KPK RESEARCH
research digest
building cost & contract information

MICA (P) 243/03/2011 Publication of KPK Research – January 2012 Issue

CLIENT PRACTICE NOTE

# BUILDING INFORMATION MODELLING – KEY CONTRACTUAL PERSPECTIVES

***A Client Practice Note by Eugenie Lip, Director and Head of KPK Contracts Support Group***

## INTRODUCTION

*"… standing still is not an option for Singapore's construction sector while the rest of the world moves towards industry-wide BIM technology adoption ..."*

– Co-Chair of the International Panel of Experts
and BCA Chief Executive Officer[1]

Much has been said and written about Building Information Modelling (or BIM) that when we talk about information technology advances in the construction industry, the catchphrase 'BIM' becomes a common conversational theme. Unsurprisingly, some may approve it, others may have doubts about what it can or cannot do but for one reason or another, BIM with all its well-publicised technology capabilities is rapidly becoming the way forward on how buildings are to be designed, priced, constructed and maintained.

The definition and scope of BIM is constantly evolving and its full potential is expected to be realised exponentially with time. Working with BIM brings about new and uncharted considerations across the contractual landscape. This practice note discusses some of the key watchpoints to be considered from a contractual perspective for and between those working with and using BIM within the environment of the commonly used local standard forms[2] (namely the SIA Form, PSSCOC and the REDAS D&B). Design responsibility, discrepancies, defects liability and interoperability issues and intellectual property rights are but some of the issues that have to be dealt with as well as relationships amongst the parties working with BIM and between the parties and the owner-employer.

## WHAT IS BIM … ACTUALLY?

The United States National Institute of Building Sciences (NIBS) describes BIM as '... a digital representation of physical and functional characteristics of a facility' which serves as 'a shared knowledge resource for information' and involves 'collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM process'.[3]

In a recent paper[4] written for the Royal Institution of Chartered Surveyors, the authors define BIM as 'a process that allows data generated by one party to flow seamlessly to other parties for beneficial reuse'. They made it clear that a '3D model, on its own, is not BIM' but the 'model's ability to store and transfer data relating to the design to other processes and systems that makes it important'.

Put simply, BIM is a process where 'existing software [is used] to build up a detailed 3D model of a project with common sets of data that everyone working on it can see'.[5] It offers a shared platform for contribution, collaboration and exchange of a

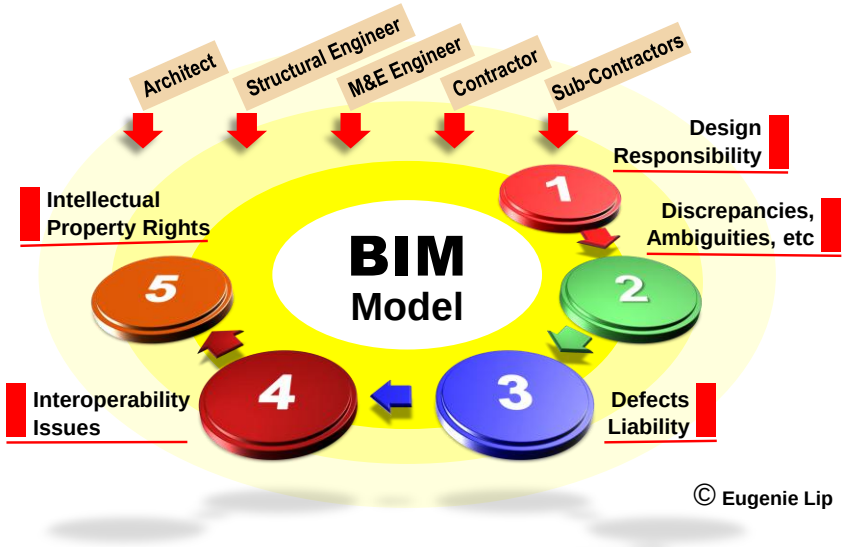
[1] Ministry of National Development, Newsroom, News Release 2011, International experts impressed with BCA's plans to transform Singapore's building and construction sector.
[2] The standard forms are published by the Singapore Institute of Architects (Articles and Conditions of Building Contract 2011 or SIA Form), the Building and Construction Authority (Public Sector Standard Conditions of Contract for Construction Works 2008 or PSSCOC) and the Real Estate Developers' Association of Singapore (REDAS Design and Build Conditions 2010 or REDAS D&B).
[3] US National Institute of Building Sciences, National Building Information Modeling Standard, Version 1 – Part 1: Overview, Principles, and Methodologies, Glossary.
[4] Simon Taylor and Christopher Bailey, Unlocking BIM Data, RICS Paper, December 2011.
[5] David Matthews, De-coding BIM, Building, May 2011.

repository of structured information by all parties involved in the design and construction of a building and the subsequent facilities management.

