
How Front-end Lawyers Can Stop Worrying about Building Information Modelling (BIM) and Learn to Love It!

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Record infrastructure investment is underway to support the national COVID-19 recovery. However, the Australian construction industry has a history of poor productivity, an over-emphasis on a project-to-project and contract-by-contract mentality, inappropriate allocation and management of risk, information asymmetry and sporadic uptake of best practice. Building information modelling (BIM) can help to address many of these issues and is increasing in popularity. However, there is still no Australian standard form construction contract or Protocol that incorporates BIM or addresses potential legal issues that flow from its use. This article investigates global best practices in relation to contractual provisions incorporating BIM and concludes with recommendations designed to place the Australian legal profession in a position to better facilitate the uptake of BIM in Australia.

I. INTRODUCTION

Building Information Modelling (BIM) is a digital system that uses state-of-the-art software to create a 3D-model of a construction project which allows parties to collaboratively integrate the design and delivery of the project and subsequently manage the asset. The introduction of technology in the construction and design sphere is nothing new. Designers have been using Computer Aided Design (CAD) since the 1970s to automate drawing instead of using ink on vellum,¹ and in some ways, BIM is just a system to replace these 2D and 3D processes.² While CAD allows for the automation of two-dimensional drawings, it does not allow for collaboration. Errors and omissions in CAD can lead to cost overruns and delays due to lack of communication, which in turn may lead to conflicts between various parties in a project. BIM is the next step in the technological evolution.³ However, as with the evolution of most technologies, there are legal implications that need to be considered, particularly in relation to the ramifications that BIM may have on the parties' rights and responsibilities under the construction contract.

To date, many construction lawyers in Australia have preferred to keep their distance from BIM, leaving it to the construction and design professionals to set out the parties' roles in a BIM Protocol. The BIM protocol document typically sets out the project standards, including providing the rules on how the BIM model is to be assembled.⁴ This scenario is far from ideal, since the parties, unless they have legal qualifications and experience, are unlikely to be aware of the legal ramifications that can arise from using BIM, the potential impact on the contractual risk allocation and the way the BIM Protocol

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¹ Rafael Sacks and Ergo Pikas, "Foundational concepts for BIM" in Farzad Hosseini et al (ed), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 5.

² Andy Wong, Francis Wong and Abid Nadeem, "Government Roles in Implementing Building Information Modelling Systems: Comparison between Hong Kong and the United States" (2011) 11 *Construction Innovation* 61, 62.

³ Sacks and Pikas, n 1, 5.

⁴ Andrew Chew and Meredith Riley, "What Is Going on with BIM? On the Way to 6D" [2013] *International Construction Law Review* 253, 259.

and construction contract interact. There is a dynamic relationship between technology, the business of construction and the law, with developments in one continually driving changes in the others.⁵

This article begins by providing an overview of BIM, including the different levels and dimensions. Enormous technological advances in recent years have led to the development of many different forms of BIM.⁶ As a result, law students and junior construction lawyers who learn the foundational concepts – the levels and dimensions associated with BIM – will enjoy an advantage denied to their predecessors; an understanding of BIM as commonplace rather than struggling with it as a disruptive technology.

BIM raises several legal issues that should be considered and accommodated within the contractual framework of a project. These issues represent a significant barrier to BIM uptake in Australia.⁷ This barrier is exacerbated by the absence of standard contractual provisions relating to BIM or BIM Protocols, meaning that bespoke clauses and documentation must be drafted to accommodate BIM on any Australian project.⁸

Before turning to the legal issues that stem from the use of BIM, it is appropriate to consider the uptake of BIM in Australia and internationally. In particular, it is helpful to look at BIM initiatives overseas, to see what Australia can learn from efforts by government agencies, industry organisations and standardisation bodies in other jurisdictions.

This article concludes with an assessment of what constitutes best practice when it comes to contractual frameworks and Protocols for the use of BIM in Australia. Ultimately, construction lawyers who are not BIM-ready are in a perilous situation. As BIM drives new approaches to the design and construction processes, the need for the construction lawyers who are fluent with BIM becomes more acute. This article highlights the vital role that front-end construction lawyers can play in addressing the legal implications of BIM on Australian construction and infrastructure projects. By drawing on the experience of jurisdictions that have greater experience with BIM Protocols and contractual provisions, this article can edify Australian construction lawyers on the path to legal literacy relating to BIM.

This article is the first part in a two-part series; Part One explores the legal issues relevant to front-end construction lawyers, while Part Two analyses how BIM is featuring in construction disputes, and what back-end lawyers need to know about this technology.

II. OVERVIEW OF BIM

A. Provenance of BIM

Early humans first embarked on designs via rudimentary sketches in the sand, which later evolved to drawings on papyrus.⁹ Some of the earliest drawings can be found in Marcus Vitruvius Pollio's 15th-century work "De architectura", which identified the plan, elevation and section as the three types of drawings necessary to represent architecture.¹⁰ In the late 20th Century, computer-aided design and drafting (CAD) software was developed and allowed architects to automate the task of drawing.¹¹ While CAD allows for the automation of two-dimensional drawings, it does not enable collaboration with others.

⁵ Nancy Wieggers Greenwald, "BIM, Blockchain, and Smart Contracts" (2020) 40(4) *The Construction Lawyer* 9, 16.

⁶ Cenk Budayan and Yusuf Arayici, "Understanding BIM to Translate It into Action" in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 49.

⁷ Australian Institute of Architects, *Design Technology in Architecture 2021 Report* (2021) Preface <<https://www.architecture.com.au/wp-content/uploads/AIA-BIM-and-Beyond-Report-F4.pdf>> (*Design Technology in Architecture 2021 Report*).

⁸ Ilsa Kuiper and Dominik Holzer, "Rethinking the Contractual Context for Building Information Modelling (BIM) in the Australian Built Environment Industry" (2013) 13 *Australasian Journal of Construction Economics and Building* 1, 1.

⁹ Sacks and Pikas, n 1, 5.

¹⁰ Sacks and Pikas, n 1, 5.

¹¹ Sacks and Pikas, n 1, 17.

The underlying concept of BIM emerged in 1974, when Charles Eastman and others presented a new form of computer-aided design known as “Building Description System”.¹² The system involved a computer database that “would allow the geometric, spatial, and, property description of a very large number of physical elements, arranged in space and ‘connected’ as in an actual building”.¹³ BIM has developed to encompass not just a 3D representation of a building, but a way of working.

We are now at the point where those not using BIM are perceived as industry laggards.¹⁴ According to a 2021 Australian Institute of Architects survey of around 12,000 institute members, 70% of respondents reported using BIM on a majority of their projects, while only 9% admitted to never having used it.¹⁵ BIM now forms a part of contemporary construction education, and architecture and engineering graduates who are not competent in using BIM are likely to have limited opportunities in an industry increasingly driven by BIM.¹⁶

BIM is now recognised as being critical to construction’s future and essential for the survival of construction businesses in the modern world.¹⁷ A recent Report by the House of Representatives Standing Committee on Infrastructure, Transport and Cities found many benefits from using BIM, including:¹⁸

- (1) government agencies in the United Kingdom (UK) have achieved construction cost savings of 12–20% by using BIM to improve productivity;¹⁹
- (2) for every dollar spent on BIM, there is an average \$6.83 return on investment, with the minimum return being \$3.26;²⁰ and
- (3) increased productivity driven by BIM would result in the constructing industry saving \$3.1 billion each year.²¹

In light of the Australian construction industry’s widespread use of BIM on major projects, it is crucial that construction lawyers are knowledgeable about the intricacies of BIM and understand the legal implications of its use.²²

B. Definition

BIM is not a construction method. Rather it is a framework to attribute geometrical and non-geometrical information to infrastructure during its lifespan – starting from the initial design of the asset and continuing through to its construction and subsequent maintenance, that is long after the asset is built.²³ The information generated is typically three-dimensional and includes an asset’s physical and functional characteristics.²⁴ buildingSMART, a worldwide industry body that is a leading advocate of BIM, defines BIM as:

¹² Charles Eastman et al, “An Outline of the Building Description System” (Research Report No 50, Carnegie Mellon University, Institute of Physical Planning, September 1974).

¹³ Eastman et al, n 12, 5.

¹⁴ Budayan and Arayici, n 6, 49.

¹⁵ *Design Technology in Architecture 2021 Report*, n 7, 13.

¹⁶ Oluwole Alfred Olatunji and Abiola Akanmu, “Scholarship of BIM and Construction Law: Myths, Realities, and Future Directions” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 185.

¹⁷ Olatunji and Akanmu, n 16, 185.

¹⁸ House of Representatives Standing Committee on Infrastructure, Transport and Cities, *Inquiry into Government Procurement: A Sovereign Security Imperative* (Report, March 2022) <<https://apo.org.au/node/317243>> (*Inquiry into Government Procurement*).

¹⁹ *Inquiry into Government Procurement*, n 18, 145.

²⁰ *Inquiry into Government Procurement*, n 18, 145.

²¹ *Inquiry into Government Procurement*, n 18, 144–145. The term construction industry includes design professionals.

²² David Levin, “BIM – Do Lawyers Need to Care” (2012) 24 *Australian Construction Law Bulletin* 130, 133.

²³ BIM can be understood as technology, a system, a philosophy, a software or a platform. See Olatunji and Akanmu, n 16, 184.

²⁴ Sacks and Pikas, n 1, 49.

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- (1) a digital representation of the physical and functional characteristics of a facility;
- (2) a business process for generating and leveraging asset data to design, construct, and operate the building during its life cycle; and
- (3) the organisation and control of the business process by using the information in the digital prototype to affect the sharing of information over the entire life cycle of an asset.²⁵

There are other definitions of BIM,²⁶ and whether BIM is a technology, a system, a philosophy, a software or a platform, continues to be debated.²⁷ Budayan and Arayici contend that there is no consensus on the definition of BIM.²⁸ This article adopts the buildingSMART definition because it captures the fact that BIM is more than just a computer model; it is a way of working collaboratively. BIM serves as a shared knowledge resource for information,²⁹ facilitating collaboration between different users at different phases of the life cycle of a facility.³⁰

Ultimately, BIM seeks to provide a single forum where all the parties involved in the project can input elements to assist with the design, delivery, operation and maintenance of the project. The model is a single source of truth to which all project participants can contribute, thereby facilitating the transfer of data.

