THE FIFTH ESTATE V
OUR PLANET
OUR REAL ESTATE

SMART BUILDING

WHAT YOU NEED TO KNOW ABOUT THE BIM AND DIGITAL TECH REVOLUTION

Featuring our symposium with:

- Alex Harrington, The Warren Centre
- Stuart Bull, Laing O'Rourke
- Toby Maple, AECOM
- Cory Banks, Microsoft

NEWFORMA

Is your firm managing project information as well as these?

New research in the United Kingdom suggests 70 percent of architecture, engineering and construction companies there believe project information has mushroomed to the point that its growth is hampering collaboration. Conducted by Vanson Bourne and commissioned by Newforma, the research fingers technologies ranging from email to BIM as the culprits responsible for the information explosion.

The challenge is little better in Australia and New Zealand, judging from input from Newforma customers here.

For example, **HASSELL** found its need to collaborate and manage project information extended beyond the capability of its legacy document management system.

BDP. The international practice of **BDP** used a system that proved cumbersome, limiting its uptake in the firm. It also did not integrate with Microsoft Outlook email or BIM processes.

Similarly, as projects became larger and more complex, with more collaborators, **Architects 61** Sdn Bhd, sought ways to reduce time spent on administration.

Then Architects 61, BDP, HASSELL, and the engineering firm **Wood & Grieve,** among others, implemented project information management software by Newforma.

The HASSELL story: transformed project delivery and reduced risk

HASSELL

After a review of their options, HASSELL implemented Newforma® Project Center software. HASSELL Design Systems Manager **Johnny Chloride** found their project teams have been better able to collaborate.

"Even though Newforma has a whole breadth of different features, the key features we're using are those for project email and file transfers," Johnny said.

"Newforma also acts like an internal Google. It lets you search through different project folders and will index not just the files, but also the text within the files, and is able to return those results back to you really, really fast."

"The Project Email activity centre reduces risk because it makes it so easy to find and sort emails filed to projects," Johnny Chloride said. "Then conversely, when people leave HASSELL, we have saved those emails in the project itself."

The Wood & Grieve story: technology supports culture

WOOD & GRIEVE ENGINEERS

Wood & Grieve Engineers specialise in technically complex projects that demand high degrees of coordination. More than 450 staff members work from eight locations in Australia and China across many disciplines and time zones.

Wood & Grieve strove to raise its standards of client service – already among the highest in the industry – to the next level.

"Great client service cannot be achieved by technology alone," says IT Infrastructure Manager **Tom Campbell-Clause**. "It has to be based on a culture of service, supported by the right tools to make it happen. Newforma software provide us with the tools we need to reduce risk, improve design, and respond more quickly."

RESPONSIVE SERVICE

One key to great service is to answer questions wherever they arise, whether at the desk or in the field. To this end, Wood & Grieve personnel have ready access to project information through the Newforma apps on their smartphones and tablets.

Unlike mobile apps that create more information silos, Newforma apps integrate with Newforma software used at the desk. That way, there's a seamless two-way flow of project information back and forth from the job site to the office, whether that information concerns drawings, markups, punch list items, team email, contact information, site photos and notes, and more.

The Architects 61 story: cementing trust

architects61

Architects 61 Sdn Bhd Principle and Director **Jeffrey Ling** understands that the industry is becoming more competitive and complex. He's taking steps to meet rising client expectations.

"Trust and collaboration are very important elements in all our relationships," Jeffrey Ling said. "We implemented Newforma over a year ago and we are seeing improved efficiency in the search for documents and producing and sharing information, giving us a coordinated procedure from project start to archiving," Jeffrey Ling said.

"Our clients now have a greater confidence in our project delivery and we are providing the contractor with more on-time documentation. The old ways of collaborating are changing, and we are leading that process."

RETURN ON INVESTMENT

A comprehensive project information management solution earns back its investment in myriad ways. "For example," BDP Director of Information and Technology **Alistair Kell** said, "the elimination of FTP sites saves £20,000 a year in hardware, software and management costs, plus eliminating FTP set-up and administration hassles." But those savings are just the beginning.

"Time savings alone generate an annual return on investment of 4X, meaning the software earns back its cost in the first 12 weeks of use each year," Alistair Kell said. "Whatever the productivity savings, we feel the most important benefit comes in risk reduction."

Similarly, Wood & Grieve calculates that its three-year Newforma license pays for itself in 10 months.

Read the free white paper

Managing information is a complex task on any project. For more information on how you can gain the upper hand against exploding project information, request this free white paper: The Art Of Project Information Management.

Advanced Surgical Skills Centre, UKM Medical Centre, Kuala Lumpur, Malaysia, by Architects 61 Sdn Bhd

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(L-R) Simone Concha, JLL and Caroline Pidcock, Pidcock Architecture + Sustainability.

Omar Awny, Newforma's Senior Enterprise Sales Manager, in a brief presentation to the audience.

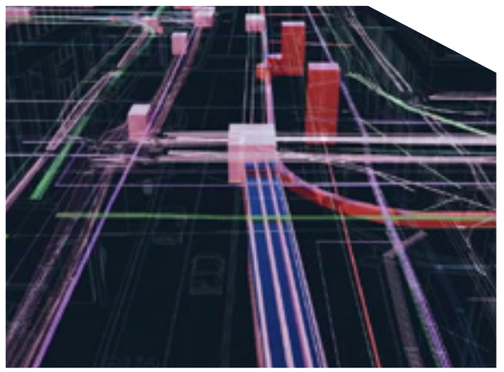
Cory Banks, Microsoft, in last-minute preparations.

» FOREWORD

Tina Perinotto
Managing editor and publisher, *The Fifth Estate*

If you want to know what's happening in the world of digital technology for buildings, you would be hard-pressed to go past the four speakers who shared their knowledge and insights at our first symposium on the topic late last year:

- Alex Harrington from the Warren Centre at the University of Sydney, who took our audience on a challenging ride to view the future and what we need to understand about the speed of change and its impact on our sector
- Stuart Bull from well-respected engineering leaders Laing O'Rourke, who showed us how BIM works in practice
- Cory Banks from Microsoft, who showed how to develop the business case for high-level technology and get support from your chief executive and the finance team
- Toby Maple from AECOM, who showed us how the big design firms – and the industry itself – needs to skill up and tool up



At The Fifth Estate we like BIM because it can theoretically deliver massive savings on the wastage that's endemic in the design, delivery and management of our built environment. On-site building material waste alone is typically 30 per cent.

But are we there yet? Not quite.

