

BIM Outreach

05 *Quantity surveyors &
cost planners – How can
BIM improve my business?*

05

BIM IN PRACTICE



Australian
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05 *Quantity surveyors & cost planners – How can BIM improve my business?*

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05 Quantity surveyors & cost planners – How can BIM improve my business? [Version 1 – August 2012]

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INTRODUCTION – BIM FOR THE QUANTITY SURVEYING INDUSTRY

The evolution of the construction industry and its implementation of Building Information Modelling (BIM) are designed to streamline the lifecycle systems and efficiency for the industry from facilities through to infrastructure. Quantity surveyors will benefit from this new process, due to the automation involved within the BIM tools available. This automation (quantities, areas and volumes) brings BIM to the forefront as a support mechanism for different stages of the quantity surveyors' project involvement.

BIM for a quantity surveyor is designed to streamline the automatic quantity extraction from a model or federated models. A BIM authoring tool uses intelligent (variable) mapping that is linked into a database system with automatic or manual associations. For example, at early stages of a design and estimate the elements are less detailed than for tender design, reflecting the limited information available.

BIM authoring tools have the capability to embed recognised information (or data) and categories into the elemental breakdown (database) of a model. This data is organised differently depending on which BIM authoring tool is utilised for the design. All authoring tools have an embedded system that as an object is selected, modelled or placed it is added to a particular category. An example of this would be when a door is placed into a model it will be placed under the door category in the database. This information is not only used as the identifier of the element but can also be used as the first category to break down the object, this would be consistent with the work break down structure. BIM authoring tools also offer a manual subdivision which is the result of adding a tag, attribute or parameter into the element (often called QSID) thus providing another way to summarise the data set.

The difference BIM brings to the industry is that, when fully realised, you have a complete database of information relevant to the design and delivered in a 3D format. This allows you to not only produce a visual takeoff, but to automatically generate complete object quantities from the model. This means that those elements can be interrogated to provide details such as finished dimensions, quantities, locations and material composition.

As all quantity surveyors know, a simple bill of quantities is not going to provide a substantial report or cost indication on the construction of a facility and at preliminary stage if the design information is not exhaustive. A BIM will break down the model to materials and fabrics where this information exists. It does not acknowledge the project deliverable and how the construction can be achieved for a particular price ie., including temporary works and sacrificial works that may be required. Elemental breakdowns generally will not include the fixing of the elements nor the time and efforts required to complete them or any factor for wastage. A quantity surveyor utilising BIM in their processes can have more billable time to understand how the facility is to be constructed, to consider where value engineering could be beneficial and to estimate costs related to doing rather than simply scheduling materials for ordering.

