

Construction Alert

# BIM from a practical perspective

## WHAT YOU NEED TO KNOW

- BIM, or building information modelling, has a proven track record of decreasing the cost and time of project delivery and improving the quality of the final constructed product.
- This article outlines what BIM is and how it is used, before discussing the legal issues and practical matters involved. It then explores the concept that BIM is a project tool to be utilised as the principal sees fit.

## Introduction

"BIM" or Building Information Modelling has a proven track record of decreasing the cost and time of project delivery and improving the quality of the final constructed product<sup>1</sup>. Early BIM demonstration projects have achieved savings of around 20% in the construction phase, some projects are expected to make a 33% cost savings over the life of the project and future projects are targeting even greater savings<sup>2</sup>.

For this reason, BIM is used around the world in countries including Scandinavia, Finland, Denmark, Norway<sup>3</sup>, Singapore, Hong Kong and China<sup>4</sup>. In the United States, the General Services Administration<sup>5</sup> established the National 3D-4D BIM Program in 2003<sup>6</sup> and the use of BIM on projects have grown steadily<sup>7</sup>.

The UK Government has announced its intention to require collaborative 3D BIM on its projects by 2016<sup>8</sup>.

In Australia, the use of BIM is spreading. It has been used in projects including 1 Bligh Street, Sydney, the Sydney Opera House Facilities Management Exemplar Project<sup>9</sup> and the UTS Dr Chau Chak Wing building designed by Frank Gehry<sup>10</sup>. The Department of Defence, one of the biggest asset owners in the country with over 30,000 properties in its portfolio is leading the charge in the use of BIM on its construction projects<sup>11</sup>.

This article will outline what BIM is and how BIM is used, before discussing some legal issues arising from, and practical matters to consider in, the use of BIM. It will explore the argument that BIM is a project tool to be utilised as the Principal sees fit. Whilst BIM will require training, re-education and re think of certain issues, it does not necessarily need a drastic overhaul of the contractual framework – it is the principal's

<sup>1</sup> McGraw Hill Construction, 'SmartMarket Report - The Business Value of BIM - Getting Building Information Modeling to the Bottom Line', (2009) [www.bim.construction.com](http://www.bim.construction.com).

<sup>2</sup> Smith, Michael, What is BIM? (November 2013) NBS <<http://www.thenbs.com/BIM/what-is-bim.asp>>.

<sup>3</sup> buildingSMART Australasia, National Building Information Modelling Initiative, Volume 1: Strategy (6 June 2012) <[http://buildingsmart.org.au/the-national-bim-initiative-1/nbi-folder/NationalBIMInitiativeReport\\_6June2012.pdf](http://buildingsmart.org.au/the-national-bim-initiative-1/nbi-folder/NationalBIMInitiativeReport_6June2012.pdf)>.

<sup>4</sup> Chew, Building Information Modelling (BIM): a construction revolution, Lexology (10 July 2013) <[www.lexology.com/library/detail.aspx?q=715c773d-1984-4292-96ea-fe6a6b49f65b](http://www.lexology.com/library/detail.aspx?q=715c773d-1984-4292-96ea-fe6a6b49f65b)>.

<sup>5</sup> Through its Public Building Services Office of Chief Architect.

<sup>6</sup> buildingSMART Australasia, above n3, p35.

<sup>7</sup> Jones, Stephen, 'Global Industry Trends with Building Information Modeling (BIM)' presentation to the Construction Innovation 2013 Forum (25 July 2013) <<http://www.bimmepaus.com.au/libraries/resources/Forum%202013/mcgraw%20hill%20global%20trends%20with%20bim.pdf>>, slide 9.

<sup>8</sup> United Kingdom Government Construction Strategy, May 2011, <[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/61152/Government-Construction-Strategy\\_0.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61152/Government-Construction-Strategy_0.pdf)>.

<sup>9</sup> Marko Misko and Ilsa Kuiper, BIM, BOOM - is Building Information Modelling coming to a building project near you soon? (24 May 2012), Clayton Utz. <[http://www.claytonutz.com.au/publications/edition/24\\_may\\_2012/20120524/bim\\_bam\\_boom-is\\_building\\_information\\_modelling\\_coming\\_to\\_a\\_building\\_project\\_near\\_you\\_soon.page](http://www.claytonutz.com.au/publications/edition/24_may_2012/20120524/bim_bam_boom-is_building_information_modelling_coming_to_a_building_project_near_you_soon.page)>.

<sup>10</sup> Crenan, Nick and Lindsay Prehn, Building information modelling (BIM) – a new phase for the construction industry in Australia (24 January 2012) CBP Lawyers <<http://www.cbp.com.au/Publications/Building-Information-Modelling-a-new-phase-for-t>>.

<sup>11</sup> Marc Howe, Australian Department of Defence Takes the Lead in BIM (22 November 2013) <<http://sourceable.net/australian-department-defence-takes-lead/>>.

commercial requirements which determine how BIM is to be used.