A growing number of governments globally are supporting BIM technology.

In the UK BIM has been mandated in major government projects such as Cross Rail or its new iteration the HS2 (High Speed 2).

Singapore's government has invested strongly in skilling up the industry because it knows that getting comfortable with sophisticated technology needs serious commitment and injection of resources that not everyone can manage up front.

New Zealand is engaging strongly in BIM.

And Australia has great intentions – a survey by McGraw Hill Construction found more than half of the design professionals surveyed expected to be heavy users of BIM.

But we're not there yet.

Read this fascinating ebook to find out where Australia is at now, where we are heading and what's needed now.

A huge thanks to our major sponsor for this event and ebook, **Newforma**, which provides a data management system to deal with the output of such powerful technology, and venue sponsor **JLL** for hosting the event.

THE BRAVE NEW WORLD OF BIM AND BIG DATA

By Lynne Blundell

Building Information Modelling, or BIM, is transforming the business of designing and constructing buildings and major infrastructure, driving efficiency, reducing errors and risk, and dramatically improving collaboration between the various disciplines and stakeholders.

Used for decades by industries such as car and aircraft manufacturing, BIM allows all stakeholders to participate in the design process by contributing vital information throughout the project. Architects, engineers, construction service providers and building owners can input data to the underlying database that drives the 3D model. Any changes that are made throughout the project lifecycle are automatically updated so that everyone is talking the same language and literally see the same pictures.

Australians have embraced BIM enthusiastically. According to a 2014 survey of professionals across the construction industry by McGraw Hill Construction, Australia is outperforming more established BIM markets in key areas such as return on investment, innovative new services and in expansion of BIM to construction-related industries such as manufacturing.

Sustainability is a key driver for Australian BIM practitioners – twice as important as it is to global users.

More than half of the Australian design professionals in the survey expected to be heavy users of BIM on more than 60 per cent of projects by the end of 2015. Positive return on investment was reported by 75 per cent of firms using BIM, 30 per cent citing ROI of 25 per cent or higher.

The top five benefits cited by Australian firms include:

- reducing errors
- promoting an industry leader image
- reducing rework
- improving collaboration
- offering new services

No longer an add-on

Chris Tate, practice director information and design technology with BVN, says uptake of BIM in the architecture, design and construction industry is happening rapidly, and is now widely seen as an integral part of the design process.

“People are now seeing BIM and advanced technology use as something we do rather than a value-add. At BVN the technology is embedded in everything we do and BIM is used on every single project,” Tate says.

“We find tremendous internal benefits in managing data associated with buildings and with our designs and using that more effectively on future projects.”

A key benefit is the ability to produce statistics and schedules and tangible information out of the design process. For example, in a hospital design, details such as walking distances between departments and the number of doors in each department can all be very useful for developing future designs.

Having tangible, real outputs to draw upon is also very handy for convincing clients that a particular approach is the best way forward.

“More important though,” Tate says, “is being able to challenge previous projects and assess whether it was the best approach. It is easy to compare and contrast.”

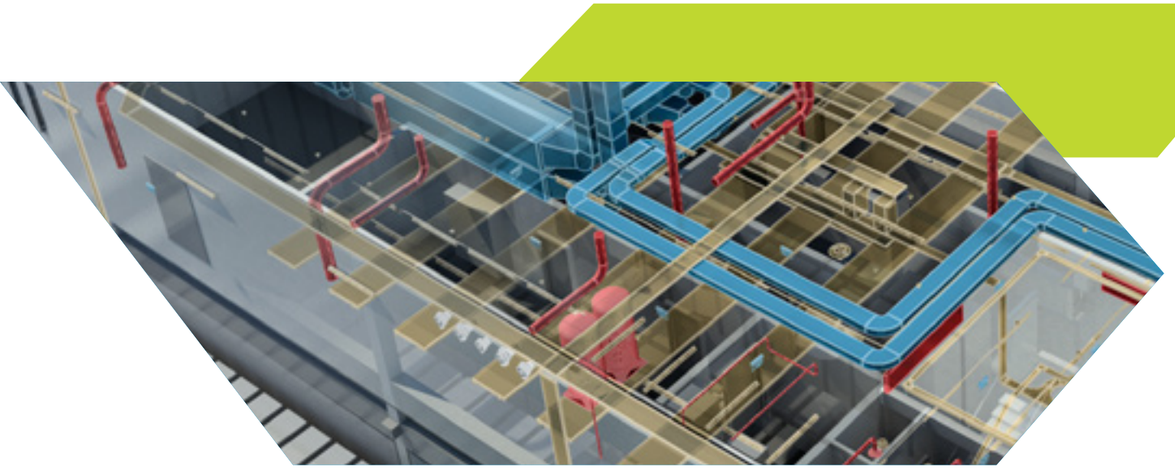
In residential design, with aspects like daylighting compliance and associated guidelines from government, BIM allows designers to quickly regenerate and iterate through different options, while also ensuring compliance.

“We can allow the technology to manage these for us rather than having to recreate and then retest a particular design,” Tate says.

Not all clients understand the benefits, particularly if they have had little experience with the technology. They may question the need for so much information at the start of a project and see the BIM process as costing more, adding it to the initial capital cost of the asset rather than applying the cost across the 35-year lifecycle of a building.

This is beginning to change now that contractors and building owners are exploiting the information from the design and construction process.

> Anything we spend in terms of additional technology or skilled people we gain back five or sixfold in efficiency. In some cases we've reduced what would have been a 1000-hour process down to two hours.



“Contractors like to exploit the information for procurement and pricing and things like construction sequencing, which is where they virtually construct the building to check out logistics and crane positions and other things that allow them to shorten the construction phase. They like to be able to take this to the client as a virtual window to the asset they’ve procured.”

But does a design firm who uses BIM cost actually more than one that doesn’t? Absolutely not, Tate says.

“Anything we spend in terms of additional technology or skilled people we gain back five- or sixfold in efficiency. In some cases we’ve reduced what would have been a 1000-hour process down to two hours. We actively pursue these efficiencies. In addition, because of the automation, the technology reduces the number of processes involving human error so there is a greater level of assurance that what we produce is correct.”

Integrating BIM into building management

Facilities management has been the hardest area to incorporate in the BIM process. Software and systems used for FM have not been able to easily embrace the data generated by BIM software. Both sides are now trying to bridge this gap through the use of IFC, or Industry Foundation Class, software. COBie, or Construction Operations Building Information Exchange, is currently the data format most commonly used to bridge the gap.