From a component's physical characteristics (shape, size, material type and density, colour and cost) to its functional relationship with other elements of the building, the information can be integrated into the model at various stages in the life-cycle of the building detecting and preventing clashes between various design inputs and providing essential information on maintenance. That it can add other dimensions and beyond like time (4D), cost (5D) and soon, energy performance, carbon emissions and sustainability considerations means for many a whole new revolutionary way of getting a building designed, built and the facility maintained.

## CONTRACTUAL CHALLENGES ILLUSTRATED

The key contractual challenges within the BIM environment to be discussed in this paper are illustrated below.




## DESIGN RESPONSIBILITY

The contractual protocol for design responsibility is defined by the boundaries set in place by a bipartite and consensual framework and is principled on a total risk pass-down between the parties across the supply chain. How does BIM cast the design responsibility net and cascade it down to the myriad of contracts, sub-contracts, sub sub-contracts, sub sub sub-contracts and so on? When a design error embedded in the model goes undetected, is constructed and the building fails, who should be the party responsible?

The Contractor under the SIA Form and PSSCOC will insist that he has no involvement in the design process and his contractual responsibility is only to bring the project to completion. Under REDAS D&B, if the model forms part of the Employer's Requirements, the Contractor is obliged to 'satisfy himself on the sufficiency and correctness' of and be responsible for the Employer's designs.

In BIM, with the stream of inputs from various design professionals expected, a system must be in place to track the design deliverables at key stages of the model development as they are produced, exchanged and reviewed to resolve any conflict or clash. A robust protocol eliminates any doubts on who got what, when and how, who did what or is required to produce what and when. Understandably, a designer or the design-build contractor may not be prepared to accept responsibility for a BIM model which other participants and users have contributed, updated or modified their respective designs.

Contract documents and consultancy service agreements must be crafted to support working with BIM so that questions of design responsibility can be appropriately allocated and not be clouded by uncertainties on where exactly are the lines of such design responsibility drawn amongst the participants and contributors to the BIM model.

## DISCREPANCIES IN CONTRACT DOCUMENTS

SIA Form Clause 14 and PSSCOC Clause 4.4 describe the process for resolving discrepancies, ambiguities, conflict and the like within and between contract documents, and the consequential time and cost implications. Under REDAS D&B, in the event of discrepancies between the contract documents, the Employer's Requirements take precedence.

As expressed in SIA Form Clause 14, the Architect resolves discrepancies by interpretation of the contract documents and then giving 'a direction if his requirement accords with [the contract] intention and an instruction if it differs from that intention'. Where the discrepancy cannot be resolved, the Architect is obliged to issue an instruction to have the contract sum increased if he opines that the Contractor has been 'misled to his detriment' or reduced if it was advantageous to the Contractor and together with an appropriate extension of time where necessary. In the PSSCOC, the Contractor is only entitled to an extension of time and loss and expense if the discrepancy 'could [not] have been found prior to the date of the Letter of Acceptance'. How should such discrepancies be resolved by the contract administrator when working with the BIM model? Are the current contractual provisions adequate to deal with this risk?

With the sophistication of BIM software and the data-rich parametric objects (or elements) incorporated in the model, having discrepant details in design drawings and schedules produced by various parties and at the interfaces of their respective deliverables is significantly reduced. Much of the problems emanating from discrepancies within and between design elements can be eliminated as all associated plans, sections, details, external elevations and schedules anywhere in the model depicting the object (say a door or window) are automatically updated when a change whether in the design, dimension, material or specification is made. Early detection of design conflicts (for example, where a beam and duct put in by different designers occupy the same ceiling void space) at the drawing-board (or conceptual and design development) stage helps resolve clashes in the best and most cost-effective means as opposed to discovering it during construction leading to potential time and cost claims.

## DEFECTS LIABILITY AND INTEROPERABILITY ISSUES

The contract forms place responsibility for making good defects with the Contractor and at his own cost but with some exceptions. Under the SIA Form Clause 27.(1)(b), the Contractor can seek payment for making good defects which occur despite his compliance with the contract whilst in the PSSCOC Clause 18.2, the cost of remedying any work not due to the fault or failure of the Contractor is valued as if it were a variation.