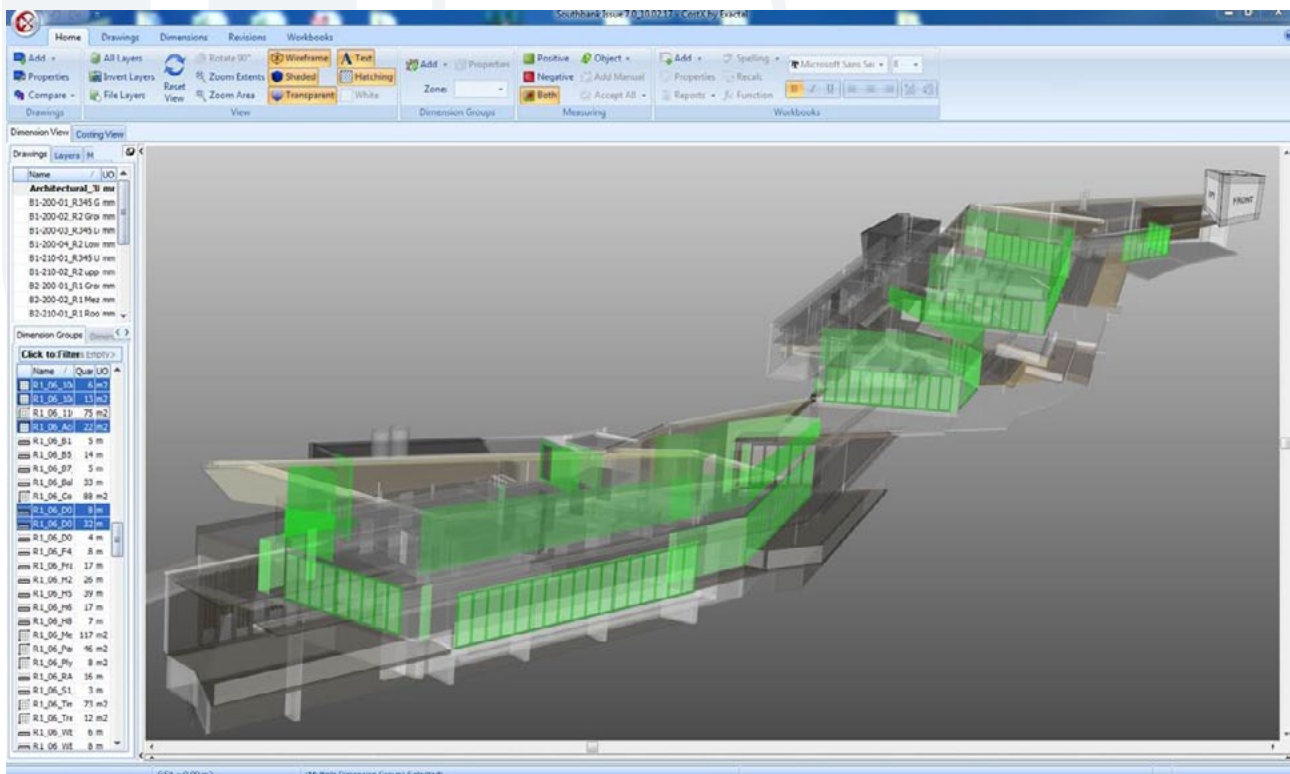


Image: A Building Information Model in a costing application (Source: David Mitchell, MitchellBrandtman)

Stage A - Brief Stage Cost (Indicative Cost)	BIM contributes to the provision of a rough master plan. Mass volumes and areas of different spaces would be produced to indicate the expected use and some estimates can then be compared in line with the client requirements.
Stage B - Outline Proposal Cost (Preliminary Estimate)	To ensure an efficient delivery of the bill of quantities it is imperative that the BIM is configured to construction methodology. This is to ensure the managing contractor can group the activities together and price the project more effectively. Framework to set this up is commonly described as a work breakdown structure (WBS) or standard method of measurement (SMM). In Australia the ACCM (Australian Cost Control Manual) describes the breakdown structure. Preparation of the ACCM elemental breakdown requirements is added to the BIM.
Stage C - Sketch Design Cost (Limit of Cost Estimate)	The model is a rough bill of quantities. This is normally at LoD (Level of Development) starting from 100 at Stage A - LoD 300 by Stage C.
Stage D - Tender Document Cost Plan (Tender Estimate)	Suggested methods of construction will be presented in a visual format for clearer understanding to all stakeholders. The cost planner can utilise the BIM to understand pricings that might have been missed (eg, extra support required below machinery).

Table 1.

HOW DOES BIM SUPPORT THE WORKFLOW OF A QUANTITY SURVEYOR?

BIM offers support to areas of the quantity surveyor roles mostly around the later design and preconstruction stages. A BIM, depending on the decided deliverables, can assist at a low level pre-tender stage through to the high-end bill of quantities methods that are mentioned above.

A brief example of the suggested methods is shown in the table above (these methods can change depending on the procurement model).

A contractor's quantity surveyor can utilise BIM from pre-construction, construction and post practical completion. During pre construction the BIM is broken down into trades. The contractor's quantity surveyor can utilise the bill of quantities extracted for tendering purposes. The numbers can be submitted to each trade along with the model so they can look at the materials needed to tender on the project, once wastage factors have been considered and added.

The contractor's quantity surveyor can keep an eye on the timeline of costs for purchasing and logistics as the model is placed into an aggregation tool to sequence the construction. This supports the quantity surveyor as they define what costs are needed at each stage of the construction process. This is sometimes referred to as 5D.

Finally, the as-built model can indicate the variations in quantum that occurred during the construction process. The QS can use the model to support the understanding of what those variations were and check against the estimated costs. The basis of entitlement will still need to be established but quantifying the effect becomes more transparent. Ultimately the BIM can be completed for 'as-built' post practical completion to ensure any defects are also modelled properly. The 'as built' model could be completed by the contractor or a consultant during the construction process. Field BIM tools can be used so that as modifications are made they are photographed or laser scanned and linked to the relevant areas of the model.

HOW DOES BIM CHANGE THE LEGALITIES OF WHAT A QUANTITY SURVEYOR DOES?

Depending on the type of contract you are committed to the liabilities may still be the same, as in traditional design-bid-build contracts. The only areas you can become unstuck is where you're trusting the software to do everything. A BIM is only one-third of the information you need. Like with CAD, a portion of your role relies on the information given to you by the designer. The rest is where your liabilities sit. When utilising BIM, alliance contracts and integrated project delivery (IPD) are the ideal solutions to address the challenges of liabilities. There are ways to adapt other procurement routes like managing contractor, design and construct, and lump sum to adopt some of the BIM benefits. An incomplete model is no different to an incomplete drawing so cannot be the sole source of information to rely on. More information can be found in the document **L4 - Viable Options - Encouraging Collaboration and 'No Blame'**.

CONCLUSION

A BIM is designed to support the roles of many, acting as a knowledge base to be used for the entire lifecycle of a facility or infrastructure. When broken down, BIM for a quantity surveyor is a support mechanism for the design economics and cost planning/cost management of projects.

Summary

- Utilising the early massing model for Stage A - brief stage cost (indicative cost) is beneficial
- Ask the design teams to assign an elemental cost parameter to all the elements in the BIM for costing as the model progresses through various project stages/phases
- Get the quantity surveyor involved with the design team early to advise on how to model correctly (no overlapping geometry) so accurate quantities can be derived