## What is BIM?

The Associated General Contractors of America defines BIM as:

*"...the development and use of a computer software model to simulate the construction and operation of a facility. The resulting model, a [BIM], is a data rich, object oriented, intelligent and parametric digital representation of the facility, from which views and data appropriate to various user' needs can be extracted and analysed to generate information that can be used to make decisions and improve the process of delivering the facility".<sup>12</sup>*

BIM programs allow the user to walk through and view the final product as if on site. At the touch of a button, walls drop down to expose the building structure, ceilings disappear to allow piping, conduits and services to be reviewed. You can zoom in, zoom out and rotate the 3D model by 360 degrees. Tap on each element of the model, such as a door, and the dimensions of the door, its make and model is displayed. This futuristic and almost surreal program is a far cry from 2D drawings.

The amount of information contained in BIM depends on "level" of BIM. Different levels of BIM are defined as follows<sup>13</sup>:

- **Level 0:** unmanaged CAD in 2D format, with paper (or electronic) data exchange.
- **Level 1:** managed CAD in 2D or 3D format with a collaborative tool providing a common data environment with a standardised approach to data structure and format, however, there is no integration of models.
- **Level 2:** Level 2 BIM can be thought of as utilising a series of "mini BIMs"<sup>14</sup>. Each model is held separately and a change in one model does not automatically result in an update to other

models<sup>15</sup>. The separate models are integrated and clash detection is conducted on a Common Data Environment<sup>16</sup>. Each consultant retains responsibility for its own design<sup>17</sup>.

- a) **Level 3:** A fully integrated and collaborative process enabled by 'web services' and compliant with emerging Industry Foundation Class (IFC) standards. The participants work off one collaborative model which is automatically updated as changes are fed through by different participants<sup>18</sup>.

## BIM use and Benefits

Identified uses of BIM include the following<sup>19</sup>:

- **Design coordination:** BIM allows different design disciplines to coordinate their design more efficiently. For example, if the architect changes the glass specification of a glass atrium, BIM will calculate the change of light and heat and feed this information into the design for the HVAC system, which design can be revised accordingly.
- **Clash detection:** BIM can consolidate into one model the design elements produced by different disciplines and detect any conflicts in design before the commencement of construction. Errors are discovered and fixed in the design phase instead of the construction phase, leading to savings in time and cost by avoiding rework and wasted resources.
- **Sustainability:** BIM can model energy, light and HVAC performance<sup>20</sup> and can be used to design a building with lower environmental impact, for example, by using less material or having a lower carbon footprint<sup>21</sup>.

<sup>15</sup> Koko Udom, *The CIC BIM protocol – a critical analysis* (May 2013) NBS  
<<http://www.thenbs.com/topics/BIM/articles/cicBIMProtocolACriticalAnalysis.asp>>.

<sup>16</sup> *Ibid.*

<sup>17</sup> Cooper, Will and Rachel Chaplin, *Professional appointments and BIM*, (05 August 2013) Clyde & Co  
<<http://www.clydeco.com/insight/articles/professional-appointments-and-bim>>.

<sup>18</sup> Fenwick Elliott LLP, *Insight – Demystifying BIM*, Issue 7 (January 2012)  
<[http://www.fenwickelliott.com/files/insight\\_issue\\_7.pdf](http://www.fenwickelliott.com/files/insight_issue_7.pdf)>.

<sup>19</sup> See e.g. Guerin, Lucy, *Building Information Modelling – What? Why? How?* (2012) McLachlan Lister publication.

<sup>20</sup> Graphisoft and Autodesk have developed programs which have the capacity to assess thermal performance, solar radiation and day lighting, and shadows and deflections, see *Ibid* p19.

<sup>21</sup> Pelsmakers, Sofie, *BIM and its potential to support sustainable building* (February 2013) NBS  
<<http://www.thenbs.com/topics/BIM/articles/bimPotentialSupportSustainableBuilding.asp>>.

<sup>12</sup> Associated General Contractors of America, *The Contractors Guide to BIM, Edition 1*  
<[http://www.engr.psu.edu/ae/thesis/portfolios/2008/tjs288/Research/AGC\\_GuideToBIM.pdf](http://www.engr.psu.edu/ae/thesis/portfolios/2008/tjs288/Research/AGC_GuideToBIM.pdf)>

<sup>13</sup> Pinsent Mason, *Building Information Modelling*, Out-Law.com, <<http://www.out-law.com/en/topics/projects--construction/projects-and-procurement/building-information-modelling/>>

<sup>14</sup> Tyerman, David, 'Building information modelling and change management: a single version of the truth' (2013) 29(4), *Construction Law Journal* 296-307, 305.

