BIM
Outreach

O2   *Architects & Building Designers – What does BIM mean to my business?*

02

BIM IN PRACTICE

CONSULT AUSTRALIA

Australian
Institute of
Architects

BIM Outreach

O2 Architects & Building Designers – What does BIM mean to my business?

Contributors:

Toby Maple (Chair), HASSELL

Glenn Cunnington, Humphrey + Edwards

John Hainsworth, Arup

Belinda Hodkinson, Sinclair Knight Merz

Daniel Jürgens, Cox Architecture

Peter Liebsch, Grimshaw

Darren Tims, Rice Daubney

Flavio Yamauti, Hansen Yuncken

O2   Architects & building designers – What does BIM mean to my business? [Version 1 – August 2012]

CONSULT AUSTRALIA

Australian Institute of Architects

INTRODUCTION

Building Information Modelling (BIM) is a digital representation of a project which contains additional information about building elements, their properties and the construction process. This information (or data) can be used throughout the entire building lifecycle from concept, through documentation, into cost management, construction logistics, project management and facility operation.

BIM is not an application or specific piece of software (although there are many) – it is a process, a methodology.

TECHNOLOGY

You can compare traditional 2D CAD to a digital drawing board, where lines are drawn to represent parts of buildings. BIM is profoundly different. It is the digital equivalent of a physical building where all disciplines and stakeholders in the project collaborate in 3D to digitally construct a virtual building. Traditional documentation can be achieved by simply slicing through the model creating views (plans, sections, elevations). However by adding additional information to the objects within the model (fire ratings, space usage, material selections etc.) this information can be accessed by other parties, reducing misinterpretation and increasing knowledge transfer.

You also need to consider that when changes are made to the BIM, or information is manipulated, you are actually modifying an underlying database, not just lines. This database has relationships between elements (e.g. a door hosted within a wall) and those associations will automatically update any manifestation of that change, be it a drawing sheet, a schedule, a perspective view, plan view or any other element.

PROCESS & WORKFLOW

Incorporating BIM into project workflows may require modification of the traditional process of how consultants currently interact with each other.

As the BIM environment includes discipline-specific input from each consultant and designer, this enables the ability to check for clashing geometry or other contradicting information. The true value of this exercise is achieved when all consultants are involved early and contribute to the shared dataset. Managing and maintaining it with up-to-date and accurate information is critical. As the timing of deliverables often varies, similarly reviewing a design that is in flux is challenging, all parties need to agree at the commencement of the project certain milestones, standards and project BIM requirements that need to be achieved. See document **P1 – What is a BIM Management Plan, and why should we use one?** for more information. This will facilitate information flow, enable reviews of the BIM files and facilitate easy amendment. Alternatively, it will identify and document any significant errors that are found within the BIM.

Clash detection is 3D coordination on the BIM to resolve issues. This scope of work typically falls outside of what may be considered as consultant coordination. The process of procurement often requires an extra layer of services that is delivered by subconsultants or subcontractors that are not part of the initial design process. Clash detection enables this new information to be incorporated into the virtual model to increase the efficacy of the design proposal to ensure a risk-reduced construction process.

Image: Architects and Consultants using a combination of traditional (paper) and improved (BIM) means to resolve coordination and constructability issues (Source: HASSELL)

DELIVERABLES & DATA QUALITY

The use of BIM software doesn't necessarily change the end paper deliverable of a project as the actual documentation still materialises into a drawing set. What can change is the extra information that may be passed to the builder and ultimately the client. To ensure smooth workflows between all parties involved it has to be contractually agreed at the commencement of the project what the actual deliverables will be, and to what Level of Development (LoD) all parties will model to. See document **P2 – What should be addressed within a BIM Management Plan?** for details. It has to be clarified early who owns what in each BIM file and how that ownership might change throughout the project lifecycle. This will ensure the resulting BIM is fit for purpose and will enable auditing of the project to ensure each of the models complies with the project BIM plan.

