

# **BIM LEGAL & PROCUREMENT**

**CWG004**

Utilising BIM in Australian and New  
Zealand Projects



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The Conduit between Practice and Policy

# **BIM LEGAL & PROCUREMENT**

**CWG004**

Understanding issues in utilising BIM in  
AECO projects

## **PURPOSE**

To assess legal and procurement issues regarding BIM, relating to forms of contractual agreement, procurement strategies, stakeholders involved, relevant IP considerations and the ultimate outcomes for the client. Further, to clarify how BIM and its inherently collaborative processes cater for the vested interests of the various stakeholders involved.

## **WORKING GROUP COORDINATOR**

Lucy Guerin, AAP

## **COMMITTEE LIAISON**

Bryce Cooper, JLL

## **KEY CONTRIBUTORS**

David Mitchell, MITCHELL BRANDTMAN

Chris Needham, AECOM

Lindsay Prehn, LENDLEASE

Darren Tims, RICE DAUBNEY

## **ACKNOWLEDGEMENTS**

Domenic Ciancio, JACOBS

Lindsay Stirton, CPB Contractors

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# CONTENTS

PURPOSE .....	2
WORKING GROUP COORDINATOR .....	2
COMMITTEE LIAISON .....	2
KEY CONTRIBUTORS .....	2
ACKNOWLEDGEMENTS .....	2
INTRODUCTION .....	4
FORMS OF CONTRACT .....	5
DESIGN-BID-BUILD .....	5
DESIGN & CONSTRUCT .....	6
REVIEW OF D&C MODEL .....	6
ADVANTAGES AND DISADVANTAGES OF D&C .....	7
BIM BENEFITS FOR STAKEHOLDERS .....	8
CURRENT BIM ISSUES LEADING TO PROJECT FAILURES .....	8
RFPS AND PROTOCOLS .....	8
LEVEL OF DEVELOPMENT (LOD) .....	9
COORDINATION OF DESIGN INTENT Vs CONSTRUCTION DOCUMENTATION.....	9
CONSTRUCTION CONTRACTS .....	9
INFORMATION EXCHANGE .....	10
BIM-WASH .....	11
CONSIDERATIONS AND POSSIBLE SOLUTIONS .....	11
CONTRACTUAL CONSIDERATIONS.....	11
OVERVIEW OF BIM RISKS FOR INDIVIDUAL CONTRACTUAL PARTIES.....	11
INTELLECTUAL PROPERTY (IP) .....	12
MODEL OWNERSHIP .....	12
MODEL CONTENT/COMPONENTS .....	12
MODEL EXCHANGE FILE FORMATS .....	13
INSURANCE .....	13
INDEMNITY/LIABILITY .....	14
CONCLUSION.....	14

## INTRODUCTION

Building Information Modelling (BIM) is increasing in demand within the Australian and New Zealand Architecture, Engineering, Construction and Operation (AECO) industry. As projects are showing wide disparities of knowledge and practice this paper addresses the current legal and procurement realities of specifying BIM, providing analysis on the forms of contract and the issues relating to project failure. This will be considered with a focus using Design and Construct (D&C) framework, followed by considerations and solutions for industry under this model.

Depending on the Level of BIM Maturity that is being utilised, BIM can be used with many delivery models.\* Following Australia's BIM Maturity Levels<sup>1</sup>, Level 0 – 1B BIM Maturity will work for all contract types.

- Design-Bid-Build (DBB)
- Design & Construct (D&C)
- Early Contractor Involvement (ECI)
- Public Private Partnerships (PPP)
- Project Alliancing
- Integrated Project Delivery (IPD) etc.

Level 2A-B supportive additions to the contract will be required such as a BIM Protocol<sup>2</sup> and BIM Management Plan (BMP)<sup>3</sup> for DBB, D&C and ECI. Level 3 will require a new approach to Australian Standards for DBB, D&C and ECI.

Although this paper focuses on D&C, we note the emergence of delivery models such as Integrated Project Delivery (IPD) as being more closely associated to BIM projects. This model is utilised for working with advances in technology and supports integrated and collaborative behaviour and use of data.

