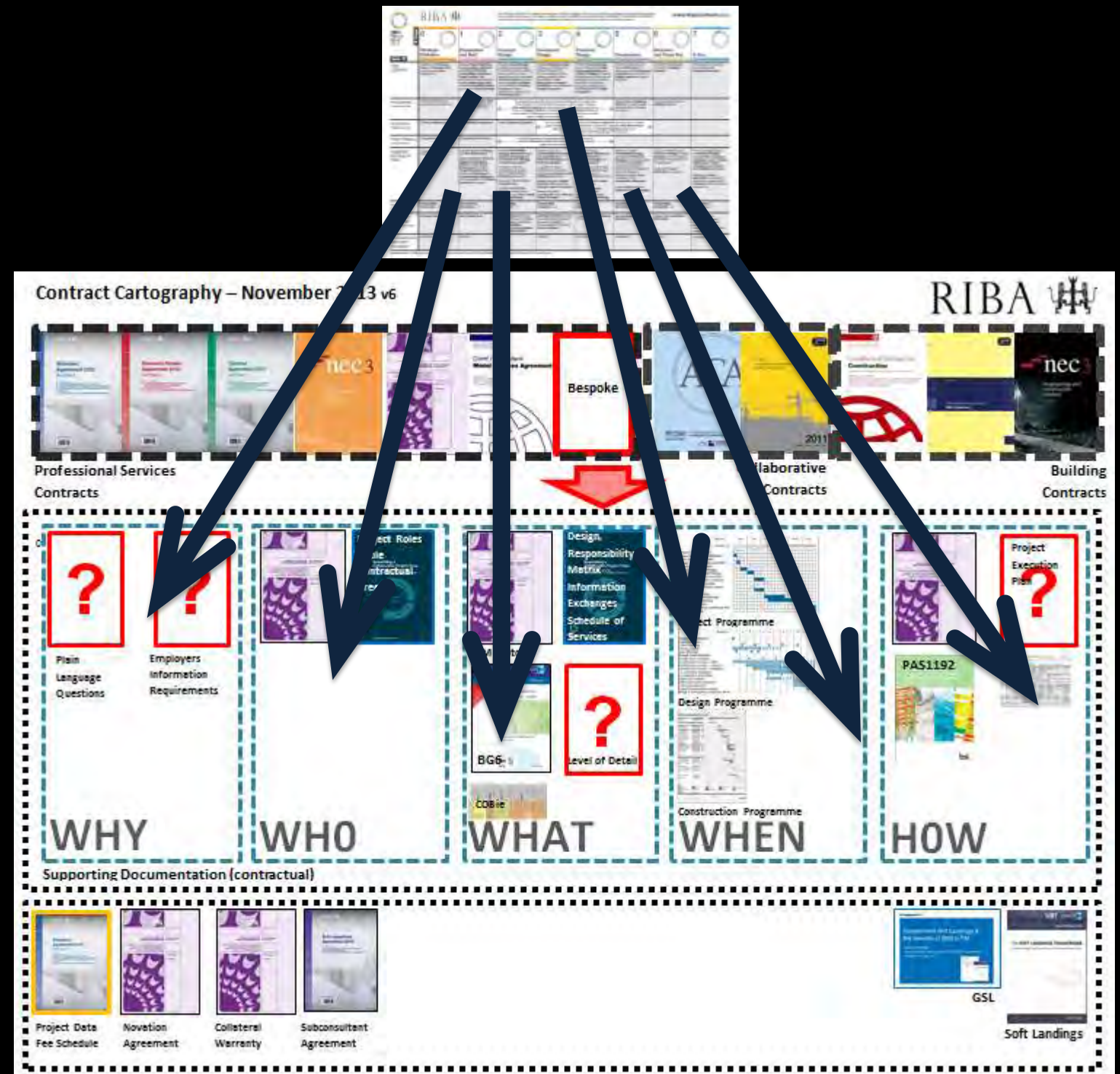
# BIM Protocol



why  
who  
what  
when  
how



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2013



# BIM Protocol

**Specimen Production and Delivery Table for BIM Protocol user Guide**

	Drop 1		Drop 2a		Drop 2b		Drop 3		Drop 4	
	Stage 1		Stage 2		Stage 2		Stage 3		Stage 6	
	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail
<b>Overall form and content</b>										
Space planning	Architect	1	Architect	2	Contracte	2	Contracte	3	Contracte	6
Site and context	Architect	1	Architect	2	Contracte	2	Contracte	3	Contracte	6
Surveys										
External form and appearance			Architect	2	Contracte	2	Contracte	3	Contracte	6
Building and site sections					Contracte	2	Contracte	3	Contracte	6
Internal layouts					Contracte	2	Contracte	3	Contracte	6
<b>Design strategies</b>										
Fire			Architect	2	Contracte	2	Contracte	3	Contracte	6
Physical security			Architect	2	Contracte	2	Contracte	3	Contracte	6
Disabled access			Architect	2	Contracte	2	Contracte	3	Contracte	6
Maintenance access			Architect	2	Contracte	2	Contracte	3	Contracte	6
BREEAM					Contracte	2	Contracte	3	Contracte	6
<b>Performance</b>										
Building	Architect	1	Architect	2	Contracte	2	Contracte	3		
Structural	Architect	1	Str Eng	2	Contracte	2	Contracte	3		
MEP systems	Architect	1	MEP Eng	2	Contracte	2	Contracte	3		
Regulation compliance analysis							Contracte	3	Contracte	6
Thermal Simulation							Contracte	3	Contracte	6
Sustainability Analysis							Contracte	3	Contracte	6
Acoustic analysis							Contracte	3	Contracte	6
4D Programming Analysis										
5D Cost Analysis										
Services Commissioning							Contracte	3	Contracte	6
<b>Elements, materials components</b>										
Building			Architect	2	Contracte	2	Contracte	3	Contracte	6
Specifications			MEP Eng	2	Contracte	2	Contracte	3	Contracte	6
MEP systems					Contracte	2	Contracte	3	Contracte	6
<b>Construction proposals</b>										
Phasing							Contracte	3		
Site access							Contracte	3		
Site set-up							Contracte	3		
<b>Health and safety</b>										
Design							Contracte	3		
Construction							Contracte	3		
Operation							Contracte	3	Contracte	6

**Levels of Detail and the Model Production and Delivery Table**  
 The Levels of Detail are as follows: The Stages are as follows:  
 LOD 1 \_\_\_\_\_ STAGE 1 \_\_\_\_\_  
 LOD 2 \_\_\_\_\_ STAGE 2 \_\_\_\_\_  
 LOD 3 \_\_\_\_\_ STAGE 3 \_\_\_\_\_  
 LOD 4 \_\_\_\_\_ STAGE 4 \_\_\_\_\_  
 LOD 5 \_\_\_\_\_ STAGE 5 \_\_\_\_\_  
 LOD 6 \_\_\_\_\_ STAGE 6 \_\_\_\_\_  
 LOD 7 \_\_\_\_\_ STAGE 7 \_\_\_\_\_

**Specimen Model Production and Delivery Table**  
 Showing model required at different project stages

Model Categories (CI/C BIM Pro 1st edition)	Drop 1		Drop 2a		Drop 2b		Drop 3		Drop 4	
	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail	Model Originat	Level of Detail
<b>Overall form and content</b>										
Space planning	Architect	1	Architect	2	Contracte	2	Contracte	3	Contracte	6
Site and context	Architect	1	Architect	2	Contracte	2	Contracte	3	Contracte	6
Surveys										
External form and appearance			Architect	2	Contracte	2	Contracte	3	Contracte	6
Building and site sections					Contracte	2	Contracte	3	Contracte	6
Internal layouts					Contracte	2	Contracte	3	Contracte	6
<b>Design strategies</b>										
Fire			Architect	2	Contracte	2	Contracte	3	Contracte	6
Physical security			Architect	2	Contracte	2	Contracte	3	Contracte	6
Disabled access			Architect	2	Contracte	2	Contracte	3	Contracte	6
Maintenance access			Architect	2	Contracte	2	Contracte	3	Contracte	6
BREEAM					Contracte	2	Contracte	3	Contracte	6
<b>Performance</b>										
Building	Architect	1	Architect	2	Contracte	2	Contracte	3		
Structural	Architect	1	Str Eng	2	Contracte	2	Contracte	3		
MEP systems	Architect	1	MEP Eng	2	Contracte	2	Contracte	3		
Regulation compliance analysis							Contracte	3	Contracte	6
Thermal Simulation							Contracte	3	Contracte	6
Sustainability Analysis							Contracte	3	Contracte	6
Acoustic analysis							Contracte	3	Contracte	6
4D Programming Analysis										
5D Cost Analysis										
Services Commissioning							Contracte	3	Contracte	6
<b>Elements, materials components</b>										
Building			Architect	2	Contracte	2	Contracte	3	Contracte	6
Specifications			MEP Eng	2	Contracte	2	Contracte	3	Contracte	6
MEP systems					Contracte	2	Contracte	3	Contracte	6
<b>Construction proposals</b>										
Phasing							Contracte	3		
Site access							Contracte	3		
Site set-up							Contracte	3		
<b>Health and safety</b>										
Design							Contracte	3		
Construction							Contracte	3		
Operation							Contracte	3	Contracte	6