- **Code checking:** BIM can preload building codes which feed into the design and show whether or not a building is code compliant.<sup>22</sup>
- **Prefabrication:** BIM provides greater design certainty of pre-fabricated elements, be it concrete structures, panels or facades. This allows more elements of the works to be manufactured offsite<sup>23</sup> and contributes to cost savings.
- **Scheduling and planning:** also known as "4D BIM", the three dimensional model can be integrated with the project schedule to develop "a comprehensive and accurate schedule, facilitating a more tightly managed project".<sup>24</sup>
- **Cost estimation:** Also known as "5D" BIM, a BIM model with sufficient detail on each component of the building allows a bill of quantities to be generated from the BIM<sup>25</sup> - manual work is taken care of by the software application "in a manner of seconds"<sup>26</sup>.
- **Operational and maintenance:** BIM can be updated to the "as built" status (much like the 2D "as constructed" drawings). This is referred to as "6D" BIM, which can contain information such as operational and maintenance manuals, maintenance schedules, suppliers and warranties. These data can be used in the ongoing maintenance of the building<sup>27</sup>.

The benefits of using BIM include<sup>28</sup>:

- better 3D visualisation and thus allowing the client to have a better understanding of the final product;
- improved design;
- improved access to project information throughout project life;
- shorter construction times (by considering constructability issues upfront);
- cost savings;
- improving safety (by removing the need for rework)<sup>29</sup>; and
- improvements to the sustainability of a building.

## Legal issues associated with the use of BIM

BIM is thought to create "new difficulties and different risks"<sup>30</sup>. There is a perception that designers will "suffer a diminution of intellectual property rights and take on unfamiliar liabilities"<sup>31</sup>. This section 4 will explore some legal issues arising out of using BIM.

### Intellectual Property

Commentators often mention intellectual property as a key issue associated with BIM use<sup>32</sup>. One concern is ownership of the BIM. BIM allows data input by multiple parties at the same time and modification of a model based on input by others. If, for example, the contract provides that the author of a product retains ownership, how can one party track what that party has created or contributed and claim ownership?<sup>33</sup>

Nunelah Design Consultants have worked with BIM since 2005 and uses labels to track author of each model element<sup>34</sup>. Provided that the author and

<sup>22</sup> Note however, due to the vast number of different building codes which exist globally, software companies do not provide pre-loaded parameters, rather, the current practice is for the designer to program in the relevant code requirements. Guerin, above n 19, p21.

<sup>23</sup> Guerin, above n 19, p19.

<sup>24</sup> Ibid p15.

<sup>25</sup> Malone, Adrian, Realising the potential of BIM (January 2013) NBS  
<<http://www.thenbs.com/topics/BIM/articles/realisingThePotentialOfBIM.asp>>.

<sup>26</sup> Guerin, above n 19, p17.

<sup>27</sup> Chew, above n 4.

<sup>28</sup> See generally, Chew, above n 4; Marko Misko and Ilsa Kuiper, above n 9; Hoar, Chris, 'BIM: the way forward in UK design and construction?' (2012) Jul/Aug, Construction Newsletter 4-5, 4; Zghari, Ahmed, The cost saving benefits of BIM (May 2013) NBS  
<<http://www.thenbs.com/topics/BIM/articles/costSavingBenefitsOfBIM.asp>>; Morrissy, Julie and Emily Mansfield, BIM – Best Thing Since Sliced Bread? (January 2012) DLA Piper  
<[http://www.dlapiper.com/files/Publication/6a9764b5-6d1e-468a-a981-813fb0b3b889/Presentation/PublicationAttachment/d406d548-72d4-4bfa-b07d-84f744d16372/Engineering\\_Construction\\_Legal\\_Update\\_BIM\\_31\\_January\\_2012.pdf](http://www.dlapiper.com/files/Publication/6a9764b5-6d1e-468a-a981-813fb0b3b889/Presentation/PublicationAttachment/d406d548-72d4-4bfa-b07d-84f744d16372/Engineering_Construction_Legal_Update_BIM_31_January_2012.pdf)>; Howe, above n 11.

<sup>29</sup> Rejendran, Sathy and Brian Clarke, 'Building Information Modelling: Safety Benefits & Opportunities, Professional Safety' (2011) 56(10), p46.

<sup>30</sup> Misko and Kuiper, above n 9.

<sup>31</sup> Newberry, Frank, 'BIM and architects' professional risk', (2012) 28(3) Construction Law Journal 272-274,272.

<sup>32</sup> See, e.g, Misko and Kuiper, above n 9; Udom, Koko, The CIC BIM protocol – a critical analysis (May 2013) NBS  
<<http://www.thenbs.com/topics/BIM/articles/cicBIMProtocolACriticalAnalysis.asp>>; Crenan, Nick and Lindsay Prehn, Building information modelling (BIM) – what should you include in your contracts? (14 March 2013) Lexology  
<[www.lexology.com/library/detail.aspx?q=21669174-a739-4f5e-8683-ad6446d92931](http://www.lexology.com/library/detail.aspx?q=21669174-a739-4f5e-8683-ad6446d92931)>.