A 2014 McGraw-Hill report<sup>4</sup> declared that 74% of architects, engineers, owners and contractors in Australia and New Zealand believe they will be engaged in BIM on more than 30% of their

<sup>1</sup> CRC 'National Guidelines for Digital Modelling', 2009,

<sup>2</sup> CIC, 'BIM Protocol', 2013

<sup>3</sup> NATSPEC, 'BIM Management Plan', 2016

<sup>4</sup> McGraw-Hill, 'The business value of BIM in Australia and New Zealand', 2014

\* Note that BIM can be utilised, but at times with difficulty depending if the contract matches the collaboration needs.

projects by the end of 2015. While this level of usage may have eventuated, there is not yet an industry-wide alignment of legal and procurement requirements with BIM processes and deliverables.

At present in Australia and New Zealand, BIM is being driven by industry organisations (e.g. NATSPEC and buildingSMART) and the private sector toward adoption of standards such as open object libraries and IFC4 data models. There is no government mandate for BIM in either country, and no statutory frameworks or case law to establish consensus or uniformity.

BIM is a feature of several recent and current high-profile projects in Australia, including the Sydney Opera House and the new Royal Adelaide Hospital. However, the design, construction and operational benefits of BIM are yet to be widely evident. BIM is deployed variously and idiosyncratically and most projects provide scant, if any, definition of "BIM" much less alignment with scoping of deliverables, contract terms and software platforms.

BIM as a concept must be applicable to different delivery methods for it to be fully utilised in the industry. Because BIM allows myriad stakeholders to contribute to and share information in the BIM, it has by experience been deemed most effective when twinned with collaborative working environments. Collaboration is facilitated and strengthened through the shared model (federated), and availability of project information to all participants. BIM has the potential to offer a single project "truth" through a convergent digital platform open to all participants -- a radical and profound contrast with the often divergent outcomes of traditional methodologies.

Legal issues arise when individual parties' deliverables are not clearly defined and aligned, which can result in scope gaps and inconsistent documentation quality. Disputes arise out of discrepant versions of the "truth" and the consequences of behavioural responses and actions regarding project goals and information.

To provide practical industry advice, this paper discusses realistic approaches for applying BIM for design and construction and operational considerations.

## FORMS OF CONTRACT

“BIM” has become shorthand for the immensely powerful digital tools able to design and define / store / track / update building data to a level not possible in the past. The term “digital engineering” is also used. Whatever the terminology, these digital tools enable explicit contractual requirements for deliverables and behaviour, but at this stage, BIM is often not explicitly required or if it is, it’s sometimes not adequately addressed. All contracts both encourage and restrict behaviour through the conditions of the contract. The form of contract selected therefore influences *how* each participant will perform their role.

### TRADITIONAL CONTRACTS

Design-Bid-Build (DBB) and Design & Construct (D&C) are currently the two dominant delivery methods within Australia and New Zealand. These two well established methods each define responsibilities and deliverables that minimise risk for the individual parties. These forms of contract legally separate each party’s core task and encourage professional behaviours that are protective of those legal obligations.

### COLLABORATIVE CONTRACTS

Project Alliancing, Public Private Partnerships (PPP) and Integrated Project Delivery (IPD) each establish a collective agreement with shared risk and (potentially) shared reward. These delivery methods generally apply to larger projects for government or institutional clients, for which risks may not be fully identified prior to project initiation. The client typically brings considerable skills, knowledge and capability to the project and the contract establishes an integrated, collaborative framework for all parties to work within. A common characteristic is early involvement of the contractor (and potentially key sub-contractors) to contribute construction expertise to the design process.

It’s no coincidence that the rise of these agreements has coincided with the development of robust digital tools and data management with the capability of supporting proactive, coordinated progress to an aligned project “truth”. As a consequence, the professional behaviour of the parties involved can be far more interactive and constructive. BIM and other collaborative tools

can be more easily employed without the silo-like impediments of DBB and D&C agreements.

### DESIGN-BID-BUILD

Design-Bid-Build as the dominant incumbent procurement method offers only limited opportunities to yield benefits using BIM, because of its inherent support for self-interest, multiple agendas and siloed communications and behaviour. This essentially sequential form of delivery requires each participant to minimise risk by protecting their own position, keeping each entity and its contracted services separate, which works against collaboration and the shared risk/reward strategies facilitated by BIM.