In practical terms, BIM allows users to:³¹

- (1) insert, extract, update and modify information in a digital model;³²
- (2) plan, layout, estimate, detail and fabricate various building components;³³
- (3) “walk through” and view the final product as if on-site;³⁴
- (4) expose the asset structure and review the piping, conduits and services which run through the asset;³⁵
- (5) zoom in, zoom out and rotate the three-dimensional model by 360 degrees;³⁶
- (6) instantly view any element of the model (such as a door) and its dimensions, make and model;³⁷ and
- (7) detect any conflicts in design (clash detection) before the commencement of works on site, by consolidating into one model all the design elements contributed by different disciplines.³⁸

C. BIM Protocols

BIM Protocols are intended to be expressly incorporated into all construction contracts between the principal and BIM users. The objectives of the Protocols include supporting the adoption of effective

²⁵ See, eg, buildingSMART, *The BIM Evolution Continues with OPEN BIM* (2012) <https://bimie.nl/images/bestanden/OPEN_BIM_ExCom_Agreed_Description_20120131.pdf>; National Institute of Building Sciences, *Frequently Asked Questions about the National BIM Standard-United States™* (2020) <<https://www.nationalbimstandard.org/faqs#faq1>>; see, eg, Pijush Samui, Anasua GuhaRay and Elham Mahmoudi, *Facets of a Smart City: Computational and Experimental Techniques for Sustainable Urban Development* (Bentham, 2022) 30.

²⁶ Olatunji and Akanmu, n 16, 184.

²⁷ Olatunji and Akanmu, n 16, 184.

²⁸ Budayan and Arayici, n 6, 49.

²⁹ The National Institute of Building Sciences, *National BIM Standard-United States: Version 1 – Part 1: Overview, Principles and Methodologies* (December 2007) 21 <https://buildinginformationmanagement.files.wordpress.com/2011/06/nbimsv1_p1.pdf>.

³⁰ The National Institute of Building Sciences, n 29, 21.

³¹ Alice Chen, “BIM from a Practical Perspective” (2014) 26(2) *Australian Construction Law Bulletin* 28, 28.

³² Chen, n 31, 28.

³³ Australian Construction Industry Forum, *Building and Construction Procurement Guide: Project Team Integration and Building Information Modelling* (Report, June 2015) <<https://www.acif.com.au/documents/item/724>>.

³⁴ Chen, n 31, 28.

³⁵ Chen, n 31, 28.

³⁶ Chen, n 31, 28.

³⁷ Chen, n 31, 28.

³⁸ Chen, n 31, 29.

and collaborative working practices in the project teams.³⁹ Standard Protocols have been published in the United States (US) and United Kingdom, however, Australia has yet to benefit from the publication of a standard BIM Protocol.

Arguably, in the absence of a government issued BIM Protocol standard or directive, parties using BIM have no alternative but to develop bespoke Protocols. This can potentially lead to BIM becoming a weapon in negotiations and a lack of consistency in Protocols across States and Territories makes it harder for businesses operating nationally and can potentially contribute to misunderstandings between parties.⁴⁰

Although there is no industry standard BIM Protocol which can be incorporated into a contract in Australia, we do have a comprehensive set of guidelines, titled *NATSPEC National BIM Guide* which was first published in 2011, and later revised in 2016. NATSPEC is a national not-for-profit organisation that is owned by the design, build, construct and property industries through professional associations and government property groups.⁴¹ The Guide is a reference document that contains definitions relating to roles and responsibilities, collaboration procedures, approved software, modelling requirements and documentation standards when using BIM.⁴² The *NATSPEC Guide* does not specifically address the ways in which BIM can impact on contractual rights and obligations, but it does canvas the areas of a project that BIM impacts. The *NATSPEC Guide* is a useful resource for construction lawyers seeking to understand the effect of BIM on different project delivery methods. In turn, this will inform contract drafting such that the need for amendments to particular clauses can be identified. The majority of those consulted during the development of the *NATSPEC Guide* were building companies or designers, rather than lawyers. However, the practical view which the contributing organisations provided, means the *Guide* is effective in identifying areas which may need legal consideration. The *NATSPEC Guide* lays the groundwork for the development of an effective Protocol for Australia.

The *NATSPEC Project BIM Template*, first published in 2012, and revised in 2016, is a document that is intended to be used in conjunction with the *NATSPEC Guide*.⁴³ The Template provides a means of documenting the particular requirements regarding BIM for individual projects. Parties can enter descriptive details of the project, such as its location, and specify the principal's expectations around BIM deliverables and uses. The template can also be used to record what standards from the NATSPEC BIM Reference Schedule are to apply. Like other briefing documents, it outlines the scope of services required for the project and allows the project team to formulate an effective response.

In the United Kingdom, the Construction Industry Council (CIC) BIM Protocol was published in 2013, and updated in 2018, to support Level 2 BIM in line with the UK Government's mandate (the requirements of the different BIM levels are discussed in the next section). The UK Government's vision is to continue the BIM journey beyond the implementation of Level 2, ultimately building to Level 3.⁴⁴ The CIC BIM Protocol is the only standard contractual Protocol published in the United Kingdom for projects using BIM. It is intended to be used as an addendum to the construction contract, consultant appointments and subcontracts.⁴⁵ For example, on design and construct projects,⁴⁶ the CIC Protocol is

³⁹ Construction Industry Council, *Building Information Model (BIM) Protocol – Standard Protocol for Use in Projects Using Building Information Models* (2013).

⁴⁰ Nick Crennan, *Standardisation Will Help Embed the Use of Building Information Modelling (BIM) in the Australian Market* (19 November 2014) Colin Biggers & Paisley <<https://www.cbp.com.au/insights/insights/2014/november/standardisation-will-help-embed-the-use-of-buildin>>.

⁴¹ See NATSPEC, *About NATSPEC* <<https://www.natspec.com.au/about/about-natspec>>.

⁴² See NATSPEC, *NATSPEC National BIM Guide* <<https://bim.natspec.org/documents/natspec-national-bim-guide>>.

⁴³ See NATSPEC, n 42.

⁴⁴ M Filho et al, "Legal Aspects of Building Information Modelling: A World View (Part I)" (2016) 11(4) *Construction Law International* 6, 13.

⁴⁵ Simon Lewis and Vicky McCombe, "Construction Law in the United Kingdom: Building on BIM" [2018] *The Licensing Journal* 22, 23.

⁴⁶ Lewis and McCombe, n 45, 23.

appended to the designers' contracts prior to the appointment of the contractor. Down the contractual chain, the contractor can incorporate the Protocol into any subcontracts that concern the use, production or delivery of models.

The CIC Protocol is by no means a comprehensive articulation of all rights relating to BIM, but provides guidance on several issues, including:⁴⁷

- (1) permitted purposes relating to the use of data from the model;
- (2) the treatment of intellectual property;
- (3) electronic data exchange;
- (4) definitions; and
- (5) any change of management relating to the design team and the individuals who manage the BIM process and the model itself.

The CIC Protocol attempts to integrate BIM with standard form contracts without the need for amendments to be made to the contract. However, the incorporation of the Protocol can potentially result in inconsistencies between the Protocol and the contract,⁴⁸ for example, when it comes to intellectual property rights.⁴⁹

D. The BIM Levels

BIM consists of four distinct levels with different criteria that reflect the degree of “maturity”, which in this context means the readiness of a stakeholder within the industry to adopt BIM, noting that which BIM level is adopted is a decision that is usually driven by the principal.⁵⁰ There are no specific definitions of where one level ceases and another commences.⁵¹ The four recognised levels are set out in Table 1.⁵²

TABLE 1. BIM Levels

Level	Detail
0	Low collaboration when it comes to information sharing, with the parties relying only on two-dimensional CAD drafting techniques. ^A
1	Information is shared between each party at each phase of the project life cycle. There is no collaboration between disciplines. Rather, each discipline publishes and maintains its respective data. ^B
2	A series of “mini BIMs”. ^C Each model is held separately and a change in one model does not automatically result in updates to other models. ^D The separate models from the different disciplines are collated, resulting in a “federated” model. Any clashes in design between disciplines are detected in a shared data environment. ^E
3	Complete collaboration between disciplines with the use of a single, shared project model held by an “owner” in a common repository. ^F All parties can access and modify the integrated model at any time, ^G and unlike Level 2, a change in one model results in an update to other models.

^A Brian Greenhalgh, Graham Squires and Abdul-Majeed Mahamadu, *Construction Procurement: Complex Property Development* (Taylor & Francis, 2021) 85.

^B Brainlab, *The 7 Elements of Building Information Modeling (BIM) for Integrated Operating Room Construction Projects* (2021) <<https://www.brainlab.com/journal/7-elements-of-building-information-modeling-for-or-construction/>>.

^C Alice Chen, “BIM from a Practical Perspective” (2014) 26(2) *Australian Construction Law Bulletin* 28, 28.

⁴⁷ Construction Industry Council, *Building Information Modelling Protocol, Second Edition, Standard Protocol for Use in Projects Using Building Information Models* (Protocol, 2018) viii <<https://cic.org.uk/admin/resources/bim-protocol-2nd-edition-2.pdf>>.

⁴⁸ Lewis and McCombe, n 45, 23.

⁴⁹ Lewis and McCombe, n 45, 23.

⁵⁰ National Building Specification, *BIM Dimensions – 3D, 4D, 5D, 6D BIM Explained* <<https://www.thenbs.com/knowledge/bim-dimensions-3d-4d-5d-6d-bim-explained>> (*BIM Dimensions*).

⁵¹ Levin, n 22, 131.

⁵² The maturity of various projects and assets along this levelled spectrum varies. “Maturity” refers to the state of readiness of any stakeholder to adopt BIM within the industry.

^D Alice Chen, “BIM from a Practical Perspective” (2014) 26(2) *Australian Construction Law Bulletin* 28, 28.

^E Alice Chen, “BIM from a Practical Perspective” (2014) 26(2) *Australian Construction Law Bulletin* 28, 28.

^F National Building Specification, *BIM Dimensions – 3D, 4D, 5D, 6D BIM Explained* <<https://www.thenbs.com/knowledge/bim-dimensions-3d-4d-5d-6d-bim-explained>>.

^G Redstack Bill Adams, *Understanding Levels of BIM* <<https://www.a2kstore.com/understanding-levels-of-bim>>; Lukas Klee, *International Construction Contract Law* (Wiley-Blackwell, 2018) 157.

E. The BIM Dimensions

BIM levels (the measure of collaboration) are not to be confused with BIM dimensions (the measure of information). BIM dimensions reflect the extent of information and data that is entered into a model.⁵³ The dimensions also indicate the level of technology used and the ability to exchange information digitally on a particular project.⁵⁴ There are seven dimensions of BIM which are generally referred to as 2D through to 8D, and are explained in the Table 2.⁵⁵

It is important for construction lawyers to be familiar with the full extent of the capabilities of BIM if they are to properly assist their clients. Not all projects will require the full suite of dimensions, however construction lawyers with knowledge of the origins of BIM, coupled with the latest information about its capabilities, are better placed to advise their clients.