<sup>33</sup> See, e.g, Andre, Gregory, Building Information Modelling: Special Contract Issues (10 October 2011), K&L Gates  
<[http://m.klgates.com/files/Publication/91bb453d-7f14-43af-8fb6-c74a78758a86/Presentation/PublicationAttachment/bd33f21-b2e6-4770-ad82-6be4a0a70903/Alert\\_Construction\\_Building\\_Information\\_Modeling\\_October%202011.pdf](http://m.klgates.com/files/Publication/91bb453d-7f14-43af-8fb6-c74a78758a86/Presentation/PublicationAttachment/bd33f21-b2e6-4770-ad82-6be4a0a70903/Alert_Construction_Building_Information_Modeling_October%202011.pdf)>, p4.

<sup>34</sup> For example, all elements created by an architect and to intellectual property is assigned is tagged with "a/IP".

contributor of each BIM element can be tracked, who retains ownership and who retains a licence to use and the extent of that licence, remains a matter for negotiation between the parties. BIM has not changed this.

Another concern is the ambit of BIM use by the principal – for example, whether the principal can use the model for operation and facilities management<sup>35</sup>. Again, this is a matter for negotiation between the parties. If parties agree, the contract can specify that the Principal retains a licence to use BIM for all matters in connection with the works, including operation and management.

### Liability

In a model prepared by multiple parties, an error by one contributor may “cause a ripple effect” throughout the entire model<sup>36</sup>. To be held liable for an error or omission in one’s own model may be acceptable for most participants, to be held liable for error or omission caused by another party but which affects the whole model is less palatable<sup>37</sup>. Concerns remain that the complexity of the integrated design processes in BIM could make it difficult to pinpoint the source of the design problem and the party responsible<sup>38</sup>.

As discussed above, current technology allows the author of new models and amendments to models to be tracked by using labels to identify the author<sup>39</sup>. Provided that it is possible to track design changes and pinpoint liability, use of BIM does not change the fact that contracts will continue to specify the allocation of risk and liability depending on the bargaining position of the respective parties.

---

When this model is used by the structural engineer who makes his/her additional contribution, the element is tagged with “a/s/IP”. In this way, each party’s contribution and intellectual property rights can be tracked. Where there is an issue, parties can also use this system to track the party responsible for amendments or additions and whose amendment or addition caused the error. See Chawla, Raj, *BIM legal issues from a practical perspective* (November 2012) UBS <<http://www.thenbs.com/topics/BIM/articles/bimLegalIssuesFromPracticalPerspective.asp>>.

<sup>35</sup> Morrissy, Julie and Emily Mansfield, *BIM – Best Thing Since Sliced Bread?* (January 2012) DLA Piper <[http://www.dlapiper.com/files/Publication/6a9764b5-6d1e-468a-a981-813fb0b3b889/Presentation/PublicationAttachment/d406d548-72d4-4bfa-b07d-84f744d16372/Engineering\\_Construction\\_Legal\\_Update\\_BIM\\_31\\_January\\_2012.pdf](http://www.dlapiper.com/files/Publication/6a9764b5-6d1e-468a-a981-813fb0b3b889/Presentation/PublicationAttachment/d406d548-72d4-4bfa-b07d-84f744d16372/Engineering_Construction_Legal_Update_BIM_31_January_2012.pdf)>, p2.

<sup>36</sup> Andre, above n 33.

<sup>37</sup> See Andre, above n 33, p4.

<sup>38</sup> Sherman, Henry, *BIM – the way forward* (19 March 2013) Minter Ellison <[www.minterellison.com/publications/BIM-the-way-forward-CLA201303/](http://www.minterellison.com/publications/BIM-the-way-forward-CLA201303/)>.

<sup>39</sup> Chawla, above n 34.

### Insurance

Commentators discuss the inadequacy of existing insurance products to cover the risks associated with BIM. For example, Professional indemnity insurance responds to failure by the insured to carry out its professional duties. In the event of a failure in the design due to software, professional indemnity insurance will not necessarily respond<sup>40</sup>.

Some commentators believe that Level 3 BIM<sup>41</sup> require the insurance market to develop and provide a new “general projects insurance”<sup>42</sup> - into which all members of the design and construction team will contribute premiums.

Putting aside the need for new insurance products, the crux of the issue remains: what risks is the Principal willing to take on which are not covered by insurance? The Principal needs to understand the additional risks associated with the use of BIM, what risks the project participants are able and willing to accept and provide for it accordingly in the contract.

### Confidentiality

BIM allows all participants to access information not usually disclosed to certain parties. For example, the contractor’s costing information included in 5D BIM (for cost estimation) may be proprietary or confidential would not usually be accessible by designers. Commentators express concern that confidentiality is one issue associated with BIM use<sup>43</sup>.