Standards Australia, General Conditions of Contract for Engagement of Consultants AS4122 - 2010 has no formal or explicit accommodation of BIM and was not specifically developed for use in a Design & Construct context, or where the client intends to novate the contract with the consultant to another entity, such as the contractor. In an attempt to address BIM specifically in a contractual form, add-ons such as the CIC BIM Protocol (UK) <sup>5</sup> and ConsensusDocs A301 BIM Addendum <sup>6</sup> (US) have been developed.

Listed below are some of the areas they cover:

- Incorporation into Contracts
- Permitted Purposes
- Treatment of Intellectual Property
- Electronic Data Exchange
- Definition of Models covered by the Protocol
- Change management
- Liability for Use
- Roles and Responsibilities
- BIM Execution Plan / BIM Management Plan

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<sup>5</sup> Building Information Model (BIM) Protocol  
<http://cic.org.uk/publications/>  
Accessed: 17 April 2016

<sup>6</sup> ConsensusDOCS 301 BIM Addendum By Richard H. Lowe and Jason M. Muncney  
<http://www.consensusdocs.org/>  
Accessed: 17 April 2016

## DESIGN & CONSTRUCT

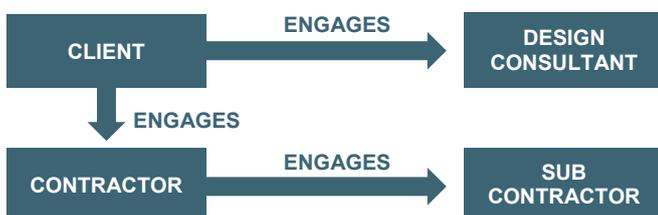
Design & Construct (D&C) has become significantly more popular over recent years by virtue of earlier integration of contractor involvement - offering opportunities to positively impact cost, time and constructability - and the placement of the design team within the contractor's contract. By the contractor taking responsibility for the design of the project the client has contractually transferred a significant amount of risk to the contractor. Despite the increased contractor risk of using D&C, the contractor has greater control over the design process: single party coordination of documentation supports consistency of design documentation across multiple disciplines. BIM can both facilitate and be supported by this dynamic.

## REVIEW OF D&C MODEL

In D&C, the majority of the project is delivered under one contract, with designers and sub-contractors engaged under the contractor-client head agreement, generally from concept or schematic design. This arrangement may come about first with the client approaching and engaging a designer, then engaging a contractor who may elect to engage a new design team, or the client's original design team is novated to the contractor, as represented in the pre- and post-novation diagrams below.

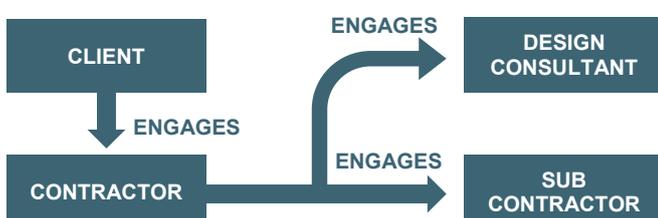
### DESIGN-BID-BUILD

#### Pre Novation Contract



## DESIGN & CONSTRUCT

#### Post Novation Contract



Of the various D&C methods for engaging the design consultant, novation is most common. Scope and fees may change, but often the contractor prices the project based on fees and scope already established with the design team.

The point at which novation occurs tends to be when the design has been resolved to an extent between 30% and 80% of what would constitute full construction documentation. Anything greater makes the arrangement tend towards a Design-Bid-Build model, where the opportunities presented by the early contractor involvement are diminished.

When using BIM within a D&C contract, the design process feeds the model with increasingly refined data created via an integrated effort on all fronts. Price certainty is established before construction commences, and is a direct outcome of a design responsive to the client's requirements; coordination conflicts are less likely to occur late in the process because the BIM prompts issues to be resolved at earlier stages.

Establishing a firm price and including a savings option split can stimulate innovation and reduce time and cost; the legal obligation provides a powerful incentive for team participants to search quickly and early for creative solutions i.e. value engineering. The D&C agreement also offers the ability to overlap design and construction activities that can reduce project time; the contractor's early input into the design can improve the constructability of the project; early sub-contractor input offers more pricing flexibility with a longer lead time for fabrication, and a more detailed understanding of the construction sequence.

