Commercial Documentation for BIM
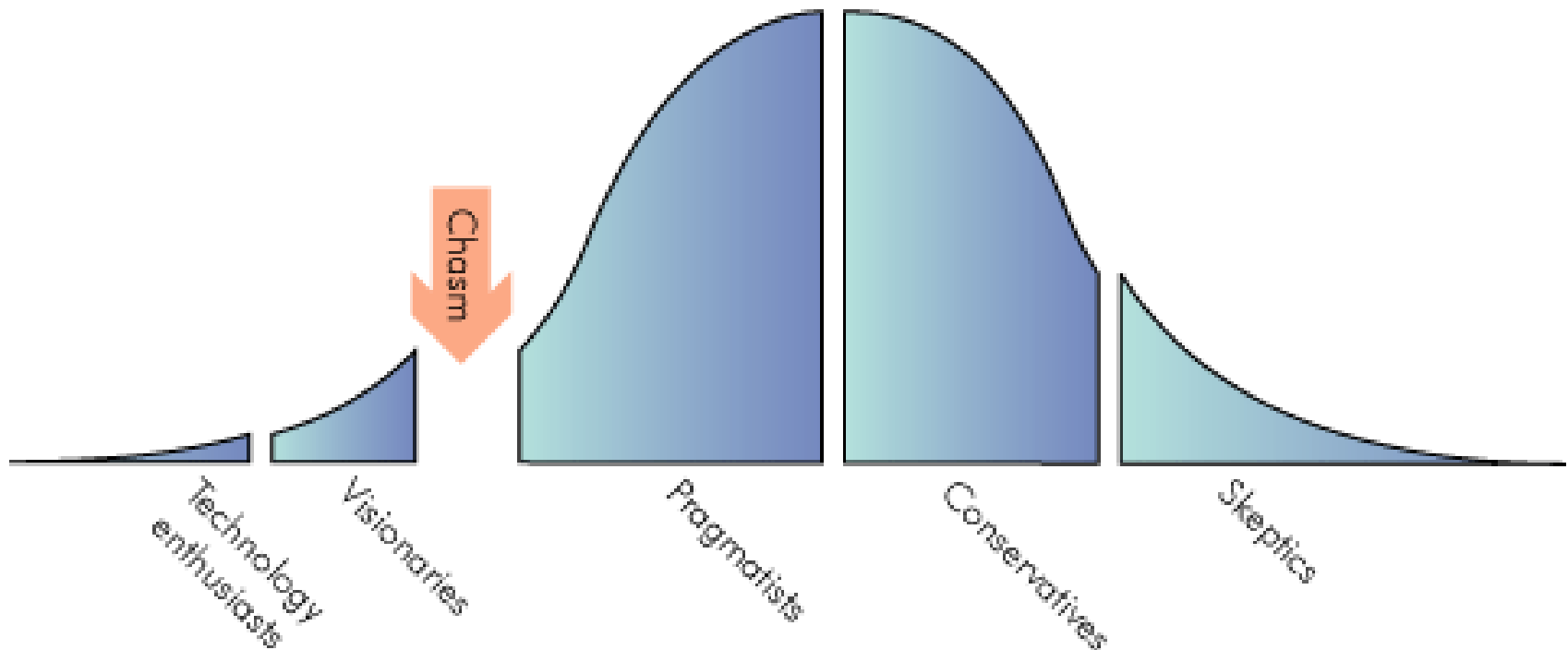
Director's Breakfast Briefing
5th July 2013

Simon Rawlinson
EC Harris and UK BIM Task Group
Commercial Documentation for BIM

HM Government

Crossing the innovation chasm

Chasm

Technology enthusiasts · Visionaries · Pragmatists · Conservatives · Skeptics
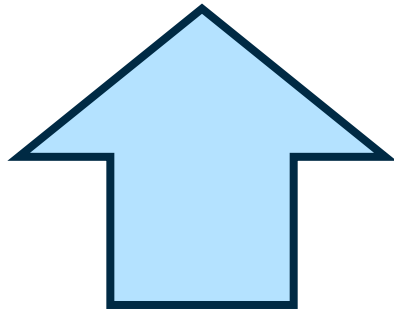
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Hypothesis

Government as a client can derive significant improvements in cost, value and carbon performance through the use of open sharable asset information"

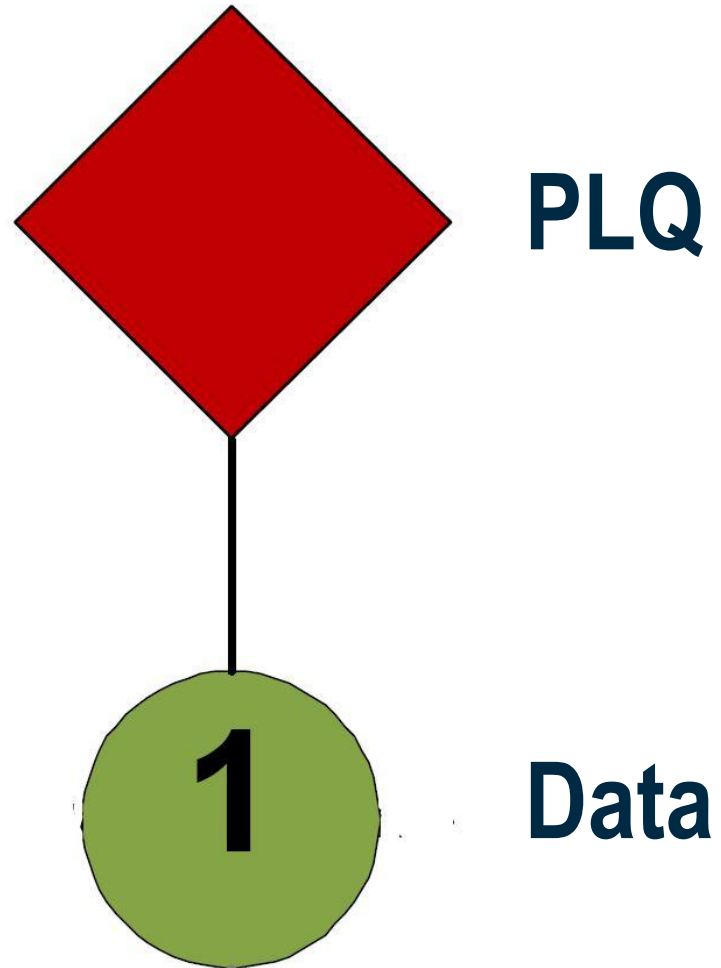HM Government

Key Building Blocks of the Strategy

1. Purpose for Data
Plain language questions
(PLQs) to inform key
client decisions

PLQ

2. Structured Data
COBie Data
2D PDF's
(Native models)

1

Data

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Client decision making drives data needs

Questions for Stage 02. Concept

2/1	**How will BIM be managed and exploited in this project?** *A contractual BIM execution plan and protocol for the project defining different levels of design maturity for each project phase, who will develop the content, to what standards, who will be authorised to use it, for what purpose, how it will be coordinated, who will own what and how information incompatibilities shall be resolved. This is to include the means and protocols for the communication of information between parties.*
2/2	**What is the concept design?** *Rendered block diagram in site context including significant equipment layout to the level of development defined in PAS 1192-2: 2013 and supporting documents.*
2/3	**Does the design's performance meet the portfolio's requirements?** *Early stage simulations, calculations and costs.*
2/4	**What is the outline proposal for structural design?** *Structural design sufficient for simulation modelling for loads, including wind + simulation models & reports Size and weight information in model Temporary construction loads assessed.*
2/5	**If the works are an addition or refurbishment, how are they to be integrated and coordinated with existing services?** *3D survey of existing and interfaces.*
2/6	**If the works are an addition or refurbishment, what impact are they going to have on existing services?** *Simulation of performance of the reconfigured facility.*
2/7	**What are the output requirements from services systems?** *Zoning of services sufficient for first iteration of spatial requirement.*
2/8	**Can the services and structure be combined within the concept design in the available 3D volumes?** *Combined model to demonstrate the first iteration of coordination.*
2/9	**Can Bldg. Rags Part L and EPC requirements be met?** *High level simulation models and reports.*
2/10	**Can the client's BREEAM or LEED objectives be met?**
2/11	**What targets are to be used for Post Occupancy Evaluation?** *Data from model[s] to be referenced when the targets relating to business outcome, environmental, people, social and economic factors.*

