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BIM and Construction Contracts

By Frank Newbery

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A brief summary and comparison of the provisions made for Building Information Modelling in the latest versions of JCT, NEC and FIDIC construction contracts.

Introduction

If suitably applied, BIM technologies and procedures can provide construction projects with a greater degree of coordination, transparency and control than otherwise achievable, thereby pre-empting many of the difficulties that commonly arise; such as unforeseen spatial or logistical clashes, misunderstood material or task requirements, overlaps or gaps in participants' obligations, and deficient or misleading records for future reference.

Implementation of BIM can be expected to incur higher initial project costs, but can then potentially provide greater certainty, clarity and economy during construction and subsequent operation. BIM-structured project information also lends itself to re-adoption and evolution through future projects. This may be especially useful and economical where standard types of accommodation must be reproduced or improved in series of similar projects such as government institutional buildings. BIM implementation is now indeed a standing requirement for state-funded building projects.

The nature of any specific form of BIM implementation and the obligations that it imposes on a project's participants must be clearly defined as early as possible during the procurement process. Also it is increasingly recognised that BIM implementation, if required, must be explicitly addressed within the broader framework of a project's main construction contract.

Because of the high degree to which information is coordinated and integrated within BIM, project participants may need to adopt more collaborative and co-dependent working relations than they might otherwise. This may potentially increase the risk and complexity of disputes concerning the scope and demarcation of required work, intellectual property and liability for defective design features.

Already there exist some key resource documents that can potentially be annexed to or cited by any type of construction contract for the purpose of establishing and regulating BIM implementation. In particular, the CIC's *BIM Protocol* [1] may be used to define a project's BIM standards, procedures and responsibilities. The *Protocol* states that it is closely aligned with PAS 1192-2, *Specification for information management for the capital/delivery phase of construction projects using building information modelling*. PAS 1192-2 can still be obtained, but has now been superseded by the international standard ISO 19650 [2]. Compliance with this standard requires an "information protocol" to be included in all project appointment terms, together with a range of essential supporting documents.

Such "bolt-on" protocols etc must be carefully integrated with the contract clauses and with other contract annexes such as the Preliminaries Specification, otherwise it is likely that inconsistencies, ungoverned gaps or conflicting simultaneous requirements will emerge.

In the following three sections I outline how BIM implementation is treated in the latest editions of three different and commonly employed standard forms of construction contract, and by relevant supporting guidance published with them.

JCT Contracts

The Joint Contracts Tribunal produces a wide range of standard construction contracts. Suitable forms can be found for construction projects varying considerably in scale and procurement structure. JCT contracts are conceived and evolved with the benefit of continuous and inclusive industry-wide consultation. In the UK they have become familiar over the course of many decades, and their use is widespread.

In May 2019 JCT published a 26-page Practice Note: *BIM and JCT Contracts*, which serves as a supplement to JCT's 2016 Practice Note: *Building Information Modelling (BIM), Collaborative and Integrated Team Working*. The earlier Practice Note is still useful as a broad introduction. The later one is more specific and, in its Part A, provides a clause-by-clause commentary on how BIM provisions should be implemented or considered in connection with JCT's 2016 *Design and Build Contract* ("DB 2016"). JCT has identified this form of contract as the most popular of its range for use in BIM projects. JCT suggests however that its comments may be relevant to similar clauses in its other forms of contract – but with an overall caveat that "*This commentary is not a substitute for professional advice and is not intended to be prescriptive or definitive*" (footnote [8]).

Part B of *BIM and JCT Contracts* is a "*BIM Protocol Checklist*", setting out items and considerations that the Protocol must cover, especially the apportionment of responsibilities and risks among different members of the project team. The Checklist appears largely to mirror the content of the above-mentioned CIC BIM Protocol, which JCT cites as "*instructive*" (footnote [6]) – but which it does not exclusively prescribe. Positive reference is also made to the ISO 19650 standard, which is linked to the CIC BIM Protocol as I have noted above.

The first of three concluding appendices is a "*Checklist of common contents of Exchange Information Requirements*". This is a series of questions under the headings "*Information*", "*Management*", "*Technical*" and "*Commercial*", for which no specific answers are recommended. This checklist is caveated as "*a general outline*" and "*not legal advice*" in a footnote. Appendix 2 is a glossary of some key BIM terms. Appendix 3 simply reproduces the original DB 2016 clauses and schedules to which the Part A comments apply. Finally there is a short but useful Bibliography.

The NEC4 Contract

NEC contracts [3] have been developed since the early 1990s under the guidance of the Institute of Civil Engineers. The latest version, NEC4, was published in 2017. The NEC type of contract is generally perceived as being less "traditional" than JCT, plainer in its language, more suitable for non-UK projects, more conducive to collaborative working and generally more flexible (but requiring more attention to detail in its annexed "Contract Data" than JCT Employer's Requirements).

NEC4 has been endorsed by the UK government as its preferred form of contract for public sector construction projects. This is consistent with the Government Construction Strategy that also promotes the use of BIM.