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Construction Industry Council

# What does the client need?



**Employer's Information Requirements (EIR)**

**+**

**Defined progressive fixity of design information (COBie)**

**+**

**PAS1192-2**

**=**

**Information at handover suitable for:**

**- CAFM & Asset Management systems (stage 7)**

**+**

**- Data mining (stage 7 to 0)**



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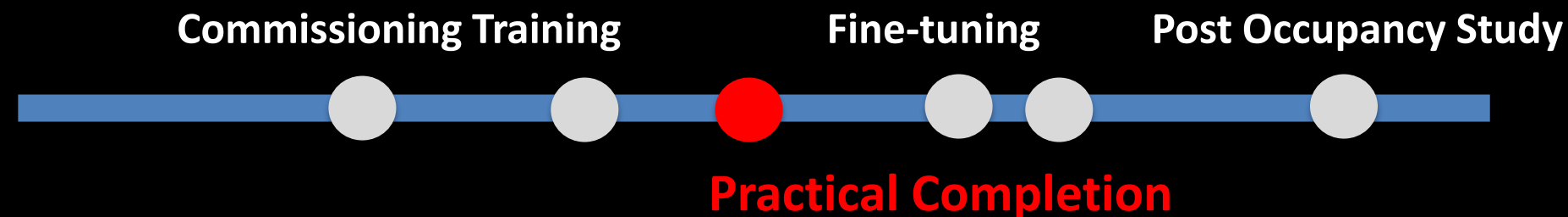
# Soft Landings



- Focus on client (user) not Building Contract
- New stage 6 with related activities and processes
- Emphasis on Post Occupancy Evaluation (POE) and Building Performance Evaluation (BPE)



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# Digital Plan of Work

who  
what  
when



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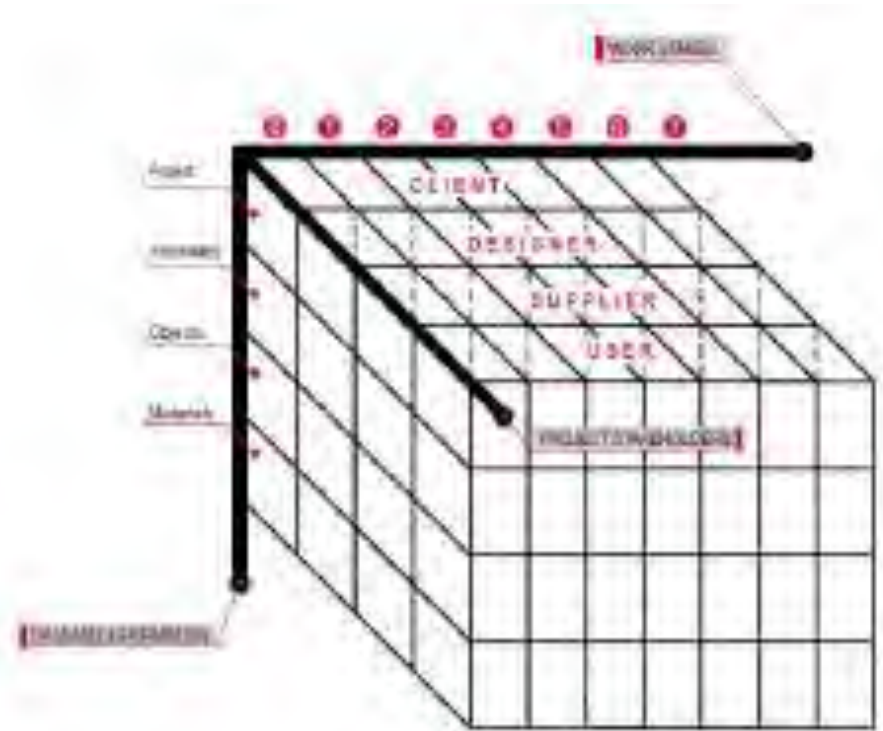
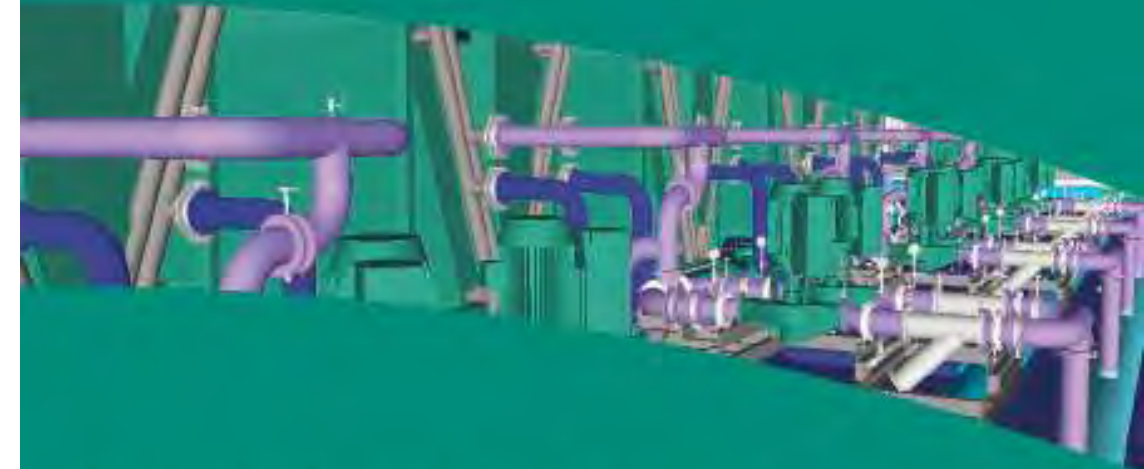


