Constructing Excellence and BIM

CONSTRUCTING EXCELLENCE
in the built environment

Introduction

In late 2009 the membership of Constructing Excellence identified five key strategic issues where there would be value in a better understanding for member companies and the wider industry. Task groups were formed to review each topic in a strategic way: Nuclear, Lean, Asset Management, Building Information Modelling (BIM) and the Economy.

In establishing a task group on BIM it is debatable whether any of us anticipated the rate at which BIM would subsequently come to the fore. We had seen that there were increasing numbers of conversations about BIM in the UK, and some good examples of its use on large projects, but there seemed to be little widespread use across the industry.

As a subject BIM wasn't new to us. We had already begun work on a series of case studies (which were published in February 2010), and prior to that we led the Avanti project in 2001-5, which became the basis of British Standard BS1192, which was a BIM predecessor. So, at Constructing Excellence, we love BIM. You can't use BIM without adopting integrated working. And we have 12 years' worth of evidence that shows that integrated working produces a better end result than traditional, sequential design-bid-build too often procured using lowest price

What next?

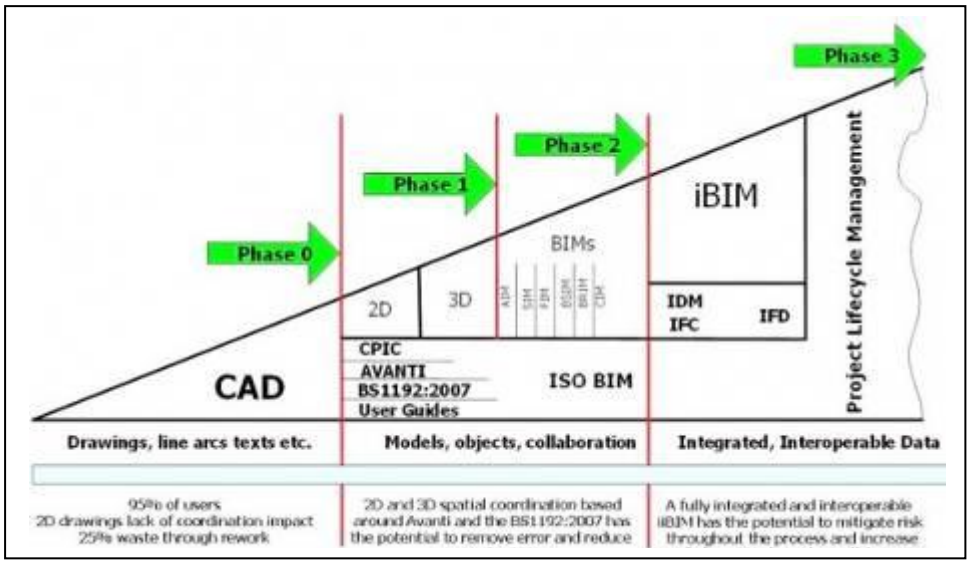
There are a number of challenges if our industry is really going to take advantage of what BIM can offer. Some of these are technological; interoperability of systems is always seen as a key barrier to implementation. Clearly this is an important issue but perhaps not as much of a deal breaker as some imagine. There are some great examples of where supply chains, with partners using different systems, have used BIM and just kind of made it work. This is clearly not a long-term solution. Certain types of information, which could be incredibly valuable to clients for asset or facilities management, cannot easily be transferred by using such 'fudges'. For people interested in interoperability we would commend the work of buildingSMART.

As well as the technological challenges there are a number of issues that are process-based; these are the ones that our members are most concerned with. There has been substantial debate over ownership of the model within our group. However, there is a strong view within Government that there is no issue here. If one listens to Paul Morrell, the government's Chief Construction Adviser, his view is that if a model is being funded by a client then it should belong to them (clearly with deals to be done over fair usage of the data within). There are also differing views over allocation of risk where various parties are working from a shared model. Again, to date, these issues haven't prevented companies exploring the use of BIM within certain parameters. However, if the extent to which BIM is used is to increase markedly the level of knowledge on how these issues can be overcome needs to filter down from the early adopters to the majority.

Our vision is of an industry that uses an integrated approach and BIM processes and tools to delight its customers and demonstrate to them the value of the built environment. The road to BIM is a journey and we're delighted that the industry has taken the first few steps.