PLQ's at Stage 02

Description	Type	Geometry	Data	Analysis	Measures	Link to document
Concept Design / As built	Solution	A / B	B			A
Brief Compliance	Solution	B	A / B	A / B	A	A
Structural Proposal	Solution	A	A	A		A
Services Systems	Solution	A	A	A		A
3d Co-ordination	Solution	A	A		A	
Part L & EPC	Computation				A	
BREEAM Achievement	Computation				A	
Manufacturing & assembly	Procurement		A		A	A
Buildability	Solution	A			A	
Cap-ex & Op-ex	Procurement			A / B	A / B	A / B
Procurement Strategy	Procurement					A
Communication of design	Solution	A	A			A
Client Performance Requirement	Solution		A		A	A
Certainty	Procurement				A	A
Schedule validated	Procurement					
Changes Incorporated	Procurement	B	B			
Commissioning Performance	Proc / Ops		B			B
O&M	Ops	B	B		B	B
Safety	Ops	B	B		B	B

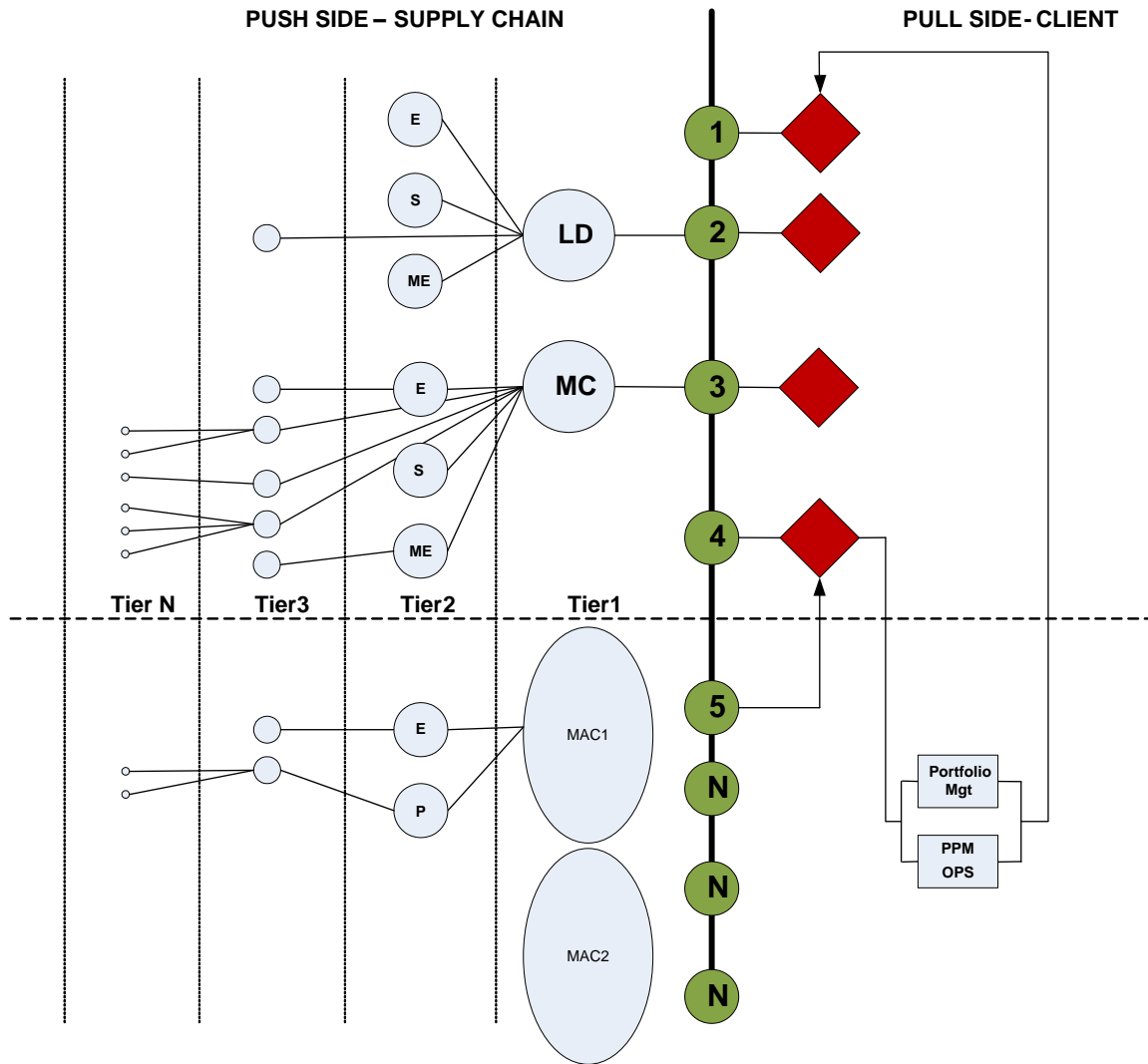## How are the PLQ's answered?

What is the data?

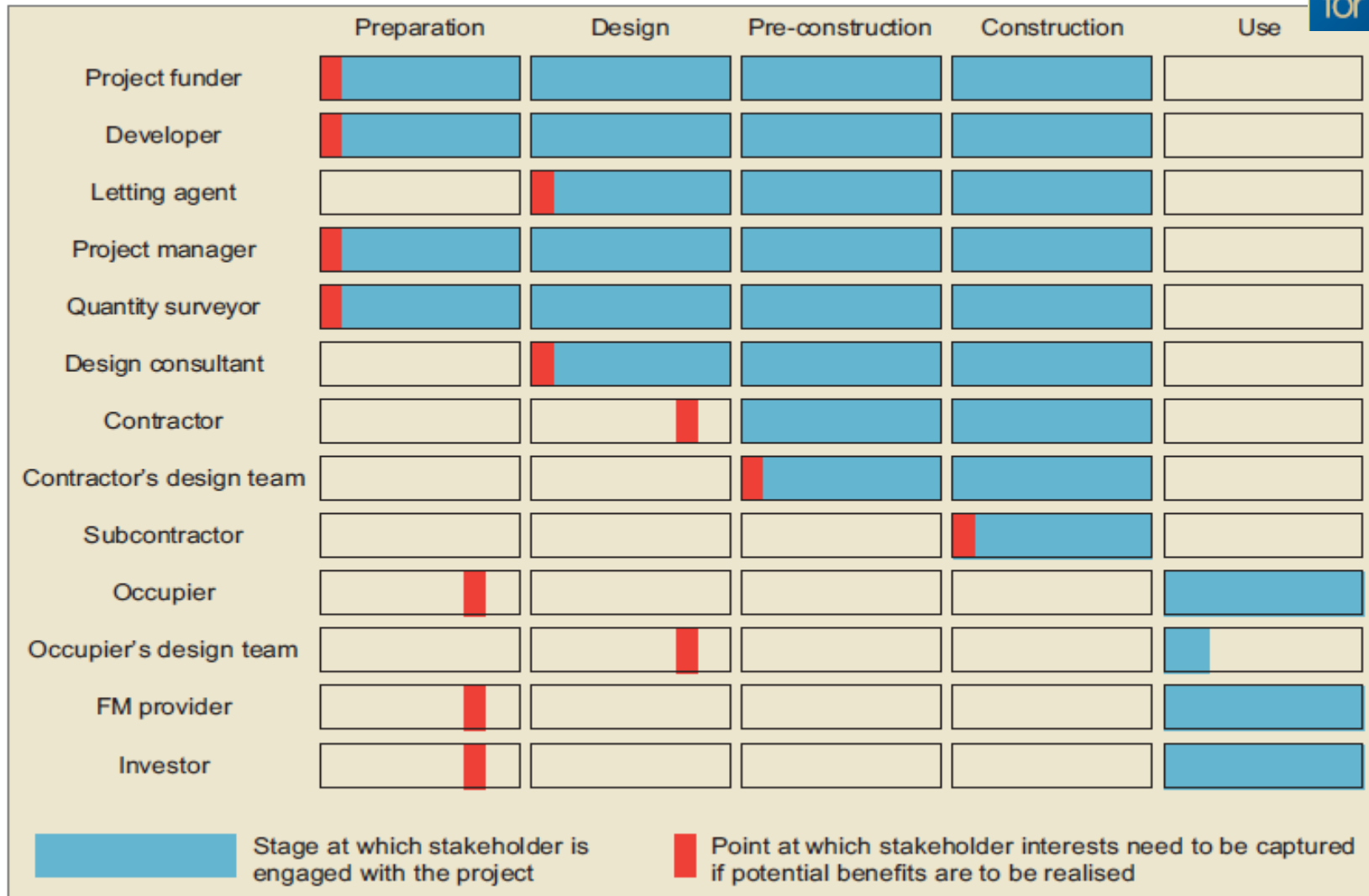|	
Energy Analysis Requirements	Humidity Requirement
Energy Analysis Requirements	Radiant Heating Requirement
Energy Analysis Requirements	Air Circulation Requirement
Energy Analysis Requirements	Ventilation Requirement
Energy Analysis Requirements	Temperature Range Requirement
Energy Analysis Requirements	Energy Performance Basis
Energy Analysis Requirements	HVAC Performance Basis