The contract should specify upfront who has the right to access what information and provide that if necessary, different BIM “stripped” of certain information could be prepared. For example, the contract can provide that 5D BIM with costing information can only be accessed on by a quantity surveyor for the sole purpose of verifying the costing information for the Principal, and all other participants only have access to BIM models without this costing information.

---

<sup>40</sup> Andre, above n 33, p4.

<sup>41</sup> See discussion in section a) of this article.

<sup>42</sup> Cooper, Will and Rachel Chaplin, *Professional appointments and BIM*, (05 August 2013) Clyde & Co <<http://www.clydeco.com/insight/articles/professional-appointments-and-bim>>.

<sup>43</sup> See discussion in section 0 above.

<sup>44</sup> See, e.g, Misko and Kuiper, above n 9; Andre, above n 33, p5; Crenan, Nick and Lindsay Prehn, *Building information modelling (BIM) – what should you include in your contracts?* (14 March 2013) Lexology <[www.lexology.com/library/detail.aspx?q=21669174-a739-4f5e-8683-ad6446d92931](http://www.lexology.com/library/detail.aspx?q=21669174-a739-4f5e-8683-ad6446d92931)>.

## Practical issues in using BIM

Industry must understand the various ways BIM can be used - from a model used solely for 3D visualisation to a fully integrated collaborative process between each participant<sup>44</sup>, or uses in between these two extremes. Each approach requires different deliverables from different participants. For example, effective 4D and 5D BIM<sup>45</sup> require the involvement of scheduling experts and quantity surveyors in the design process. Unless project participants understand what is required to facilitate the production of a quality BIM model, its full potential cannot be uncovered.

This section will discuss some practical issues a Principal should consider before using BIM.

### Is BIM appropriate or feasible for the project?

BIM implementation requires an upfront cost to invest in software and training<sup>46</sup>. The initial cost is thought to be one of the biggest deterrents for small businesses<sup>47</sup>. Many second or third tier contractors may not have access to the required software nor the expertise required to implement BIM<sup>48</sup>. Until there is more pervasive use of BIM, there will be duplication and costs associated with producing 2D drawings.

BIM use requires the right people with the appropriate knowledge and training. The Principal should consider whether, in light of the complexity and scale of the project, and having regard to the current players in the market, utilising BIM for a particular project is appropriate or feasible. Of course, if BIM is mandated for use with the particular project<sup>49</sup> this issue will be moot.

### Level of BIM and purpose of BIM

Having regard to the budget, timing and complexity of the project, the Principal should consider the appropriate level of BIM to be used. For some projects, level 1 BIM that would provide client visualisation and a 3D model may be all that is required. For others, level 2 BIM, clash detection and 4D, 5D or 6D benefits may be appropriate.

<sup>44</sup> Fenwick Elliott LLP, above n 18.

<sup>45</sup> See sections □ and □ of this paper.

<sup>46</sup> Newberry, above n 31.

<sup>47</sup> Morrissy and Mansfield, above n 35.

<sup>48</sup> Guerin, above n 19, p30.

<sup>49</sup> Lewis, Simon, *Learning lessons* (August 2013), NBS <<http://www.thenbs.com/topics/BIM/articles/learningLessons.asp>>.

<sup>49</sup> Such as certain government projects, if Australia is to follow the lead of countries like the United Kingdom.

### What is required for an accurate BIM?

The Principal should ensure that the right people are involved at the appropriate time in light of the level and purpose of BIM. For example, 4D BIM requires input from a construction contractor to resolve any constructability issues. 5D BIM still requires an appropriately qualified and experienced quantity surveyor for an accurate product<sup>50</sup>. Past experience suggest that where specialist subcontractors are not involved at the early stages leads to difficulties and further changes are required further down the line<sup>51</sup>. Full benefits of BIM are realized by involving the right expertise upfront in the design phase.

### BIM software and system capacity

There are many programs on the market for BIM and not all are compatible with one another, some examples include<sup>52</sup>:

Modelling Software	Scheduling software	Estimating	Audit and Analysis
<ul style="list-style-type: none"> <li>Autodesk Revit Building Suite</li> </ul>	<ul style="list-style-type: none"> <li>Autodesk Navisworks</li> <li>Synchro Ltd</li> <li>VICO Control</li> </ul>	<ul style="list-style-type: none"> <li>Beck Dprofiler</li> <li>Quantity Take-Off</li> <li>Innovaya</li> </ul>	<ul style="list-style-type: none"> <li>Autodesk Navisworks</li> <li>Solibri Model Checker</li> <li>Ecotect</li> </ul>
<ul style="list-style-type: none"> <li>Graphisoft ArchiCAD</li> </ul>			
<ul style="list-style-type: none"> <li>Beck Dprofiler</li> </ul>			
<ul style="list-style-type: none"> <li>Bentley Building Suite</li> </ul>			

In practice, participants found that agreeing the software upfront ensures efficiency,<sup>53</sup> saves costs and assists with interoperability issues. BIM requires a system which can facilitate large amount of memory and data transfer<sup>54</sup> and recommendations include that BIM be stored on its own server with at least 100 GB RAM available for memory and a gigabit threshold

<sup>50</sup> Guerin, above n 19, p15 -17.