Although a D&C contract may provide many advantages to the Client, the contractor cost will generally be higher than a Design-Bid-Build contract as the contractor absorbs the additional risk. The Client's control over the design and build of the project is also significantly reduced, requiring a significant amount of trust that the contractor will be able to deliver the envisioned final outcome.

## ADVANTAGES AND DISADVANTAGES OF D&C

ADVANTAGES	DISADVANTAGES
<p><b>Single point of responsibility</b> as the contractor is responsible for the design and construction.</p>	<p><b>Reduced design control</b> for the client particularly if the brief is not sufficiently detailed.</p>
<p><b>Faster delivery</b> from concept to completion as on-site work can commence sooner, before design is complete.</p>	<p>Potential for <b>reduced quality control</b> as the contractor is often perceived to be driven by time and cost rather than by design quality.</p>
<p><b>Cost certainty</b> is provided as the tender sum is generally a lump sum where the price is renegotiated only if a major change in scope is introduced.</p>	<p><b>Higher build cost</b> as the contractor will price a premium for taking on more perceived risk.</p>
<p><b>Reduced administrative burden</b> for the client.</p>	<p>Potential for <b>increased maintenance costs/risks</b> for the built outcome as the contractor has an incentive to provide the minimum compliant standard to decrease cost if final project and operational requirements are not clearly defined.</p>
<p>Potential for <b>increased innovation</b> if the contractor is on board early enough to have an impact on the constructability of the design. For some projects, inclusion of sub-contractors (e.g. mechanical, steel fabricators) can also contribute to innovative design solutions.</p>	<p><b>Difficulty in comparing bids</b> as the design, program and price can vary if contractors offer different design solutions.</p>
<p><b>Transfer of risk</b> from the client to the contractor.</p>	<p>Potential <b>conflict of interest</b> for novated design consultants having worked for both the client and contractor on the same project.</p>
<p><b>Lower upfront consultant fees</b> due to a reduced service for the design consultants in the contract administration phase.</p>	<p>Post-contract <b>variations cost</b> more should the client want to change aspects of the brief and/or design.</p>
<p><b>Fewer claims and disputes</b> as the contractor manages the design and construction post tender.</p>	<p><b>Timing of the tender is critical:</b> too early and the design is insufficiently resolved to avoid variations or compromise on design; too late and there is little opportunity for the contractor to influence the design and constructability.</p>

## BIM BENEFITS FOR STAKEHOLDERS

CONTRACTUAL PARTY	BENEFITS OF BIM
<b>Owner</b>	Superior visualisation of the design. Enhanced replication of base design e.g. retail bank fit out rollouts. Leverage D&C model data for ongoing FM. High quality model data reinforces owner's position in case of an event.
<b>Project/Construction Manager</b>	Greater control of design process, and cost and program. Faster program with reduced onsite delivery, construction and installation issues.
<b>Design Team</b>	Development of libraries for application to future projects. Potential for streamlined design on future projects. Replicability of design for increased production efficiency.
<b>Head Contractor</b>	Development of libraries for application to future projects. Potential for streamlined design on future projects. Replicability of design for increased production efficiency.
<b>Sub-contractors</b>	Program and cost clarity. Pre-fabrication in controlled environments and /or precise fabrication (off site and on site) with reduced waste. No or fewer clashes with other disciplines/trades. Faster installation and fewer defects. Accurate shop and as-built drawings for owner / manager.
<b>Suppliers</b>	Streamlined procurement process.
<b>Post-handover for Facility Manager</b>	Reliable information for ongoing maintenance, and for scheduled infrastructure and equipment upgrades.

## CURRENT BIM ISSUES LEADING TO PROJECT FAILURES

Greater industry understanding brings increasingly successful utilisation of BIM on projects, although a number of issues are still not defined correctly, which leads to project failures.

### RFPS AND PROTOCOLS

Although many projects now have a requirement for a BIM, this is rarely articulated well enough to ensure the maximum use of the BIM. BIM is often requested, or even mandated, however may state only that the project is a BIM project, that documentation should be derived from the BIM or that clash detection is to be undertaken.