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Data Procurement
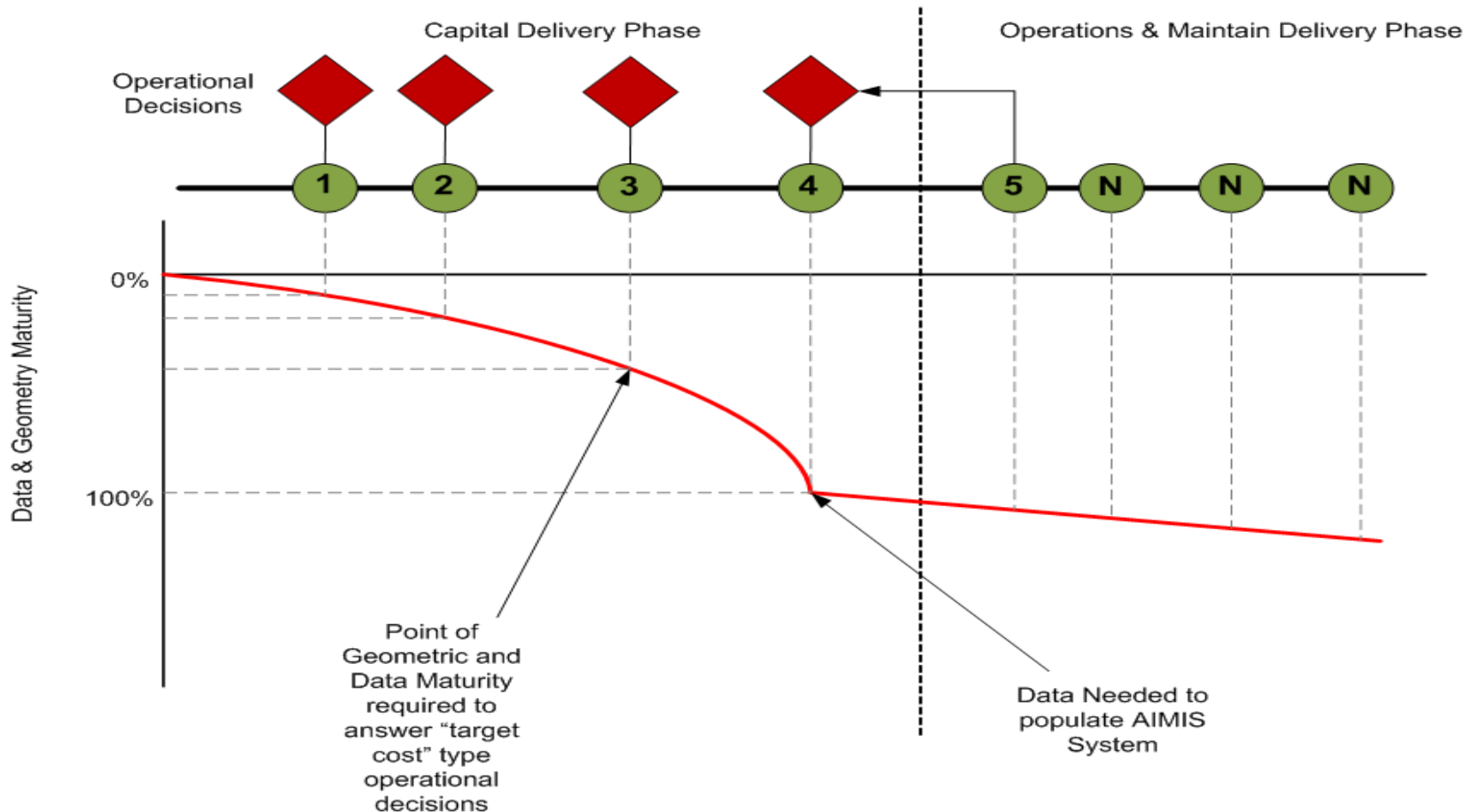
Supply Chain Engagement

Stakeholder alignment

	Preparation	Design	Pre-construction	Construction	Use
Project funder	🟥🟦	🟦	🟦	🟦	
Developer	🟥🟦	🟦	🟦	🟦	
Letting agent		🟥🟦	🟦	🟦	
Project manager	🟥🟦	🟦	🟦	🟦	
Quantity surveyor	🟥🟦	🟦	🟦	🟦	
Design consultant		🟥🟦	🟦	🟦	
Contractor		🟥	🟦	🟦	
Contractor's design team			🟥🟦	🟦	
Subcontractor				🟥🟦	
Occupier	🟥				🟦
Occupier's design team		🟥			🟦
FM provider	🟥				🟦
Investor	🟥				🟦

Legend:
🟦 Stage at which stakeholder is engaged with the project

🟥 Point at which stakeholder interests need to be captured if potential benefits are to be realised