<sup>51</sup> Sawyer, 'Not for the faint of heart - expecting a win by taking on BIM', (2009) Engineering News Record, 262(14), 34-5, cited in McAdam, Brodie, 'Building information modelling: the UK legal context' (2010) 2(3) International Journal of Law in the Built Environment, 246-259, 251.

<sup>52</sup> Guerin, above n 19, p59.

<sup>53</sup> Chawla, above n 34.

<sup>54</sup> Thompson, Neil, Building Information Model density: the results, (February 2013) NBS <<http://www.thenbs.com/topics/BIM/articles/bimDensity.asp>>.

should be maintained at all stages of the network<sup>55</sup>. Principals should ensure that there will be necessary resources and systems to facilitate BIM use.

### Procurement considerations

Before BIM use is more widespread, the procurement process needs to be carefully considered and more forward planning is required where BIM is used in procurement<sup>56</sup>. If the procurement is for a construct only contract (where BIM is already prepared), the Principal should consider whether the tenderers can access and use the electronic BIM<sup>57</sup>. Current practice in the UK is that even where BIM is used to design a project, 2D drawings are subsequently produced for the purpose of procurement<sup>58</sup>.

### "BIM Manager"

Many commentators agree on the need for a BIM manager<sup>59</sup>, although different terminology is used by different commentators, protocols and template contracts<sup>60</sup>.

The BIM manager is responsible for access to the model, security for the model, tracking data entry into the model<sup>61</sup>, coordinating submission of individual designs and integrating them into the project model<sup>62</sup>.

One commentator suggests that the BIM manager should be a lead designer or a member of the design team<sup>63</sup>, others suggest that it should be a representative of both the principal and the contractor or an independent project manager<sup>64</sup>. This writer's

view is that the party responsible for design and construction of the works should nominate a BIM manager.

As the success of the BIM is dependent on efficient management of the input into BIM and identification of clashes and inadequacies<sup>65</sup>, the ability of the BIM Manager to carry out its function is vital. The contract and tender documents should as a minimum:

- specify BIM manager as a "key person" or a required subcontractor; and
- prescribe the required expertise for the BIM manager, which is thought to include IT knowledge, data management, construction knowledge and knowledge of BIM application, data interfacing and software programming<sup>66</sup>.

### BIM as a contract document?

One commentator queried whether it is legally or practically possible to retain BIM as a contract document<sup>67</sup>. BIM can be specified as a contract document and treated in the same way as 2D CAD drawings – so long as additional provisions are included.

The contract should specify which model the contractor is bound by at any particular time as BIM is updated as design progresses<sup>68</sup>, by prescribing "freezing points" (the point at which when the various BIM will be "frozen" and recorded). It is important to adhere to pre agreed freezing points to ensure that members of the design team are not working to out of date models, which may result in time and cost delays<sup>69</sup>.

Where BIM sits in the order of precedence and whether it prevails in the event of inconsistency with other project documentation such as plans or certain specification will also need to be considered<sup>70</sup>.

### Design review and "directions"

The contract should specify when design review will be carried out how design changes will be tracked and implemented. Whilst BIM software has the capability

---

<sup>55</sup> Guerin, above n19, p67.

<sup>56</sup> Lewis, above n 48.

<sup>57</sup> Misko and Kuiper, above n 9.

<sup>58</sup> Interestingly, designers working with construction contractors state that they do not typically pick up models worked on by other designers. See Lewis, above n 64.

<sup>59</sup> See, e.g., Andre, Gregory, *Building Information Modelling: Special Contract Issues* (10 October 2011), K&L Gates <[http://m.klgates.com/files/Publication/91bb453d-7f14-43af-8fb6-c74a78758a86/Presentation/PublicationAttachment/bd33ff21-b2e6-4770-ad82-6be4a0a70903/Alert\\_Construction\\_Building\\_Information\\_Modeling\\_October%202011.pdf](http://m.klgates.com/files/Publication/91bb453d-7f14-43af-8fb6-c74a78758a86/Presentation/PublicationAttachment/bd33ff21-b2e6-4770-ad82-6be4a0a70903/Alert_Construction_Building_Information_Modeling_October%202011.pdf)>, p2

<sup>60</sup> For example, some commentators use the term "BIM Model Manager", the UK CIC BIM Protocol uses the term "BIM Information Manager" (see Glover, above n8), the CIOB Contract for use with Complex Projects uses the term "Design Coordination Manager (see Rock, Sarah, 'BIM – is it legal' (2013) 24(8) Construction Law 29, p31)

<sup>61</sup> Andre, above n 33.