The Constructing Excellence Building Information Modelling (BIM) Task Group is chaired by John Lorimer of Manchester City Council and has sought to assist members in preparing themselves for the anticipated increase in the use of BIM and a change in the 'level' at which it is used. Figure 1 (below), shows the phases of introduction of BIM to the sector; arguably the destination at Phase 3 is some way off – the industry is somewhere between Phases 1 and 2 at present.

Figure 1



What is clear is that a commitment to an increased use of BIM exists within Government. The November 2010 Innovation and Growth Team report featured two relevant recommendations:

Recommendation 3.11
That the industry should work, through a collaborative forum, to identify when the use of BIM is appropriate (in terms of the type or scale of project), what the barriers to its more widespread take-up are, and how those barriers might be surpassed, leading to an outline protocol for future ways of working.

Recommendation 6.14
That Government should mandate the use of Building Information Modelling for central Government projects with a value greater than £50 million.

Furthermore, Government, led by the Chief Construction Advisor, established two Task Groups in 2010 to consider some of the barriers to BIM as described above. A group of BIM products suppliers has been brought together to consider the barriers caused by a lack of interoperability between different systems.

A second group has been established to consider the contractual and supply chain issues around BIM and it is in supporting this Government review that the Constructing Excellence Task Group has been especially active.

A number of sub-groups have been established to consider particular issues and, over the following pages, details of how Constructing Excellence has responded are featured.

1) **Commercial, Contractual and Legal Issues**

2) **Delivery Standards**

3) **Training and Accreditation**

Delivery Standards

The Delivery Standards sub-group has considered the case for an increase in the uptake of BIM by understanding the evidence that supports such a business case.

At present it is difficult to make a serious business case for BIM due to the lack of available data from projects that have used modelling in a significant way. However, many with the sub-group consider that the uptake of BIM is analogous to the increase in use of extranet technology that has taken place since the late 1990s.

Extranet systems are now commonly used by contractors as a portal to share information and track the flow of information for a construction project. Many reports have been issued over the past ten years identifying the need for the construction industry to improve communication and collaboration through the use of Information Technology. Managing information is a key factor to the success of a construction project and increasing the efficiency of this process provides contractors, design teams and ultimately the Client with many benefits. The Network for Construction Collaboration Technology Providers identified in a report in 2006 what the potential benefits of utilising an extranet system to be:

- Improved communication
- Improved RFI process
- Improved drawing review and issuing
- More efficient document management and file storage
- Documents can be accessed 24/7
- Less money spent on couriers/post
- Less chance of losing important documents
- Better audit trail
- Lower document distribution/production costs
- Finding archived information faster and easier
- Better version control
- Better geographically dispersed collaboration
- Easier to find and retrieve the right document

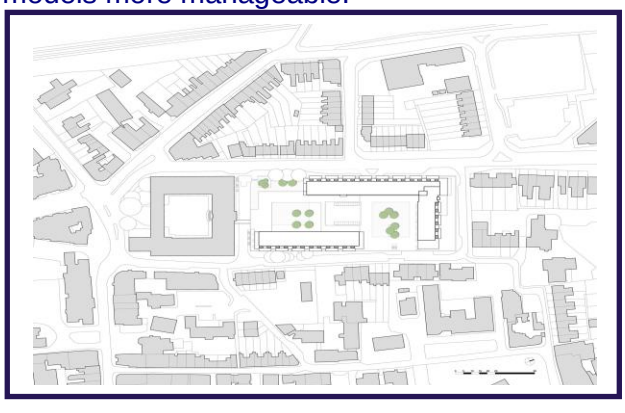
Although it is hard to quantify such benefits, a study was undertaken in 2003, The Compagnia Survey, which looked at the generic impact of collaborative applications within the construction industry and reported:

- Potential direct cost savings of up to 1.28% (print, post, courier etc)
- Potential indirect cost savings of up to 4.28% (time, man hours, travel)

The successful use of extranet systems to co-ordinate and share project information is dependent on the contractor's ability to set up and manage protocols, this process orientated management is required to deliver a successful model based project.

BIM is the process of generating, developing and managing information by creating real-time data in one location. To manage this information on one model will require a rethink of the design process and the design responsibilities / deliverables at each stage. There are three key elements which the contractor should determine: the library of materials; the level of information and design responsibilities for each stage; and the QA procedure to ensure that change control and model revisions are managed efficiently.