For example, recent Requests for Proposals each had a single reference to BIM in the scope:

**RFP for Project 1** – Principal Consultancy  
*“Management of BIM, including: establishing BIM system requirements and protocols; coordination; clash resolution; and handover of the BIM model.”*

**RFP for Project 2** – D&C Head Contract *“all information...must be delivered in a BIM model and format”*

**RFP for Project Management Panel for investor client** – *“Implement Building Information Modeling (BIM) as the method of project documentation”* for the project manager, architect, services consultants and structural & civil consultants

This lack of specificity is largely because of a lack of understanding of the real value of a BIM, both short term (during design, procurement and construction) and long term (for FM). This often results in large price differences within submissions, an inability to complete an accurate “apples-for-apples” tender assessment and an over expectation of the quality and level of detail of the project’s BIM.

## LEVEL OF DEVELOPMENT (LOD)

While the use of LOD has been developing it’s not common for LOD to be specified in the design RFP. Even so the “expectation” seems to be similar to LOD 300. BIMForum interpretation: The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs.

Where this is true, different designers can perceive risk differently for the same project:

One group considers the risk profile to be unchanged because the process of designing and coordinating in a 2D environment via the exchange of files (albeit with 3D files) is replicated.

The other group perceives the risk to be high (regardless of the specified LOD) and these organisations are reluctant to commit without the use of caveats when issuing models. For example, a statement might be included that *“the BIM cannot be used for costing purposes”*.

For designers that promise more than LOD 300 the risk increases significantly and may exceed their expertise.

For further guidance on LOD refer to the separate paper prepared by Collaborate CWG001.

## COORDINATION OF DESIGN INTENT VS CONSTRUCTION DOCUMENTATION

Traditionally, designers have been responsible for coordinating design intent - not construction means and methods.

With the advent of BIM and an expectation of “clash-free design” the difference between design intent and construction has blurred and downstream tensions can occur. This blurred distinction is because designers have learnt to

use digital tools that allow them to resolve designs and provide a better level of design coordination. Most contractors are still learning how to understand digital tools and their limitations, such as a design model being issued with all buildability issues resolved. Designers are arguing that the expectation is beyond their obligations and expertise, while contractors may regard some buildability issues as not actually fully resolved in the model.

Designers and contractors contend that “clash-free design” cannot be provided without sub-contractor involvement. Sub-contractors may alter what is designed due to buildability issues during both prefabrication and installation, and these alterations can impact the spatial relationships with adjacent elements. The result can render redundant some of the spatial coordination already undertaken during design and raise the question - Why does the model need to be so perfectly coordinated prior to sub-contractor involvement?

## CONSTRUCTION CONTRACTS

Often, contractors shift coordination risk and responsibility to:

- Designers for “clash-free” design (particularly for D&C contracts where the designer is engaged by the builder); and to
- Sub-contractors by requiring sub-contractors to be responsible for coordinating with other sub-contractors (even though there is no contractual relationship between those sub-contractors).

Issues occur if the contractor uses the BIM as an excuse to neglect coordination, leaving other parties to incur the expense of resolution. It’s experience of this behaviour in an environment that lacks transparency that results in sub-contractors inflating risks, resulting in construction costs that should not eventuate in a BIM environment. Unknowingly the client is often complicit in this systemic problem by contractually offsetting risk and thereby setting team members against each other through adversarial contracts. Others earnestly want their teams to work better together (with the project benefiting as a result), but are seemingly unable or ill-equipped to achieve this degree of collaboration.

## INFORMATION EXCHANGE

Tendering D&C projects at notional design percentages like 30% or 50% adds complications to projects (particularly for the MEP designers) because the point at which a project is tendered impacts on the ability of the designers to produce a useful BIM, and the impact increases as the percentage decreases.

The D&C Contractor who is now charged with completing the design is faced with two options. Option one is to bring on a sub-contractor to complete the BIM or extend the designer's engagement to develop the BIM to a higher level of resolution, say 70-80%, before bringing in the specialist sub-contractors.

Option two can then create a further problem where the sub-contractor reproduces the BIM (i.e. starts from scratch) rather than relying upon the designer's work. The most obvious example is in the services trades and trades that produce fabrication drawings.