This is something that BuildingSMART is working hard to bring about. Operating globally, BuildingSMART facilitates the use of open standards and non-proprietary methods of exchanging information throughout a process, referred to as openBIM. These standards are moving towards full ISO recognition with the aim to have fully interoperable data exchange.

An approach that is favoured by many in the industry is to adapt the ISO British standard for Australian and Asian use, putting in local product data and terminology to ensure rich modelling and relevance.

John Mitchell, chair of BuildingSMART Australasia, believes one of the biggest barriers to more widespread use of BIM in Australia is the lack of a national consensus on BIM implementation.

“If it continues much longer different platforms will develop and it will end up like the incompatible railway gauge situation across the different states,” Mitchell says.

In the public sector the technology is being embraced in an ad hoc way. The federal Department of Defence has mandated BIM in its contracts from 2016 and at a state level different governments have built it into procurement contracts for individual departments. But it is a disjointed approach, Mitchell says.

And while BIM is well-entrenched in design and construction, it is not yet widely integrated into building management and maintenance, he says.

In the UK, the government set up a taskforce in 2011 to ensure BIM is used on all government building projects by 2016, including building management, with the aim of reducing costs by 20 per cent. UK building owners have been enthusiastic about adopting BIM into asset management systems, Mitchell says.

A long way to go for Australia

He believes there is a long way to go in educating Australian building owners on the benefits of BIM for building management.

“Asset management is the more difficult aspect in BIM because to be successful the client has to voice their needs right at the beginning. Otherwise the designers and engineering consultants don’t know what data to include in the model for asset management, particularly as some of that data is irrelevant to the design aspect. The asset management data gets more and more explicit as you get closer to construction.

“So clients need to be well-informed on this technology and they’re not. There are very few building owners in Australia who are well-informed and they need to be to get the most out of BIM,” Mitchell says.

» Clients need to be well-informed on this technology and they're not. There are very few building owners in Australia who are well-informed and they need to be to get the most out of BIM.

A prime example of where BIM technology should be integrated with asset management systems is government departments, such as the NSW Department of Education with its 26,000 buildings, he says.

“With all those buildings you would think they would be interested in the way they gather asset information and design their facilities. They’ve got good asset management systems but they’re not looking at how they might adapt these to work in with BIM design and construct projects for new facilities.”

And while the benefits of BIM are well-understood in tier one design and construction firms, tier two and three (made up of medium and small businesses) are reluctant to implement it because of cost. Without government getting behind it, Mitchell thinks progress at this end of the industry will be delayed.

Stephan Langella, BIM manager Australia with Atlas Industries, has seen a marked increase in demand for BIM from clients. A provider of documentation and BIM data management to architects and engineers, Atlas operates around the globe.

“Five or six years ago hardly any of our clients were asking for anything in BIM. We were thinking about it and getting ready to go there. Now we have very little requirement for any 2D work. It changed very quickly,” he says.

BIM adopted in a similar way

Langella believes Australians are more courageous and innovative in the way they use BIM than many overseas markets.

“Australians are not so impressed by big talk and self-promotion but tend to get behind causes. When I talk to my peers this technology is something they actually believe in and so they have got behind it without it being mandated. I think we are going in the same direction with BIM as we did with Green Star – everyone thought it was a good idea, Defence took it up, commercial followed and away it went.”

The design and engineering professions are now in the broad adoption phase and those who still have not adopted BIM would be considered laggards. But the real test of technology adoption is what firms are doing internally with BIM.

“People wonder why BIM integration is slower than it should be and it is often because firms have responded to external rather than internal drivers. The smart way to do it is to centralise the database so that everyone in the firm is leveraging it,” Langella says.

“Design is a service industry and we provide hours, and it is on all of us to provide quality in those hours. If you want to make money you do more in those hours – you multiply the effect.

“Using BIM effectively means you reduce risk and increase quality – that is the fundamental reason for using BIM. The upside is it will address the external drivers [of client demand] at the same time.”

BIM also turns the concept of architectural drawings on its head because physical drawings are largely redundant.

“Architectural drawings are not just lines on a page – they represent information and BIM extracts this information. For anyone working in this space this is a big disruption – we no longer see a series of documents. Instead every project is a single or couple of databases containing data right through from feasibility to operations.”

Prefab the next frontier

Tom Leyden, director of information technology with Woods Bagot, believes the next big thing with BIM is to move into the prefabrication industry. Now that the models are so advanced and the data so accurate, the next step is to move straight from design to manufacturing.

“This reduces time, waste, energy and cost,” Leyden says, “making it a much better experience for the whole industry and really reducing the environmental impact of buildings.”

At this point not all manufacturing equipment is ready to take that leap. While architects and engineers might have the skills and models, the whole industry needs to step up before it can become the norm.

“Some economies and industries are a bit more advanced so this may be happening faster. In the US they’ve come out of a recession and they’ve become very clever with costs. They’ve got the scale as well to make it more possible.”

Another area for expansion, now that the 3D modelling is well understood, is adding a layer of computational design to further inform design. An example of where this is useful is designing facades that maximise light to the interior but minimise heat.

“We’re just starting to see the benefits of this added layer of computational design,” Leyden says. “At the moment it is not as fluid as it should be. Computers are really good at one part and humans at another part – it’s a matter of trusting each other and understanding the strengths of both to get the balance right.”

Sustainability outcomes

And in terms of sustainability, BIM offers enormous advantages.

“Being able to predict energy use of a building over its lifetime well in advance of anything being built is enormously useful. You can optimise that by looking at things like wind flows and sunlight into certain areas. And then you can model out how people will use the building and maximise the internal workings of the building,” Leyden says.

“It’s really clever stuff. In the past there was a lot of guessing and you couldn’t be sure until the building was used. The certainty now gives people an incentive to invest.”

» Being able to predict energy use of a building over its lifetime well in advance of anything being built is enormously useful.