TABLE 2. BIM Dimensions

2D	Simple, two-dimensional drawings. ^A
3D	Three-dimensional CAD to create a geometric representation of the structure’s components. ^B
4D	Introduced in 1986, during the phased construction of Heathrow’s Terminal 3. This level involves the use of BIM data to analyse time and schedule information during construction, including phase planning modelling. For example, scaffolding in a 4D BIM model is a temporary activity, ^C thus elements should occur in the 4D model for only a limited time. 4D models can be animated, and construction production workflows can be simulated, to identify potential space/time conflicts between different kinds of works. ^D
5D	This dimension emerged in 2000, following the release of the software Autodesk® Revit®, and allows costs to be quantified for building components. ^E 5D involves integrating quantity or cost data, including cost estimation modelling and cost control analysis. The cost estimating process starts with exporting data from 3D models to BIM-based cost estimating software. Subsequently, the designated party prepares an estimate of the physical materials required for a project (quantity take-off). ^F The model then generates a bill of quantities and exports it to an external database. ^G
6D	This dimension allows for sustainability issues to be factored into the design and construction of the project by facilitating the performance of energy consumption analyses. ^H 6D BIM technology can enable more accurate energy estimates and reduce overall energy consumption. ^I This is possible because the moving parts of the building, for example, the heating and ventilation system, have sensors that can feed information on their performance to the BIM dashboard.
7D	Often described as facility management, 7D is used by managers in the operation and maintenance of a project throughout its life cycle. Facility managers can use this throughout the operation and maintenance phase of a building’s life cycle. ^J The operation and maintenance phase is considered to be the most cost-consuming period in a building’s life cycle. ^K 7D provides facility managers with increased knowledge and control over data and documents relating to the building. ^L This dimension can extract and track relevant asset data including component status (eg, air flow pressure in a building), maintenance/operation manuals and warranty dates. ^M

⁵³ Zeynep Işık et al, “BIM, Sustainability, and Energy Optimization” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 147.

⁵⁴ May Winfield and Sarah Rock, *The Winfield Rock Report: Overcoming the Legal and Contractual Barriers of BIM* (February 2018) 15 <<https://www.ukbimalliance.org/winfield-rock-report/>>.

⁵⁵ Işık et al, n 53, 147. The dimensions are sometimes referred to as “stages”. This is evident in the British Standards Institute infographic.

8D	This dimension adds safety information to the geometric model of the structure throughout the design and execution stage. ^N 8D aims to prevent accidents through safe design – for example, identifying site conditions more accurately and hazards in advance. ^O The model reproduces the real construction site, complete with machinery, provisional works and workers in motion. ^P
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^A Jim Mason, *Innovating Construction Law* (Taylor and Francis, 2021) 183.

^B Jim Mason, *Innovating Construction Law* (Taylor and Francis, 2021) 183.

^C Rafael Sacks and Ergo Pikas, “Foundational Concepts for BIM” in Farzad Hosseini et al (ed), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 17.

^D Rafael Sacks and Ergo Pikas, “Foundational Concepts for BIM” in Farzad Hosseini et al (ed), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 17.

^E Rand Group, *What Is BIM? An Overview of Building Information Modelling – Part II* <<http://www.randgroup.com/insights/bim-overview-building-information-modelling-part-ii/>>.

^F Faris Elghaish, Saeed Talebi and Song Wu, “Cost Management-based BIM: Skills, Implementation, and Teaching Map” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 103.

^G A bill of quantities is a list of materials in which rates for combined materials and labour and their costs are itemised.

^H There is some disagreement as to whether 6D and 7D are different. It is generally understood that 6D BIM refers to sustainability (energy analysis, efficiency studies) whilst 7D BIM refers to facility management activities. See Zeynep Işık et al, “BIM, Sustainability, and Energy Optimization” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 147. Compare National Building Specification, *BIM Dimensions – 3D, 4D, 5D, 6D BIM Explained* <<https://www.thenbs.com/knowledge/bim-dimensions-3d-4d-5d-6d-bim-explained>>.

^I Zeynep Işık et al, “BIM, Sustainability, and Energy Optimization” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 144–146.

^J Faris Elghaish, Saeed Talebi and Song Wu, “Cost Management-based BIM: Skills, Implementation, and Teaching Map” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 147.

^K Faris Elghaish, Saeed Talebi and Song Wu, “Cost Management-based BIM: Skills, Implementation, and Teaching Map” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 147.

^L Faris Elghaish, Saeed Talebi and Song Wu, “Cost Management-based BIM: Skills, Implementation, and Teaching Map” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021) 147.

^M Zeynep Işık et al, “BIM, Sustainability, and Energy Optimization” in Farzad Hosseini et al (eds), *BIM Teaching and Learning Handbook: Implementation for Students and Educators* (Routledge, 2021).

^N BibLus, *8D BIM: What Is It and What Are Its Benefits?* (26 November 2021) <<https://biblus.accasoftware.com/en/8d-bim-what-is-it-and-what-are-its-benefits/>>.

^O Imriyas Kamardeen, “8D BIM Modelling Tool for Accident Prevention through Design” (Paper presented at the Proceedings of the 26th Annual Association of Researchers in Construction Management Conference, June–August 2010) 285.

^P BibLus, *8D BIM: What Is It and What Are Its Benefits?* (26 November 2021) <<https://biblus.accasoftware.com/en/8d-bim-what-is-it-and-what-are-its-benefits/>>.

To consider the development of BIM as having reached its pinnacle, would be akin to IBM’s president in the 1940s, believing that there will only be five different companies that manufacture computers. BIM is arguably one of the most influential technologies to be embraced by the construction industry with the potential to continually evolve. It is therefore essential that today’s construction lawyers understand BIM’s current capabilities and stay up-to-date as the technology evolves.

III. USE OF BIM IN AUSTRALIA

A. National Level

BIM is yet to reach anywhere near its full potential in Australia. This may be due, in part, to a palpable absence of any mandate from the federal government concerning its implementation.⁵⁶ This is in stark

⁵⁶ See, eg, *Design Technology in Architecture 2021 Report*, n 7, 23.

contrast to the United Kingdom where the government has mandated the use of BIM (level 2) on all government projects over £5 million (AU\$8.59 million).⁵⁷

In 2016, the House of Representatives Standing Committee on Infrastructure, Transport and Cities released its “Smart Information and Communications Technology” Report, which recommended that the Australian Government require the use of BIM on all major infrastructure projects exceeding \$50 million.⁵⁸ In April 2022, the same Standing Committee published a further report entitled “Procurement Practices for Government-Funded Infrastructure”, which again made recommendations regarding the adoption of BIM. This time the Committee urged the Commonwealth Government to enforce tender requirements that use BIM.⁵⁹ Notwithstanding these reports and recommendations, there are still no there is still no federal mandate regarding the use of BIM on government projects.

The Commonwealth Procurement Rules govern construction procurement at the federal level, and set out numerous mandatory rules which Australian government agencies must observe when conducting procurements.⁶⁰ The rules are the most obvious way the Commonwealth could ensure the use of BIM on its projects.⁶¹ However, despite the capacity for BIM to significantly improve efficiency and productivity, it is not addressed in the Rules.⁶²

The Department of Defence is at the forefront of Commonwealth Government Departments utilising BIM. The Department has created six BIM collaborative procurement models based on integration requirements and various risk profiles for each delivery or project type in Australia.⁶³ Each delivery model requires early contractor involvement and an overarching project team agreement.⁶⁴ The department has also trialled a suite of integrated project delivery contracts on pilot projects.⁶⁵ These models incorporate:⁶⁶

- early contractor involvement;
- collaboration through an integrated project team involving all key project contractors and stakeholders;
- a deconstructed supply chain to facilitate access to buildability;
- two-phase delivery to enable the project to be de-risked in the initial design phase and to provide maximum flexibility as to scope, programme and budget;
- removal of traditional fixed time/fixed price tensions in the risk allocation;
- positive financial incentives through a “project performance dividend”; and
- dispute avoidance through a “project risk and issue settlement model”.

Australian construction lawyers can play a pivotal role in increasing the use of BIM by assisting their clients to incorporate BIM into their contracts. A principal barrier to BIM adoption in Australia, is that while BIM is widely known within the industry, it is not as widely understood by construction lawyers.⁶⁷

⁵⁷ Işık et al, n 53.

⁵⁸ House of Representatives Standing Committee on Infrastructure, Transport and Cities, *Smart Information and Communications Technology: Inquiry into the Role of Smart ICT in the Design and Planning of Infrastructure* (Report, 2016) xiv <<https://apo.org.au/node/62234>>. The mandate was only applicable to projects which receive government funding.

⁵⁹ *Inquiry into Government Procurement*, n 18, xxii.

⁶⁰ Australian Government, Department of Finance, *Commonwealth Procurement Rules* (2022) <<https://www.finance.gov.au/government/procurement/commonwealth-procurement-rules>> (*Commonwealth Procurement Rules*).

⁶¹ Paula Gerber and Marko Misko, “How Does Collaborative Procurement Operate in Australia?” in David Mosey (ed), *Collaborative Construction Procurement and Improved Value* (John Wiley & Sons, 2019) 395.

⁶² *Commonwealth Procurement Rules*, n 60.

⁶³ Australasian BIM Advisory Board, Submission to House of Representatives Standing Committee on Infrastructure, Transport and Cities, *Inquiry into Government Procurement: A Sovereign Security Imperative* (16 July 2021) 9 <<https://www.abab.net.au/wp-content/uploads/2021/12/ABAB-Submission-to-Parliamentary-Inquiry-into-Procurement-16-July-2021.pdf>>.

⁶⁴ Australasian BIM Advisory Board, n 63, 9.

⁶⁵ Gerber and Misko, n 61, 396.

⁶⁶ Gerber and Misko, n 61, 396.

⁶⁷ Steven Phillips and Jim Martin, *Grenfell and Construction Industry Reform: A Guide for the Construction Professional* (Routledge, 1st ed, 2021) 76.

In the United Kingdom, the 2018 Winfield Rock report found that there is a widespread perception by those in the architecture, engineering and construction professions that the legal community lacks true understanding or realisation of the meaning of BIM and consequently, its risks, issues and opportunities.⁶⁸ The Report states that “[c]ontracts are intended to reflect the commercial agreement between the parties, the ‘legal tail’ should not wag the ‘commercial dog’”. In Australia, the “legal tail” all too often wags the “commercial dog”. However, in the context of BIM, it is the complete absence of a tail that is the problem. The lack of legal frameworks is hindering the widespread adoption of BIM and impeding the realisation of its full potential.