If it is agreed that the 3D model will be provided to any other party outside of the interdisciplinary coordination process during design, a commensurate increase in fees should also be negotiated. See work undertaken by the AIA/Consult Australia on Legal and Procurement issues in the document **L3 – Stakeholders' Responsibilities** as part of this series of documents.

STAFF & NEW RESPONSIBILITIES

New workflows of a BIM project lead to the creation of new roles and responsibilities to maintain and oversee these virtual building models. Two of the most prevalent are the model manager and the project BIM manager. These roles require time to perform their responsibilities; the amount of time required depends on project complexity.

It is common to have a model manager for each discipline (architecture, structure, hydraulic etc) who is responsible for the integrity of their respective discipline-specific BIM file and information within it. The model manager ensures that the discipline-specific model is created according to their office and project standards.

The project BIM manager can be appointed from one of the disciplines or as an independent consultant. This role defines and enforces project standards and agreements, coordinates the collation of discipline-specific BIM files into a federated model, generates and distributes clash detection and audit reports and facilitates subsequent resolution meetings. They typically work on the client's behalf to ensure the best possible outcome for the client's dollar.

COLLABORATIONS & BIM CAPABILITY

BIM without collaboration is not much more than glorified 3D drafting. The real benefit is realised within the collaborative dialogue that occurs between the designers, engineers, the contractor and owner/occupiers.

The change in workflows caused by the implementation of BIM is significant; any discrepancies or lack of model quality can have big impacts on the delivery of a project. It might be beneficial for a practice to review existing and even long-standing collaboration procedures with other practices and consultancies to see if they are able to successfully deliver a BIM project (are BIM-ready) or if they need additional support from your own team.

The same assessment should be carried out internally within the practice to ensure that your own BIM competencies and capabilities are stated correctly.

INVESTMENT & COSTS

Implementation of BIM requires several financial investments as new software licenses can be required. It might be that the software package currently used offers a BIM solution beside your current 2D/3D CAD software and an upgrade can be purchased rather than investing in new licenses.

Hardware also needs to be audited by the IT department to ascertain if the workstations, network and server infrastructure require upgrading. BIM requires substantial increase in hardware over CAD and should not be underestimated. Up-to-date workstation hardware also shows a significant improvement of production speed (best value for money) and therefore productivity as a whole when accessing memory intensive 3D models.

Staff training is another major investment that needs to be considered and it is crucial to the successful implementation of the new workflow. See the document **E2 – BIM Learning Providers** for details about what is happening within education.

LEGAL

Documents **L1-L4** created by the BIM Legal and Procurement Working Group offer a detailed view on topics like intellectual property, liability and responsibilities. Please refer to those documents for further information.

CONCLUSION

The delivery of a project using BIM can enable information and knowledge sharing unseen in a CAD or 2D environment. This information is attached to the 3D objects in a relational database. This explosion of information needs to be managed by someone – hence new roles and responsibilities have emerged such as the model manager. BIM projects can increase the efficient delivery of traditional architectural services as well as the potential to offer additional services, such as project BIM manager, should the client or builder require them. Technology and training costs need to be factored as a significant cost when implementing BIM.

Summary

- BIM is not an application or specific software – it is a process, a methodology.

- BIM is the digital equivalent of a physical building rather than lines drawn to represent a building.

- Clash detection is a scope of work that falls outside of what may be considered as consultant coordination.

- The true value of BIM is achieved when all consultants are involved early and contribute to the shared data set and the subsequent collaborative dialogue.

- The use of BIM software doesn't necessarily change the deliverables of a project.

- If the deliverables are beyond traditional drawing sets contractual agreements need to be defined at the commencement of the project.

- BIM projects lead to the creation of new roles or responsibilities.

- BIM competence assessment of project teams should be undertaken.

- The change in the workflow between disciplines caused by the implementation of BIM can be significant.

- The implementation of BIM requires several financial investments in training and technology.