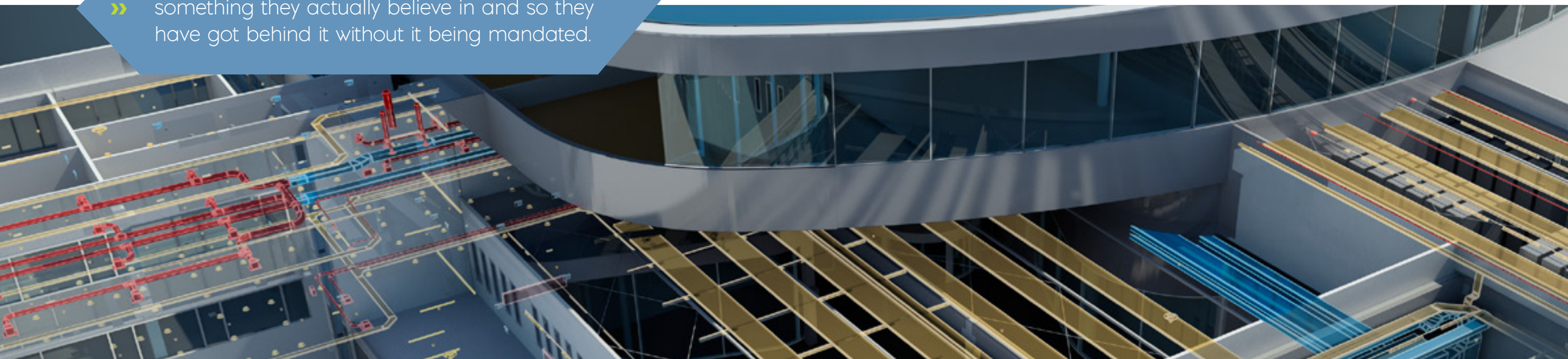
And for the future? Leyden believes BIM and its use of big data will really allow designers and building owners to maximise the space inside buildings and in urban spaces by predicting how people interact in that space.

Multi-use spaces will become easier to predict and design. This is already happening with airports, hospitals and retail.

“We’re getting really good now at using the big data that is available and putting that into the design. For example, at airports we can put in data on how long people spend between check-in and boarding and where they spend their time. This helps us design things like the retail space and maximise use of that space, which leads to better rents and a much better experience for people moving through airports,” Leyden says.

“It’s about taking big data and using it to inform design and to improve design. That is a really big focus for us.”

» When I talk to my peers this technology is something they actually believe in and so they have got behind it without it being mandated.



THE SYDNEY SYMPOSIUM ON HOW THE DIGITAL WORLD CAN DELIVER SUSTAINABLE REALITIES FOR BUILDINGS

A narrative on the event

20 October 2015, JLL, George Street, Sydney

With thanks to sponsor Newforma and venue sponsor JLL

» THE SPEAKERS

ALEX HARRINGTON

CHIEF OPERATING OFFICER, THE WARREN CENTRE, UNIVERSITY OF SYDNEY

Alex Harrington is chief operating officer of The Warren Centre, a science, technology and innovation think tank at the University of Sydney.

Ms Harrington joined The Warren Centre after working on the Low Energy High Rise Project, which identified significant energy savings in the commercial office sector through a number of low-cost strategies.

Prior to joining The Warren Centre, she was responsible for delivering the sustainability platform for the DEXUS Property Group, including a $41 million energy improvement upgrade plan to deliver a 4.5-star NABERS Energy average for the office portfolio.

Ms Harrington holds a Master of Environmental Law, Business and Management, a Bachelor of Science in Agriculture, a Graduate Diploma in Applied Finance and Investment, and is currently participating in the Innovation and Entrepreneurship program at the University of Sydney.

STUART BULL

REGIONAL DIGITAL ENGINEERING LEAD AND ENGINEERING EXCELLENCE GROUP AMBASSADOR, LAING O'ROURKE

Stuart Bull is regional digital engineering lead with DE/Engineering Excellence Group (EnExG) ambassador responsibilities at Laing O'Rourke. Based in the Sydney office, Stuart has responsibilities for NSW, ACT and NZ.

Mr Bull is a chartered civil engineer and chartered building surveyor with 25 years in the engineering and architectural industry. He has an MSc in architectural engineering and holds professional BIM qualifications with the Hong Kong Institute of BIM, Singapore Building & Construction Authority and Royal Institute of Chartered Surveyors.

He previously worked for Arup Consulting Engineers in the UK, Asia and Australia, and has utilised BIM processes on some of the world's largest and most iconic projects. Mr Bull provides strategic advice on the use and implementation of digital technology to owners/operators, contractors, consultants and government groups wishing to further their understanding of BIM processes.

CORY BANKS

PRINCIPAL CONSULTANT ON ADOPTION AND CHANGE MANAGEMENT, MICROSOFT

Cory Banks is principal consultant in the adoption and change management practice at Microsoft. He has been helping organisations to better leverage what they know in Australia, North America, Europe and the Middle East over the last 15 years.

Mr Banks has also worked with AECOM, ARENA, John Holland, the Global Carbon Capture Storage Institute and Arrow Energy on the adoption of collaboration practices and platforms to support the achievement of business outcomes.

In a previous life, he spent five years with Parsons Brinckerhoff as the knowledge manager and then the executive knowledge and business improvement. He currently sits on the board of the Institute of Information Management and the Australian Knowledge Management Society.

TOBY MAPLE

NORTHERN AND WESTERN BIM PRACTICE LEAD, AECOM

Toby Maple is northern and western BIM practice lead at AECOM. He is a highly motivated, successful implementer of BIM and the change management that this technology enables. He is well versed in analysing and developing creative solutions for organisational change, assessing differing requirements and providing "win-win" scenarios to all levels of project delivery and business processes.

Mr Maple has extensive expertise in overcoming challenges in introducing BIM technology within an organisation and across industry. He currently works with AECOM in the BIM advisory group, assisting government and private clients to enable the benefits of BIM processes within their organisations.

Over the past 10 years he has worked with over 30 companies in the Asia/Pacific region providing these services, most notably as HASSELL design technologies leader and Woolworths Limited Revit systems manager, where he created the standards, methodology, workflows and content to streamline supply chain processes, reducing errors.

HOW TECHNOLOGY IS TRANSFORMING OUR WORLD

Alex Harrington

CHIEF OPERATING OFFICER, THE WARREN CENTRE AT THE UNIVERSITY OF SYDNEY

If you want to know what's really going on in the world of technology and understand exactly how disruptive it is likely to be, you need to watch a video called "Humans Need Not Apply". Actually, the title probably says it all, Alex Harrington said during her fly-through intro into the challenges massing on the digital horizon for the property and building sectors. Her key message? Understanding is the first step to opportunity.

Here is a synopsis of her presentation:

People underestimate just how quickly technology is changing our world.

3D printing is now able to construct human tissue, and not just that, but a nerve cell, one of the most difficult tissues to deal with. If we embrace technology, we could see artificially created repairs to spinal cord injury patients, for example. It is a really dynamic and changing world.