Contractual Context of the CIC BIM Suite

Plain Language Questions

Project Stage

Information Model

Project Outputs

Documentation

BIM

Data

Definition and delivery

Geometry

Protocol

Contract

Ers/CPs

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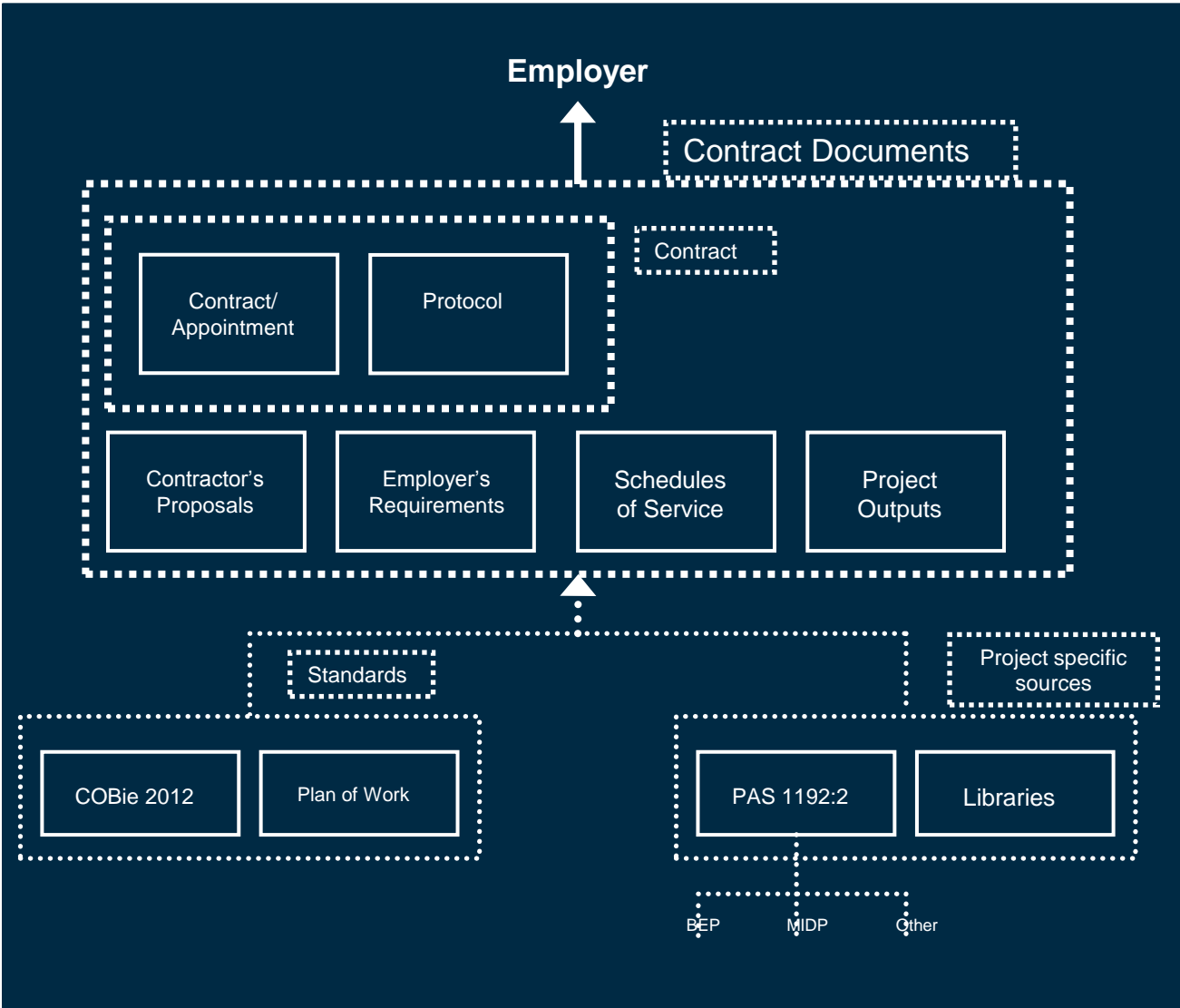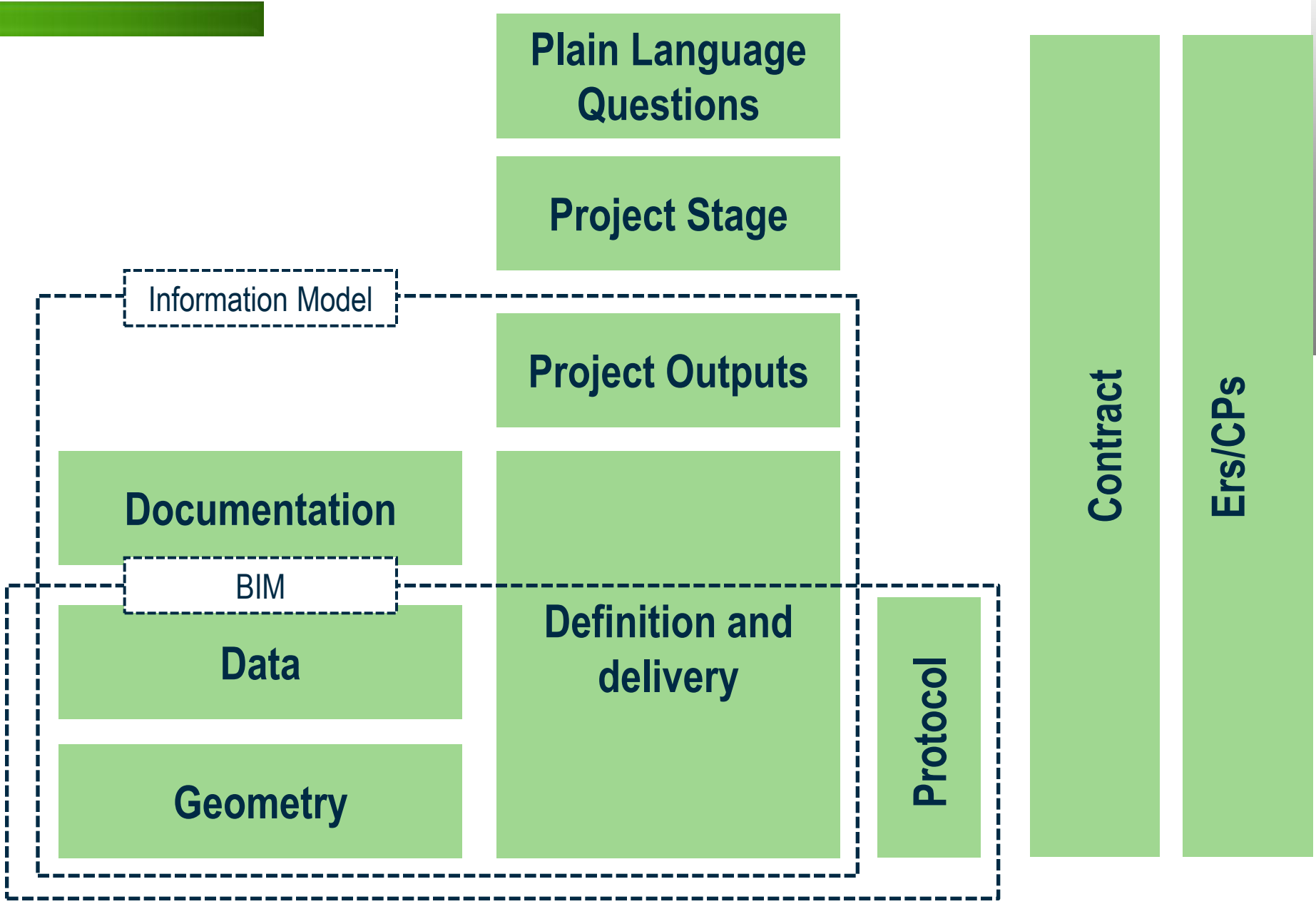
CIC BIM Suite - Components

- **BIM Protocol**

- **Scope of Services for Information Management**

- **PI Insurance Guidance**

Other Documents

- **PAS 1192-2**
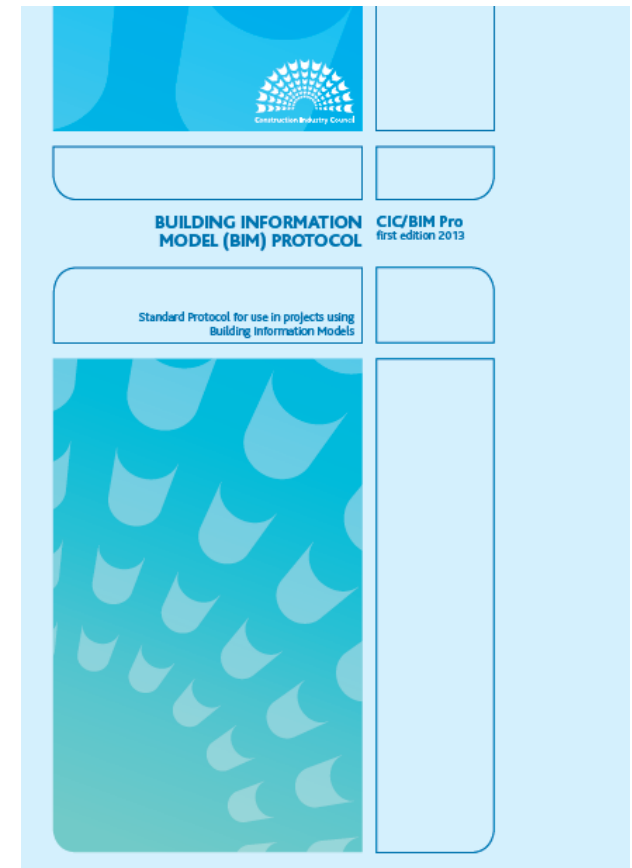
- **Employers' Information Requirements**

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CIC BIM Suite - Objectives

- **Acceleration of the adoption of Level 2 BIM with simple, standard documents**

- **Align with existing Contracts and appointments**

- **Clearly communicate requirements for data**

- **Address potential blockers such as PI insurance**

- **Formalise Data and Information Management practice**

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BIM protocol – Operational Principles

- Employer completes the Protocol
- Protocol used on all direct appointments and contracts
- Protocol used throughout the supply chain
- The same Protocol should be used for all parties

