

BIM: THE 360° VIEW FOR CONSTRUCTION EXCELLENCE

Offsite construction and prefabrication is a growing trend across the world, with qualified manpower becoming evermore scarce and projects increasing in size and scope but running on lower budgets.

One of the techniques being increasingly used to streamline the construction process is 3D data modelling, which can act as a cradle-to-grave reference and interface point for all the stakeholders party to a project.

In this interview, we speak to an advocate and long-term user of such a software interface, about the merits that it brings to the construction fold.

SPEAKER KEY

TH Tim Häidar, Editor In Chief, Oil & Gas IQ

JW Jason Whittall, Director, One Creative Environments

TH Jason, thank you so much for joining us today. Could you start by explaining what BIM is?

JW Sure, Tim, and thank you for having me. BIM stands for building information modelling and it's been mandated by the government that all their centrally-funded projects must be delivered to BIM level 2 by

March 2016.. There will have to be information

deliverables driven by the client that the design and construction teams have to provide.

This then allows us to get the benefit out of these models by doing 3D clash detection, coordination, time management and quantification. Leading through to the construction side, we utilise something called "Field BIM", which creates and manages asset registers, inputting component parts and commissioning data for all the items that are constructed on site, and then moving into the operational phases that provides the users with a lot more information about the buildings they've procured.

This then allows them to make better informed decisions derived from better access to information out of the Building Information Model as they maintain, operate, use and, eventually, demolish the building in the future.

TH How has this approach changed how building happens?

JW The way the building used to happen is quite a disjointed approach where you typically get design teams, client teams, contracting teams all working away in their siloes and the interfaces between those design teams only ever occur when 2D drawings are exchanged, or meetings occur.

Those 2D drawings are then given to the contractor to interpret, often because it's not possible to detail and design every part of the building so often you get parts that are designed as in "typical details" of something. It's still happening now, but we refer to it "the olden days", you get 2D plans that will show pipework runs, for example, and you'll get 2D plans that will show steelwork positions and the only way that we would have ever known whether there were any clashes with that is to draw sections through it, or give it to the contractor who builds it and then finds the problems!

So the way this is changing now is that we all create information in 3D models, which can be exchanged. The models need to be interoperable. That means that they can be exchanged between the parties without loss of information. And this means that by designing in three dimensions that we are ultimately better aware of what we're creating, we're better aware of what our colleagues are creating and the design and client teams are then better aware of what the design intent is and they can get better confidence that it's been designed, considered and coordinated before it actually goes to site.

TH Can you give us examples of how BIM has reduced waste and increased efficiency?

JW The government's agenda for mandating BIM is essentially cost savings and, reading between the lines, it's also about enabling them to ensure that design and construction teams provide the "building's performance"

that they are promised. So, when they say that they're going to get energy efficiencies there's a way of checking that that is going to be the case.

The government expects to achieve 20 per cent savings on their projects delivered through BIM. That's not necessarily 20 per cent savings in design fees, for example, that's 20 per cent across the whole project. And if you use a rough rule of thumb that for every £1 you spend on design you'll spend £10 on constructing the building, you'll spend £100 on actually operating the building.

The government have realised, as have a lot of building owners and operators, that the main project expenditure comes during the operational phases of a building. If we're able to provide better design information, better designs, better construction and more information about those projects, the savings throughout the lifetime of the scheme through maintenance and operation, will far outweigh any savings you're going to get in the design stages.

So, by providing better design information upfront you will make savings on site because there'll be less wastage, you'll be able to get better accuracy for doing quantity take-offs and there'll be fewer coordination issues on site because they've already been resolved in the virtual environment.

TH Are there any differences in BIM adoption between the private and public sectors?

JW What I've seen in the industry is that there is currently a larger take-up from the private sector than the public sector, which is interesting because it's the public sector that has received the mandate. But it's the private sector clients that seem more open to change, especially where you've got private owners that are developing portfolios that are "designing, constructing, operating, owning, maintaining" their own assets. They are the ones that have been quick off the mark in saying, "actually there's benefit to be had in here".

We do a lot of work in the healthcare sector and what I've seen is a very low uptake so far. High interest, but low uptake in actually mandating BIM on their own projects. I think there's going to be quite a waterfall moment when we get to 2016, when the public sector realise that it perhaps affects their funding streams if they're not working to level 2.

TH So it's a case of business as usual until the fear sets in....

JW Yes, I think so. A lot of people are trying to gather information at the moment. Within the industry there are a host of BIM seminars and CPDs that people can go on to try and gather information. We are fortunate that we were one of the early adopters of BIM as a multi-disciplinary design practice. The year before the word BIM was around we were trying to solve issues internally about how to better communicate within our own disciplines in-house. We had our own M&E engineers that were working with their preferred bit of software, our structural engineers that would use theirs. Architects and interior designers that would use Apple Macs as opposed to somebody else on PCs. We weren't even sharing information interoperably between ourselves.

When the government mandated BIM and released their construction strategy in 2011 it was actually a godsend. It gave us an opportunity to step back and align ourselves with the standards that they're beginning to produce and reinvent all of our own processes to follow suit. What we've now seen, is that our own internal coordination output has drastically improved. Although we haven't had that many projects yet where we have been mandated to use BIM, we get an awful lot where they say, "we're interested in BIM, please can you show us a bit about it or can you show us how it benefits us".