At The Warren Centre, we believe that where there is the opportunity to find solutions to a challenging societal problem, technology and engineering can help improve our quality of life.

Are we being replaced?

The efficiency benefits of technology are so significant that humans are starting to seem inefficient. **NR has a website** that tells you whether your job is at risk of automation.

Engineers and designers are very well protected, but some others in the industry... not so much. Real estate is very much at risk of automation.

If you want to understand exactly what I am talking about, have a look at the video **Humans Need Not Apply**. What it shows is that robots don't have to be perfect, they just have to be less unreliable than us.

For example 40,000 people are killed in motor vehicle accidents in the US every year, so technology – in the form of driverless cars –

> NPR has a website that tells you whether your job is at risk of automation.

> The more information you have, the better. Digital technology is vital in terms of gathering that information and allowing you to understand the system and then working out where you can innovate.

only has to reduce that number to be better than humans.

Information is key

Totally automated driving is some way off, but the innovation propelling this technology is here now, and our immediate need is to understand how it will integrate with the way we live and work.

The more information you have, the better. Digital technology is vital in terms of gathering that information, allowing you to understand the system and then working out where you can innovate.

Shopping centres for instance structure their layouts to "entrap" shoppers who might be just going to the bricks and mortar retailer to validate the decision they've already made online.

It's only fairly recently that we've seen way-finding technology in retail centres, and that's based on a premise that the longer a person spends in the space, the more money they spend.

But there doesn't seem to be a lot of data to show if that's really true. Are shoppers frustrated by this? It's like the **Seinfeld sketch** where he goes to the mall but can't find the car.

Gathering information on what customers want is crucial.

It's about shifting from push data to pull data.

The property sector is very much about push information – we market to people, we tell people what they want. But do we need to shift this to pull data where people tell us what their preferences are and we work out better ways to gather that information?

Information is really, really important from an adaptability point of view. The more data you have, the more information you have, the more adaptable your projects and your property offering can be.

I think that, increasingly, property will be valued on external reviews and platforms that won't be in the industry's control.

The rate of information exchange is rapidly increasing. For example, a typical day on social media outlet Twitter results in 500 million tweets.

There is information flowing at a rate that we can't manage.

> Facebook, the biggest media content management company, owns no content; Alibaba, the biggest online transaction market, has no inventory; Uber has no taxis; and Airbnb owns no real estate.

We're shifting very much from a file mentality for data management, to a sort and interrogate mentality, and it's a big shift. Global business is here.

Businesses are changing

Businesses are changing the way they operate.

Facebook, the biggest media content management company, owns no content; Alibaba, an online wholesale retailer based in China, is the biggest online transaction market and has no inventory; Uber has no taxis; and Airbnb owns no real estate.

So, the world is changing, and we're seeing fundamentally different business models. This is throwing out a question about how we work. Will we put on an Oculus Rift to have a business meeting, or send our avatar, or use new, as yet unknown platforms? Will this make us more efficient or will we be burdened by a constant flow of information?

If business can be done totally virtually, then the property sector really needs to think about how we adjust to that. How do we make the argument and the business case to have people value the products (buildings) that we are offering?

> The old metrics were: how many people can we fit in a box? The new metrics are about ensuring property works for people.

The old metrics were: how many people can we fit in a box? The new metrics are about ensuring property works for people.

If global business is here, but we're still building boxes to fit everyone in the same place, and the lifetime of that building has to be at least 20 years for ROI, what are we doing to adjust our industry? And how do we control that when we aren't going to necessarily control that information?

I found this great comment online: "You may not work in a cube farm, but chances are you live in a silo."

The proliferation of technology information and data are fundamentally driven to break down silos; it's to change markets to make them more transparent and give people more control and information to reach conclusion.

And so, businesses should question: is property a silo, or is it a facilitator of productivity?

Many benefits

The benefit of technology and digital design is that it can be used to improve a concept, improve the design process and speed it up, to keep the information consistent, to redesign the concept completely, or to identify opportunities for disruption and innovation.

Take for example **Maptek**, an Australian software and hardware provider that built an algorithim to automate the process of graphing bore drilling.

It started in the 1970s by a geologist who saw the benefit of computers. He started selling a computer to do statistical analysis for bore drilling. This was after the fact, but it was a process to say, "Hey, we can speed up the analysis process for you."

These guys pretty much locked themselves in a room, pulled apart a document scanner and reverse engineered it to apply it to the physical environment. They now do laser scanning of mine sites, so instead of doing a very manual process, they don't even have to get out of their car. They drive through the mine while the laser scans the mine, and within hours they have a full, virtual 3D model of the mine. It's quite phenomenal.

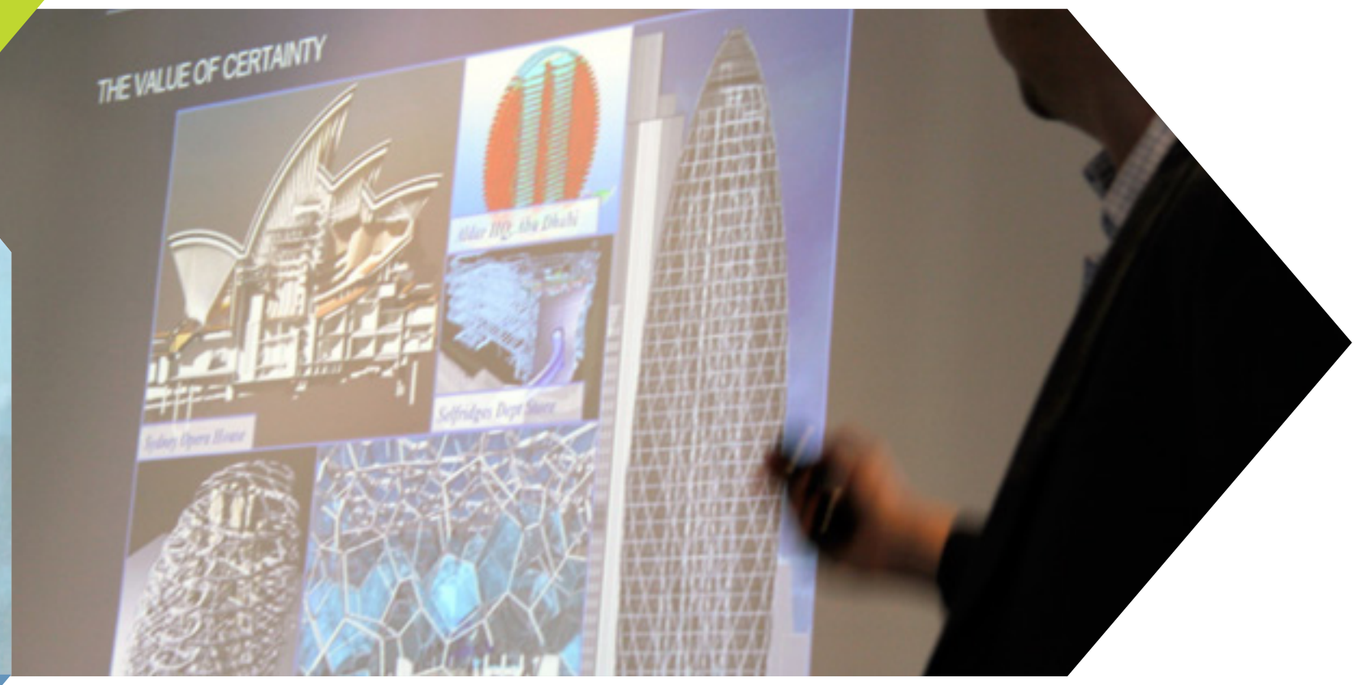
> Is property a silo, or is it a facilitator of productivity?