- Protocol sets rights and obligations with regard to Models.
- Other obligations remain in the Contract

- The Protocol creates no new relationships between Project Team Members

- The role of Information Management should be allocated

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Key Features of the Protocol

- Definitions
- Priority of the Contract Documents
- Obligations of the Employer
  - Put a Protocol in place
  - Appoint to the role of Information Manager
- Obligations of Project Team Members
  - Produce the Specified Models
  - Collaborative working practice
- Electronic Data Exchange
  - No warranty for data integrity
- Use of models
  - Licences related to permitted purposes
  - Limitations related to the extension of a project
- Limitations on liability

The Protocol has been drafted explicitly to avoid creating additional liabilities

BUILDING INFORMATION MODEL (BIM) PROTOCOL CIC/BIM Pro first edition 2013

Standard Protocol for use in projects using Building Information Models

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Protocol Appendices

- Completed for each project
- Model production and delivery table
  - Records Models to be produced
    - Definitions of the LoD
    - Originator of a model at the Project Stage/Data Drop
    - LoD required in a model at the Project Stage/Data Drop
- Information Requirements
  - Contractual effect to requirements set out in the EIR
    - Common data environment
    - Information management standards
    - Model delivery programme
    - Security Requirements

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

RIBA 🏛

The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, maintaining, operating and using building projects into a number of key stages. The content of 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 detailed professional services contracts and building contracts.

RIBA Plan of Work 2013

Tasks ▼	**0** Strategic Definition	**1** Preparation and Brief	**2** Concept Design	**3** Developed Design	**4** Technical Design	**5** Construction	**6** Handover and Close Out	**7** In Use
Core Objectives	Identify client's **Business Case** and **Strategic Brief** and other core project requirements.	Develop **Project Objectives**, including **Quality Objectives** and **Project Outcomes**, **Sustainability Aspirations**, **Project Budget**, other parameters or constraints and develop **Initial Project Brief**. Undertake **Feasibility Studies** and review of **Site Information**.	Prepare **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 **Design Programme**. Agree alterations to brief and issue **Final Project Brief**.	Prepare **Developed Design**, including coordinated and updated proposals for structural design, building services systems, outline specifications, **Cost Information** and **Project Strategies** in accordance with **Design Programme**.	Prepare **Technical Design** in accordance with **Design Responsibility Matrix** and **Project Strategies** to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with **Design Programme**.	Offsite manufacturing and onsite **Construction** in accordance with **Construction Programme** and resolution of **Design Queries** from site as they arise.	Handover of building and conclusion of **Building Contract**.	Undertake **In Use** services in accordance with **Schedule of Services**.
Procurement *Variable task bar	Initial considerations for assembling the project team.	Prepare **Project Roles Table** and **Contractual Tree** and continue assembling the 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. ------→			Administration of **Building Contract**, including regular site inspections and review of progress.	Conclude administration of **Building Contract**.	
Programme *Variable task bar	Establish **Project Programme**.	Review **Project Programme**.	Review **Project Programme**.	←--- The procurement route may dictate the **Project Programme** and may result in certain stages overlapping or being undertaken concurrently. A bespoke **RIBA Plan of Work 2013** will clarify the stage overlaps. The **Project Programme** will set out the specific stage dates and detailed programme durations. ---→				
(Town) Planning *Variable task bar	Pre-application discussions.	Pre-application discussions.	←------ Planning applications are typically made using the Stage 3 output. A bespoke **RIBA Plan of Work 2013** will identify when the planning application is to be made. ------→					
Suggested Key Support Tasks	Review **Feedback** from previous projects.	Prepare **Handover Strategy** and **Risk Assessments**. Agree **Schedule of Services**, **Design Responsibility Matrix** and **Information Exchanges** and prepare **Project Execution Plan** including **Technology** and **Communication Strategies** and consideration of **Common Standards** to be used.	Prepare **Sustainability Strategy, Maintenance and Operational Strategy** and review **Handover Strategy** and **Risk Assessments**. Undertake third party consultations as required and any **Research and Development** aspects. Review and update **Project Execution Plan**. Consider **Construction Strategy**, including offsite fabrication, and develop **Health and Safety Strategy**.	Review and update **Sustainability, Maintenance and Operational** and **Handover Strategies** and **Risk Assessments**. Undertake third party consultations as required and conclude **Research and Development** aspects. Review and update **Project Execution Plan**, including **Change Control Procedures**. Review and update **Construction and Health and Safety Strategies**.	Review and update **Sustainability, Maintenance and Operational** and **Handover Strategies** and **Risk Assessments**. Prepare and submit **Building Regulations** submission and any other third party submissions requiring consent. Review and update **Project Execution Plan**. Review **Construction Strategy**, including sequencing, and update **Health and Safety Strategy**.	Review and update **Sustainability Strategy** and implement **Handover Strategy**, including agreement of information required for commissioning, training, handover, asset management, future monitoring and maintenance and ongoing compilation of 'As-constructed' Information. Update **Construction** and **Health and Safety Strategies**.	Carry out activities listed in **Handover Strategy** including **Feedback** for use during the future life of the building or on future projects. Updating of **Project Information** as required.	Conclude activities listed in **Handover Strategy** including **Post-occupancy Evaluation**, review of **Project Outcomes** and **Research and Development** aspects. Updating of **Project Information**, as required, in response to ongoing client **Feedback** until the end of the building's life.
Sustainability Checkpoints	**Sustainability Checkpoint — 0**	**Sustainability Checkpoint — 1**	**Sustainability Checkpoint — 2**	**Sustainability Checkpoint — 3**	**Sustainability Checkpoint — 4**	**Sustainability Checkpoint — 5**	**Sustainability Checkpoint — 6**	**Sustainability Checkpoint — 7**
Information Exchanges (at stage completion)	**Strategic Brief**.	**Initial Project Brief**.	**Concept Design** including outline structural and building services design, associated **Project Strategies**, preliminary **Cost Information** and **Final Project Brief**.	**Developed Design**, including the coordinated architectural, structural and building services design and updated **Cost Information**.	Completed **Technical Design** of the project.	'As-constructed' Information.	Updated 'As-constructed' Information.	'As-constructed' Information updated in response to ongoing client **Feedback** and maintenance or operational developments.
UK Government Information Exchanges	Not required.	Required.	Required.	Required.	Not required.	Not required.	Required.	As required.

*Variable task bar – in creating a bespoke project or practice specific RIBA Plan of Work 2013 via www.ribaplanofwork.com a specific bar is selected from a number of options.

© RIBA

Protocol Appendices

Specimen Production and Delivery Table for BIM Protocol user Guide

	Drop 1 Stage 1		Drop 2a Stage 2		Drop 2b Stage 2		Drop 3 Stage 3		Drop 4 Stage 4	
	Model Originator	Level of Detail	Model Originator	Level of Detail	Model Originator	Level of Detail	Model Originator	Level of Detail	Model Originator	Level of Detail
Overall form and content										
Space planning	Architect	1	Architect	2	Contractor	2	Contractor	3	Contractor	6
Site and context	Architect	1	Architect	2	Contractor	2	Contractor	3	Contractor	6
Surveys							Contractor	3		
External form and appearance			Architect	2	Contractor	2	Contractor	3	Contractor	6
Building and site sections					Contractor	2	Contractor	3	Contractor	6
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Fire			Architect	2	Contractor	2	Contractor	3	Contractor	6
Physical security			Architect	2	Contractor	2	Contractor	3	Contractor	6
Disabled access			Architect	2	Contractor	2	Contractor	3	Contractor	6
Maintenance access			Architect	2	Contractor	2	Contractor	3	Contractor	6
BREEAM					Contractor	2	Contractor	3	Contractor	6
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Building	Architect	1	Architect	2	Contractor	2	Contractor	3		
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MEP systems	Architect	1	MEP Eng	2	Contractor	2	Contractor	3		
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4D Programming Analysis										
5D Cost Analysis										
Services Commissioning							Contractor	3	Contractor	6
Elements, materials components										
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Phasing							Contractor	3		
Site access							Contractor	3		
Site set-up							Contractor	3		
Health and safety										
Design							Contractor	3		
Construction							Contractor	3		
Operation							Contractor	3	Contractor	6