The dearth of Australian standard clauses and Protocols addressing BIM, that can be readily used in and with construction contracts is highly problematic. The Australian Standards suite of construction contracts (along with various forms of associated works and services) dominate the Australian construction contracting landscape.⁶⁹ They purportedly represent almost three quarters of the 68% of projects which use standard forms and it appears they will continue to dominate the industry into the foreseeable future.⁷⁰

The current standard form contracts are well past their use by dates and it is time that Australian standard form construction contracts address the different risks and documentation associated with BIM projects (including standard Appendices, how to complete them and their purpose), the BIM processes (with consequent necessary rights and duties), and the terms required for a BIM-supportive contract.

B. State Level

Most State and Territory governments have begun adopting BIM on a project-by-project basis, resulting in bespoke, rather than consistent, approaches.⁷¹ Victoria and Queensland have been at the forefront of BIM adoption, and are analysed in further detail below. These States have used BIM on significant infrastructure projects, particularly hospitals, but typically only in the design and construction phases and not during the operation and maintenance phases of the completed project.⁷²

1. Victoria

In 2019, the Victorian Government rolled out the Victorian Digital Asset Strategy (VDAS) across all relevant government agencies.⁷³ VDAS is designed to assist Victorian Government departments and agencies implement BIM in projects in a manner that is capable of being efficiently rolled out on a whole-of-government basis.⁷⁴ The VDAS identifies key legal considerations that should be addressed in any contract involving BIM, including, intellectual property and ownership; confidentiality and privacy; licensing; data sovereignty and critical assets; data security and integrity; critical asset requirements and liability and information reliance. VDAS is not a mandate, but rather a strategy which lays the foundations for a clear system to standardise how BIM is implemented across Victorian Government projects.

2. Queensland

In 2018, the Queensland Government developed a policy entitled, “Digital Enablement for Queensland Infrastructure – Principles for BIM implementation”.⁷⁵ The principles and associated work plan establish

⁶⁸ Winfield and Rock, n 54.

⁶⁹ John Sharkey et al, “Forms of Contract in the Australian Construction Industry” (Research Report, The University of Melbourne, June 2014) 5 <<https://law.unimelb.edu.au/news/archive/forms-of-contract-in-the-construction-industry>>.

⁷⁰ Sharkey et al, n 69, 5.

⁷¹ Australasian BIM Advisory Board, n 63, 17.

⁷² Australasian BIM Advisory Board, n 63, 17.

⁷³ Office of Projects Victoria, *Victorian Digital Asset Strategy* <<http://www.opv.vic.gov.au/Digital-Build/Victorian-Digital-Asset-Strategy>>.

⁷⁴ Office of Projects Victoria, n 73.

⁷⁵ Queensland Government, *Building Information Modelling* (2021) <<https://www.statedevelopment.qld.gov.au/industry/infrastructure/infrastructure-planning-and-policy/building-information-modelling>>.

a framework to implement BIM on all major government infrastructure projects by 2023. Since 1 July 2019, all Queensland Government construction projects with a value of \$50 million or more must use BIM from the early planning phase.⁷⁶ However the mandate does not specify which level of BIM is to be used.⁷⁷ The most recent publicly available data indicates that BIM is being used on 18 government projects valued at \$50 million or more, and 10 government projects valued at less than \$50 million.⁷⁸

While Victoria currently has extensive guidance in the form of an overarching strategy and policy, it does not have a recognisable mandate. Conversely, Queensland has an established mandate but lacks detailed standards or Protocols. Best practice requires a combination of the Victorian and Queensland approach across all Australian States. Ideally, there should be a federal BIM mandate and the development of a consistent BIM standard and Protocol. A national comprehensive strategy, standards and Protocol would enhance the uptake of BIM across each of the states and territories in Australia. The federal government might not be in a position to mandate that state governments use BIM on their projects; however, it is in a position to develop a strategy and the accompanying contractual documentation to facilitate national adoption. Ultimately, the federal government is best placed work together with the State Governments to develop state-of-the-art legal and contractual documentation for use on all Government BIM projects. A consistent and certain legal framework for BIM projects will help BIM to thrive in Australia.

IV. USE OF BIM INTERNATIONALLY

The importance of Australian construction lawyers being familiar with the impact of BIM on contract drafting is evident from the widespread use of BIM across the globe.⁷⁹ BIM usage is increasing at a rapid rate, including in Australia, making it vital that the Australian legal profession has the knowledge and skills necessary to advise clients on the legal implications that flow from BIM. The driving force behind the increase in BIM usage around the world comes from major private and government owners seeking to reap the benefits of a faster, more certain project delivery, with more reliable quality and cost.⁸⁰

The McGraw Hill Construction SmartMarket Report surveyed 727 companies across 10 countries, including Australia, and found that the adoption of BIM by contractors in North America increased from 28% to 71% between 2007 and 2012.⁸¹ This dramatic expansion was reflected in other regions, including South America, Europe and the Asia-Pacific over the same period.⁸² The Report found that BIM users experienced significant benefits from using BIM including better profits, less rework, reduced project duration and fewer claims.⁸³ Such results should be a strong incentive for Australian construction lawyers to quickly school themselves in the legal ramifications of using BIM so that they are able to advise their clients on how to address such issues appropriately.

A. United Kingdom

1. Adoption

Since April 2016, the British Government has mandated Level 2 BIM for all centrally procured government projects with a value in excess of £5 million (AU\$7.1 million), including both new infrastructure and

⁷⁶ Queensland Government, n 75.

⁷⁷ Queensland Government, *BIM Projects – Data and Information Guideline* (July 2020) <<https://www.qgcio.qld.gov.au/documents/bim-projects-data-and-information-guideline>>.

⁷⁸ As of April 2022. See Queensland Government, n 75.

⁷⁹ Olatunji and Akanmu, n 16, 185.

⁸⁰ McGraw Hill Construction, *The Business Value of BIM for Construction in Major Global Markets: How Contractors around the World Are Driving Innovation with Building Information Modelling* (SmartMarket Report, 2014) 4.

⁸¹ McGraw Hill Construction, n 80, 4.

⁸² The McGraw Hill Construction SmartMarket Report surveyed companies from the following countries: Australia, Brazil, Canada, France, Germany, Japan, New Zealand, South Korea, United Kingdom and United States.

⁸³ McGraw Hill Construction, n 80.

refurbishments.⁸⁴ The initial recommendation was that the UK Government mandate the use of BIM for government projects over £50 million. However, the UK's first Chief Construction Adviser suggested lowering the amount on the basis that £50 million was "under ambitious" and would not trickle down to the "small players" in the "supply chain".⁸⁵

The mandate falls under the broader remit of the "Digital Built Britain Strategy".⁸⁶ However, BIM's use is not intended to be limited to multi-million-dollar projects. In 2017, Dame Judith Hackitt conducted an independent review of building regulations and fire safety following the tragic events of the fire at Grenfell Tower, which led to 72 deaths.⁸⁷ The Hackitt report recommended that the government mandate a BIM-like digital standard of record-keeping for the design, construction and occupation of new multi-occupancy higher risk residential buildings over 10 storeys.⁸⁸ The review concluded that BIM would result in improved transparency and integrity of information which are crucial for building-in safety up front.

2. Standards Forms

(a) JCT

The Joint Contracts Tribunal suite of contracts (JCT) is the UK's most popular suite of construction contracts.⁸⁹ JCT published a practice note which stipulates how BIM provisions should be implemented and includes a "BIM Protocol Checklist" stipulating how risks and responsibilities for BIM projects can be addressed.

The JCT 2016 suite cross-references details set out in a separate BIM Protocol.⁹⁰ JCT does not publish a form of BIM Protocol and the parties must agree the form of BIM Protocol to be used on a project during the precontract stage. The chosen BIM Protocol should be reviewed to ensure that, from both a technical and contractual perspective, it does not contradict the terms of the contract or the other contract documents.⁹¹

The JCT 2019 Practice Note is intended to supplement the Protocol once adopted by parties and be a practical guide, based on the JCT's most popular contract, the JCT Design and Build Contract.⁹² The Practice Note is divided into two parts, namely:⁹³

- Part A is a detailed commentary on the provisions in the JCT Design and Build Contract that are, or could be, relevant where BIM is implemented on a project;⁹⁴
- Part B is a BIM Protocol checklist, suggesting a non-exhaustive list of main topics which a BIM Protocol should cover.⁹⁵

⁸⁴ Infrastructure and Projects Authority, *Government Construction Strategy 2016-20 March 2016* (Report, 2016) 16 <<https://www.gov.uk/government/publications/government-construction-strategy-2016-2020>>.

⁸⁵ Construction News, *Government Plots Five-year Path to BIM in Public Sector* (18 May 2011).

⁸⁶ University of Cambridge, *What Is a Digital Built Britain?* <<https://www.cdbb.cam.ac.uk/AboutDBB/whatisdbb>>.

⁸⁷ See Caroline Davies et al, "How the Grenfell Tower Disaster Unfolded", *The Guardian*, 15 June 2017 <<https://www.theguardian.com/uk-news/2017/jun/14/how-the-grenfell-tower-disaster-unfolded>>.

⁸⁸ Dame Judith Hackitt, *Building a Safer Future: Independent Review of Building Regulations and Fire Safety* (Report, 2018) 104 <<https://www.gov.uk/government/publications/independent-review-of-building-regulations-and-fire-safety-final-report>>.

⁸⁹ Jim Mason, *Innovating Construction Law* (Taylor and Francis, 2021) 47.

⁹⁰ "Contract Documents" is defined as "the Agreement and these Conditions, together with the Employer's Requirements, the Contractor's Proposals, the Contract Sum Analysis and (where applicable) the BIM Protocol".

⁹¹ Mark Pantry, *Working with BIM and JCT Contracts* (10 February 2020) <<https://corporate.jcttd.co.uk/working-with-bim-and-jct-contracts/>>.

⁹² Pantry, n 91.

⁹³ Pantry, n 91.

⁹⁴ Pantry, n 91.

⁹⁵ Pantry, n 91.

The aim of the Practice Note is to increase understanding of BIM related legal and contractual issues and suggest ways of approaching such issues in a collaborative and constructive manner. The Practice Note provides helpful guidance around the legal ramifications of using BIM and provides a useful model for Australian publishers of standard form contracts to follow.

While these extra-contractual documents provide useful practical guidance, there is still a need for contractual clauses that explicitly address BIM, and the JCT suite of contracts does not have this. This is in stark contrast to the 4th edition of the New Engineering Contract (NEC4).

(b) NEC4

The UK government has endorsed NEC4 as the preferred contract for its projects.⁹⁶ NEC4 was released in June 2017 and can be readily adapted for BIM use by adopting one of its “Secondary Option Clauses”, known as the “Option X10 (Information Modelling)”. This clause addresses various BIM issues, including liability, use of the model, ownership and information requirements.⁹⁷ It places obligations on the contractor to collaborate with others who contribute “project information” to the model and provides a straightforward process for creating an “Information Execution Plan”.⁹⁸ The Information Execution Plan explains how the information modelling aspects of a project are to be carried out and defines the required level of development for project deliverables.

