Hurley Palmer Flatt understand Building Information Modelling (BIM) and have been working with digital representations of physical and functional facility characteristics for over a decade. We ensure client’s visions of building and service installations are realised in the early stages of the design process. The origins of BIM are routed within the process and infrastructure industries but first found their way into the building and construction industries in the mid 1980s with the introduction of Graphisoft’s Archcad package. This was effectively a tool that enabled architects and designers to model buildings in 3D.

It has taken the rest of the construction industry a while to catch up with this technology, but in the last decade the use of BIM technology has increased profoundly and is likely to be considered the norm in the near future, as the benefits are realised.

The release of the government’s construction strategy in May 2011 has helped push the use of the BIM process, requiring all public sector projects to utilise level 2 of the BIM process by 2016.

It is fair to say from an MEP engineering services perspective that the supply chain and contracting sectors need to make a conscious commitment in developments to fully leverage from a BIM philosophy and ultimately its capability.

### BIM drivers

Many factors are driving a de facto standard for a best-in-class way of collaboratively working within one’s own environment, and more broadly working in conjunction with all project participants to deliver more intelligently and effectively.

- Economic pressures
- Reducing costs
- Government changes
- Client request
- Reducing site mistakes
- Developed technology
- Use of digital data

### Client gains

There are clear gains to be had for clients who adopt a BIM approach for their property portfolio and research suggests these quantifiable gains are demonstrable:

- Up to 40% elimination of unbudgeted change
- Up to 65% reduction in time taken to generate a cost estimate
- Cost estimation accuracy within 3% of actual cost
- Savings of up to 10% of the contract value through clash detection
- Up to 7% reduction in project time

### Working in collaboration

Simply put, BIM Level 0 is all about using the right tools – CAD. At BIM Level 1, Hurley Palmer Flatt is committed to working smarter and harder in collaboration across all of its internal divisions using 2D and 3D models.

For BIM Level 2 and on a wider scale, Hurley Palmer Flatt are one of the industry’s leading building services design engineers. Trusted advisors who have attracted external project partners who in collaboration have collectively built robust building solutions by using industry standard tools on known technologies.

Integrated BIM (iBIM) is the next step and we are ready! We have tested our own internal pilot data system using Deltek and its SQL data server. This allows us to capture manufacturer’s object information and present detailed object specifications linked to our design models. We are committed to supporting a wider iBIM deployment, as supply chain participation increases over the coming years.

### Further developments

- **4D - time**: Virtual representation of project phasing and sequencing, plant replacement strategy analysis CFD modelling.
- **3D - costs**: Costs allocated directly to design objects that generate analysis and the cost impact for changes.
- **6D - lifecycle management**: Ensuring maximum value is achieved throughout the lifecycle of your asset.

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**BSI/B555 Roadmap Model**

- **Level 0**: CAD - drawings, lines, arcs, text etc.
- **Level 1**: 2D / 3D - models, objects and data with full team collaboration
- **Level 2**: 2D/3D - models, objects and data with full team collaboration
- **Level 3**: Integrated BIM using single model with multiple users, Fully interoperable data exchange
**Hurley Palmer Flatt**  
**MEP BIM Overlay to the RIBA Stages**  
May 2012 version - Undergoing change for 2013 to further integrate with CIC proposals.

### INTRODUCTION TO THE WORK STAGES

At Hurley Palmer Flatt we have traditionally worked within the RIBA and ACE work stages when delivering our services for clients. Since the release of the RIBA work stages (May 2012), which now incorporate the architectural BIM work activities, we have looked at the synergy with our own BIM work activities and demonstrated above where we fit into the life of the model, and reflected in our BIM activity work steps 1-6 overleaf.

We believe this level of service delivery will ensure a fully collaborated design, with the appropriate level of energy monitoring and feedback. Furthermore, we are aware that RIBA are looking to collaborate more with the wider construction audience in relation to workflows, and our strategy will be adjusted to suit this deliverable once completed.

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<table>
<thead>
<tr>
<th>Preparation</th>
<th>Design</th>
<th>Pre- Construction</th>
<th>Construction</th>
<th>Use</th>
<th>R&amp;D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Appraisal</td>
<td>Design brief</td>
<td>Concept</td>
<td>Design development</td>
<td>Technical design</td>
<td>Production information</td>
</tr>
</tbody>
</table>

- Advise client on purpose of BIM including benefits and implications. Agree level and extent of BIM including 4D (time)  
- SD (cost) and 6D (FM) following software assessment. Advise client on Integrated Team scope of service in totality and for each designer including requirements for specialists and appointment of a BIM Model Manager  
- Define long-term responsibilities, including ownership of model  
- Define BIM Inputs and Outputs and scope of post-occupancy evaluation (Soft Landings)  
- Identify scope of and commission BIM surveys and investigation reports.  
- Data drop 1

> **Hurley Palmer Flatt BIM Strategy step 1**  
> **Hurley Palmer Flatt BIM Strategy step 2 & 3**  
> **Hurley Palmer Flatt BIM Strategy step 4 & 5**  
> **Hurley Palmer Flatt BIM Strategy step 6**

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“We have looked at the synergy with our own BIM work activities and demonstrated above where we fit into the life of the model’
Our BIM strategy

We pride ourselves on fully appreciating the client’s objectives. From day one our BIM Manager will employ a six step BIM strategy, starting with a full appraisal briefing session to understand what our clients goals really are. Each milestone is manageable and our BIM Technicians will ensure a seamless stepped approach to building implementation. Once the project goes live, we provide visibility through our monitoring and feedback to ensure that our client’s aspirations are fully met for the lifecycle of the facility.