Figure 7 - Data Cube Control

Technology Strategy Board  
Driving Innovation



## A digital tool for building information modelling

SBRI competition for contracts  
February 2014

**SBRI** Government challenges.  
Ideas from business.  
Innovative solutions.



# C8

RIBA



**RICS**

**BIFM**



**ice**

Institution of Civil Engineers



**IStructE**



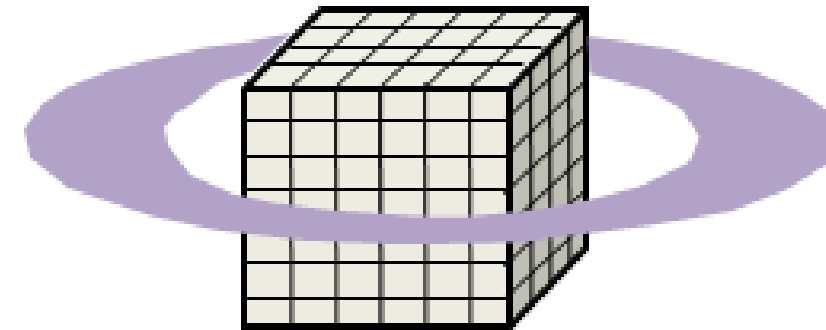
**CIOB**

THE CHARTERED INSTITUTE OF BUILDING

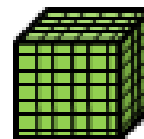


## THE DATA CUBES

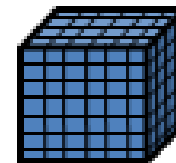
### MASTER CUBE



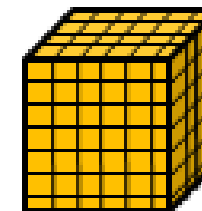
SHED



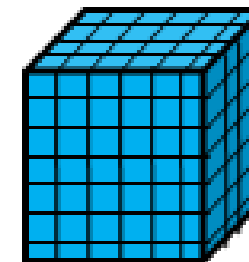
CAR PARK



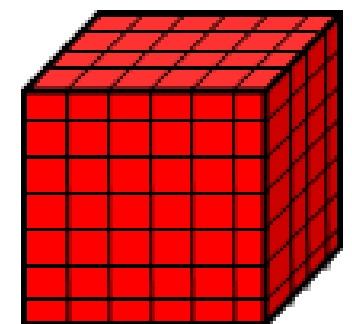
SCHOOL



BRIDGE



AIRPORT  
TERMINAL



HS2



# The data cube

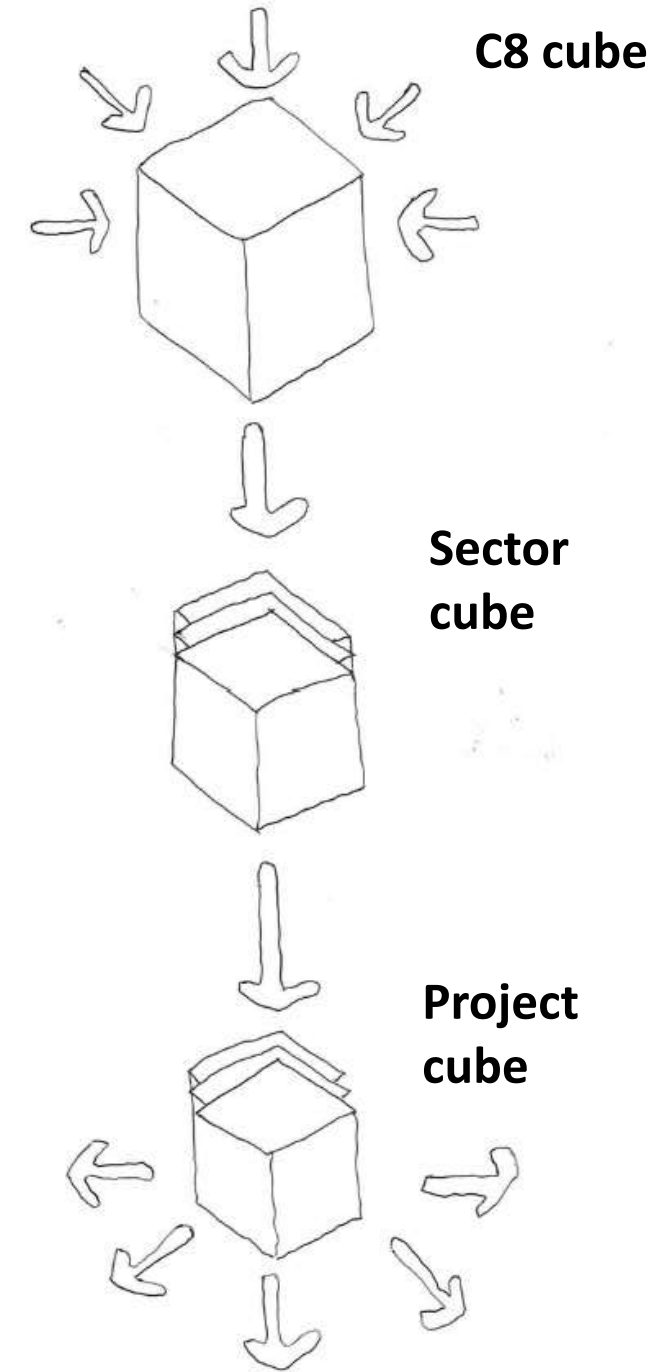
## The C8 data cube

Getting the data **in**

Selecting a sector cube

Selecting a project cube

Getting the data **out**



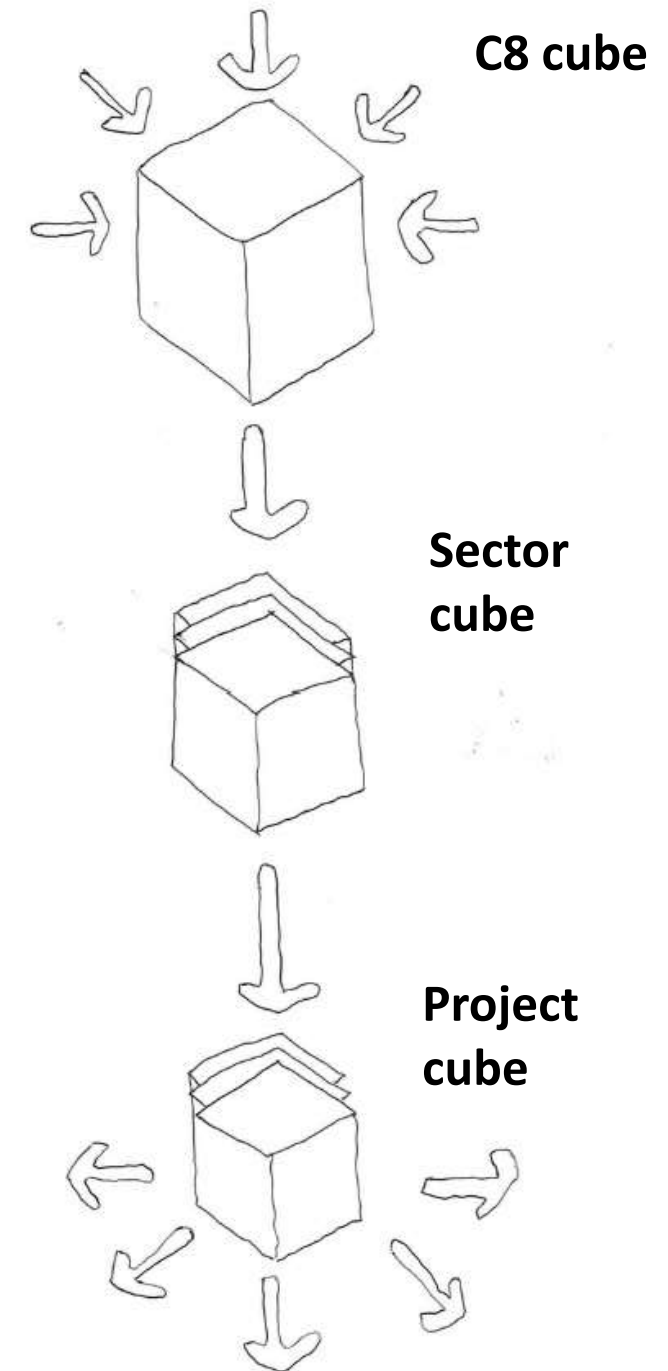
# Getting the data **out**?

**who**  
**what**  
**when**

- **Links to BIM model**
  - - for what?
  - NOTE: 4D/5D from BIM not cube
- **Contracts**
  - Professional Services Contracts
  - Building Contract
- **Validation**
- **Specification**
- **Management**
  - Programme tools
  - EVA
- **Operational tools**
  - CAFM/Asset management



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# Winners!