NEC's published guidance for NEC3 had explicitly recommended use and adaptation of the *CIC BIM Protocol* for the purpose of BIM implementation. Now, with international adaptability in view, NEC4 no longer specifically cites the *CIC BIM Protocol* (although there is nothing that would inhibit its use, and it would probably remain among the first-considered options for UK-based projects).

NEC4 can be adapted for BIM using one of its "*Secondary Option Clauses*", i.e. "*Option X10: Information Modelling*". The clause itself occupies about 1½ pages, but its text defines and refers to substantial information packages that must be prepared and annexed. These are: an "*Information Model*", with "*Information Model Requirements*", and an "*Information Execution Plan*" which conforms to those requirements.

This *Information Execution Plan* would be equivalent in scope and status to a *BIM Execution Plan* as defined in the *CIC BIM Protocol*, i.e. an explanation of how the information modelling aspects of the project will be carried out. If not already specified in the Client's *Contract Data*, the Contractor is expected to submit a proposed *Information Execution Plan* for approval by the Project Manager.

Further sub-clauses of NEC4's X10 establish the parties' rights and liabilities in respect of the information modelling process and contents. The Client is deemed to own the Information Model except as stated otherwise in the *Information Model Requirements*.

FIDIC Contracts

Of the alternative forms discussed here, FIDIC [4] construction contracts are best known and most used for major construction projects situated in the developing world outside Europe and North America. They are seldom used for projects within the UK. The core versions of the FIDIC “rainbow” suite of contracts, last revised in 2017, are the “Red Book” for employer-designed projects, the “Yellow Book” for contractor-designed projects, and the “Silver Book” for EPC [5] / “turnkey” projects. Other FIDIC forms and publications cater to further variants in project procurement structure and context.

FIDIC contracts must function simply and robustly in a great diversity of project situations, and might therefore not be expected to benefit greatly from incorporating fixed and uniform BIM implementation requirements. Nonetheless, BIM in some form is often required or advantageous for particular projects, and FIDIC’s publishers have given this due consideration.

The 2017 FIDIC contract editions now include “Advisory Notes to Users of FIDIC Contracts Where the Project is to Include Building Information Modelling Systems”. This occupies three pages and consists mostly of general explanation and advice concerning BIM. It contains no specific additions or modifications to the contract text, but includes a “non-exhaustive” list of 25 numbered sub-clauses that “should be thoroughly reviewed” if BIM is to be implemented. There is no equivalent to NEC4’s relatively specific X10 clauses, nor any mention of the CIC BIM Protocol or its associated procedural standards.

The Advisory Notes’ last paragraph states FIDIC’s intention to publish a “Technology Guideline” and a “Definition of Scope Guideline Specific to BIM”. At the time of writing these have not yet appeared.

Comparative Summary

Of the three forms of contract discussed above, NEC4 together with its secondary clause X10 appears to offer the most direct and specific integration between contract provisions and BIM implementation. Given the UK government’s endorsement of the NEC4 contract along with BIM generally, it is probable that a range of more detailed norms and adjuncts will evolve from this nucleus and acquire general currency (at least within the UK).

Although it does not specifically modify or add any actual contract clauses, JCT’s advisory approach is usefully detailed and beneficially informed by awareness of the CIC BIM Protocol and its associated evolving standards for information management procedure. This may in due course lead to practical development of more standardised and specific BIM adaptations by regular users of the JCT contract form.

By comparison with the above, the FIDIC contracts prescribe no specific clause modifications in respect of BIM, and offer the least specific general advice. This “broad brush” approach is perhaps a reasonable reflection of the form’s valued global portability and robustness in greatly varying circumstances. Insofar as BIM procedures become globally more standardised and routine, then the FIDIC forms might then usefully be equipped with some more specific BIM provisions.

[1] *Building Information Modelling (BIM) Protocol*, 2nd edition 2018, published by the Construction Industry Council. Free download available at <http://cic.org.uk/admin/resources/bim-protocol-2nd-edition-2.pdf>

[2] BS EN ISO 19650-1:2018 and -2:2018, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling. Part 1: Concepts and principles and Part 2: Delivery phase of the assets*. Published by the British Standards Institution.

[3] NEC: “New Engineering Contract”. The NEC4 document is subtitled “Engineering and Construction Contract”.

[4] FIDIC: Federation Internationale des Ingenieurs-Conseils, i.e. International Federation of Consulting Engineers.

[5] EPC: Engineering, procurement and construction.

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BIM: a collaborative approach to risk management & mitigation?

By David King

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Synopsis of a BIM4Legal presentation at Norton Rose Fulbright LLP.

By now most people are familiar with what we refer to as BIM maturity level 2 where a digital project information model is created from consultant models, produced by a range of different designers, contributors or manufacturers; creating a federated model. Here clash detection is often easier than clash avoidance, because individual teams are working separately and don't actually know if their bit of the jigsaw really fits until they plug it in.