The foundation of BIM is that information is passed down the supply chain without reinventing the wheel or recreating a learning curve at each exchange of information. There are a number of reasons for problems to occur, such as technology incompatibilities, lack of information exchange skills, past behaviours and beliefs ("it's easier to do it myself"). On projects, this break in information exchange often arises because the designer won't guarantee the model or the sub-contractor won't trust the designer's model.

Often, BIM is not managed well or not managed at all, particularly on large projects. Consequently, individual parties are not held accountable and project BIM plans, manuals or protocols are not developed or adhered to when they exist, leading to frustration in, and between, the project team organisations.

On some recent projects, consulting BIM Managers have been employed. Generally, they are independent of the designers, and manage and lead the coordination of the BIM, including meetings that define actions for each consultant to ensure their model is suitable for use and complies with their contractual obligations.

During construction and at handover the BIM Manager may also be responsible for managing the BIM that is generated by the contractor, sub-

contractors and manufacturers, although BIM-literate contracting firms may often choose to be the BIM Manager themselves. Either way, it is important for the contractual obligations of the designers, contractors, sub-contractors and manufacturers to be consistent and clearly defined particularly if the end goal is production of as-built BIM. This is rare today.

Problems can be further amplified where the preferred technologies of the parties to a project are different and a common native file format is not specified. The current way the industry deals with this is to specify:

- The technology platform to be used e.g. Revit. This simple solution will work in some instances but not for all unless preselection of the design, construction and manufacturing team is done on the basis of an organisation's preferred technology. In practice where there is no preselection this could mean that:
  - some parties will work with an unknown or unfamiliar platform which results in a poor outcome because an expert may not trust a beginner's work.
  - others will choose to work in their preferred platform and then convert the file into the specified platform which if poorly executed will result in data loss and again a poor outcome. E.g. If Revit is specified and the architect prefers ArchiCAD then the architect will export the ArchiCAD file as an .ifc, import the .ifc into Revit to create a .rvt file and then distribute that file to the design team.
- A common file format such as Industry Foundation Class (.ifc). This solution will also work in some instances but not in all unless preselection is based upon the parties' proven .ifc skills. Even though .ifc is a common global format for transferring BIM, many organisations do not have enough experience to apply it. This is because their preferred technology may not support .ifc or if it does the integration of has not been correct. Either way the result, in many circles, is a perception that .ifc does not work or cannot be relied upon whereas the organisations that have persevered are very capable of exchanging BIM openly with other organisations.

## BIM-WASH

“BIM-wash” is an industry issue because BIM is new but it is no different from any other project characteristic that is over promised but under delivered. It seems to occur when the BIM users in an organisation have a good grasp of BIM and are keen to work in BIM but the management of the organisation has a lesser understanding. This causes problems because of the disconnection between what is promised and what the organisation can produce. Often it’s not deliberate, but rather ignorance or a lack of knowledge or understanding of BIM.

## CONSIDERATIONS AND POSSIBLE SOLUTIONS

Contracts are not congruent with the collaborative behaviour that BIM requires to yield maximum benefit. Contracts should:

- Clearly define what the model is to be used for during the project and on project completion.
- Clearly define individual parties’ roles, responsibilities and project deliverables
- Be set up to determine rewards for high performance rather than penalties for poor performance.

- Encourage team collaboration by requiring workshops, charrettes or “big rooms” to resolve issues in information exchange.

If project teams are to work together successfully and reduce project risk, then team selection and the procurement method (inclusive of forms of contract) are key.

The inclusion of the client and contractor within the BIM process is rare today, with BIM regularly led by the principal designer, not the client. Greater client and contractor involvement will require a change of behaviour in the industry, resolution of legal issues and acceptance of roles and obligations by all stakeholders.

## CONTRACTUAL CONSIDERATIONS

In some circumstances the use of BIM on a project can significantly alter all risk profiles for all contractual parties (see table below), and therefore may alter the contractual obligations which need to potentially be considered when drafting the contract. The risks or issues where BIM has been shown to have a significant impact and which the industry is still to resolve includes:

- IP
- Insurance
- Liability

## OVERVIEW OF BIM RISKS FOR INDIVIDUAL CONTRACTUAL PARTIES

CONTRACTUAL PARTY	RISKS OF BIM
<b>Owner</b>	Faulty set-up and process may add cost and time. Model not reflective of as-built reality. Gaps between design and sub-contractor data input. Agreement unclear on model process and delivery requirements.
<b>Project/Construction Manager</b>	As above. Currently, many professionals are not very BIM-adept in either theory or practice.
<b>Design Team</b>	Failure to agree on and implement common platform/ open source requires costly and unnecessary data conversion.
<b>Head Contractor</b>	May not yet have team members familiar with BIM. Non-compliant design data, incompatible model elements.
<b>Sub-contractors</b>	Increased delivery risks through being new to BIM. May not provide BIM-compatible data re installation and MSDS suitable for O&M at handover. Unaligned data from designers and sub-contractors.