The catalogue of products, materials and construction types should be developed and controlled by the contractor and be a direct reflection of the contractor's supply chain. The library should also be split into levels, i.e. a model can be developed in Level 1 (Spatial only) to which the contractor can apply a variety of Level 4 (supplier / product selection) to give the client a number of costed options early on in the design process. This also makes the transfer of models more manageable.



Work stages should be developed to coincide with the RIBA work stages and the level of information that the model is to hold should be agreed within the consultant appointments, i.e. Stage C model is to have spatial / massing, general arrangement of spaces, elemental types (Level 2 library) etc. Between work stages the model should be owned and controlled by the lead consultant, this allows each consultant to develop their own individual models which are transferred into the main model and co-ordinated by the lead consultant. This process becomes more complicated once you get to the Stage E/F model where the information is required progressively by the contractor to procure packages early enough to allow the team to integrate the subcontractors information where required. There would need to be continual model freeze points and continual transfer of model ownership between the contractor and the lead consultant.

The QA Procedure determined by the contractor is of upmost importance to ensure that all parties using the model are aware of its status. There would need to be an agreed issue, status, draft and file reference system. The use of extranet systems does aid the control of the model and ensure that everyone who logs on to work on the model is aware of its status and what parts of the model are frozen.

All of the above needs to be agreed within the consultant appointments.

Contracts and Legal

The purpose of this document is to provide views on best practices for contractual and legal obligations for the implementation of Building Information Modelling (BIM).

At present significant legal and contractual barriers exist to an increased uptake of BIM, in particular in the areas of ownership and fair use of models and the data contained within them. This concern is most prevalent when considering the product and component libraries used to populate a model. The creation of these models in particularly resource intensive and therefore they are often jealously guarded. This locking of F,F&E is currently achieved through a variety of methods ranging from providing information in Navisworks files to simply not providing the data in a 3D format in the first place.

Below is a response to these issues from the Contracts and Legal sub-group to the Constructing Excellence BIM Task Group.

Copyright and IP

Irrespective of the differing levels of BIM integration, information created by any entity is deemed as their property, unless permission has been granted for the sharing of information. For components, assemblies and families created in the BIM environment,
developers need to enhance technological capabilities or an add-on needs to be developed that allows data fields and parameters to be locked for editing outside the scope of specific projects. This approach will allow organisations to author created elements, providing more confidence to share information and reduce legal disputes.

A further option which could possibly eliminate copyright and IP barriers is the creation of a fully populated open source information repository for the sector. Organisations would be driven to contribute towards development and use of this portal could be mandatory for all public framework projects.

Ownership and Sharing of Data

It could be envisaged that in a BIM environment a key requirement for consultants could be to share information with the wider project team, without the addition of separate contracts and agreements, in respect of specific parties. Furthermore, there could be scope to incorporate penalty clauses in contracts to ensure all stakeholders cooperate and communicate relevant information at the required time.

To ensure the protection of intellectual property, legal obligations could be put in place for project consultants to ensure that any information is not used outside the scope of the project unless the relevant permissions are obtained. This would specifically mean that any information obtained from project partners could not be used, exploited, disclosed, copied, reproduced or transformed.

Integration with Existing Standard Contract, Appointment and Framework Families

The contractual relationship between a consultant and client does not change. Scope of work and fees are fixed in reference to appointment. Any additional work outside scope of work will be charged out at the rate specified by a consultant.

A framework agreement between consultant partners will need to have a greater emphasis on collaborative working. Contracts specified by clients or contractors need to be issued to all members of the project team, including supply chain members, specifying the need for integrated project delivery and collaborative working.

Other Commercial Issues

Specification of a clause which limits liability in certain circumstances, i.e. information disclosed accidently or unknowingly could be employed. Moreover, collaborative agreements e.g. BIM execution plans which need to be adopted by the consultant members are also seen as important. Please refer to appendix A.

There is a view within the Constructing Excellence Task Group that the sharing of information need not be contractual but rather a mutual agreement, such as one would find within a ‘partnering charter’.

Training and Support

This document provides recommendations on a development framework for training and support initiatives in line with the adoption of BIM methodologies.