This is the whole understanding of technology and using it to see where you can be disruptive. And this sort of technology is becoming standard.

With building information modelling, when you have a conversation with an asset manager about why assets need attention, you can either look at reams and reams of data, or look at a 3D image and understand it spatially.

That's the next challenge for us: how do we assemble all this data to make it digestible? We need to make quick decisions in a rapidly changing environment.

HOW ONE BIG ENGINEERING COMPANY USES BIM



Stuart Bull

LAING O'ROURKE REGIONAL DIGITAL ENGINEERING LEAD AND ENGINEERING EXCELLENCE GROUP AMBASSADOR

There are key steps and solid rationale for using BIM. A big part is making highly complex projects very visual. Here's a synopsis of Stuart Bull's presentation.

The application of digital engineering or BIM is transforming the future of design infrastructure and also reinventing the past. It's changing the way we think about design and construction project delivery in a very short period of time.

Laing O'Rourke is committed to challenging the image of the construction industry wherever it goes to work – whether it is through technology and innovation, materials, methods and processes, procurement routes, strategic partnerships or the industry's best people.

> BIM is transforming the future of design infrastructure and reinventing the past.

The use of digital engineering is about the value of certainty. It is a risk reduction tool, a tool for certainty and a tool for information both internally and externally.

The use of state-of-the-art digital prototyping technology enables the integration of data about a project's design, construction and future function to develop the most efficient methods of delivery and operation.

Digital engineering and BIM software provides access to information more readily in a common-data environment.

It's about utilising large-scale document management systems that are immediately accessible to anybody with a mobile device onsite, while also meeting the industry design questions.

Employing BIM

We begin each project with workshops to define the project-wide technical protocols and outcomes, so everything has key performance indicators.

It's about strategy and renewing and auditing, and ensuring we have the right plans in place to meet those KPIs.

The application of digital engineering has been mandated across the company. So this isn't pick and choose by our design and bid manager – this is a mandate we must use.

Project leaders must demonstrate how they are using these smarts to deliver improvements and how they will foster project-wide support. You can't just have a group of people saying that a project will run in a certain way; it must be company wide and agreed upon. That's why it's important to sit down with designers to put our expectations of the project outcomes on the table and work through any problems.

There is no such thing as a typical project. We treat each one as an individual. But the strategy remains the same.

The strategy is around how we deliver, co-ordinate and collaborate with our sub-contractors and how we work with the designers. We have to ensure that everyone knows what the project looks like, what technology they are using, what types of software and so on, so that everyone is on the same page.

By using 4D sequencing at the start of the program we ensure everyone has a clear picture of how we will go to work. We are no longer looking at traditional Gantt charts, but validating that information into a model view.

The next step is about mapping the project.

We have a visual system map being developed into our digital platform, which is a project-wide map of all the functional integrations of the technology. We then layer that with software maps – every piece of software that is being used by designers and our own internal delivery teams and sub-contractors are put into that map to find out where the missing interfaces are and in some cases build a data link to solve any issues.

Data and material mapping is a key activity on each project, ensuring everyone on site knows where everything is and how work is

» Digital engineering is doing away with a silo mentality and moving to a single model approach.

progressing at every stage – if something changes, the team needs to know the impact. This would be demonstrated in a model change management process, where all changed model objects are highlighted revision to revision.

We build an ID infrastructure program that links to the structural models and information, and we expect our designers to assist us with that when we bring them on.

This program automatically associates the code with the activity and allows the construction team to visualise what they are doing on a week-by-week basis. And it allows costing outputs to be generated across the construction packages.

More specifically, it allows us to take a basic structural model and overlay each stage, for example, services. And all of these are being visualised, measured and tracked every step of the way and being updated on a weekly basis.

» The software allows us to identify problems on the go, when we can still do something about them

It's very visual so it's very easy to see what cost and change is happening. We never want to get to the point where we see a problem six months after the building has finished. The software allows us to identify problems on the go, when we can still do something about them.

It's doing away with a silo mentality and moving to a single model approach.

The benefits of BIM

BIM allows a whole host of people to access the same information, and be on the same page when it comes to building projects. It also has safety benefits as it supports element prefabrication or Design for Manufacture and Assembly (DfMA), keeping people off-site when they aren't needed.

The main benefit of BIM is that it's a collaborative process. There are a number of areas we work through and a number of areas where our partner designers are expected to be part of that process.

It's not that we take a model from the designers and throw it away and start again. We want to improve initial sorting of information using the designers' models, which sees usable contractor information delivered earlier in the design development process.

This does mean that some businesses have to step up their business-as-usual mentality. But that is not a bad thing – we want to continue to challenge the old way of doing things.

The number one thing that we use the models for is for safety, as it can link construction risk, design risk, site safety risks and so forth, which are all demonstrated within the model.

The modelling can also help with sustainability verification. We asked one of our designers to trial a new 3D sustainability software for six months in 2009 to see if it could validate certain aspects of the Green Star rating requirements. We found the model helped demonstrate that what we thought was a 5 Star Green Star rating was in fact a 6 Star Green Star rating.

It's hoped that by being able to implement all documentation drawings, costs, programme and material use on one platform, BIM or digital engineering could be used to not only increase the speed, efficiency and transparency of construction, but also the sustainability.