## Suppliers/Sub-contractors

Learning curve re providing the required information for the project BIM.  
Untrained personnel not meeting model requirements, not applying design model to fabrication.  
Documentation strays from BIM requirements and provides static value only for future operations.

## Post-handover for Facility Manager

BIM doesn't represent as-built reality.  
FMs may not comprehend BIM adequately and fail to utilise and maintain/update for ongoing operations.  
Model discrepant from current reality.

## INTELLECTUAL PROPERTY (IP)

Many owners / clients have the view that they should own the model - and the native file format model at that. Owning the model would allow them to take the work elsewhere to find someone cheaper, or to repeat/adapt the project for another location (admittedly a low risk due to site constraints). Yet intellectual property in a BIM can be governed by the same principles as other creative endeavours. The question instead is one of defining creative contributions to the model and adequately describing BIM in project-related documentation (contract, public liability insurance, professional indemnity insurance, BIM Management Plan etc.).

## MODEL OWNERSHIP

What constitutes IP in a model-based world (as distinct from just drawings) is not well understood. Related to this generally inadequate level of understanding is the liability associated with the unintended uses of a model, which is why consultants who do agree to issue models often convey a standard disclaimer of all liability associated with the model's use - in some cases for any purpose, in others for any purpose beyond those stated and/or agreed.

## MODEL CONTENT/COMPONENTS

For years many consultants have held the view (some still do) that their BIM content (i.e. digital components within their models) represents IP, and they are reluctant to provide this on the perceived risk that someone else will benefit more directly (read "unfairly") from their effort. When a consultant has invested considerable time and resources into developing their own component library, there is a natural desire to protect that IP effort.

This view is becoming less common as the scarcity of ("good quality") components has diminished, and people have begun to realise that having access to another party's component library does not mean there is reason to use it. The maximum value of that content remains with the creator, based on the way those components fit within their internal BIM processes and workflows.

If the designers change during a project, BIM licencing needs to be reviewed and confidentiality issues clarified in terms of access, third party permissions, assumption of responsibility, dissemination in specific formats, and data integrity.

A BIM Management Plan (BMP) should become part of the binding contractual documents.

For further guidance on BMPs refer to the separate paper prepared by Collaborate CWG002.

The world of art and music offers a comparison, with licences that attach certain conditions to the use of creative (i.e. IP) efforts. With BIM, legitimate users of work under another's copyright could be granted a licence or be assigned copyright ownership with restrictions related to the term of the project.

## MODEL EXCHANGE FILE FORMATS

Worth considering is whether or not it is functionally necessary to provide native file format models to others for necessary uses downstream, such as coordination, federation, construction sequencing, as-builts, facility management and so on. What are the limitations of non-native file formats that might be the basis of the argument for native files to be shared? Examples are NWC (Navisworks Cache) and IFC (Industry Foundation Class) files. Neither is intended as an authoring format, so what authoring needs are justifiable post-design? Does a sub-contractor need a design model in Revit for conversion to construction means and methods?

These questions take on a different light when considering the potential of the model for post-construction operation of a building. The owner/building manager should be able to use the data to manage user needs on a daily basis (e.g. housekeeping and maintenance, help desk) and on a longer term basis (e.g. planned replacement of critical asset infrastructure such as chillers). The design and construction stages of a facility's life cycle are short in comparison with the ongoing operational aspects over a period counted in years.