Traditionally, responsibility for defects caused by design issues falls on the design consultants. What if the design error is attributable to the modelling software and goes unnoticed until much later during construction or after handover and occupation or even years later emerging as a latent defect? Presently, not all modelling programs are able to read, interpret and use data created by another software reliably (or in other words, speak to each other in a common language) albeit laudable efforts are being made to achieve software interoperability.

The concern here is that if in the process of attempting to extract information from the data, the designer corrupts, destroys or even unwittingly changes an otherwise correct model data in the course of jointly contributing to the model, whose responsibility is it? What level of reliance of the model data can be expected by other parties who use it? Are professional indemnity insurers prepared to underwrite and respond to such design errors and interoperability problems caused by the modelling software and even if so, whose insurance will pick up the tab?

Given that contract forms impose continuing liability on the Contractor for defective work 'whether previously or subsequently discovered' (SIA Form Clause 27.(5) and REDAS D&B Clause 20.7) and 'at common law' (PSSCOC Clause 18.5) until it becomes statute-barred, is a Contractor prepared to accept the burden of responsibility for defects where it can be established that it was due to the modelling software systems and protocols used and contend that he should be exonerated since he has complied with the contract?

Undoubtedly, clear lines of contractual responsibility for software interoperability issues to allay concerns of who should bear the risk of defects appearing are critical to the success of BIM technology. The use of Industry Foundation Classes (IFCs) developed by the International Alliance for Interoperability (IAI) in software applications will surely go some way in limiting ensuing problems downstream arising from interoperability implications.

## INTELLECTUAL PROPERTY RIGHTS

Who owns the BIM model and the layers of intellectual property rights and information arising from the resultant efforts and activities of a community of contributors and users to the final model development?

REDAS D&B Clauses 1.9 and 1.10 state that copyright of 'all drawings, specifications and other documents' remains with the party (be it the Employer or the Contractor) who produced them. Public Sector Standard Conditions of Contract for Design and Build Clause 3.6 extends it to cover a 'non-terminable transferable non-exclusive royalty-free licence to copy, use and

communicate the Contractor's Proposals' including making any modifications. Whether such provisions can be taken to include the data contained in a BIM model is arguable.

If ownership of the BIM model remains with the owner-employer, can the model database be used for future refurbishment and/or extension works to the building by a different group of third party design consultants without consent? The latter may have their own concerns to accept responsibility for a BIM model which is the output of multiple contributors and users. These are issues requiring careful consideration not only in design-build contract forms but also in consultancy service agreements.

## CONTRACTUAL CHALLENGES MATRIX

A snapshot of the contractual challenges presented is set out in the matrix below.

| | Contractual Challenges |
|---|---|
| **Design Responsibility** | ▪ Acceptance of design responsibility for BIM model which other participants and users have contributed, updated or modified |
| **Discrepancies in Contract Documents** | ▪ Extent of applicability of current contractual provisions in the resolution of discrepancies when working on a BIM-based project |
| **Defects Liability and Interoperability Issues** | ▪ Design defects appearing during construction, after handover or emerging as a latent defect caused by software interoperability issues<br>▪ Response by professional indemnity insurers to design errors arising from interoperability problems |
| **Intellectual Property Rights** | ▪ Ownership of BIM model and layers of intellectual property rights<br>▪ Use of BIM model for future refurbishment and extension works by third party design consultants |

## CONCLUSION

Understandably, BIM is here to stay and will only continue to improve and become more powerful as it matures with the development of new technology and the use of open interoperable software applications. With it, contractual documents (and likely, standard contract forms and consultancy service agreements) will have to be reviewed to respond to and deal with challenging issues in contractual relationships and develop unique language to address the terms and conditions to be incorporated in the respective contracts. As a starting point, new forms of construction contracts such as the Integrated Form of Agreement (or IFOA) may have to be explored.[6]

BIM, with its enormous potential and creative power, will not be a panacea for all contractual claims albeit it will bring about unprecedented immense benefits in cutting down abortive work and waste and mitigate some of the causes for such claims on the drawing-board before construction starts on site. On the other hand, it may be useful for employers, consultants, contractors and sub-contractors entering into contractual agreements and working relationships with one another to address the potential contractual challenges.

[6] See note 1 above. The International Panel of Experts in BIM in their recent dialogue with the Building and Construction Authority (BCA) and industry stakeholders has, amongst other things, recommended studying new forms of construction contracts such as the Integrated Form of Agreement (or IFOA) to deal with legal and contractual risks which may become impediments to the adoption of BIM.

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