**BDP.**



**nbs**



**BIFM™**



The Institution  
of Structural  
Engineers



The BIM Toolkit

**nbs**

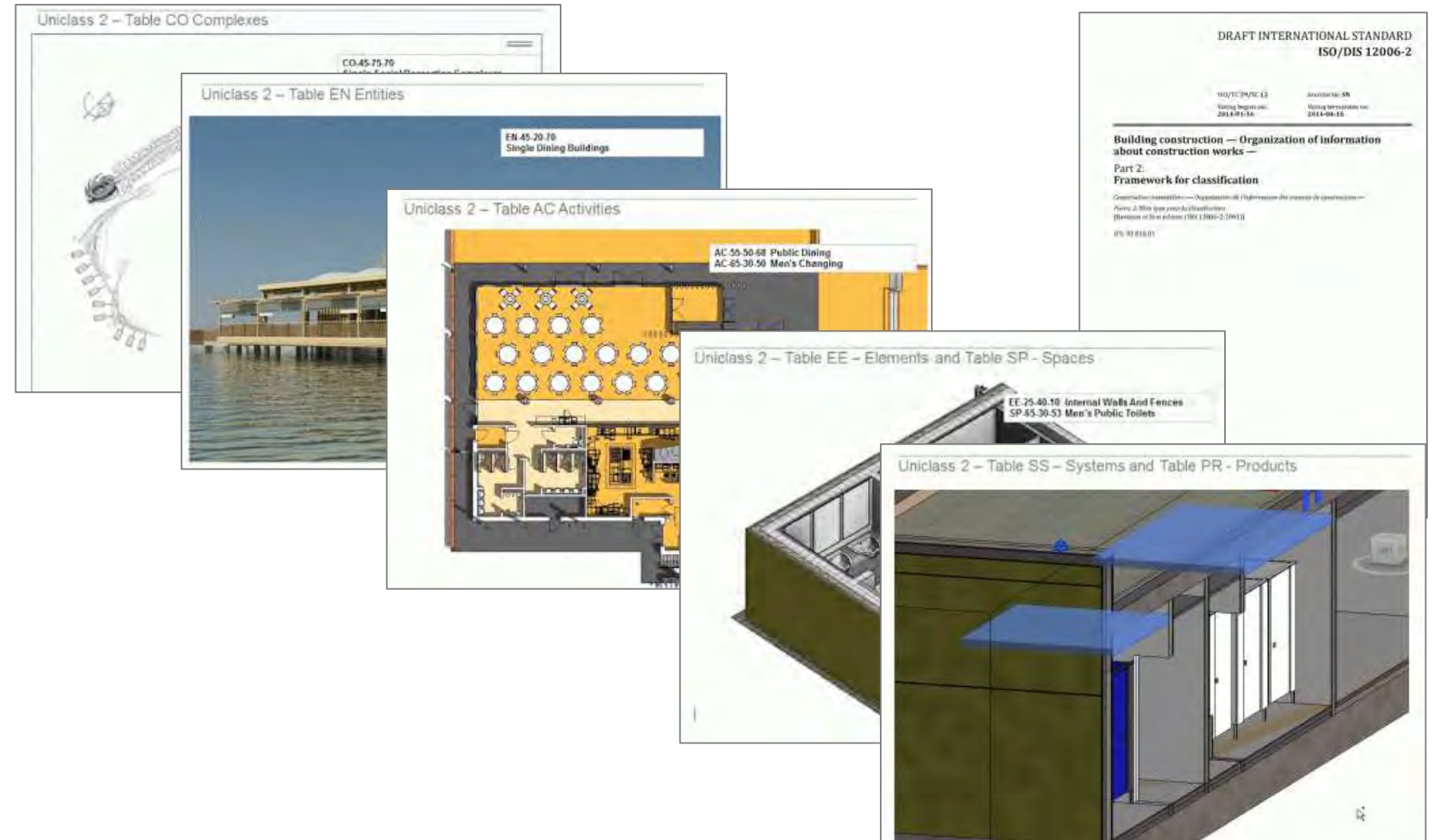


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1. [BIMTaskGroup.org](http://BIMTaskGroup.org)
2. [theNBS.com/BIMToolkit](http://theNBS.com/BIMToolkit)
3. Social Media - [#BIMToolkit](https://twitter.com/BIMToolkit)

# Classification and object templates

## Uniclass2 – the core classification



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# Classification and object templates

Gypsum board partition system

Partition systems comprising plasterboard dry lining on metal stud or timber frame

Classification - 25-15-25/135 Gypsum board partition system

[Hide classification mappings](#)

Uniclass2	NBS Create	Uniclass	NRM 1	NRM 2	CESMM4	OmniClass	CI/SFB
Ss-25-10-30-35 Gypsum board partition systems	25-15-25/135 Gypsum board partition system	JK10 Plasterboard dry lining/partitions/ceilings	2.7.1.3 Fixed partitions	20 Partitions			Non-bearing internal walls

Level of detail (LOD) Level of Information (LOI) [Download template](#)

**A**

GF-002  
Storeroom  
SP\_30-95\_86  
25m2

**1** Provide an outline description of the object.

Name	Definition
Description	A description of the type of object to detail any design intent.



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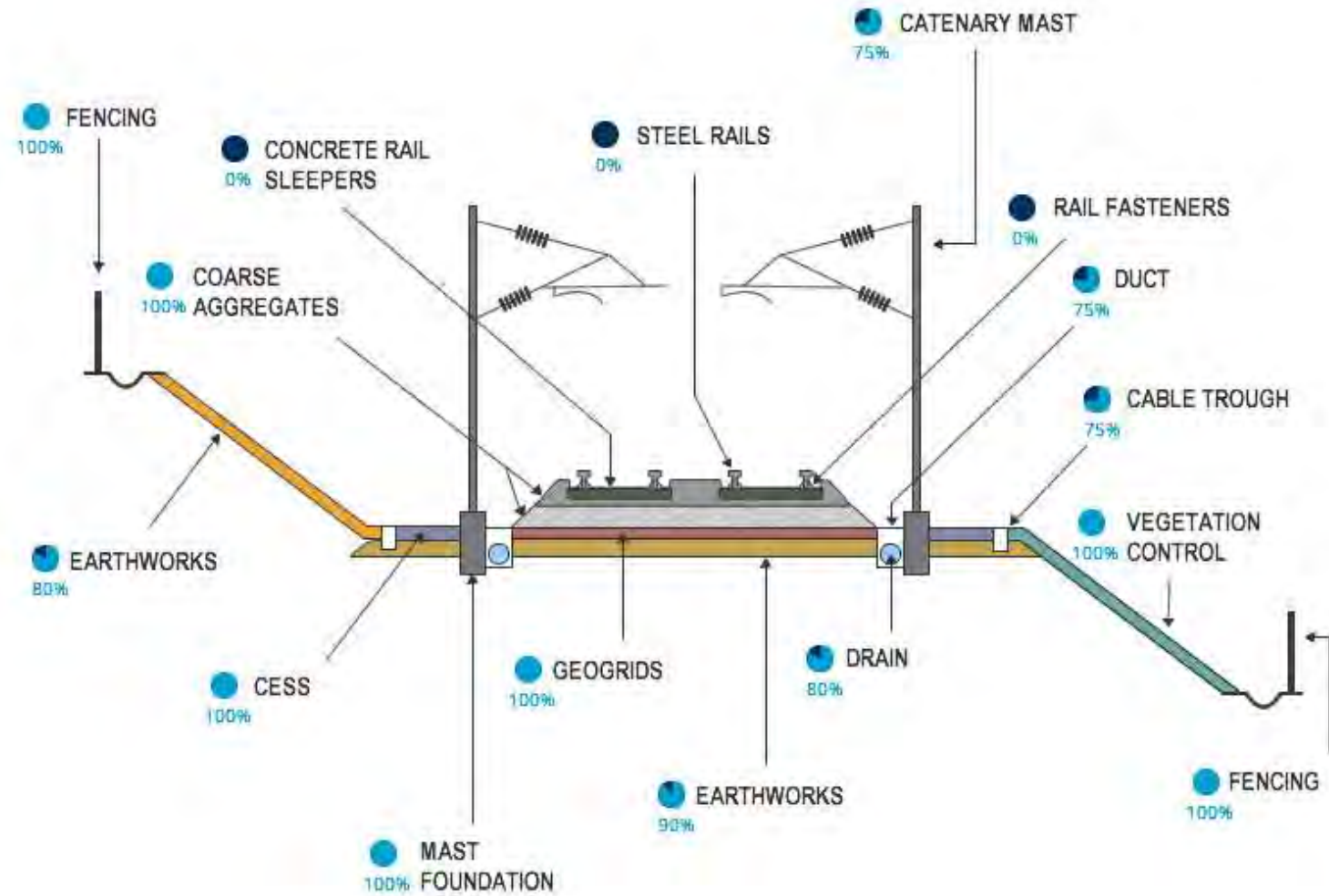


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# Classification and object templates

# A toolkit for all – buildings, linear networks and geographical



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# Classification and object templates

**D** Provide information related to purchasing. Information should also be provided.

**C** Plan Representation: Provide enough information to meet requirements. The product during the operation of the execution of the design.

**D** Provide information related to purchasing. Information should also be provided for child products.

**B** Plan Representation: Provide information to specify the component. Information should also be provided.

Name	Definition
Piling design standards	Specific piling design standards, piling design rules and References
Pile performance criteria	Requirements for test piles
Engineer design	Requirement, Standards used
Geotechnical design	Standards, Design category
Settlement criteria for buildings and structures	Requirement and Permitted state.
Reinforcement schedules and drawings for concrete construction	Reinforcement schedules and drawings



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Work  
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#BIMToolkit

# Digital Plan of Work



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Work  
2013

The screenshot shows a web browser window titled 'Project Details' with the URL 'ribae-labs-dpow.azurewebsites.net/#!/projectDetails/4aa71d12-fd8b-4bfd-a8ca-7789ff4d4c40'. The page has a blue header with navigation links: 'The BIM Toolkit', 'Objects', 'Projects', and 'Standards', along with a 'Sign out' button. The main content area displays a list of project items with columns for description, provider, and a dropdown menu. The 'Intruder detection and alarm system' item is selected, and its dropdown menu is open, showing options like 'Open in new tab', 'alarm hold-up systems', 'System setting and unsetting', etc. Below the list, there is a section for downloading the digital plan in IFC, COBie, or XML formats. At the bottom, there are logos for various partners including BDP, Microsoft, NBS, and Newcastle University.