<sup>62</sup> Glover, Jeremy, *Legal issues surrounding Building Information Modelling* (November 20 2012) Lexology <<http://www.lexology.com/library/detail.aspx?g=e721bd6f-77d2-4301-851b-07e8fe6a9599>>.

<sup>63</sup> Rock, Sarah, 'BIM – is it legal' (2013) 24(8) Construction Law 29, p30

<sup>64</sup> Crenan and Prehn, above n 43.

---

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Newberry, above n 31, 273.

<sup>68</sup> Andre, above n 33.

<sup>69</sup> Rock, Sarah, 'BIM – is it legal' (2013) 24(8) Construction Law 29, p30.

<sup>70</sup> Andre, above n 33.

to record and track the authors of BIM models and to "save" approved final models after design review<sup>71</sup>,

As directions may form the basis of a claim for variations, the contract should also specify what activities in the BIM comprise of a "direction" for the purpose of the contract. For example, when one design consultant amends a design element, is this a deemed direction by the principal for other consultants to make further changes?<sup>72</sup> One approach is to specify that directions from the Principal will only come through a nominated party and will as soon as practicable be in writing<sup>73</sup>.

### Reliability of data and liability

The Principal should consider which party is to bear the cost of data corruption or failures in the software program, noting the discussion in section 0 above. There is no right answer or correct approach. One argument is that the contractor or designer should not bear the cost of software failures which are out of its control. Conversely, one may argue that the designer and the contractor are the ones with the expertise and knowledge to best manage this risk<sup>74</sup>.

### Communication

BIM is not the miracle cure for poor communication on construction projects<sup>75</sup>. Level 3 BIM, the supposed nirvana of collaboration, resulted in the first litigation in the US concerning BIM<sup>76</sup>. In this case, the contractor was required to install mechanical, electrical and plumbing systems in the ceiling void in accordance with an accepted BIM model. The design tolerances adopted were extremely tight and a very tight installation sequence was required for this to be achievable. This was not adequately communicated to the contractor. The contractor had completed 70% of the work but ran out of room to install the balance of the work. Dispute arose and was eventually settled out of court. This case demonstrates that even with a BIM model where each design component fitted

perfectly, this need to be checked to test that this would work in reality<sup>77</sup>.

The Principal should consider appropriate communication protocols between the relevant parties – which is already being implemented on some projects utilising 2D design. It will be worthwhile to have a communication plan under the contract which is continually updated. The need for open and accurate communication between the parties on a contract is an age old issue and not one that is specific in projects utilising BIM.

### How will BIM be implemented?

In addition to the issues discussed above, other administrative and logistical issues need to also be considered upfront, these include:

- determining who will be responsible for the management of the BIM model<sup>78</sup> - noting the discussion above regarding the BIM Manager;
- processes and protocols to be followed in the use of BIM<sup>79</sup>, such as file naming protocols<sup>80</sup>;
- required deliverables<sup>81</sup>, who will produce the models and when<sup>82</sup>;
- backup/software failure arrangements<sup>83</sup>;
- how to manage and prevent systematic errors<sup>84</sup>; and
- standard nomenclatures and syntaxes<sup>85</sup>.

It is critical to ensure that timeframe, protocols, and rights and responsibilities of each project participant<sup>86</sup> are well as record management tools and change protocols are considered upfront<sup>87</sup>.

As with any other design tool, before using BIM the principal should understand and ascertain its requirements, the risks it is willing to and not willing to accept, and any premium it is able and willing to pay for the contractor to take on specific risks

---

<sup>71</sup> Chawla, above n 34.

<sup>72</sup> Crenan and Prehn, above n 43.

<sup>73</sup> Noting that "writing" could be via email or via an electronic document management system.

<sup>74</sup> Interestingly, the UK CIC BIM Protocol provides for the Principal to bear this cost – so long as the relevant contributor of BIM complies with the protocol, the contributor is not responsible for any "unintended amendment, modification or alteration of electronic data (See CIC BIM Protocol, clause 5.2). This position is in contrast to the United States - the ConsensusDocs 301 BIM addendum (a document to be appended to contracts to prescribe obligations in connection with the use of BIM) provides that each party is responsible for its own contribution (see ConsensusDocs 301 BIM addendum, clause 5.1).

<sup>75</sup> Cooper and Chaplin, above n 42.

<sup>76</sup> Tyerman, above n 14, 306.

---

<sup>77</sup> Ibid.

<sup>78</sup> See, e.g, Misko and Kuiper, above n 9.

<sup>79</sup> See, e.g, Misko and Kuiper, above n 9.

<sup>80</sup> Rock, Sarah, 'BIM – is it legal' (2013) 24(8) Construction Law 29

<sup>81</sup> See, e.g, Misko and Kuiper, above n 9.

<sup>82</sup> Glover, above n 62.