Members agreed that a separate BIM course would be unhelpful and could lead to a new project team role (such as that of BIM Enabler). Instead, there should be knowledge of how BIM works and adds value throughout the project team.

However, embedding BIM into existing courses would be a significant challenge with most institutions having around 100-150 accredited courses.

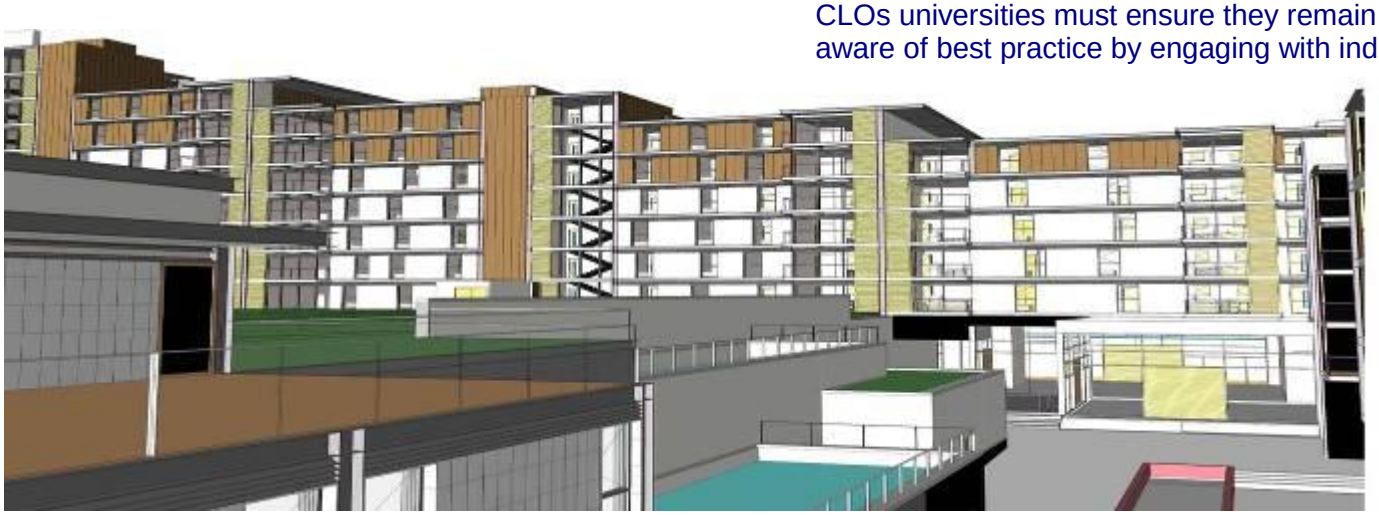
Consideration needs to be given to current professionals employed in the AEC industry and undergraduate students studying courses in relation to specific disciplines and the built environment. Courses accredited by industry institutions and universities are a key requirement, in providing individuals with the knowledge and expertise of BIM workstreams, technologies and processes.

Qualifications, i.e. Diploma, BSc, MSc and CPD accreditation for higher learning, are feasible options for development. Course modules need to offer a variety of subject areas for study in terms of theory and practical workshops.

It was noted that in the USA that students studying across all professions have to do a BIM module which has a mandatory pass attached to it and it was agreed that this would be a useful approach within the UK. What is clear is that for academic courses to be of value they should reflect the way in which the industry is required to work. It is interesting, as Constructing Excellence has stated, that the current use of collaborative working within the industry is not reflected in course syllabi. One example of how this could be resolved is for one module each year to focus on all design disciplines working together on a project in the same way that the industry is expected to operate; this would promote collaborative working (although it is recognised that logistically this could be difficult to achieve).

It should be noted that in 1997 all major professional bodies signed up to the Common Learning Outcomes (CLOs) covering Built Environment HE programmes. Through consultation with the professional bodies and academia, a revised set of CLOs was developed to reflect the changing needs of the industry.

Each professional body is at liberty to choose the means by which evidence of the Common Learning Outcomes is collected and assessed, to best suit their own systems and processes. In many cases, assessment of courses against the CLOs will coincide with the regular time-scale for general accreditation of the course by the professional body. In order to deliver against the CLOs universities must ensure they remain aware of best practice by engaging with industry.



The Constructing Excellence sub-group has proposed the following first principles:

- BIM should provide the opportunity to promote collaborative working methods. We do not see it as an opportunity for new courses or qualifications and another layer of management in the process.