LOD definitions (from PAS 1192)

1 Brief
2 Concept
3 Definition
4 Design
5 Build and Commission
6 Handover and close out
7 Operation

Stage definitions (from APM)

1 Concept
2 Definition
3 Implementation
4 Handover & Closeout

Model Originators identified by name

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BIM Provisions in more detail

- The permitted purpose
  - General concept rather than specific uses for each model
  - Related to the project
  - Consistent with the level of detail
  - Consistent with the purpose for which the model is prepared
  - For permitted purposes to work, appendix 1 needs to be completed
- Project Team Member
- Electronic Data Exchange
  - Avoids separate agreement
  - Focused on major risks – e.g. post transmission corruption
  - Requirement to comply with the protocol

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BIM Provisions in more detail

- IPR
    - All rights remain vested in the originator
    - Other rights and interests dealt with by provisions in the contract
    - Licences in clause 6 cover data and geometry
    - Project team members granted licences by the employer to use the models
    - Licences cover Project Team Members only – 3rd party rights or collateral warranty for other users
    - No right to amend materials without consent, or to use materials beyond the scope of the project
    - Originators should ensure that licences are in place to use material in their models
- Liability for use of models
    - No liability for uses that are not permitted by the licences

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The Information Manager Role

Three key activities

- Managing the Common Data Environment
- Supporting the production of 'Project Outputs' – e.g. data drops
- Contributing to the management of the project

No direct design responsibility
Key role for facilitating PAS 1192-2

OUTLINE SCOPE OF SERVICES FOR THE ROLE OF INFORMATION MANAGMENT — CIC/INF MAN/S first edition 2013
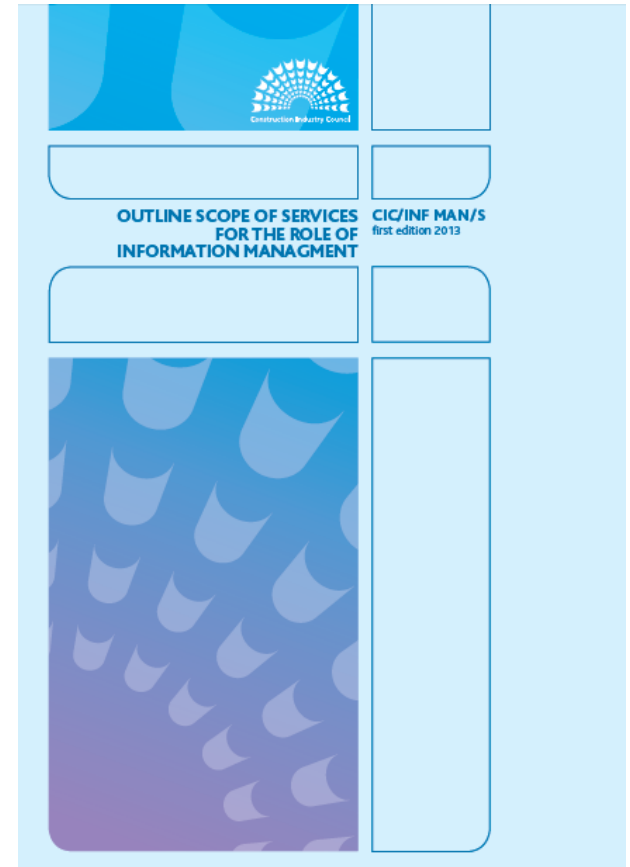
The Information Manager role has no design role and could be delivered by any party

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Other documents

- Appendices – Model Appendices for Project Specific Completion
- Employer's Information Requirements
    - Describes the Models Required
    - Defines information management standards
    - Defines other information management standards
- PAS 1192-2

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PAS 1192-2 Alignment

- Employer's Information Requirements
- BIM Execution Plan
- Roles, Responsibilities and Authorities
- Common Data Environment
- Level of Detail

Table 2 – Information exchange activities

Figure 20 – Levels of model definition for building and infrastructure projects

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Importance of LoD

Figure 20 – Levels of model definition for building and infrastructure projects

| Stage numbers | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
Model name	Brief	Concept	Definition	Design	Build and commission	Handover and closeout	Operation
Systems to be covered	N/A	All	All	All	All	All	All
Graphical illustration (building project)							
Graphical illustration (infrastructure project)							
What the model can be relied upon for	Model information communicating the brief, performance requirements, performance benchmarks and site constraints	Models which communicate the initial response to the brief, aesthetic intent and outline performance requirements. The model can be used for early design development, analysis and co-ordination. Model content is not fixed and may be subject to further design development. The model can be used for co-ordination, sequencing and estimating purposes	A dimensionally correct and co-ordinated model which communicates the response to the brief, aesthetic intent and some performance information that can be used for analysis, design development and early contractor engagement. The model can be used for co-ordination, sequencing and estimating purposes including the agreement of a first stage target price	A dimensionally correct and co-ordinated model that can be used to verify compliance with planning and regulatory requirements and which can be used as the start point for the incorporation of specialist contractor design models. The model can be used for fabrication, co-ordination, sequencing and estimating purposes, including the agreement of a target price/GMP	An accurate model of the asset before and during construction incorporating co-ordinated specialist sub-contract design models and associated model attributes. The model can be used for sequencing of installation and capture of as-installed information	An accurate record of the asset as a constructed at handover, including all information required for operation and maintenance	An updated record of the asset at a fixed point in time incorporating any major changes made since handover, including performance and condition data and all information required for operation and maintenance. The full content will be available in the yet to be published PAS1192-3

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CIC BIM Suite – Key Points

- **Support Level 2 BIM**

- **Works with existing Contracts and appointments**

- **Emphasises data requirements – e.g. Models**

- **Promotes Data and Information Management**

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Director's Breakfast Briefing
5th July 2013

Simon Rawlinson
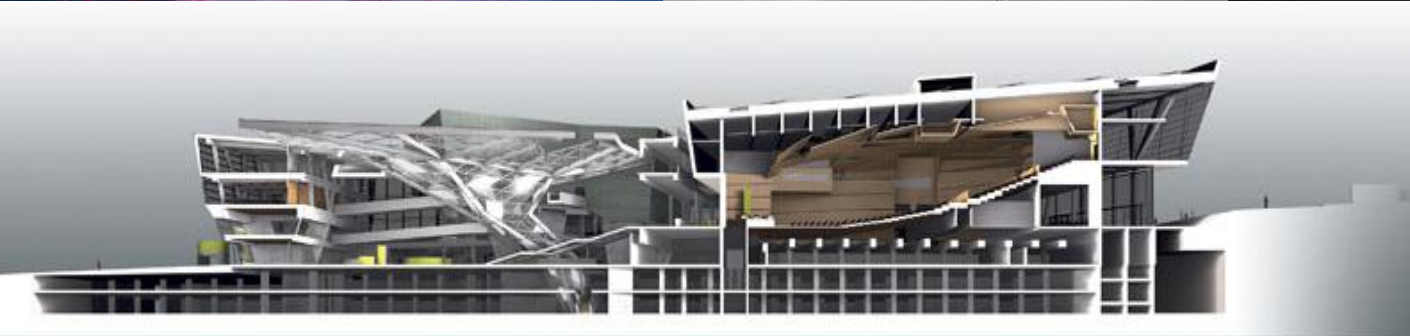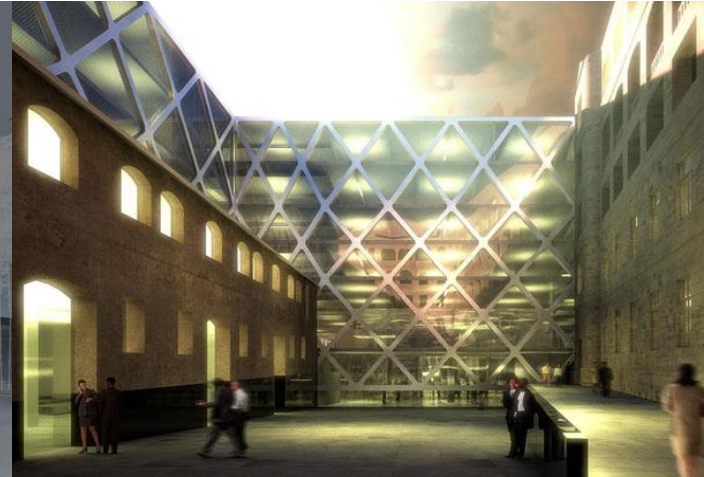## Commercial Documentation for BIM