The real benefits come when the client says, this is the data I require and this is the format that I want it in and when the client says that, (ie. provides an E.I.R (employers information requirement) document, that is when you get the real benefits out of BIM. Because all the design and the construction team have to provide specified data in a certain format and that really focuses the mind and that's what BIM is all about.

TH Is BIM something that is suited more towards the advancement of modular construction projects than stick built?

JW In regards to modular construction projects, the modelling of information has been there longer than in most parts of the industry. If you look at prefabrication of Mechanical, Electrical, Plumbing (MEP) modules, they came along a good while before BIM came about. Companies specialising in prefab modules will have to already design this in in a virtual environment in three dimensions. So, when we look at offsite fabrication, prefabrication, BIM has got a huge role to play in that part of the construction sector because if you're going to prefabricate things to get the efficiencies you want, you need to be absolutely

certain that what you're going to prefabricate is going to work! There are less wet trades involved when you're doing prefabrication, so you want to be precise. You can work to lower levels of tolerance and this is where BIM comes into play, in proving these designs before they are constructed.

If you can create all your design information in three dimensions, you can clash detection resolve the issues, you can take better quantities off, you're going to be in a much better position to provide elements built offsite and know that they're going to fit when you come onto site because you can then coordinate those prefabricated elements before you even get there.

TH I've heard a lot of people talking about one of the major pros of offsite construction of prefabrication being the fact that you're skirting around labour and a skills shortage. Do you think that this is one of the saving graces of BIM as well? Putting a lot more information than before in the hands of the right people.

JW Yes, indeed. When you're creating information in a BIM workflow the resource curve, if you can call it that, is compressed to earlier stages in the project. Traditionally, in "the olden days" you would start off with a low level resource that gradually rises through the design, development stages. When you're designing something in BIM, that resource expenditure comes forward, so you have to put a lot more effort in upfront to get the same amount out. But whilst that might sound a bit wasteful, it is actually the logical way to do it, and I think that this shows that by having more effort expended in design stages, doing more coordination upfront, it reduces problems later. If you start coordinating when you're actually physically building the thing you're wasting time, effort, money, materials.

TH Interface and communication have been cited as one of the major stumbling blocks in construction. How does BIM help with that side of things?

JW Within the industry, there was a perception that BIM was going to mean that stakeholders lost control over who was doing what. Could I as an architect change somebody else's design? Could I hack the M&E engineer's design? Then who would be responsible for that if there was a perceived change that I'd moved things around to accommodate one of my design elements.

In reality, this is not the case. In fact, it does the reverse. Because information is shared in a 3D virtual environment and the information that you author stays with you. So all you issue to your colleagues are the “coordination files”, they’re not files for authoring.

When those coordination files are brought together, that’s when you can see the interface issues. Information can be generated in all sorts of different formats and different software platforms, it doesn’t matter.

What matters is that it is outputted in a common format, which is usually IFC. Once it’s received in a common format it then can be brought together in a container model and that’s where you can check all the interfaces. This makes absolutely crystal clear where the scope edges are. There are no grey areas between who does one thing and who does another.

For example, if you’ve got a drainage system and you’ve got a sink that connects to it, historically there might have been a bit of a scope gap between the connections, say, from the underside of the sink into the downpipe that goes to the main drain. Within a model environment it’s absolutely clear whether that’s missing because there’s either a pipe there or there’s not.

There’s no interpretation about was it in yours, was it in mine, is it on the drawing, is it in the spec, is it not. It’s either modelled or it’s not. And if it’s not there, then you can have a discussion about it very early, about who is actually due to design / supply that item.

So, I see that interfacing by using BIM vastly increases the control and the visibility about who exactly is doing what and being able to manage those people and also, importantly, being able to manage those interfaces where you have got issues. There is no ambiguity in that, in fact there is increased transparency.

TH Great. Jason, thank you so much for your time today.

JW The pleasure is mine, many thanks, Tim.



Jason Whittall will be speaking in more detail on this topic at the Offsite Construction & Prefabrication Summit on 8-10 December 2015 in Manchester, UK.

Whether you’re involved in commercial, residential or educational projects we believe we have a case study you will learn from. Highlights include GlaxoSmithKline, Lime Tree Primary, Believe in Better Sky Office, Lewisham ‘Pop-Up Village’ and Hope Street Student Accommodation projects.

For the full speaker and sessions line up, visit www.offconevent.com, call +44 (0)20 7036 1300 or email enquire@iqpc.co.uk.

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Improving Speed, Efficiency and Quality through Construction Industrialisation

As many of you will be aware offsite construction is not new but many are still questioning the quality, cost, sustainability and efficiency. Deferring or delaying these questions could not only be wasting your money but it could also be stopping you from saving money!

Join us at the **Offsite Construction & Prefabrication event** where your fellow industry experts will provide you with a full breakdown of current case studies. Ensuring that you leave equipped with the knowledge to pursue offsite construction as the option for your projects.

As you will be aware the challenges across multiple platforms and project teams differ substantially as do the strategies to address them. This event will unite **asset owners, architects, construction contractors** and **building services** professionals to present you with their expertise across offsite construction projects within the **commercial, residential** and **educational sectors**.

This event will focus on:

- Assessing the feasibility of offsite construction for your project
- Selecting the right contractors, products and materials for your project
- Planning and implementing complex transportation and the installation of modules
- Tackling interface management to ensure communication and best practice
- Creating the best delivery and execution model for your project
- Planning, designing and building on time and within budget