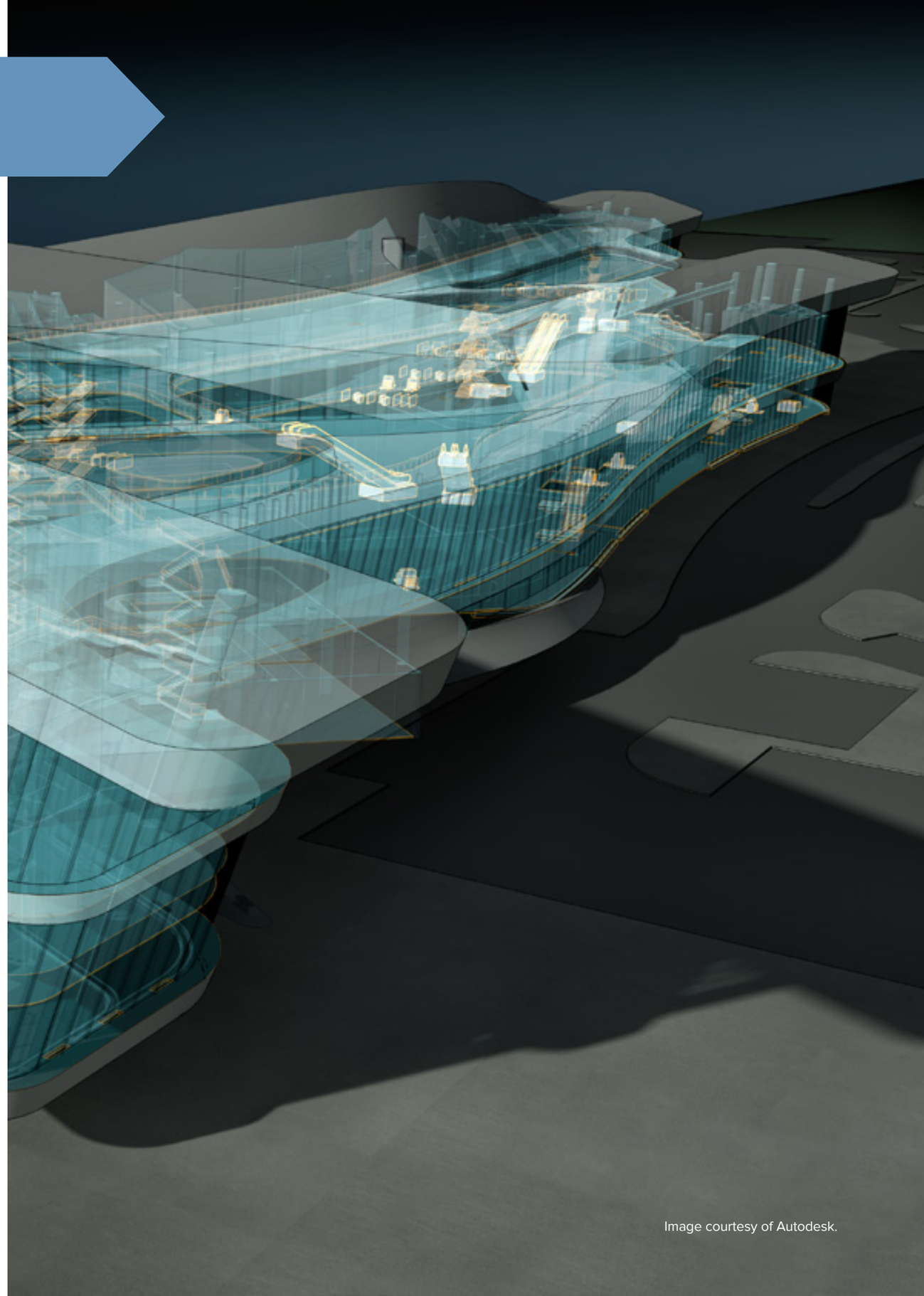


Image courtesy of Autodesk.

WHY AUSTRALIA NEEDS TO GET A MOVE ON

Toby Maple

Northern and Western BIM Practice Lead, AECOM

What's BIM really about? What does it mean for each contributor? And how is it being taken up by the industry in general? And why is Australia lagging behind neighbours such as New Zealand and Singapore in aggressively rolling out BIM? Here is a synopsis of Toby Maple's answers to these questions and more.

Although BIM is useful, there are still some challenges that need to be overcome. One such challenge regards terminology.

I often see scope of works requirements or contract documents that ask us "for a full BIM", whatever that means. It can mean so many things and summing it up to "I'll have some of that BIM thanks" is not helpful. Clients then don't get what they truly need and project teams spend large amounts of time trying to decipher what is actually needed.

The first step for a BIM project should be defining at the beginning of the project what is required for the BIM to achieve, what information is important to the client and how you want each of the supply chain to contribute to these information requirements.

My interpretation of BIM, after 12 years of experience, is that if you're producing a model, and you're producing drawings from that same model as well as producing information (attached to objects) as such schedules or data exports from that same model by capturing and reusing information in that same model, then that to me is a pretty good form of BIM.

People also think that to be doing BIM you need to include fabrication, cost estimating, time sequencing, facilities management and all these other wonderful things. But, for me, if we can get industry to working on a collaborative, shared model and producing information from that same model, I think that is the core of BIM. A lot of people get caught up in what BIM can do, but they need to be able to define what the actual client requirements are, and deliver on that.

Laing O'Rourke uses the term digital engineering, which is more far reaching than just the Building Information Model – it encompasses things like Design for Manufacture and Assembly (DfMA) and Lean Construction methodologies. And Newforma tools capture all sorts of project information and manage it such as emails, requests for information and other information that is not in the model. But for me, BIM is really about managing information in a much better way. BIM = Better Information Management.

The basic terms and instruments are BIM management plans, levels of development, model element authors, and then different needs of the model.

> A lot of people get caught up in what BIM can do, but they need to be able to define what is the actual client requirement first.

For AECOM, it's around better information management and structuring that information in such a way that can be used across the building lifecycle, from design, construction, to operations.

After defining the information requirements (data), you then need to outline how you are using BIM to achieve this.

The profitability paradox

I often see a profitability paradox. People say: "I like what BIM can do, just not on my project". Senior management often say they are for it, and want to change the way project delivery is done; the guys on technical level are also for it, and have probably been learning it on the side; but the guys who are actually managing the jobs and are responsible for the profitability of the project don't want to use BIM as they have profitability targets to meet and it's seen as an initial cost impost. So you have this tension between senior management and middle management. So getting these guys over the line by supporting them is important.