Lawyers will need to ensure that the BIM specific documentation, such as the Protocol, is consistent with the contract.⁹⁹ The NEC4 does not include provision for use of a BIM Protocol. It was designed to be independent of other BIM contractual documents such as the CIC Protocol.¹⁰⁰ Further, NEC4 does not contain detailed provisions dealing with intellectual property rights when compared to other standard forms.¹⁰¹ Intellectual property rights in the model for the project, or in a particular model developed for a limited purpose, can be assigned or controlled by contract. The increasing prevalence of proprietary issues around data ownership and information sharing will mean that intellectual property rights provisions are likely to become an important area of focus for future construction contracts.¹⁰²

(c) FIDIC

The use of the Federation Internationale Des Ingenieurs-Conseils (FIDIC) Rainbow Suite of contracts is a growing phenomenon in the United Kingdom. The Second Editions of the Red, Yellow and Silver Books, launched in 2018, do not address the use of BIM within their General Conditions. BIM is only mentioned in an advisory note in the Special Provisions.¹⁰³ The advisory note states that FIDIC is preparing two documents to address the use of its form of contract for BIM-enabled projects, namely a “Technology Guideline” and a “Definition of Scope Guideline Specific to BIM”.¹⁰⁴ At the time of writing this article, those two documents have yet to be published. On one view, the absence of express provisions addressing BIM in the FIDIC contracts means that these standard form contracts will remain attractive in the jurisdictions and markets where BIM is less developed.¹⁰⁵ However, on another view, it

⁹⁶ Brian Greenhalgh, Graham Squires and Abdul-Majeed Mahamadu, *Construction Procurement: Complex Property Development* (Taylor & Francis Ltd, 2021) 66.

⁹⁷ Mason, n 89, 60.

⁹⁸ Greenhalgh, Squires and Mahamadu, n 96, 299.

⁹⁹ Lewis and McCombe, n 45, 23.

¹⁰⁰ Mason, n 89, 60.

¹⁰¹ Charles Blamire-Brown and Danielle Griffiths, “Collaborating and Contracting for Success: How Future-proofed Are the New NEC4 and FIDIC 2017 Suites for the Needs of the Global Construction Industry in the Technological Age?” [2019] *International Construction Law Review* 296, 302.

¹⁰² Blamire-Brown and Griffiths, n 101, 302.

¹⁰³ Jeremy Glover, *The Application of BIM under the FIDIC Form of Contract* (2019) <<https://www.fenwickelliott.com/research-insight/newsletters/international-quarterly/application-bim-fidic-form-contract>>.

¹⁰⁴ Glover, n 103.

¹⁰⁵ Blamire-Brown and Griffiths, n 101, 302.

is preferable that FIDIC follow the lead of NEC4, and incorporate clauses specifically addressing BIM into its suite of standard form contracts,¹⁰⁶ parties on projects where BIM is not being used, deleting these provisions.

B. United States

1. Adoption

The United States is reportedly the biggest producer and consumer of BIM, even though there is no federal government mandate.¹⁰⁷ Despite the lack of a federal mandate, BIM use has grown organically across each of the states.¹⁰⁸ For example, Wisconsin became the first state to require BIM on publicly-funded projects with a budget over \$5 million.¹⁰⁹ According to US software company Autodesk, there is a 93% adoption rate of BIM by large architectural firms, 75% by mid-sized architectural firms and 34% by smaller architectural firms.¹¹⁰ In addition, the United States has an average 70% BIM adoption rate among construction firms.¹¹¹

The United States, unlike the United Kingdom, does not have a central government department responsible for procuring all civil engineering and infrastructure projects.¹¹² Instead, a number of US federal and state government and non-government agencies operate in parallel, or in collaboration, to promote and develop BIM applications.¹¹³ For example, the US General Services Administration (GSA), the Coast Guard, the Army Corps of Engineers, and the Smithsonian have each developed their own BIM mandates.¹¹⁴ The GSA is a federal agency with responsibility for new construction and the operation of existing federal properties,¹¹⁵ including approximately 10,000 buildings.¹¹⁶ In 2003, the GSA established its “National 3D-4D BIM Program” for buildings. It subsequently produced a “BIM Guide Series” covering topics related to the use of BIM for asset management from planning to operation.¹¹⁷ The GSA reports that BIM has enabled it to achieve 90% accuracy in space measurements and a 6% reduction in asset management costs.¹¹⁸

2. Standard Forms

BIM’s widespread use has prompted the need for standardisation.¹¹⁹ Such standardisation is a prerequisite for the coherent and consistent development and implementation of BIM.¹²⁰ Although a 2021 survey revealed that approximately 40% of the professional BIM users are unaware of standard form contracts

¹⁰⁶ Blamire-Brown and Griffiths, n 101, 302.

¹⁰⁷ Wong, Wong and Nadeem, n 2, 62.

¹⁰⁸ Anneliese O’Malley, *BIM in the US: Overview of a Game Changing Technology* (6 May 2021) <<https://www.planradar.com/us/bim-in-the-us/>>.

¹⁰⁹ See Viewpoint, *Is a BIM Mandate Coming to the US?* (20 March 2018) <<https://www.viewpoint.com/en-au/blog/is-a-bim-mandate-coming-to-the-us>>.

¹¹⁰ Kylee Swenson, *Prevent Your Extinction: Why BIM Matters in 2020 and Beyond* (24 October, 2019) <<https://www.autodesk.com/redshift/bim-2020/>>.

¹¹¹ Greenwald, n 5, 10.

¹¹² O’Malley, n 108.

¹¹³ Wong, Wong and Nadeem, n 2, 62.

¹¹⁴ Greenwald, n 5, 10.

¹¹⁵ U.S. General Services Administration, *Our Mission’s Evolution* (2021) <<https://www.gsa.gov/about-us/mission-and-background/our-missions-evolution>>.

¹¹⁶ Adriana X Sanchez, Keith D Hampson and Simon Vaux, *Delivering Value with BIM: A Whole-of-life Approach* (Routledge, 2016) 26.

¹¹⁷ Sanchez, Hampson and Vaux, n 116, 27.

¹¹⁸ Sanchez, Hampson and Vaux, n 116, 27.

¹¹⁹ Chew and Riley, n 4, 253.

¹²⁰ Sacks and Pikas, n 1, 17.

that include clauses relating to BIM,¹²¹ There are two standard form contracts that have adopted addendums that comprehensively address contractual issues arising from the use of BIM, namely:¹²²

- (1) ConsensusDOCS 301; and
- (2) the AIA E203-2013, which replaced the AIA Document E202-2008 Building Information Modeling Exhibit in 2013.

The purpose of these two publications is to address BIM related issues that go beyond the terms and conditions of industry standard form agreements. Thus, each document has been drafted to be an addendum or appendix to the standard form contract between the principal and architect or the principal and contractor, rather than a standalone document. The effect of this approach is that the contractual relationships between the three primary parties (principal, design professional and contractor) are largely preserved.

Although requirements for information and model management, model ownership, copyright and model standards are addressed in both documents, they differ in their approach, and it is appropriate to analyse both.¹²³

(a) *ConsensusDocs*

ConsensusDOCS is a suite of American standard form contracts endorsed by a diverse coalition of 40 leading construction industry associations with members from the design and construction industries.¹²⁴ ConsensusDocs 301 Building Information Modeling Addendum was the first US standard contract document to address the legal and administrative issues associated with using BIM.¹²⁵ The addendum is akin to a Protocol.

The addendum specifies that incorporating the addendum into the contract does not restructure the contractual relationships between project participants or alter the contractual regime.¹²⁶ This approach is not ideal because the Protocol could be considered a collateral contract and be found to modify the legal regime under the main contract, notwithstanding the assertion that it does not do this.¹²⁷ Further, any acts pursuant to the addendum could potentially give rise to claims such as estoppel, misrepresentation or misleading and deceptive conduct, in the event of a dispute.¹²⁸

The addendum is designed to be used in conjunction with the ConsensusDOCS 300 suite of contracts.¹²⁹ If there is a conflict, the addendum takes precedence over the contract.¹³⁰ It also includes a “BIM Execution Plan”, which defines how a BIM project is to be executed, how the BIM models will be updated over the project’s life cycle, and what information will be delivered in the various exchanges.¹³¹

¹²¹ Steve Rizer, “Lack of Knowledge about BIM Standard Form Documents Widespread among Construction Professionals Responding to WPL Publishing’s Latest Survey” *Construction Pro Week*, 16 July 2012 <http://constructionclaims.com/Content_Free/2012-07-16CPC.aspx>.

¹²² As of the date of this article, only the American Institute of Architects and ConsensusDocs have developed standard BIM protocols and contract documents.

¹²³ Hamid Adirad, *Advancing in Building Information Modeling (BIM) Contracting: Trends in the AEC/FM Industry*.

¹²⁴ ConsensusDOCS, *Coalition Members* <<https://www.consensusdocs.org/coalition-members/>>.

¹²⁵ Sacks and Pikas, n 1, 4.

¹²⁶ Sacks and Pikas, n 1, 6.

¹²⁷ Chew and Riley, n 4, 260. See, eg, Trevor Thomas, “Collateral Contracts and Relationship Contracting: Co-operation, Teamwork, Collaboration ... Disputation?” (2008) 24(4) BCL 224.

¹²⁸ Chew and Riley, n 4, 260.

¹²⁹ ConsensusDOCS, *300 Series: Collaborative* (2017) <<https://www.consensusdocs.org/contract/301-2/>> (*300 Series*).

¹³⁰ Chris Lenz, “BIM Is Vital for the Future, But Industry Must Co-operate” (Paper presented at the Society of Construction Law Conference, 25 July 2018) 11.

¹³¹ *300 Series*, n 130; Sacks and Pikas, n 1, 17.

How Front-end Lawyers Can Stop Worrying about Building Information Modelling (BIM) and Learn to Love It!

The drafters of the addendum adopted the approach that BIM does not require any restructuring of typical contractual relationships, and the architect remains the person responsible for the design, notwithstanding that other parties contribute to the design of the model.¹³² Article 1.4 of the addendum states:¹³³

Nothing in this Addendum shall relieve the [architect] from its obligation, nor diminish the role of the [architect], as the person responsible for and in charge of the design of the Project.

On the basis that the architect is liable for the work of others, it is appropriate that the entities inputting data into the model indemnify the architect for any errors in their work.