Description	Provider	Dropdown	Value
Natural stone cladding system	ABC Architects	C	2
Above ground wastewater drainage system with internal stacks	Wires+Fires Ltd	A	2
Cold water supply system	Wires+Fires Ltd	A	2
Medium temperature hot water heating system	Wires+Fires Ltd	A	2
Solar heating system	Wires+Fires Ltd	B	3
Access control system	Wires+Fires Ltd	B	1
Intruder detection and alarm system	Wires+Fires Ltd	A	2
Fire detection and alarm system	Wires+Fires Ltd	A	2

Download your digital plan  
Select a format from the options below.

IFC COBie XML

The BIM Toolkit

BDP Microsoft NBS Newcastle University

Who is responsible for what, when and clarity on information requirements



Innovate UK  
Technology Strategy Board



#BIMToolkit

# Digital Plan of Work

```

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88 #81=IFCPROPERTYSINGLEVALUE ('TypeID', $, IFCTEXT (''), $
89 #82=IFCRELDEFINESBYPROPERTIES ('3EJNvdDRf5CPdUxixagi
90 #83=IFCRELASSOCIATESCLASSIFICATION ('3DPtR52aX2G92fF
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<IfcText>Further design is needed by the structural engineer to ensure that the architect has all of the detail for the external cladding.</IfcText>

</NominalValue>

</IfcPropertySingleValue>

- <IfcPropertySingleValue id="i107" pos="3">

<Name>TypeID</Name>

dPOW Viewer

File Camera View Reports Help

dPOW Spaces

035 Newtown High School  
dPOW - Stage 3

Item	Owner	LOD	NBS V
Rooflight system type...	ABC Architects	B2	20-25
Rooflight system type...	ABC Architects	B2	20-25
Doorset system type A	ABC Architects	C2	25-50
Doorset system type B	ABC Architects	C2	25-50
External window syste...	ABC Architects	C2	25-50
Stick curtain walling s...	ABC Architects	C2	25-50

Doorset system type B  
Classification 25-50-20/120

Stage 3 - LOI 2

Item	Value
PerformanceRequireme...	Req FireResistance-Standard:To BS 476-22;
PerformanceRequireme...	Req FireResistance-Integrity:30 minutes;
PerformanceRequireme...	Not SurfaceSpreadOfFlame:As given in Building Regulations (E&W) Approved Document B2, Class 0;
FirePerformance	Fire Conformity:Certification by accredited third party certification body;
WeathertightnessPerfor...	Standard:BS 6375-1;UKExpos...
ResistanceToWindLoad	ResistanceToWindLoad:To B...
AirPermeability	AirPermeability:To BS EN 12...
AcousticPerformance	SoundInsulationRating:To B...
DoorAssemblyDurabilit...	DoorAssembly-OperationAn...
MechanicalStrengthReq...	Standard:To BS EN 1192.;Cat...
DoorHardwareDurabilit...	DurabilityOfSelfClosing:To B...
DoorsetSecurityPerform...	Not required - parked
InclusiveDesign	Missing

data and an online verification tool based on xBIM open source technology

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#BIMToolkit

# Design Responsibility Matrix

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## Assembling a Collaborative Project Team

Practical tools including  
Multi-disciplinary Schedules of Services



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## A completed Stage 2 Design Responsibility Matrix


Element	Design responsibility	Level of detail	Level of information	
Substructure	C&S engineer	2	2	
Frame/upper slabs - steel	C&S engineer	2	2	
Fire protection	Architect	2	2	
Stairs (precast)	C&S engineer	2	2	
Brickwork/blockwork	Architect	2	2	
Masonry support	C&S engineer	2	2	
Curtain walling	Architect	3	2	
Insulated render	Architect	2	2	
Stone cladding	Architect	3	2	
Louvres	Architect	2	2	
Ceiling systems	Architect	2	2	
Hot and cold water services	M&E engineer	2	2	
Ventilation (natural and a/c)	M&E engineer	3	2	
Sprinklers	M&E engineer	2	2	
Electrical services	M&E engineer	2	2	
Lifts	M&E engineer	2	2	


# RIBA Plan of Work 2013: analogue to digital

RIBA 

**Assembling a Collaborative Project Team**

Practical tools including  
Multi-disciplinary Schedules of Services



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 Stage 2

**Concept Design**

Project role	Tasks to be undertaken
All roles	<ul style="list-style-type: none"> <li>Contribute to Health and Safety Strategy as required</li> <li>Provide information for and contribute to contents of Project Executive Plan as required</li> <li>Contribute to development of Final Project Brief</li> </ul>
Client and/or client advisor	<ul style="list-style-type: none"> <li>Comment on Concept Design proposals as they progress</li> <li>Sign off Concept Design and Final Brief</li> <li>Comment on Project Strategy as requested</li> </ul>