- The role of a BIM coordinator for each project may be beneficial to maintain some consistency and continuity.

- BIM application software provides a means for delivering designs, commercial, construction or facilities management more effectively and efficiently.

- Resellers are experienced in providing high level training and support but “the industry” in using applications in real time situations is leading in applications awareness and use.

- Larger software developers offer packages free of charge to students but do universities have the expertise on BIM applications? It appears to be that the technical application of BIM rests currently within the industry

- We cannot ignore the take up of BIM in the United States or in Europe and if companies are actively using applications to provide an improved service then we could learn from them.

- Students could use web tutorials on product training, online seminars, career network sites, and reference books to familiarise themselves with new software

- Universities may recommend students be instructed to seek work placements within organisations who are actively using BIM during year out periods.

- Organisations need to understand the benefits of working with academic and professional institutions. Many companies endorse graduate training programmes etc but this is limited to the brightest and best.

- Until computer technology changes common standards and a platform for interoperability are crucial if competition in software development is to be maintained.

Other activity

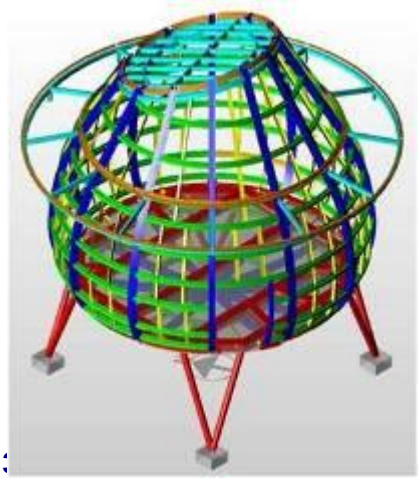
In addition to informing the Government BIM review, the Constructing Excellence BIM Task Group has delivered three further key activities which are described below:

1 Show and Tell

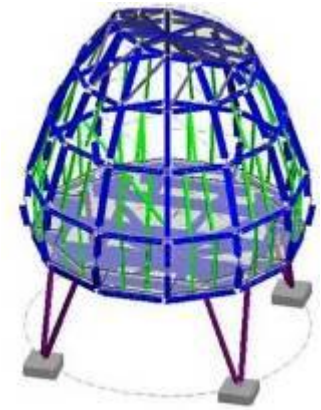
Firstly, through a range of 'show and tell sessions' we have operated as a 'support network' for members who have implemented or are attempting to implement BIM on their own construction projects.

We are grateful to the following member organisations that have presented to date:

- BAM Construct
- Davis Langdon
- FaulknerBrown Architects
- Laing O'Rourke
- Vinci Construction
- Waterman Group



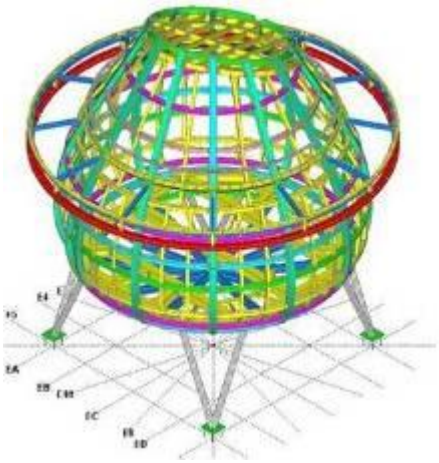
Constructing Excellence partnered with BSRIA, CIRIA, UKCG and CPIC to deliver a one day conference on BIM in November 2011. John Lorimer chaired the event on behalf of Constructing Excellence and members Eversheds and Faulkner Browns also presented. The presentations from this event can be accessed from: http://www.bsria.co.uk/services/design/bim/bim2010/



2 Knowledge Hub

The members of Constructing Excellence agreed that it would be valuable were a 'Knowledge Hub' be formed on the Constructing Excellence website, providing links to sources of information delivered across the industry.

The Knowledge Hub can be reached at: http://www.constructingexcellence.org.uk/sectorforums/buildingestatesforum/activities/wg8.jsp



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Constructing Excellence is committed to reducing its carbon impact | Photograph courtesy of Elizabeth II Court, Winchester, Hampshire County Council (Page 4); Oratory at BSF School, West Dunbartonshire, BAM Design Ltd.
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