(b) American Institute of Architects

The American Institute of Architects (AIA), a leading professional membership association for architects, published the AIA E203-2013 Building Information Modeling Protocol Exhibit.¹³⁴ This document is intended to be an exhibit that is attached to the primary contract at the time that agreement is executed. Prior to 2008, no document published by the AIA had addressed BIM, and the AIA's standard form contracts were silent concerning contractual provisions for electronic data and models (ie the same situation that Australia is still in).¹³⁵

The AIA addressed this deficiency by creating a new set of digital practice documents, which includes AIA E203-2013.¹³⁶ The objective of E203-2013 is to allow parties to document their general expectations about how BIM will be used and relied upon at the outset of the project.¹³⁷ E203-2013 then requires the users of BIM, as soon as practical after execution of the agreement, to meet and decide upon the necessary and relevant Protocols for developing and using digital data and models.¹³⁸ This could be interpreted as "an agreement" and therefore not be binding on the parties.

Ultimately, the ConsensusDOCS approach is preferable to the AIA approach as it appears the addendum will be binding on the parties, there is no interference with the contractual relationships and there is less uncertainty arising out of the use of ConsensusDOCS.

V. CONTRACTUAL OBSTACLES AND SOLUTIONS

Contractual issues associated with BIM are recognised as a significant hindrance to BIM's successful adoption in Australia.¹³⁹ If Australia is to catch up to the rest of the world when it comes to BIM, construction lawyers must step up and be ready and able to identify and address for their clients the contractual implications of using BIM. The starting point is to acknowledge that no standard form contract currently in use in Australia addresses BIM at all. It is imperative that this omission be rectified. Standards Australia has announced that it is undertaking a long overdue review of AS4000, which will hopefully culminate in a modern, fit-for-purpose standard form contract that comprehensively deals with the legal ramifications of BIM, including by addressing the following, each of which is discussed in more detail below:

- (1) risk allocation;
- (2) incorporation of a BIM Protocol;
- (3) intellectual property;

¹³² Jason Dougherty, *Claims, Disputes and Litigation Involving BIM* (Routledge, 2015) 108.

¹³³ Dougherty, n 133, 108.

¹³⁴ American Institute of Architects, *About Us* <<http://www.aia.org/about/index.htm>>.

¹³⁵ Rayan Assaad et al, "Contractual Perspective for BIM Utilization in US Construction Projects" (2020) 146(12) *American Society of Civil Engineers Journal* 1, 3.

¹³⁶ Assaad et al, n 136, 3. The new digital practice documents consist of three separate documents designed to be used as a suite: "AIA Document E203-2013 Building Information Modeling and Digital Data Exhibit"; "AIA Document G201-2013 Project Digital Data Protocol Form" and "AIA Document G202-2013 Project Building Information Modeling Protocol Form".

¹³⁷ Assaad et al, n 136, 4.

¹³⁸ Assaad et al, n 136, 4.

¹³⁹ Srinath Perera et al, *BIM Execution Framework for Early-stage Estimating in PPP Projects* (Report, 2019) 23 <<https://researchdirect.westernsydney.edu.au/islandora/object/uws%3A52907>>.

- (4) data security and privacy;
- (5) liability for data; and
- (6) access to data.

Until Australia has a standard form contract that meticulously addresses the legal issues that flow out of BIM, it is incumbent on front-end construction lawyers to draft provisions that appropriately deal with these matters. This section considers each of these five contractual issues and recommends approaches for dealing with each of them.

A. Risk Allocation

BIM adds a further layer of complexity to the contractual regime for allocating and managing risk. In particular, BIM is premised on multiple parties being involved in developing aspects of the model, which can make the allocation of risks difficult. The Abrahamson model of risk allocation proposes that risk is allocated to the party best able to manage, estimate and carry the risk.¹⁴⁰ However, the Abrahamson model of risk allocation is often not applied, and principals often want to transfer as much risk as possible to the contractor, regardless of whether or not the contractor is in a position to manage or control that risk.¹⁴¹

If this approach is applied to projects using BIM, a contractor may be required to assume risks for any issues with the model (rather than risk being shared fairly between all users).¹⁴² For example, under a traditional delivery method, the principal is responsible for the design produced by its consultants.¹⁴³ This risk might be passed to the contractor if there is a novated Design and Construct contract. Principals do not generally want to bear the risk of inaccurate or missed information, and therefore might issue the model as “information-only” so as to exculpate the issuing party from any liability. Contrary to the philosophy that risk should be allocated to the party best able to manage and control the risk,¹⁴⁴ contractors are accepting risks for all issues with the model when they have little ability to manage or control that risk.¹⁴⁵

While the risk allocation in every contract depends on the particular project and parties, there always needs to be a clear description of the scope and responsibilities of each party using BIM. There will inevitably be variations in the levels of risk associated with each party’s responsibilities and rights (eg, the volume of information and models provided by each party).¹⁴⁶ The courts are full of construction disputes that arise from unforeseen developments and which lead to the relationship between parties being irreparably damaged. Clearly defined roles between those involved in the model will assist parties to administer the contract. Therefore, the Abrahamson model of risk allocation should not be ignored, and the drafting of BIM related provisions needs to reflect the collaborative process in which parties’ responsibilities may practically overlap. The Australian Institute of Architects suggests that there should be a matrix of responsibility on a BIM project, with the matrix incorporating all BIM roles, vocabulary and activities (eg, the matrix may specify who is responsible for clash detection). Such a matrix would assist parties to identify and allocate risks.

¹⁴⁰ National Public Works Conference/National Building and Construction Council Joint Working Party, *No Dispute – Strategies for Improvement in the Australian Building and Construction Industry* (Report, 1990) 6.

¹⁴¹ John Sharkey et al, *The Health of the Australian Construction Industry* (Report, 2020) 25 <https://law.unimelb.edu.au/_data/assets/pdf_file/0005/3501086/Health-of-the-Australian-Construction-Industry-Research-Report.pdf>.

¹⁴² Sharkey et al, n 142, 25.

¹⁴³ Maria Alma Chiozzi, *A Collaborative Contracting Framework Supported by BIM and Lean* (PhD Thesis, Queensland University of Technology, 2020) 138.

¹⁴⁴ Julian Bailey, *Construction Law* (London Publishing Partnership, 3rd ed, 2020) [4.13].

¹⁴⁵ Chew and Riley, n 4, 258.

¹⁴⁶ May Winfield, “Building Information Modelling: The Legal Frontier – Overcoming Legal and Contractual Obstacles” (Working Paper, Society of Construction Law UK, April 2015) 10 <https://www.acecae.eu/fileadmin/New_Upload/3_Area_2_Practice/BIM/Other_Docs/5_0_Legal_Frontier.pdf>.

However, parties need to not only allocate risk equitably but also manage risk. Australian construction contracts are largely silent when it comes to active risk management to achieve good project outcomes.¹⁴⁷ This is in stark contrast to NEC4 which requires contract parties to give an early warning to each other of any matter that could negatively impact the cost, program or quality of the project.¹⁴⁸ It is vital that construction lawyers assist their clients to not only allocate BIM risk fairly but also facilitate that risk being appropriately managed.

B. Incorporation of a BIM Protocol

In Australia, the current approach is to use a Protocol but not refer to it in the construction contract.¹⁴⁹ However, this approach is unsatisfactory as the Protocol may be considered a collateral contract that could modify the legal regime as set out under the main contract.¹⁵⁰ The Protocol may have different risk allocation than the contract or contradict other contract documents, including those relating to,¹⁵¹

- (1) definitions;
- (2) allocation of design responsibility and fitness for purpose;
- (3) the status of information provided by others;
- (4) insurance; and
- (5) copyright.

What is or should be the legal status of a BIM Protocol? Should it be an addendum or an amendment to the contract in the form of a special condition?¹⁵² Should it be an entirely separate standalone document? Whether it is incorporated into a bespoke contract, added as an addendum, or via alternative means, such as a multi-party project agreement, will depend on the project and the participant needs.¹⁵³ However, incorporating the BIM Protocol into the contract, via a specific amendment to the contract constitutes best practice, provided that there are no inconsistencies, ambiguities, conflicts or discrepancies between the Protocol and the contract. For example, a contract may contain a more comprehensive intellectual property licensing procedure than is provided under the BIM Protocol.¹⁵⁴

C. Intellectual Property

Multiple parties contributing to a BIM model gives rise to issues concerning intellectual property rights. Generally, architects, engineers and other designers in construction projects own the copyright to the drawings and specifications that they develop.¹⁵⁵ The ownership of that intellectual property prevents third parties from distributing or using the drawings or specifications other than for the project for which they were developed.¹⁵⁶ A model that comprises information provided by different parties may cause ownership issues as each party may wish to retain the intellectual property rights to the material they contribute to the model. Consequently, different intellectual property and other rights may attach to different classes of material contributed by different parties.¹⁵⁷

¹⁴⁷ Kevin Pascoe, "Incorporating Active Risk Management in Construction Contracts" (2018) 33 BCL 333, 333.

¹⁴⁸ NEC4, cl 15.2.

¹⁴⁹ Chew and Riley, n 4, 260.

¹⁵⁰ Chew and Riley, n 4, 260.

¹⁵¹ Nicholas Dennys and Robert Clay, *Hudson's Building and Engineering Contracts* (Sweet & Maxwell, 14th ed, 2021) [3-029].

¹⁵² Appendix A to the AIA of Steel Construction's Manual of Practice states that the model is the contract document. Although this may be appropriate for steel fabricators and erectors, it is not yet appropriate in all contexts.

¹⁵³ Kuiper and Holzer, n 8, 10.

¹⁵⁴ Koko Udom, *BIM: Mapping out the Legal Issues* (February 2021) <<http://www.thenbs.com/topics/BIM/articles/bimMappingOutTheLegalIssues.asp>>.

¹⁵⁵ Gregory R Andre, *Building Information Modeling (BIM): Special Contract Issues* (10 October 2011) 4 <https://files.klgates.com/files/publication/91bb453d-7f14-43af-8fb6-c74a78758a86/presentation/publicationattachment/bd33ff21-b2e6-4770-ad82-6be4a0a70903/alert_construction_building_information_modeling_october%202011.pdf>.

¹⁵⁶ Andre, n 156, 4.

¹⁵⁷ Mason, n 89, 124.