Project lead	<ul style="list-style-type: none"> <li>Monitor progress of Concept Design</li> <li>Collate and agree changes to initial Project Brief and issue Final Project Brief</li> <li>Review Handover Strategy and Risk Assessments with project team</li> <li>Review and update Project Execution Plan</li> <li>Review Project Programme and agree any changes with project team</li> <li>Comment on stage Design Programme and Cost Information</li> <li>Monitor and review progress and performance of project team</li> </ul>
Lead designer	<ul style="list-style-type: none"> <li>Comment on design proposals and Project Strategy as they progress</li> <li>Update Sustainability Strategy and Maintenance and Operational Strategy with input from project team as required</li> <li>Prepare stage Design Programme with input from other design team members</li> <li>Comment on Cost Information</li> <li>Monitor and review progress and performance of design team</li> </ul>
Architect	<ul style="list-style-type: none"> <li>Prepare architectural Concept Design in accordance with the Initial Project Brief, Design Responsibility Matrix incorporating Information Exchange and Design Programme</li> <li>Submit planning application (recommended at Stage 2)</li> <li>Undertake third party consultations and any Research and Development aspects as required</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for preparation of Cost Information and Project Strategy</li> </ul>
Building services engineer	<ul style="list-style-type: none"> <li>Prepare Concept Design for building services design in accordance with the Initial Project Brief, Design Responsibility Matrix incorporating Information Exchange and Design Programme</li> <li>Undertake third party consultations as required and any Research and Development aspects</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for preparation of Cost Information and Project Strategy</li> </ul>
Civil and structural engineer	<ul style="list-style-type: none"> <li>Prepare Concept Design for structural design in accordance with the Initial Project Brief, Design Responsibility Matrix incorporating Information Exchange and Design Programme</li> <li>Undertake third party consultations as required and any Research and Development aspects</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for preparation of Cost Information and Project Strategy</li> </ul>
Cost consultant	<ul style="list-style-type: none"> <li>Prepare preliminary Cost Information</li> <li>Assist lead designer with preparation of stage Design Programme</li> </ul>
Construction lead	<ul style="list-style-type: none"> <li>Prepare Construction Strategy</li> </ul>
Contract administrator	N/A
Health and safety advisor	<ul style="list-style-type: none"> <li>Develop Health and Safety Strategy, including statutory requirements</li> </ul>
All additional project roles	<ul style="list-style-type: none"> <li>Work with project lead and lead designer as required</li> <li>Provide information as set out in the Design Responsibility Matrix incorporating Information Exchange in accordance with Design Programme</li> </ul>

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 Stage 3

**Developed Design**

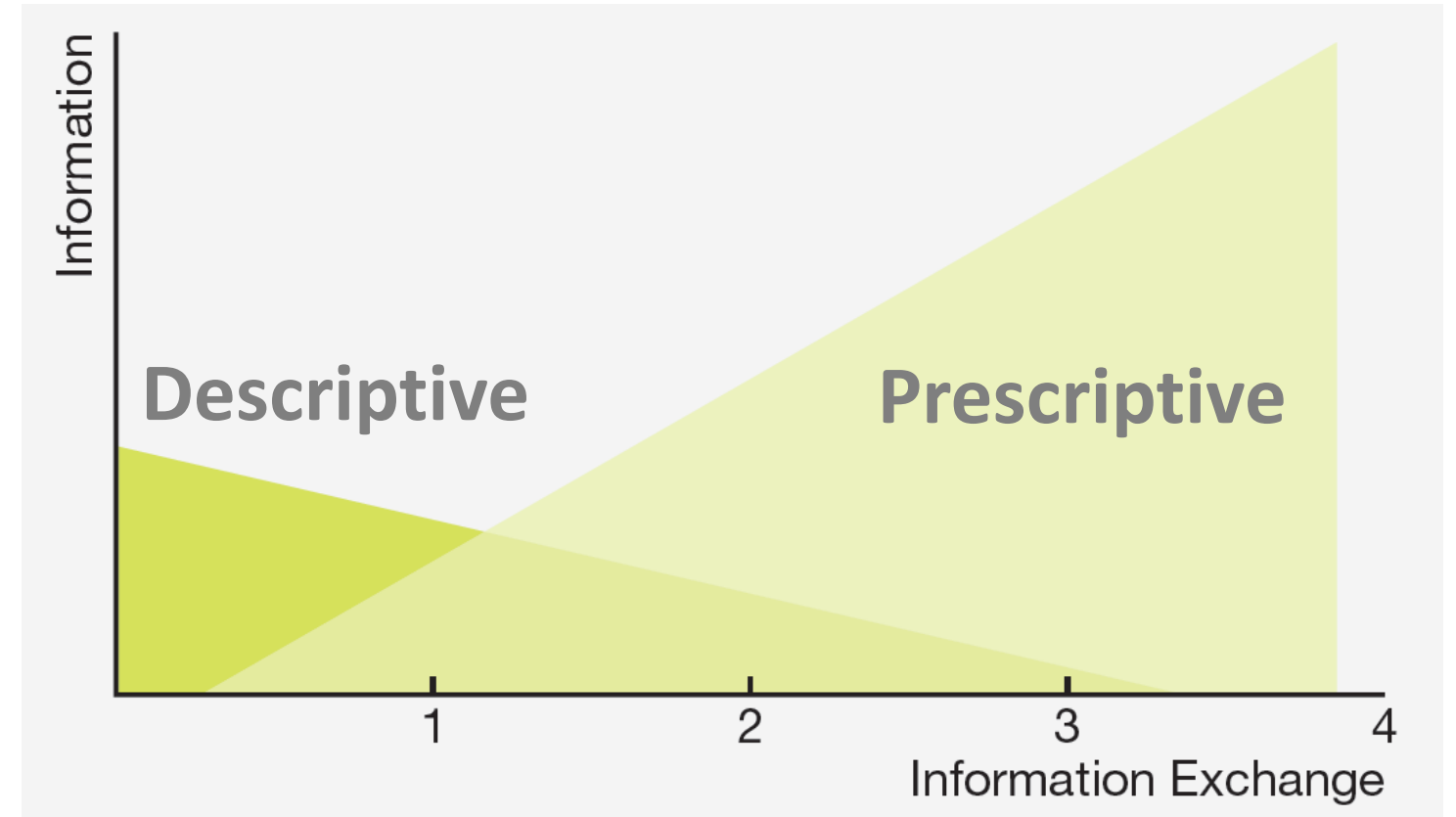
Project role	Tasks to be undertaken
All roles	<ul style="list-style-type: none"> <li>Contribute to Health and Safety Strategy as required</li> <li>Provide information for and contribute to contents of Project Executive Plan as required</li> </ul>
Client and/or client advisor	<ul style="list-style-type: none"> <li>Comment on Developed Design proposals as they progress</li> <li>Sign off Developed Design</li> <li>Comment on updated Project Strategy as requested</li> </ul>
Project lead	<ul style="list-style-type: none"> <li>Monitor progress of developing design</li> <li>Review updated Handover Strategy and Risk Assessments with project team</li> <li>Review and update Project Execution Plan</li> <li>Review Project Programme and agree any changes with project team</li> <li>Comment on stage Design Programme and Cost Information</li> <li>Manage change control process</li> <li>Monitor and review progress and performance of project team</li> </ul>
Lead designer	<ul style="list-style-type: none"> <li>Coordinate and comment on design proposals and Project Strategy as they progress</li> <li>Update Sustainability Strategy and Maintenance and Operational Strategy with input from project team as required</li> <li>Prepare stage Design Programme in conjunction with other design team members</li> <li>Comment on Cost Information</li> <li>Monitor and review progress and performance of design team</li> </ul>