HM Government

Graphisoft & ArchiCAD
Implementing Protocols and Open Standards

Adrian Girling

4th July 2013

GRAPHISOFT ArchiCAD

Creative, productive and enjoyable design experiences for architects

GRAPHISOFT

Protocols & Open Standards

Graphisoft is committed to open standards

- IFC

- COBie

- OPEN BIM network
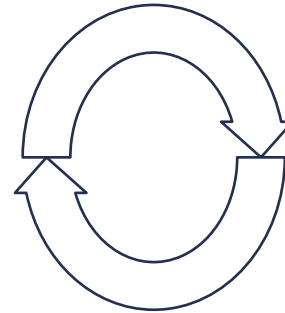
Why ArchiCAD:
BIM Product of the Year 2011 & 2012
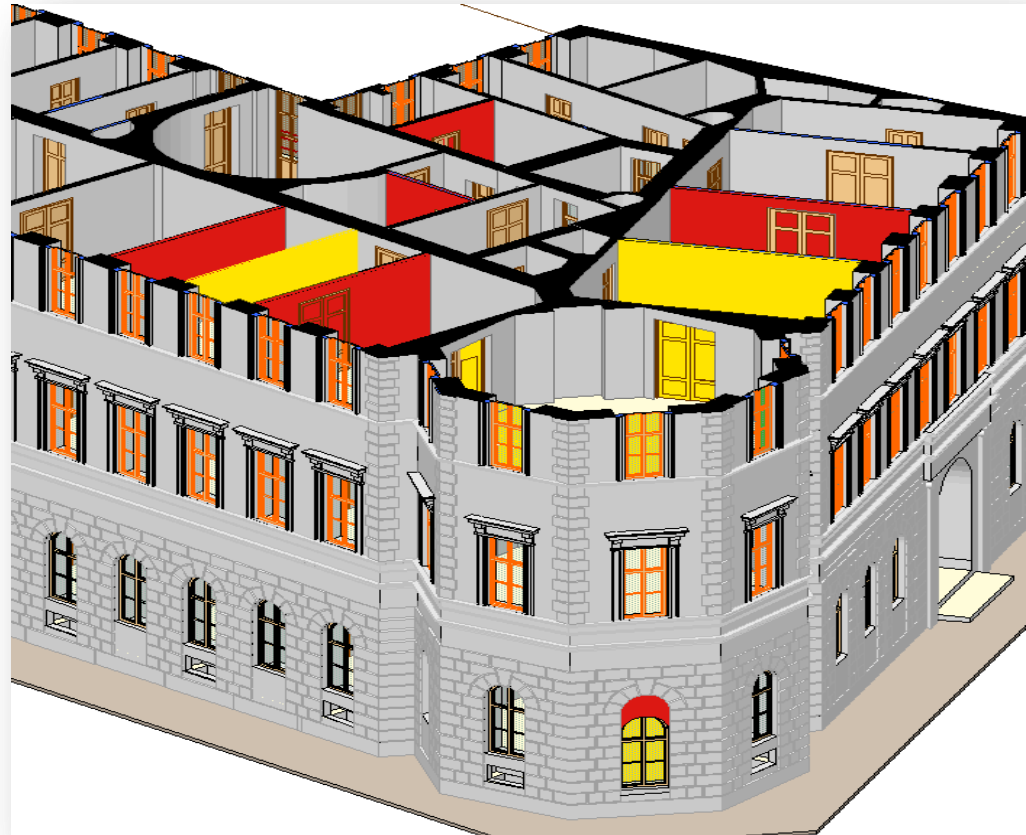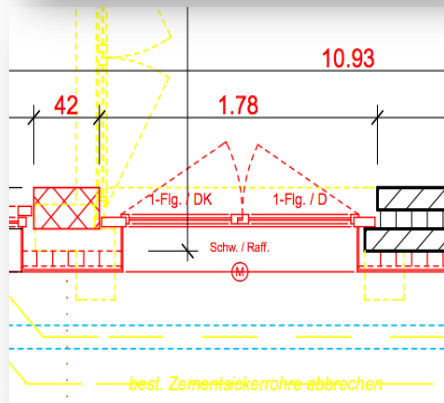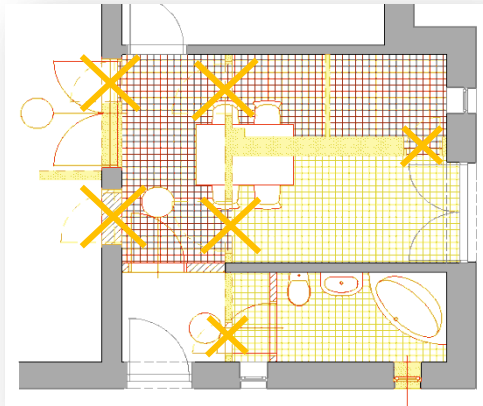
- **Award winning renovation, refurbishment and retrofit facilities.**

Why ArchiCAD: Teamwork

BIM Model Server

● **Only Modified Building Elements**

Data Flow: Elements

Home PC: WAN

Office Workstations: LAN
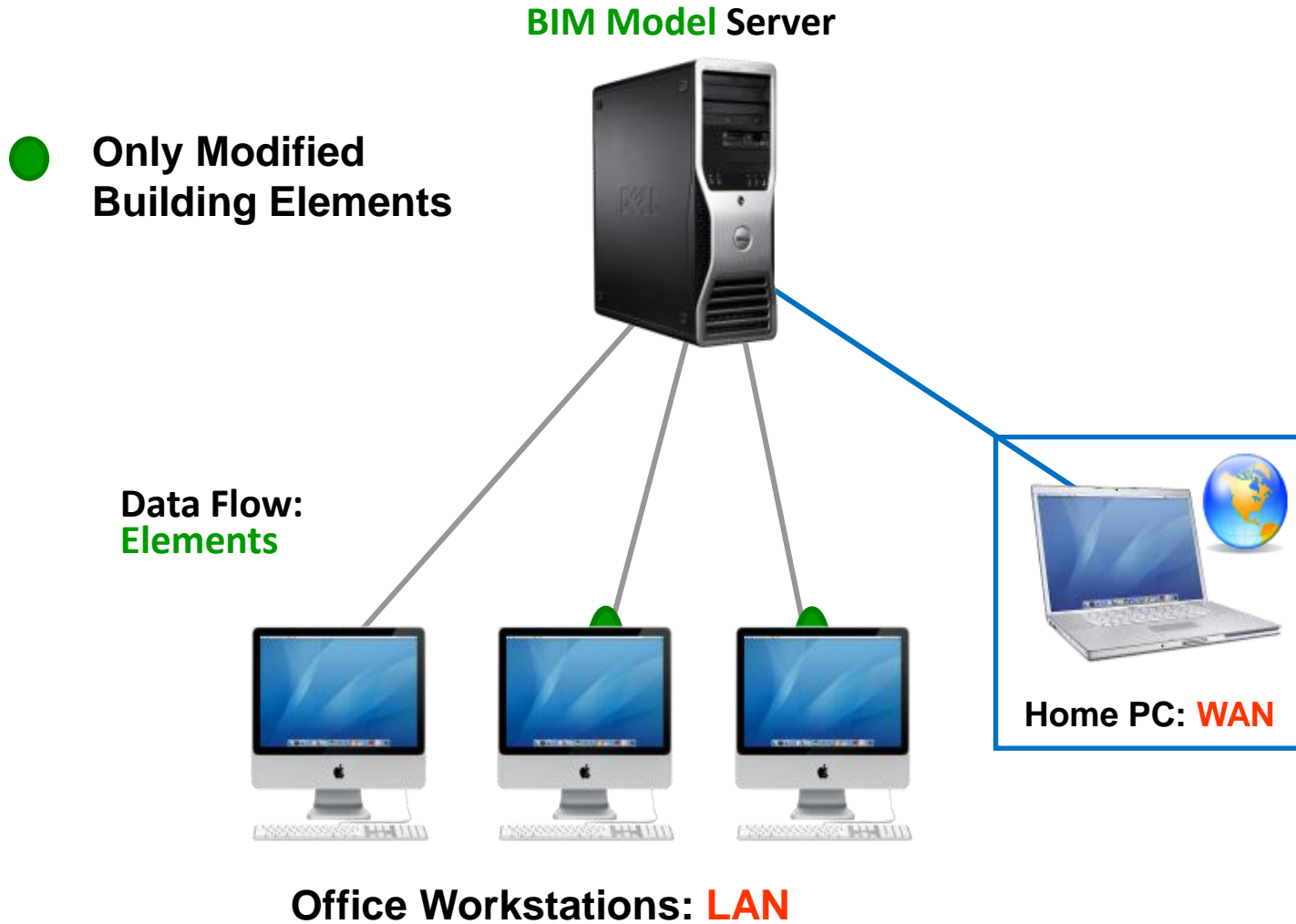
• **Smooth large team, multiple office capability using Delta-Server™ Technology.**