Some commentators argue that the ownership of intellectual property should rest with the creator of the information, not the party who pays for its creation.¹⁵⁸ In such a scenario, each contributor retains rights over their contribution to the shared model. Others assert that ownership of the model itself and the data incorporated into the model should lie with the principal upon the project's completion.¹⁵⁹

Best practice requires that the principal buy all intellectual property reposed in the BIM model for the purpose of lifetime ownership.¹⁶⁰ The benefit of ownership of the model vesting in the principal is that the principal can ensure that the model outputs, such as facility management,¹⁶¹ lie where they were initially intended.¹⁶² Thus, the principal owns the data in the model from the asset's inception to its decommissioning (if this occurs). Separately, the principal can revert to the original contributors for future maintenance of the model.¹⁶³ It would also be prudent for each party contributing data to the model to represent and warrant that it owns the copyright and holds a valid licence to the data it contributes, but ultimately transfers the copyright to the owner of the model.¹⁶⁴

D. Data Security and Privacy

The security of a project's BIM data is critical, particularly in light of security risks such as data corruption, data loss and unauthorised access via hacking or cyber-attacks. In addition, specific data submitted to the model may be proprietary, especially data submitted by contractors, manufacturers and suppliers.¹⁶⁵ Best practice requires that a contract impose rigorous privacy and data security obligations on each BIM user. As there will be entities who contribute to the model who are not parties to the construction contract, the principal will need to enter into contracts with each BIM user separately. Such agreements should require all BIM users to undertake use data and information obtained through BIM only for the project.¹⁶⁶ Furthermore, it must be documented who has the right to access what information.¹⁶⁷ For example, the Protocol can provide that only the quantity surveyor can access 5D BIM with costing information to verify the costings for the principal, while other users do not have access to this data.¹⁶⁸

All users should also be required to keep all data and information obtained through the BIM confidential (except to the extent that the information is required to be disclosed for the purposes of the project), and at the end of the project to delete copies of information obtained, except to the extent that the information is the subject of a continuing license (eg, the information will continue to be used across the asset life cycle) or the information is required to be retained by law. Finally, the written agreement should require all users to hold an appropriate amount of cyber insurance to protect against data corruption risks, loss or unauthorised access.

E. Liability for Data

BIM is a design approach and not a product. It is an approach that uses technology to bring together the technical disciplines involved in the design process. If an issue arises, it is essential to be able to

¹⁵⁸ Douglas Arensman and Mehmet Ozbek, "Building Information Modeling and Potential Legal Issues" (2012) 8(2) *Journal of Construction Education and Research* 146, 148.

¹⁵⁹ Winfield and Rock, n 54, 15. Referred to here as the "Principal". Principal in this context is the creator of the information.

¹⁶⁰ Oluwole Alfred Olatunji, "Building Information Modeling and Intellectual Propertization: A Revolutionary Nirvana or a Disillusionment" in Phillip Greenham (ed), *Construction Technology and the Law* (Society of Construction Law Australia, 2014) 77, 84.

¹⁶¹ Olatunji, n 161, 77, 84.

¹⁶² Olatunji, n 161, 77, 84.

¹⁶³ Olatunji, n 161, 77, 84.

¹⁶⁴ Andre, n 156, 4.

¹⁶⁵ Andre, n 156, 4.

¹⁶⁶ Chen, n 31, 30.

¹⁶⁷ Chen, n 31, 30.

¹⁶⁸ Chen, n 31, 30.

pinpoint liability. In a model prepared by multiple parties, an error by one contributor may cause a ripple effect throughout the entire model.¹⁶⁹ To be liable for one's own errors or omissions would be acceptable for most participants. However, to be potentially liable for the errors or omissions caused by the work of another party is less palatable.¹⁷⁰ For example, just as a head contractor is liable for the errors of its subcontractor, so too will the party who owns the model (often the head contractor) be liable for errors in the work inputted by others. Parties may protect themselves with a blanket limitation of liability clause, making it challenging to transfer the risk of technical errors to a negligent BIM user.¹⁷¹

The NEC4 standard form contract provides a useful template in this regard. BIM Protocols tend to place strict liability for errors in information on the contractor or subcontractor, regardless of whether they have been negligent.¹⁷² Option X10 in NEC4 takes a different, more common-sense approach. It provides that the contractor is liable for information only if it has been negligent, reflecting industry practice that contractors and subcontractors are generally only insured for claims arising from their negligence in design.¹⁷³

Another solution to the difficulty in establishing parties' respective liabilities when it comes to BIM models is integrated project insurance (IPI). IPI, which that can be used on any construction project, is an alternative insurance product to conventional individual project insurance policies because it does not revolve around individual liability.¹⁷⁴ IPI covers all participants, on projects where the principal and the project team jointly purchase a single policy which removes the need to attribute blame for issues to particular parties.¹⁷⁵ The policy responds to an insured's claim, and the insurer waives any right of subrogation against other insureds. Thus, the complexities of ascertaining and apportioning responsibility fall away.¹⁷⁶ IPI theoretically provides a participant with unfettered freedom to operate as it wishes.¹⁷⁷ It would be inappropriate to obtain IPI on a project where parties are highly adversarial and there is insufficient trust and communication between parties. However, there is merit in an approach that seeks to provide blame-free construction in circumstances where the parties are willing and able to collaborate.

F. Access to Data

All relevant parties typically have access to BIM and the appointed co-ordinator of BIM provides codes or passwords to the platform allowing access for those parties entitled to it. The question of access to data was considered in the UK case of *Trant Engineering Ltd v Mott MacDonald Ltd*.¹⁷⁸ Mott, the designer changed passwords to the model during a dispute with Trant, the contractor, leading Trant to apply to the Technology and Construction Court for an interim injunction allowing it to use the model and data stored in the common data environment (CDE). The CDE is a central source of information for the project that is used to collect, manage and disseminate for the whole project team.¹⁷⁹ Work on the project could not progress without the contractor being able to access the BIM model. The Court found that the balance of convenience lay firmly in granting the injunction. The case is a reminder that careful

¹⁶⁹ Chen, n 31, 29.

¹⁷⁰ Chen, n 31, 30.

¹⁷¹ Udom, n 155; Andre, n 156.

¹⁷² Dennys and Clay, n 152, [3.028].

¹⁷³ Dennys and Clay, n 152, [3.028].

¹⁷⁴ Jeremy Parsons, "Cloaking Parties with New Clothes – BIM and Apportioning Liability, If At All" (2017) 176 *Australian Construction Law Newsletter* 34, 34.

¹⁷⁵ Mason, n 89, 162.

¹⁷⁶ Parsons, n 175, 34.

¹⁷⁷ Mason, n 89, 162. A party can generally still sue for wilful default under IPI.

¹⁷⁸ *Trant Engineering Ltd v Mott MacDonald Ltd* [2017] EWHC 2061 (TCC).

¹⁷⁹ See David Mosey, "How Does BIM Support Collaborative Contracts?" in David Mosey (ed), *Collaborative Construction Procurement and Improved Value* (John Wiley & Sons, 2019).

consideration should be given to who can access the CDE and under what, if any, circumstances access can be denied. If the contract is silent in this regard, the entire project may be brought to a grinding halt by one party refusing to allow another party to access the CDE.

In summary, construction lawyers need to ensure their clients' interests are protected by incorporating appropriate contractual provisions and working with their clients to develop a BIM Protocol that is consistent with the contract and can be incorporated into the contract via a specific amendment. In order to undertake this work, construction lawyers need to understand the language and concepts of BIM, be across the implications and risks associated with BIM and be ready to assist with the implementation of BIM solutions.¹⁸⁰

VI. IMPORTANCE OF COLLABORATIVE CONTRACTS

Australia is currently seeing numerous infrastructure projects being procured by way of collaborative procurement models.¹⁸¹ Collaborative procurement models embrace a comprehensive and flexible range of approaches to managing the principal-contractor relationship, based on a recognition that there are mutual benefits from working cooperatively.¹⁸² If the principal contractually commits to sharing the benefits it receives from the contractor's competent performance, the contract can financially motivate the contractor to achieve such outcomes, even if the contractor needs to expend more resources to do so.¹⁸³ This article submits that BIM is enhanced by collaborative rather than traditional, adversarial contracts.

By aligning the interests of the parties and developing a culture of collaboration, a relational contract arrangement can potentially deliver real commercial benefits. Marinho et al note that the greatest advantage of combining BIM and a collaborative procurement model is that it leads to a reduction of conflicts between the various stakeholders throughout the life cycle of construction projects.¹⁸⁴

Under an alliance contract, the focus is on working collectively for the benefit of the project with an expectation that what is in the project's best interests is in the best interests of each of the parties. An alliance has several key aspects.¹⁸⁵ First, the principal, contractor and designer are parties to the one project agreement.¹⁸⁶ Second, an alliance leadership team provides joint leadership and can only make decisions on a unanimous basis.¹⁸⁷ The alliance leadership team could be comprised of a senior representative from the principal, contractor and designer and the BIM manager. Third, an integrated project team delivers the project, and although the principal retains some isolated risks, almost all project risks are collectively shared and managed by all parties.¹⁸⁸

Although alliance contracting is regarded by many as producing a less bellicose environment for construction projects, questions have been raised as to whether alliances offer value for money to those who procure (and pay for) construction or engineering work.¹⁸⁹ For example, a 2009 Victorian Department of Treasury and Finance commissioned report concluded that, although alliancing had the potential to

¹⁸⁰ See, Levin, n 22, 133.

¹⁸¹ Rebecca Dickson, "Understanding and Administering Co-operation Clauses in Major Australian Project Contracts" (2020) 36(2) BCL 96, 96. We understand that the term "relational contracting" and "collaborative procurement models" to be interchangeable.

¹⁸² Hugh Collins, *Regulating Contracts* (OUP, 2nd ed, 2002) 129–131.

¹⁸³ Collins, n 183, 129–131.

¹⁸⁴ António Marinho, João Couto and José Teixeira, "Relational Contracting and Its Combination with the BIM Methodology in Mitigating Asymmetric Information Problems in Construction Projects" (2021) 27(4) *Journal of Civil Engineering and Management* 217, 222.

¹⁸⁵ Ian Bailey, *Construction Law in Australia* (Thomson Reuters, 4th ed, 2018) [8.170].

¹⁸⁶ Bailey, n 186, [8.170].

¹⁸⁷ Bailey, n 186, [8.170].

¹⁸⁸ Bailey, n 186, [8.170].

¹⁸⁹ Bailey, n 186, [1.71].

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deliver value for money, it was often not doing so.¹⁹⁰ In fact, it resulted in projects significantly exceeding business case estimates.¹⁹¹ The authors note that we do not have a control case study so we will not know whether the cost of the project under a traditional procurement model would have been better, worse or the same.

The current alliancing framework in Australia does not address BIM.¹⁹² While this does not prevent BIM from being used on alliancing projects, it makes it more difficult because there is no existing framework to integrate BIM and the respective processes and roles that are required.¹⁹³ Lawyers will be engaged in the unenviable task of having to draft bespoke amendments to accommodate BIM in the alliance context.