Architect	<ul style="list-style-type: none"> <li>Prepare architectural Developed Design in accordance with the Design Responsibility Matrix incorporating Information Exchange, Design Programme and coordination comments from lead designer</li> <li>Work with planning authorities as required</li> <li>Submit planning application</li> <li>Undertake third party consultations as required and conclude any Research and Development aspects</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for updated Cost Information and Project Strategy</li> </ul>
Building services engineer	<ul style="list-style-type: none"> <li>Prepare building services Developed Design in accordance with the Design Responsibility Matrix incorporating Information Exchange, Design Programme and coordination comments from lead designer</li> <li>Undertake third party consultations and any Research and Development aspects as required</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for preparation of Cost Information and Project Strategy</li> </ul>
Civil and structural engineer	<ul style="list-style-type: none"> <li>Prepare coordinated and updated proposals for structural design in accordance with the Design Responsibility Matrix incorporating Information Exchange and Design Programme</li> <li>Undertake third party consultations as required and any Research and Development aspects</li> <li>Assist lead designer with preparation of stage Design Programme</li> <li>Provide information for preparation of Cost Information and Project Strategy</li> </ul>
Cost consultant	<ul style="list-style-type: none"> <li>Update preliminary Cost Information</li> <li>Assist lead designer with preparation of stage Design Programme</li> </ul>
Construction lead	<ul style="list-style-type: none"> <li>Update Construction Strategy</li> </ul>
Contract administrator	N/A
Health and safety advisor	<ul style="list-style-type: none"> <li>Update Health and Safety Strategy</li> </ul>
All additional project roles	<ul style="list-style-type: none"> <li>Work with project lead and lead designer as required</li> <li>Provide information as set out in the Design Responsibility Matrix incorporating Information Exchange in accordance with Design Programme</li> </ul>

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Multi-disciplinary Schedules of Services

# Descriptive to Prescriptive journey

Google  
+  
nest

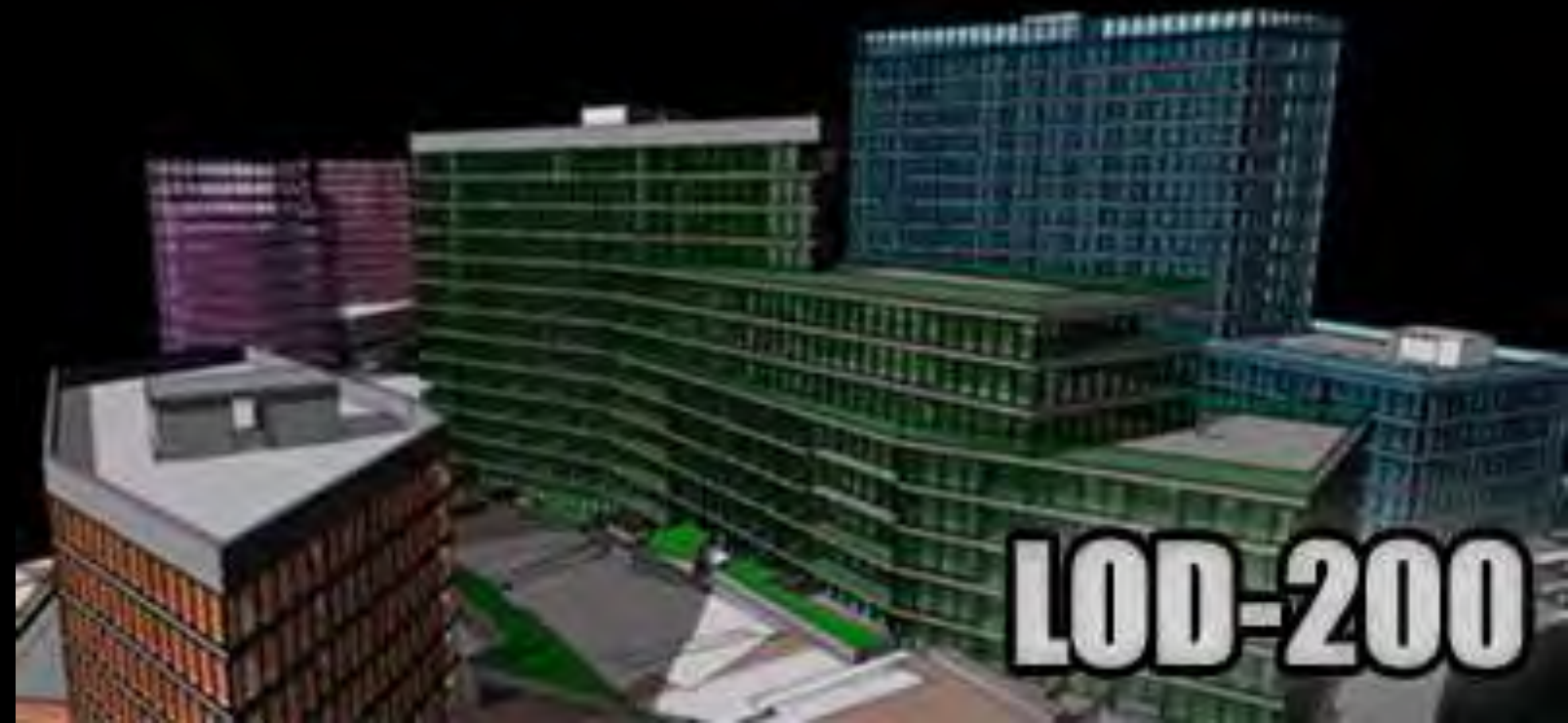


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# Level of Development



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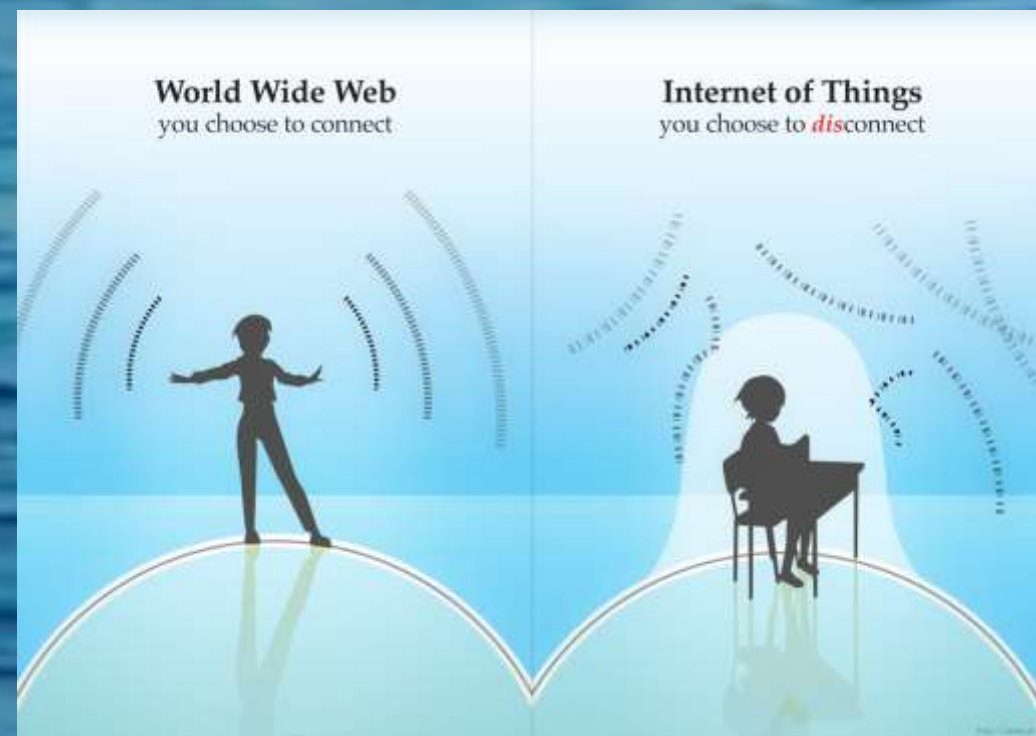


**LOD-200**

# What else?

**World Wide Web**  
you choose to connect

**Internet of Things**  
you choose to *dis*connect



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# Professional Maturity



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Clients



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Estates v

One-Off

# Project Outcomes



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The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, handover, opening and using building projects into a number of key work stages. The content of work stages may vary or overlap to suit specific project requirements. The RIBA Plan of Work 2013 should be used solely as guidance for the preparation of defined professional services contracts and building contracts.

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Stages	0	1	2	3	4	5	6	7
Tasks	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In Use
Core Objectives	Identify client's business.	Develop Project Objectives, including Quality Objectives and Project Outcomes, Sustainability Aspirations, Project Budget, other parameters or constraints and develop the Initial Project Brief. Undertake Feasibility Studies and review of Site Information.	Prepare the Concept Design, including outline proposals for structural design, building services systems, outline specifications and preliminary Cost Information along with relevant Project Strategies in accordance with the Design Programme. Agree allocations to Client and Issue Final Project Brief.	Prepare the Developed Design, including coordinated and updated proposals for structural design, building services systems, outline specifications, Cost Information and Project Strategies in accordance with the Design Programme.	Prepare the Technical Design in accordance with the Design Responsibility Matrix and Project Strategies to provide architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with the Design Programme.	Oversee manufacturing and write Construction in accordance with the Construction Programme and evolution of Design Gates from site set up area.	Handover of building and possession of the Building Contract.	Understand In Use services.