In principle moving to level 3 will enable all designers to work together on the same central model, but practitioners are not currently operating at this level and there often appears to be a degree of smoke & mirrors in many of the conversations around the subject.

Initially the developments in Information Modelling were led by the design team because of the advantages it offered in coordination, clash detection and visualisation. In 2007, in pursuit of brevity, I described the process as design development using;

"Virtual modelling in a collaborative environment with computable interoperable data"

However, it soon became apparent that the process was not limited to design, and I don't think designers realised quite how significant the "collaboration" part would prove to be. Perhaps that's because as designers we are used to the idea of collaborating; it's what we do all the time and design teams couldn't function without it. But information modelling is about more than simply 3D modelling. We now talk in terms of 4D (for sequencing), 5D (for cost analysis) and 6D (for operations management). Which is not to underestimate the role of innovations in technology where the question is "what more can we do?"

There have been many developments in parametric modelling so that, for example, a stadium designer may write an algorithm to look at how seating options will impact the revenue stream and programmes to test how orientation impacts energy use, etc. Also, future developments in AI will clearly lead to big changes – not least in dispute resolution.

This time last year a report from the CITB talked of "unlocking construction's digital future" and warned that the construction industry risks being marginalised and losing a generation of new talent, unless it starts to adopt innovative technology on a large scale ... this is required reading: <https://www.citb.co.uk/about-citb/construction-industry-research-reports/search-our-construction-industry-research-reports/innovation-technology/unlocking-constructions-digital-future/>

But again, it's not just about technology. 3D modelling will of course continue to be an invaluable design tool; some projects are just too complex to coordinate without it. And with the launch of CDBB's National Digital Twin programme by HM Treasury in July 2018, the expansion of opportunities for digital inter-connectivity continues to accelerate: <https://www.cdbb.cam.ac.uk/national-digital-twin-programme>

However, it seems to me there is also an opportunity for designers to regain some of the ground lost to other consultants over recent years. And this brings me to the issue of risk management and mitigation. It has always been a central premise of risk management that risks should be owned by those best placed to manage them, but in my experience the construction industry doesn't always follow this doctrine and is not always very good at risk management. Those who create the risk too often look to offload it on to somebody else.

If we are already sharing data, why not also share the risks ... and the rewards; which is where Integrated Project Delivery comes in. Perhaps the only impediment is one of attitude; largely because UK construction industry procurement follows an adversarial model, rather like our legal system.

Integrated Project Delivery or IPD challenges this model and it seems government is once again

setting the agenda. The announcement almost a year ago by Highways England of a “Smart Motorways” programme could yet presage what is to come: a 10 year “Alliance” that might provide a model for future building procurement: <https://www.theconstructionindex.co.uk/news/view/highways-england-issues-tender-for-7bn-smart-motorways-alliance>

And let us not forget, one aspect of alliancing in its typical form, is limited access to dispute resolution. But this begs a number of questions:

- Where government leads will others follow? Are government initiatives enough to effect a cultural change?
- Can infrastructure procurement models translate into building procurement?
- Can traditional U.K. construction contracts actually be an obstacle to innovation?

Jerome Stubler (chairman of Vinci Construction) speaking at a recent Future of Construction Summit offered the following observation;

“The risk averse nature of UK procurement keeps costs artificially high – a power station the size of Hinckley Point is currently being built in France for less than half the cost”

So, what is the difference in IPD? Well, at its heart is the concept of shared information ... together with shared risk and shared reward. Here collaboration is the key to digital transformation. True collaboration requires trust and a relationship where decisions are made based on what is best for the project, rather than what is best for any individual team member.

What are the challenges for the legal team? I believe these remain much as before: the protection of authorship; intellectual property; and sometimes copyright, but in a new context. Of course, there is potential for a much more fluid context outside the EU. Could dispute avoidance reduce the need for dispute resolution, and can the legal team play an active part in such a transformation?

We’ve been talking about collaboration for a long time now, certainly since the Latham Report of 1994; the Egan Report in 1998; and the Government Construction Strategy launched in 2011. But to the extent that construction procurement remains a largely adversarial affair, the challenge of cultural change remains. IPD, grounded in BIM, offers an opportunity to facilitate that change, providing an environment where design teams can maximise their value, rather than just selling their time, and where the benefits of increased productivity are shared.

Of course, this requires first and foremost enlightened clients who are willing to contemplate sharing the reward they look to generate and to see the design team as partners rather than a service. Such enlightened clients will surely look to appoint enlightened design teams, advisers and lawyers. Are we all ready to play our part?

David King is an Architect with outstanding experience throughout the design and construction process. He has led and managed large-scale and complex undertakings in a wide range of sectors and building types through all stages of the delivery process. Among his areas of expertise lies the detailing and design coordination; with a particular interest in materials technology, research and the environmental performance of building envelopes. As a former Technical Principal, he had overall responsibility for strategy in digital information management (BIM). David was elected as a Fellow of the RIBA in 2016.

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