BIM requires a project delivery model which provides for optimal integration and collaboration of all key project participants; to the extent that this is what alliances are designed to do, this provides principals with a model which can assist in driving a more integrated approach to the implementation of BIM on their projects.¹⁹⁴

The NEC4 Alliance Contract is one framework that can be used to deliver BIM without amendment.¹⁹⁵ The NEC4 Alliance Contract addresses how alliance members can integrate their contributions to BIM through the following contractual mechanisms.¹⁹⁶ First, a shared “Information Execution Plan” which is to be issued and updated by the “Alliance Manager”.¹⁹⁷ Second, a single “Information Model”, which is “the electronic integration of Project Information in the form stated in the Information Model Requirements”, to be created by the alliance members, subject to clarification of each alliance member’s roles and responsibilities in the “Implementation Plan”.¹⁹⁸ Third, agreement by alliance members to warn each other of “any matter which could adversely affect the creation or use of the Information Model”.¹⁹⁹

VII. BEST PRACTICE

Australia lacks a consistent approach to BIM implementation, and still has no Australian standard form contract that addresses BIM and no standard BIM Protocol.²⁰⁰ There is an urgent need for a consistent national framework. Australia is a late adopter of BIM and as a result is playing catch-up with the rest of the world. However, the silver lining is that Australian lawyers have a smorgasbord of legal frameworks to choose from in order to support the use of BIM and address the associated risks and responsibilities. To assist with achieving this, we can look at international best practices and draw conclusions about the most appropriate way forward and the role that construction lawyers can play in ensuring the widespread, successful implementation of BIM across Australia.

A. Australian Standard Form Construction Contract

One of the fundamental goals of a standard form contract is to minimise the transaction costs of entering into a contract by providing benchmark provisions that aid understanding, allocate risk in a recognisable

¹⁹⁰ Victorian Department of Treasury and Finance, *In Pursuit of Additional Value – A Benchmarking Study into Alliancing in the Australian Public Sector* (Report, October 2009) 71 <https://www.infrastructureaustralia.gov.au/sites/default/files/2019-06/PC_Submission_Attachment_L.pdf>.

¹⁹¹ Victorian Department of Treasury and Finance, n 191, 71.

¹⁹² Chiozzi, n 144, 157.

¹⁹³ Chiozzi, n 144, 157.

¹⁹⁴ Marinho, Couto and Teixeira, n 185, 222.

¹⁹⁵ Mason, n 89, 189.

¹⁹⁶ Mosey, n 180, 277.

¹⁹⁷ Mosey, n 180, 277.

¹⁹⁸ Mosey, n 180, 277.

¹⁹⁹ Mosey, n 180, 277.

²⁰⁰ Chiozzi, n 144, 148.

way and create the benefit of precedent.²⁰¹ Having common and familiar provisions within standard form contracts makes it easier for parties to understand their roles and responsibilities.²⁰² However, since there is no Australian standard form contract that explicitly addresses BIM, this potential benefit is not realised on BIM Projects.

Most Australian based projects are still using the traditional procurement models with BIM treated as a form of design documentation.²⁰³ Consequently, bespoke amendments to the contract and a project specific BIM Protocol are required. However, lawyers charged with drafting these provisions can draw on precedents in jurisdictions with more mature BIM practices, such as the United Kingdom and United States.²⁰⁴

Relying on an all-encompassing BIM Protocol that purports to contain all the necessary BIM-related terms is not the answer, as there is a risk of inconsistencies between the Protocol and the contract.²⁰⁵

The 2021 Australian Institute of Architects survey found that 47% of respondents believe that current standard form contracts were incompatible with BIM.²⁰⁶ It is appropriate that Standards Australia develop a new standard form collaborative construction contract that is BIM ready. Seventy percent of the projects undertaken pursuant to a standard form, use one of the Australian Standards suite of contracts.²⁰⁷ Therefore, it is fitting that Standards Australia take the lead in drafting BIM friendly contracts. At a minimum, the contracts should be able to be used to deliver BIM with minimal amendments needed to address the various BIM issues, including liability, use of the model, ownership and information requirements.

B. Australian BIM Protocol

An Australian BIM Protocol that addresses the roles, responsibilities and obligations of parties when developing a BIM model, and which is consistent with, and complements, the contract provisions is urgently needed.

As a first step toward embracing BIM in Australia, and cognisant of the legal implications associated with its use, it would be appropriate for an organisation such as the Society of Construction Law of Australia, in collaboration with relevant industry bodies, to develop a BIM Protocol that is capable of being expressly incorporated via a standalone amendment into the contract. This is a necessary first step that will help increase awareness of the legal issues associated with BIM. The Protocol should, at a minimum cover the following:

- (1) relevant definitions;
- (2) the priority of the contract documents;
- (3) the obligations of the principal to appoint the relevant BIM personnel such as a BIM Information Manager to manage common data between designers and to assist in collaborative working and information exchange;
- (4) an electronic data exchange clause to deal with the risk of corrupt data between team members;

²⁰¹ Jim Mason, "BIM Fork: Are Smart Contracts in Construction More Likely to Prosper with or without BIM?" (2019) 11(4) *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction* 02519002, quoting Peter Hibberd, "The Place of Standard Forms of Building Contract in the 21st Century" (Paper presented at the Society of Construction Law Conference, 11 March 2004).

²⁰² Paula Gerber and Brennan Ong, *Best Practice in Construction Disputes: Avoidance, Management and Resolution* (LexisNexis Butterworths, 2013) 68.

²⁰³ Wallwork, Niemann and Gelic, n 123.

²⁰⁴ Wallwork, Niemann and Gelic, n 123.

²⁰⁵ Lewis and McCombe, n 45, 27.

²⁰⁶ *Design Technology in Architecture 2021 Report*, n 7, 22.

²⁰⁷ John Sharkey et al, "Standard Forms of Contract in the Australian Construction Industry" (Research Report, Faculty of Law, University of Melbourne June 2014) 5 <https://law.unimelb.edu.au/data/assets/pdf_file/0007/1686265/Research-Report-Standard-forms-of-contract-in-the-Australian-construction-industry.pdf>.

- (5) the use of the BIM models, including reference to copyright and licenses and the level of detail required;
- (6) provision for regular project reviews to ensure model integrity and project workflow;
- (7) who has the right to access the BIM models, even in the event of non-payment; and
- (8) the requirement for a BIM management plan which provides detailed information, data management and the assignment of roles and responsibilities.

As is the case in so many areas of contract law, clear drafting with consideration of the interaction of BIM principles with ordinary contract principles will put the parties in the best position to work together collaboratively with each parties' rights clearly articulated. of course, commercial factors influence the negotiated terms of a contract, and therefore it is important that the BIM Protocol, which includes a BIM management plan, is incorporated into the construction contract. This will ensure that the BIM Protocol can facilitate effective communication between the parties while also prescribing clear rights, responsibilities and liabilities.

Developing a standard form BIM Protocol is consistent with overseas jurisdictions and represents global best practice (as seen with the UK CIC BIM Protocol and the US ConsensusDocs 301 BIM Addendum).

C. Collaborative Procurement Model

The procurement model defines the process and management of the BIM model. The Australasian BIM Advisory Board (ABAB) was established in May 2017, to represent state and territory governments, government agencies, industry bodies, universities and consultants. Promoting a more consistent approach to the adoption of BIM across jurisdictional boundaries; it also recognises that – without central principal coordination – there is a significant risk that the development of Protocols and guidelines will be fragmented, leading to wasted effort and inefficiencies.

ABAB has observed that many of the non-collaborative procurement models in use in Australia reduce the productivity of projects due to the lack of shared responsibilities across the project life cycle.²⁰⁸ Conversely, features of collaborative contracting such as early stakeholder engagement and the sharing of financial risk and reward complement BIM's inherently collaborative nature. To optimise the benefits of BIM, there needs to be a procurement process and a collaborative contract that addresses who provides what information, when it is provided and how it is used and relied upon.²⁰⁹

The drawback of this recommendation is that collaboration has never been a hallmark of the Australian construction industry.²¹⁰ The industry is notorious for responding to problems in an adversarial way, rather than cooperatively.²¹¹ Therefore, the hypothetical benefits of a collaborative procurement strategy will not be realised if the contracting parties continue to operate in a highly combative manner.

As always, the choice of procurement model should be based on the project's unique characteristics. Nevertheless, the evidence so far indicates that the benefits of BIM are more easily realised in collaborative rather than in traditional, transactional project environments.²¹² Therefore, BIM should be used with collaborative procurement models that involve early contributions from the head contractor as well as subcontractors, suppliers, manufacturers and operators.²¹³

VIII. CONCLUSION

Ultimately, BIM projects have a proven track record of delivering positive results in terms of cost savings and fewer disputes. In Australia, the journey to widespread use of BIM has begun. With the

²⁰⁸ Australasian BIM Advisory Board, n 63, 6.

²⁰⁹ Winfield and Rock, n 54, 44.

²¹⁰ Olatunji and Akanmu, n 16, 186.

²¹¹ Gerber and Ong, n 203, 65.

²¹² Greenhalgh, Squires and Mahamadu, n 96, 297. Compare Olatunji and Akanmu, n 16, 192 where the authors state "there is limited evidence to conclude that traditional methods will not achieve exceptional outcomes if supported with the instrumentality of collaboration and forced macro-policies".

²¹³ Mosey, n 180, 256.

support of the private sector and growing support from state and federal governments, the Australian construction industry is gradually embracing the technology. It is time for the Australian legal profession to embrace BIM and play a role in ensuring that the legal issues flowing from it are appropriately and comprehensively addressed.

There are several contractual issues that arise or are potentially exacerbated by the use of BIM on projects. These issues impact on risk allocation and involve questions around the incorporation of BIM-specific technical documents, intellectual property, data inaccuracies and data security. Construction lawyers need to become familiar with the intricacies of BIM so that they can identify such issues and provide their clients with best practice solutions, taking into account lessons learned from other jurisdictions.

Construction lawyers also have a role to play in supporting clients interested in using BIM to move towards collaborative contracting in order to realise the full potential of BIM. For too long, many Australian construction lawyers have shied away from immersing themselves in the technological advances that the construction industry has embraced. However, BIM comes with too many legal ramifications for the legal profession to not be key players in the conversations about the impact of BIM on parties' contractual obligations and how best to address the changes that BIM necessitates. Perhaps, BIM will be the catalyst for construction lawyers and all stakeholders involved in project delivery in Australia, to finally, whole-heartedly embrace collaborative contracting, and leave behind the traditional adversarial approaches to contracting that have proven to be in no one's best interest.

This article is the first part in a two-part feature on the legal implications of BIM. Part Two will consider the potential role that BIM can play in disputes, focusing on two key issues, namely, the potential for BIM litigation to alter the professional standard of care, and the role that BIM and BIM experts may play in dispute resolution from an evidential perspective.