Procurement (variable Task Bar)		Prepare Project Roles Table and Contractual Tree and continue assembling project team.	The Procurement Strategy does not fundamentally alter the progression of the design or the level of detail prepared at a given stage. However, Information Exchanges will vary depending on the selected procurement route and Building Contract. A bespoke RIBA Plan of Work 2013 will set out the specific tendering and procurement activities that will occur at each stage in relation to the chosen procurement route.			Finalisation of Building Contract, including sign-off of contracts and order.	Consideration of the Building Contract.	
Programme (variable Task Bar)								
(Town) Planning (variable Task Bar)								
Suggested Key Support Tasks								
Sustainability Checkpoints	SUSTAINABILITY CHECKPOINT – 1	SUSTAINABILITY CHECKPOINT – 2	SUSTAINABILITY CHECKPOINT – 3	SUSTAINABILITY CHECKPOINT – 4	SUSTAINABILITY CHECKPOINT – 5	SUSTAINABILITY CHECKPOINT – 6	SUSTAINABILITY CHECKPOINT – 7	SUSTAINABILITY CHECKPOINT – 8
Information Exchanges (if Stage Cooperation)	The Initial Project Brief.	The Concept Design including outline structural and building services design, annotated Project Strategies, preliminary Cost Information and Final Project Brief.	The Developed Design, including the coordinated architectural, structural and building services design and updated Cost Information.	The completed Technical Design of the project.				'As-constructed' Information.
UK Government Information Exchanges	REQUIRED.	REQUIRED.	REQUIRED.	NOT REQUIRED.	NOT REQUIRED.	REQUIRED.		



intelligent brief

project outcomes

# Project Outcomes


## 10 Downing Street

home about blog feedback login


Powered by **CARB N CULTURE.**

### About this building

The Downing Street complex is a four storey Grade-I and II listed brick built Georgian terraced townhouse. It is a home to the Prime Minister and his family, and a busy office and workplace for the PM and his support staff. In 1732 the first-ever PM Robert Walpole refused to accept the house as a personal gift from King George II. Instead he insisted it be used by future First Lords of the Treasury. In 1735 the architect William Kent connected No.10 Downing Street to a larger house at the rear of the property (erected in 1677) facing Horse Guards Parade. 100% of PMO's electricity supply is on a green tariff, generated from renewable sources.



### Our energy use

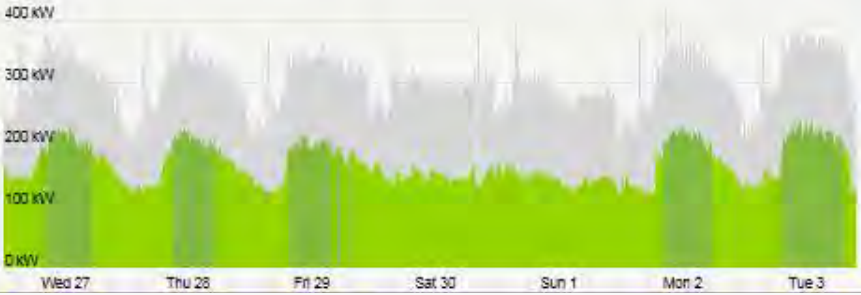


#### 10 Downing Street

This graph allows everyone to access a range of data from our offices at no.10. It's generated in real-time from data taken every 5 seconds from the on-site meters.

From midnight on 27 Nov to 21:31 on 3 Dec, no.10 has used:

<b>50,081kWh</b> Energy use	<b>£3,078</b> Energy cost	<b>18,618kg</b> Carbon Impact
27,828kWh in Electricity	£2,384 from Electricity	14,493kg for Electricity
22,415kWh in Gas	£662 from Gas	4,115kg for Gas
40kWh in Heat	£1 from Heat	0kg for Heat
Average 286kWh per hour	Average £16 per hour	Average 110kg per hour



# CarbonBuzz

an RIBA CIBSE platform

Collaborative  
Anonymous  
Real



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Work  
2013

# The design stages

*geometry*

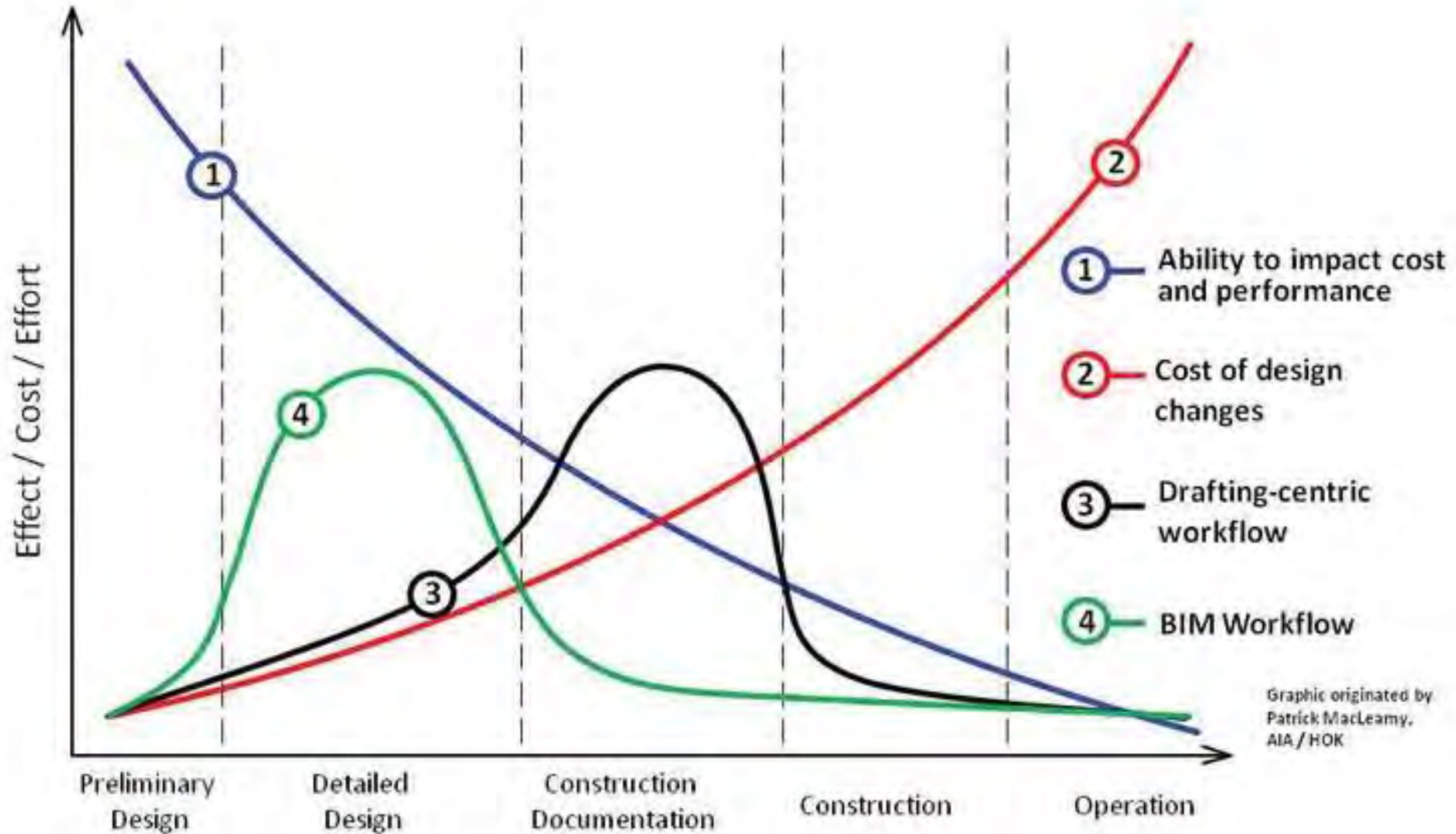


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*data*

RIBA 

# Stage 2 PLQs



# The Lead Designer



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2013



*clash  
detection*

*lead designer*

# Briefing to Design to Construction

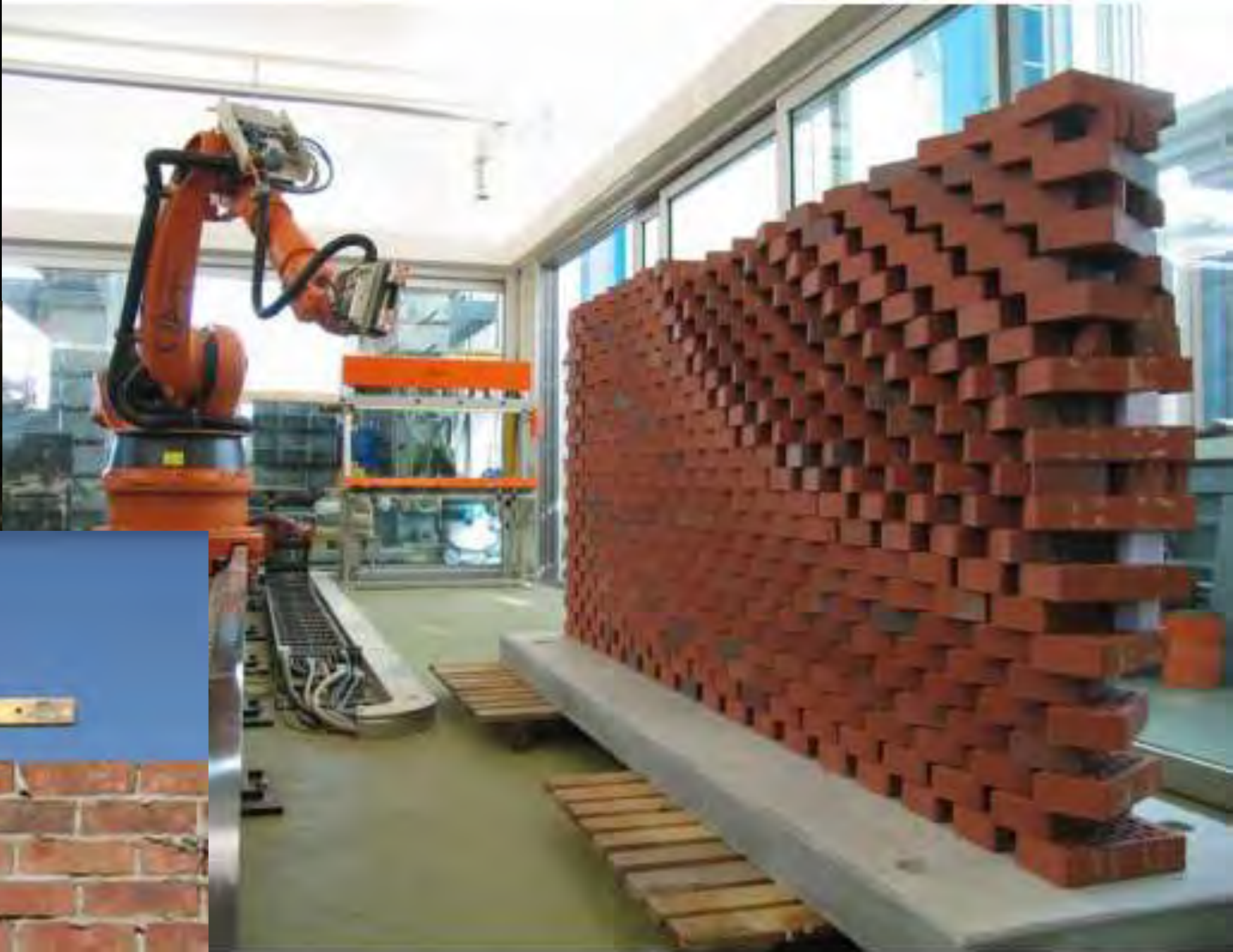




# Briefing to Design to Construction



# Stage 4: analogue to digital



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# Stage 4: digital



3D printing



*build*offsite  
promoting construction offsite

designformanufacture



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2013

# Future Design Processes



**A + B + C = D**

# Thank you!