<sup>83</sup> Cooper and Chaplin, above n 42.

<sup>84</sup> Andre, above n 33.

<sup>85</sup> Chawla, above n 34.

<sup>86</sup> Crenan and Prehn, above n 12.

<sup>87</sup> Tyerman, above n 14, 307.

## Contract model

Some commentators believe that BIM can be used with all contract models<sup>88</sup> including traditional contract models<sup>89</sup>. Some believe that traditional contract models cannot realize the full benefit of BIM<sup>90</sup> and full collaborative procurement such as partnering<sup>91</sup> or “integrated projects delivery”<sup>92</sup> should be used to get “the best out of BIM”. Others suggest that BIM requires the strict traditional hard dollar contract due to the dispersed nature of responsibility<sup>93</sup>.

The legal and practical issues discussed above need to be considered for all contract delivery models and can be provided for irrespective of whether the delivery model is construct only, design and construct, or alliance. For example, the requirement to involve appropriate people with appropriate expertise in the design phase does not require a collaborative or partnering contract:

- For a construct only contract, the Principal could specify in its brief to the designer that it must, in preparing BIM, engage specialist experts in constructability and cost estimation upfront during the design phase - whether as key persons from its own organisation or as subconsultants. The Principal could also itself engage those specialists and require the designer to work with these specialists before finalising the BIM for the procurement of the construction contractor.
- For a design and construct contract, the Principal could require the contractor to procure the necessary expert consultants to produce specified BIM output, and to obtain final Principal approval before constructing the works.
- In the alliance approach, the Principal could specify as Key Performance Indicators appropriate engagement of experts in facilitating an accurate BIM.

Risk allocation as between the parties, as well as intellectual property, insurance requirements, confidentiality and so on will be provided for in the contract and remains a matter to be negotiated with the parties.

Indeed, UK commentators believe that level 2 BIM can be used with the more “traditional” contracts<sup>94</sup>- the new technology and new way of producing design do not change the fundamental legal principles<sup>95</sup> and the design process will not be far removed from current practice<sup>96</sup>. It is level 3 BIM – the full collaborative, integrated model that is causing commentators concern and which commentators consider will require drastic overhaul of the contracts and a full reconsideration of legal issues<sup>97</sup>.

## Conclusion

BIM has been described as “a fundamental tool transforming the way we develop new infrastructure”<sup>98</sup>. It carries with the promise of new tomorrows where the electronic capability and technology decreases the required man hours, wasted resources and enables designs to be fine-tuned to produce high quality end products.

Despite anxieties and perceived impediments surrounding the use of BIM, like any new technology, BIM introduces new facets to existing issues. Level 2 BIM will require new expertise and understanding of the program’s capacities and limitations but not necessarily drastic amendments to existing contracts. It is the Principal’s commercial requirements and the contractual framework which determine how BIM will be used.

---

<sup>88</sup> Andre, above n 33.

<sup>89</sup> That is, traditional design and construct models

<sup>90</sup> McAdam, Brodie, ‘Building information modelling: the UK legal context’ (2010) 2(3) International Journal of Law in the Built Environment, 246-259, 251.

<sup>91</sup> Ibid, 246.

<sup>92</sup> See generally Misko and Kuiper, above n 9.

<sup>93</sup> Crenan and Prehn, above n 43.

---

<sup>94</sup> Lewis above n 48.

<sup>95</sup> Glover, above n 62.

<sup>96</sup> Morrissy and Mansfield, above n 62, p2

<sup>97</sup> Cooper and Chaplin, above n 42.

<sup>98</sup> Chew, *Building Information Modelling (BIM): a construction revolution*, Lexology (10 July 2013) <[www.lexology.com/library/detail.aspx?q=715c773d-1984-4292-96ea-fe6a6b49f65b](http://www.lexology.com/library/detail.aspx?q=715c773d-1984-4292-96ea-fe6a6b49f65b)>.



## Contact



**Jos Mulcahy**  
Partner  
Melbourne  
T: +61 3 9679 3512  
E: [jos.mulcahy@ashurst.com](mailto:jos.mulcahy@ashurst.com)

This article was also contributed to by Alice Chen.

This publication is not intended to be a comprehensive review of all developments in the law and practice, or to cover all aspects of those referred to. Readers should take legal advice before applying the information contained in this publication to specific issues or transactions. For more information please contact us at [aus.marketing@ashurst.com](mailto:aus.marketing@ashurst.com).

Ashurst Australia (ABN 75 304 286 095) is a general partnership constituted under the laws of the Australian Capital Territory and is part of the Ashurst Group. Further details about Ashurst can be found at [www.ashurst.com](http://www.ashurst.com).

© Ashurst Australia 2014. No part of this publication may be reproduced by any process without prior written permission from Ashurst. Enquiries may be emailed to [aus.marketing@ashurst.com](mailto:aus.marketing@ashurst.com). Ref: 652898606.01 May 2014