GRAPHISOFT
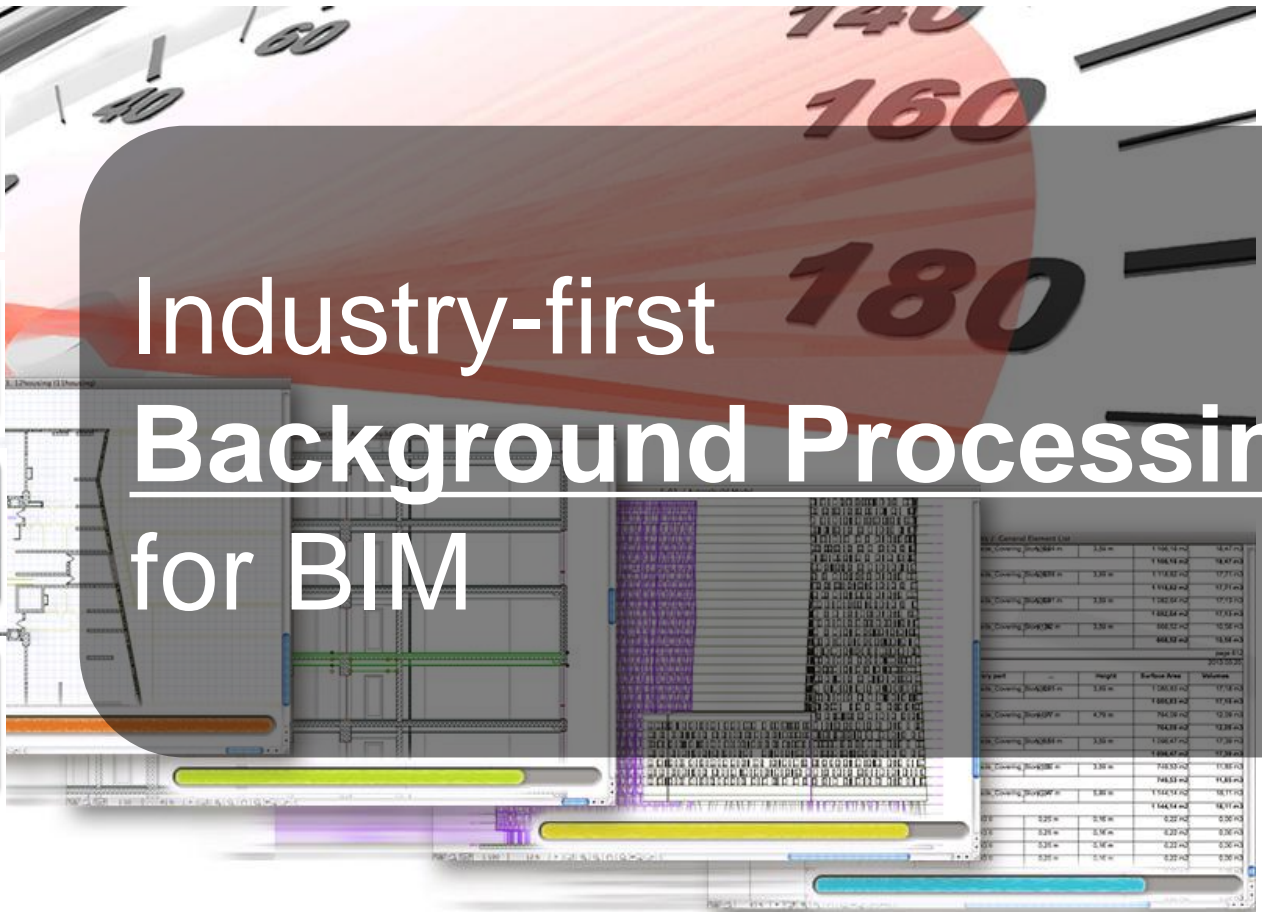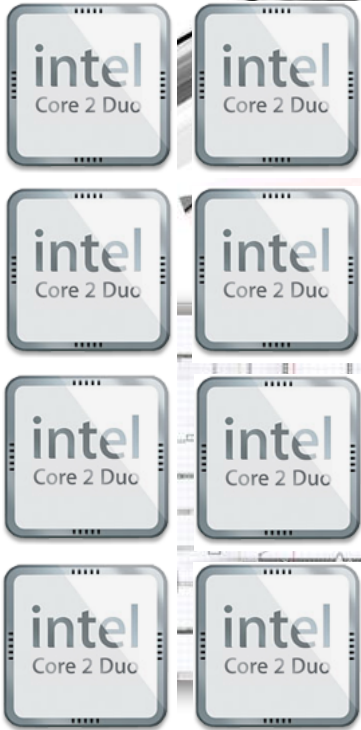
Why ArchiCAD:

The Ultimate BIM Communication Tool
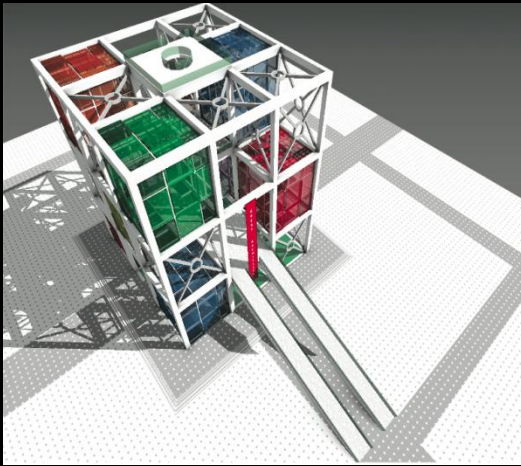
> Navigate

> Display BIM Data
- Material Quantities
- Measure Dimensions
- Show Structures

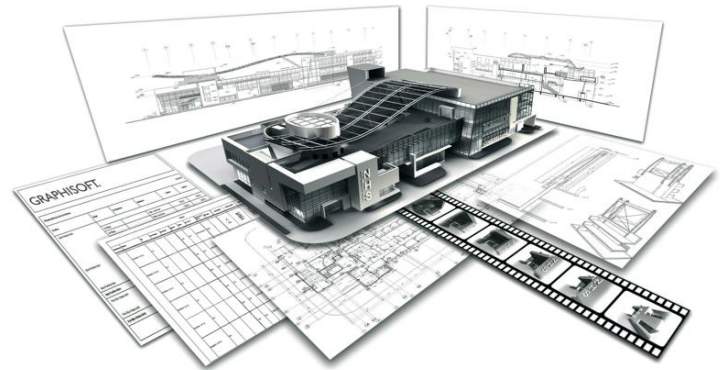- **BIMX Cloud integrated model-sharing service for tablet and smart phone.**

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Why ArchiCAD: Performance

Industry-first
Background Processing
for BIM

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Summary

- Open Standards
  - ➤ IFC & COBie

- ArchiCAD is an OPEN BIM Platform
  - ➤ 3D modelling and documentation for Architects

- ArchiCAD Pilot Scheme

Thank You

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