STEP 1 APPRAISAL
- Engage with the BIM team and contribute to the client
- Discuss and agree level of BIM to be used
- Discuss and agree how BIM will integrate with the master model
- Discuss and advise the technical software that BIM will use
- Advise any specific BIM surveys required from the engineering services perspective

STEP 2 DUE DILIGENCE
- Review model produced by the Architect and advise any quick wins
- Carry out high level environmental analysis using IES software model and data provided by the Architect to build thermal model and inform any further adjustments to maximise energy and carbon reduction benefits
- Review any prefabrication opportunities for the engineering services
- Review and agree with the BIM team, extent of performance specified elements of the engineering services

STEP 3 SCOPING WORKSHOP
- Attend workshops to review all the elements discussed at steps 1 and 2 to ensure that the scope of our works is clear and any options are viable
- Discuss and agree any changes to the master model in terms of logistics, prefabrication, plant or riser location etc.
- Agree procedure for clash detection and frequency of uploading to avoid abortive works
- Agree level of data to be attached to the various objects
- Agree use of generic or bespoke engineering services design components

STEP 4 LIVE TESTING
- Check that all links are correctly operating for data sharing and integration
- Check that the uploading of models and data is working
- Check that the model changes from each member of the BIM team is being received correctly with the data intact
- Issue areas of engineering service detail to BIM to facilitate any coordination in critical areas, such as plant rooms, service risers, and service routes

STEP 5 IMPLEMENTATION
- Complete details of thermal model working closely with other members of the BIM team to maximise energy and carbon reduction with the IES modular design tools
- Complete design using technical software for all engineering service disciplines and feed this into the detailed design model to finalise all objects with tagged information to allow input to the relevant schedules (COBie or otherwise)
- Discuss and agree any modifications necessary to overcome any clashes detected
- Attend ongoing workshops to ensure the collaboration process is successful and the collective individual models sit within the master

STEP 6 MONITORING AND FEEDBACK
- Review energy data obtained after a seasonal usage of the building to assess actual data against the intended design energy consumption and building operation
- Advise any issues or anomalies found that could be as a result of poor engineering services operation, staff training or any immediate faults found

Glossary of Terms and Acronyms used in BIM

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
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<tr>
<td>AIM</td>
<td>Architectural Information Model</td>
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<tr>
<td>BIM</td>
<td>Building Information Model</td>
</tr>
<tr>
<td>BIM Task Group</td>
<td>A group that brings together expertise from industry, government, public sector, institutes and academia to help deliver the government’s construction strategy</td>
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<tr>
<td>BPMN</td>
<td>Business Process Modelling Notation</td>
</tr>
<tr>
<td>BSIM</td>
<td>Building Engineering Services version of the common model</td>
</tr>
<tr>
<td>CDE</td>
<td>Common data environment</td>
</tr>
<tr>
<td>CIC</td>
<td>Construction Industry Council</td>
</tr>
<tr>
<td>COBie</td>
<td>Construction Operations Building Information Exchange</td>
</tr>
<tr>
<td>Core Maturity Model</td>
<td>Model used within BS 1192:1 to define levels of BIM as follows:</td>
</tr>
<tr>
<td>Data Drops</td>
<td>A level of data as yet undefined that will be the output from the BIM process at various stages</td>
</tr>
<tr>
<td>EDMIS</td>
<td>Electronic Digital Management System</td>
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<tr>
<td>ERP</td>
<td>Electronic reporting process</td>
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<tr>
<td>IER</td>
<td>Information Delivery Manual</td>
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<tr>
<td>IFD</td>
<td>International Framework for Dictionaries</td>
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<tr>
<td>IFC</td>
<td>Industry Foundation Classes</td>
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<tr>
<td>IPO</td>
<td>Integrated Project Delivery</td>
</tr>
<tr>
<td>IFM</td>
<td>Facilities Information Model</td>
</tr>
<tr>
<td>Government Construction Strategy</td>
<td>Issued in May 2011, spells out the Governments 4 year programme, in Construction, including the use of level 2 BIM on all public sector projects by 2016 (3D collaborative models with all project and asset information, documentation and data being electronic)</td>
</tr>
<tr>
<td>Meta Data</td>
<td>Data used for the description and management of documents and other containers of information</td>
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<tr>
<td>PAS</td>
<td>Publicly Available Specification</td>
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<tr>
<td>SIM</td>
<td>Structural Information Model</td>
</tr>
</tbody>
</table>

Standards and Codes used in BIM

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIA E202-2008</td>
<td>Building Information Modelling Protocol produced by AIA used in the UK as a reference document</td>
</tr>
<tr>
<td>BS 1192:2007</td>
<td>Collaborative production of architectural, engineering and construction information. Code of practice</td>
</tr>
<tr>
<td>BS 7000-4:1996</td>
<td>Design management systems. Guide to managing design in construction</td>
</tr>
<tr>
<td>BS 8541-1:2011</td>
<td>Library objects for architecture, engineering and construction: identification and classification</td>
</tr>
<tr>
<td>BS 8541-2:2011</td>
<td>Library objects for architecture, engineering and construction: recommended 2D symbols of building elements for use in building information modelling</td>
</tr>
<tr>
<td>BS 8541-3:2011</td>
<td>Library objects for architecture, engineering and construction: shape and measurement</td>
</tr>
<tr>
<td>BS 8541-4:2011</td>
<td>Library objects for architecture, engineering and construction: attributes for specification and assessment</td>
</tr>
<tr>
<td>BS ISO 29841:12010</td>
<td>Building information modelling, information delivery manual part 1: methodology and format</td>
</tr>
<tr>
<td>PAS 1192:2012</td>
<td>Early adopter document to enable the delivery of HMIG BIM strategy projects to level 2 maturity indicator</td>
</tr>
</tbody>
</table>
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