BRW.
Professions

SHARING – A MODEL SOLUTION

Michael Bleby

5 July 2012

Engineering

Building information modelling is set to change the construction industry forever. Report: Michael Bleby

There is a change afoot in construction. It's not an architectural thing or an engineering thing. Building information modelling (BIM) is both. And more. It is a software that allows different professionals to work together on the same project.

"BIM is a leap forward," says Melbourne architect Rowan Opat. "You are drawing lines but the lines have meaning. They have attributes. When you draw a wall, that is a wall. The [software] knows a wall is a wall, a floor is floor, a duct is a duct and a roof is a roof, a door is a door."
One benefit of this is that the software can tell different professionals working on a project when there is a clash between designs. Eliminating such mistakes, traditionally a painstaking job, is taken care of by the software.

For a small, two-person practice such as Opat's, BIM frees up practitioners from technical drudge work and lets them do more design.

The wider consequences of BIM, however, are huge. It represents a real change in the world of construction – a huge part of the economy – that according to one study could add 0.2 basis points (one basis point is a hundredth of a per cent) to Australia's economy each year. And it is only just starting.
The gains in productivity are significant. Adrian Stanic, a director at Melbourne architecture firm Lyons, contrasts the difference between a design using BIM and one done on the widely used two-dimensional CAD software.

"Let's say, you have a roof and you change your roof wholistically and have a new elevation," he says. "Once that roof has been 3D changed, the changes will appear in all of those flat elevations and in each of those flat views, whereas previously, in the old scenario, you would be going back and would amend each drawing."

It goes further, with functions that allow those on the design side to work more efficiently with others in the construction chain, such as component suppliers. Stanic gives a simplified example of a window schedule, the document through which a builder would order windows from a manufacturer.

"Fundamentally the schedule would tell the manufacturer: '20 of these, five of those …'," he says. "Through BIM you can actually create those schedules and they're automatically updated from the model. If you add a window, it gets added to the schedule."
Opat agrees. "The sky's the limit," he says. "You can tell it to weigh the paint [needed for a design] and it will tell you how much it's going to weigh."

The economic benefits of BIM come not just through a more efficient construction industry but in lower input costs that indirectly benefit other industries, a 2010 report on BIM by the Allen Consulting Group for the Built Environment Innovation and Industry Council says.

Widespread adoption of BIM could immediately boost gross domestic product by 0.2 basis points above the "business as usual scenario", with that rising to 5 basis points by 2025, the report says.

"It is estimated that this benefit over the period 2011 to 2025 is equivalent to a one-off increase in gross domestic product of $4.8 billion in 2010 and that this benefit could be as high as $7.6 billion," the report says. "There are very few options available for enhancing productivity that can be achieved on such favourable terms and without difficult-to-achieve structural reforms."

BIM came about after the architecture, engineering and construction industries in the US started copying manufacturing, the head of engineering in the Asia-Pacific region for software company Autodesk, Rob Malkin, says. The design and construction industries both needed to resolve the same problems – to ensure components delivered were made to the right design and came in the right number at the needed time. BIM allows the construction industry to follow a just-in-time procurement process.

"When you build a car, you want pieces to show up an hour before that car is going to be built," Malkin says. "Think about a building site four to five years ago. There would be piles of materials sitting there and exposed to elements for a month. Now, with these models, you can [create a] timeline: 'On the first day I need these tiles arriving the night before' ... You're not carrying the cost of inventory of those tiles."

A note of caution is needed. Stanic warns against overstating what BIM can achieve. "There's a real danger of people overselling what BIM can do," he says.

"There are a lot of people in the market, probably driven by the software producers, advocating incredibly high levels of what BIM can achieve. It might be able to achieve those levels but the problem is industry hasn't caught up to that yet. A lot of people don't know what it is, don't understand it."

The fact that information is being shared by different players is more important than the technology, according to a lecturer in construction project management at the University of Technology, Sydney, Jennifer Macdonald.

"Companies are making [3D] models, but that's not really BIM," Macdonald says. "What happens is that you get the architect's design to the engineer's office and then it's far too detailed. There is lots of stuff in it that the engineering firm doesn't need. They might be doing structural analysis. So they spend time stripping out [details], rebuilding the model for their analyses. There's not that proper exchange. The idea with BIM is to cut back on waste."