Commercial products are increasingly available for BIM collaboration through shared platforms e.g. Trimble Connect, Autodesk, Aconex and newcomer Flux. Users are becoming adept at setting up and benefiting from tools such as dashboards and hierarchical access levels they can use on both desktop and mobile devices. Similarly, proprietary tools are also tending in this direction, using collaborative platforms and shared workspaces such as Microsoft SharePoint, Google Drive and Apple iCloud. Consider also the proliferation of related technologies such as scanners, bar codes and QF codes, Augmented Reality, 3D printers, smart hard hats, robots, Unmanned Aerial Vehicles and Building Management Systems. These emerging tools all pose new legal and procurement issues while also offering the promise of solutions.

## INSURANCE

As with technical aspects of BIM, the insurance industry is also adapting. Whether through D&C delivery or any other method, BIM must be addressed in the following:

- Professional Indemnity
- Public liability
- Capped claims vs. uncapped claims
- Duty of care - standard vs. elevated
- Roles: designer / builder / supervisor / verifier / certifier / operator/FM

Insurers have to date not regarded BIM as substantially different from established design practice using CAD, with each designer still using BIM within their own discipline to contribute to a federated model in a 3D environment, managed further perhaps with time (4D construction sequencing/programming/scheduling) and cost (5D) information. Current thinking is that LOD 200 and even LOD 300 are not substantially different enough for policies to require modification. From an insurer's perspective, robust audit trails and date-stamped change documentation within the software tools provide reassurance about the reliability of records in the event of a claim.

Higher levels of BIM imply more complex and continuous management, coordination, changes and interdependencies, with most industry participants yet to experience projects with these requirements. Insurers are similarly unexperienced in understanding BIM including at current levels. Therefore, those parties requiring insurance should disclose the following to their insurer:

- Basic project information (project name, brief description, contract value, professional fees)
- Nature of services performed under the policy
- Contract conditions regarding BIM and the LOD required
- Role as it relates to BIM (e.g. design, explicit level of information management)
- Clarification on hosting, employment of sub-consultant e.g. BIM Manager
- Statement about level of BIM required for the project

By not disclosing the above, the insured party risks a future claim being denied or the policy being voided.

Insurers recommend asking the broker/insurer whether a policy contains any terms, conditions, limitations or exclusions that would have an

impact on the use of BIM on a project, such as the following:

- Professional indemnity policy liability basis (legal/civil) in a context of non-negligence claims under the contract
- Express guarantees requiring compliance with specific standards that might affect the BIM
- Clauses regarding document retention (how, and for how long), which might affect any future claims
- Exclusions related to loss, damage, security breaches of data (computer viruses, unauthorised access to systems, cyber-attacks, hacking)
- Cover for restoring, reconstituting or replacing lost documentation
- BIM Hosting

In general though, the use of BIM is generally identified as a risk which needs to be independently evaluated by insurance brokers, with the same insurance policies being applied to BIM and non BIM projects.

## **INDEMNITY/LIABILITY**

For liability to be assigned, exposure must first be understood and duty of care obligations must be defined for specific roles. In the context of BIM, the worry is that expectations of a “competent professional” have changed for the various project team members. This is a significant concern for design consultants as the use of BIM increases design transparency and issues such as detailed coordination between individual disciplines and design constructability, generally resolved by the contractor on site, are partially transferred back to the design consultant team.

When the BIM is to be carried over into building operation, design consultants and constructors need to clearly define the what has been allowed for in the designer team’s model and agree to how the contractor will further develop the model, to meet the contractors deliverables requirements. The use of the same model throughout the whole project creates significant risk for both the contractor and the design consultant. This is due to insurers refusing to cover a designer stating that their model is “100% error free” and a contractor’s insurer refusing coverage unless such a statement is received.

As a solution to this the contractor will generally redraft the model from scratch, which also enables them to build the model so it can support their specific deliverables, which many designers models are unable to do.

BIM is rarely specifically addressed in indemnity and liability clauses and so the potential additional risks that are part of a BIM project including their impacts on insurances need to be considered when defining limits of liability and indemnities.

## **CONCLUSION**

Within the industry there is general agreement that while BIM approximates traditionally distinct documentation (as in LOD 200 BIM, or federated models receiving separately developed designs by discipline), accepted practices regarding procurement, intellectual property, insurance and liability are generally adequate. However, as expertise grows, standards and protocols are developed, and behaviours become more collaborative, BIM will become more explicitly required and addressed in the legal and insurance context. The challenge is to bring all practices into alignment as data becomes more shareable and more frequently shared.