One natural brake on the adoption of BIM are the costs. Stanic, whose firm used BIM to design the new RMIT Swanston Academic Building in central Melbourne, says that in a firm like his with 70 architects, the $12,000-to-$15,000-per-software licence mounts up.

Autodesk's Malkin, who says the cost is "under $10,000 on average," argues that the greater cost comes in the lost working time it takes to train staff.

"The cost of the software is not the big part," he says. "It's not cheap but it's nothing like having four people out of the office for three weeks to be trained."

Stanic says his firm trains staff in BIM in-house.

Despite the software having been around for more than a decade, there is still a struggle on between rivals such as Autodesk's Revit, Graphisoft's ArchiCAD, Tekla BIM and Bentley BIM to establish themselves as the standard.

"Think about Microsoft versus Word Perfect years ago," Malkin says. "The industry is going to decide what the standard is and how to drive the standard."

It is still early days for everyone but the implications for built environment professionals are great. "Small practices suddenly are empowered to be able to do bigger work," says Opat. "Which doesn't necessarily mean a small firm can suddenly build a city but you can do bigger work. There's a small leap there."

HOW TO BRING IN BUILDING INFORMATION MODELLING

The adoption of building information modelling among the professions in construction will get a boost when the government mandates using BIM in public tenders. The Department of Innovation, Industry, Science, Research and Tertiary Education hasn't yet done that but it is coming under pressure from industry to do so.

Last month, a report by industry body buildingSMART recommended the official adoption of BIM for government procurement, with a five-year program to take the necessary steps to make it possible. One hurdle to the adoption of BIM in public procurement in Australia is the lack of a uniform national framework, as the states have their own ways of planning and developing public projects. While the various states in the United States also play a role in procurement, the US federal government – particularly through projects for the US Department of Defence – is such a large buyer of facilities that it can mandate standards that the construction industry is all but forced to adopt.

In Australia, that is not the case. "Each state does things differently and doesn't like to be told what to do," says Rob Malkin, the head of engineering in the Asia-Pacific region for software company Autodesk. "The federal government is going to have to mandate certain standards and protocols for everybody."

SHAKING THE CHAIN

Building information modelling (BIM) is not just shaking up the architecture, engineering and construction industries. The reverberations are being felt all the way back to the tertiary education foundations of these professions.

UTS's Jennifer Macdonald is working on a joint project with colleagues at UniSA and Newcastle University on integrating BIM training into current undergraduate courses to prepare future professionals with some of the skills those in industry are struggling to grasp. One hurdle, she points out, is that the lack of trust between professions pervades academia as well.

"Those same divisions exist at the academic level that exist in the construction industry," she says. "At the university level, the different professions work separately. The only time they work together is out in industry."

Macdonald studied at the UK's Strathclyde University, where undergraduates studied architecture and different types of engineering before specialising. "That gave me an appreciation for other disciplines," she says. "That's what I'm trying to encourage. We have to start exposing undergraduates to other disciplines and what they do and what they have to contribute."

BIM is also forcing more immediate changes to the ways professionals such as architects work, says Lyons director Adrian Stanic. "BIM has changed the structure of architecture teams and the way you set up a team," he says. In the past, a team would have several people working 'in parallel' on a facade. "Because it was in two dimensions, someone could be working on the north elevation, someone on the western elevation." But that doesn't make a lot of sense in the BIM environment. Now, he says, there would be a couple of lead people – the key BIM modellers – in charge of much of the three-dimensional geometry, including where key features such as stairs and lift cores were sited.

"These people have the big moves on the project. They would be adjusting the geometry. Overlaid on that you'd have people working on other areas of the project and their contribution to the project, but they would not be controlling whole aspects of the model."

He says the net result is not fewer people on a project team, just different division of tasks. "I don't think it's necessarily changed the need for resources on projects. It just allows you do to things with more efficiency."

http://www.brw.com.au/p/sections/professions/sharing_model_solution_JzG4cdzZoUgnWxVCTeU0DN