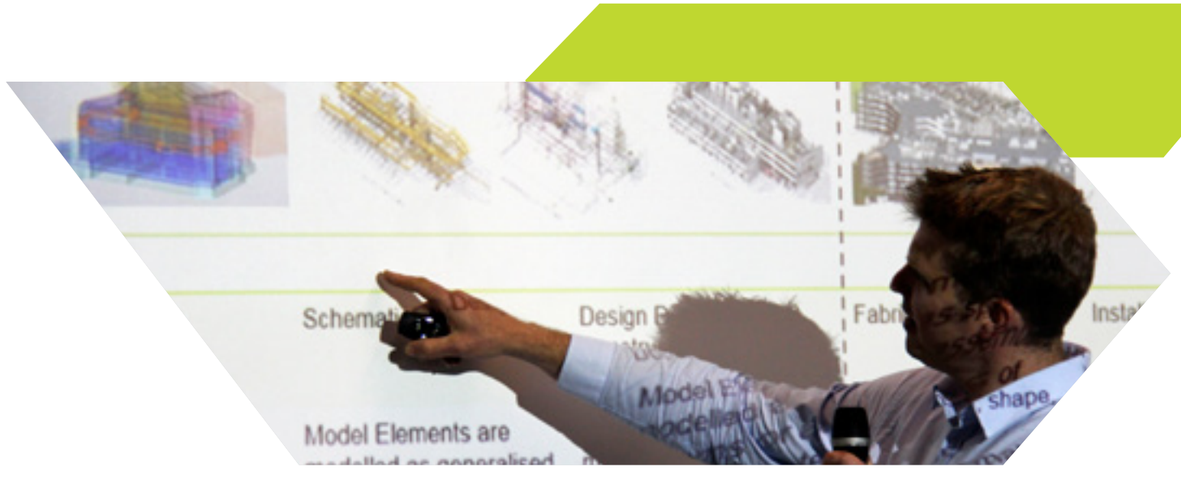
It's not a technical person's endeavour though. I've seen it time and time again when you get a contractual requirement for BIM but the project managers flick it to a technical person and say, "Answer these BIM questions please." It's not the technicians responsibility; it's the project manager's to understand how his team with deliver the project. So explaining the changes to workflows and giving people a direction and understanding as to why they are doing this stuff is important.

Getting the communication right

Communication is key. Take for example Woolworths (which employed Maple prior to AECOM), which needed to upgrade their old systems.

They said to their staff: "We're going to turn off this old, ageing system and everyone has to use this new one," so there was a lot of time spent in developing the BIM system to achieve what six other systems were doing before.

It's important that employees – not just the



staff working on projects, but senior leadership – know that this is the way the company is heading. It sends a clear message that there is support and an imperative to get on board. If you flounder around and don't give that signal to staff and explain why it is needed, it can take a very long time, which, in turn, costs a lot of money, which gives a perception that BIM costs a lot to implement.

The traditional approach to constructing a building was to create a discipline specific 2D drawing and then overlay it with other disciplines. These individual drawings explained what needed to be built, which a contractor has to interpret to turn it back into a 3D built form. What is being done now is a more collaborative approach of using different specific discipline models, to combine into the consolidated, federated model that can be used to ensure coordination has occurred, virtually, before the contractor starts on site. Drawings are still issued from the model, but the coordination is much more resolved.

It is important to ensure that all those involved know that models progress at different stages and different discipline models are at different levels of development during the lifecycle of a project. Collaborative forms of contracts are key to getting everyone at the table, working to achieve the best project outcomes.

Overseas innovation, but Australia lags

Looking at how BIM is being taken up abroad, the UK has mandated to have a level two maturity of BIM by 2016. That's around working towards an open format – Industry Foundation Classes (IFC) – and collaborating around a common federated model. So they've been very proactive in a fairly short space of time. In the past four years they have really ramped up the industry over there to a more collaborative way of working – it helps when the government is supportive and sends that directional message.

One of focuses of UK's level three BIM is around making much more collaborative forms of contracting and insurance models to reduce the duplication of effort – for example, where the architect models a column and then the structural engineer models the same column and then they coordinate the two. As cloud computing evolves we may get to a point where all parties work live in the same model, reducing the duplication.

However, collaborative forms of contracting require a lot of trust between parties, which still isn't that prevalent in Australia.

» Collaborative forms of contracting require a lot of trust between parties, which isn't that prevalent in Australia.

In New Zealand there is the Productivity Partnership, which has pushed the need for BIM as one of the key initiatives. But in Australia, there hasn't been that – there have been a lot of reports around BIM increasing productivity, but it's only really been in the last six months that government has started to look at this as a way to improving productivity.

In Singapore the government invested $250 million in incentives to upskill the industry, for example in software, training, hardware, trades skills and design for manufacture, so digitising the industry does need some investment.

To try to increase the uptake of BIM in Australia, AECOM has been involved in several working groups with the Australian Institute of Architects and Consult Australia on the different issues within the BIM industry, and with the Australasian Procurement and Construction Council Project Team Integration approaches using forms of contract to really try and help industry move to BIM as "business as usual".

CollaborateANZ is also giving industry guidance on some of these issues that affect BIM. Things like the LODs (Level of Development), which can oversimplify complex information requirements, BIM management plans, and others.

Recently CollaborateANZ has joined together all the regional BIM groups across Australia and New Zealand. This helps with the dissemination of local issues upwards to organisations such as NATSPEC, the AIA and Consult Australia, but also to feed information down to those regional groups and share knowledge across those groups.

Good project practice examples include having BIM deliverables in the scope of works and explaining it in such a way that it doesn't dictate to the design partners or the contractor how it needs to be done, just what information is required.

For example, identifying that you want to use the models for cost estimating at tender or to improve site logistics and planning for safety, or whatever else is a requirement of the models, is best done at the Expressions of Interest stage. They're the big high-level statements that should be in the contractual scope of works – so everyone is aware right at the beginning what the priorities are of the BIM and how to price their fee accordingly.

It's important that you use simple language and identify why you are doing this, what are you trying to achieve, what is to be done, and where it will be done (for example, in an co-located integrated office or teams collaborating on an extranet), who will be responsible for each piece, when it is required, what can it be used for, who is going to use this model after the asset is constructed, and who will be updating it into the future.

These are all important things to address. The beauty of BIM is that you can use it over the long-term, and add/reuse and query the model over time – if it's kept up to date.

» The UK has been very proactive in a fairly short space of time. It helps when the government is supportive and sends that directional message.

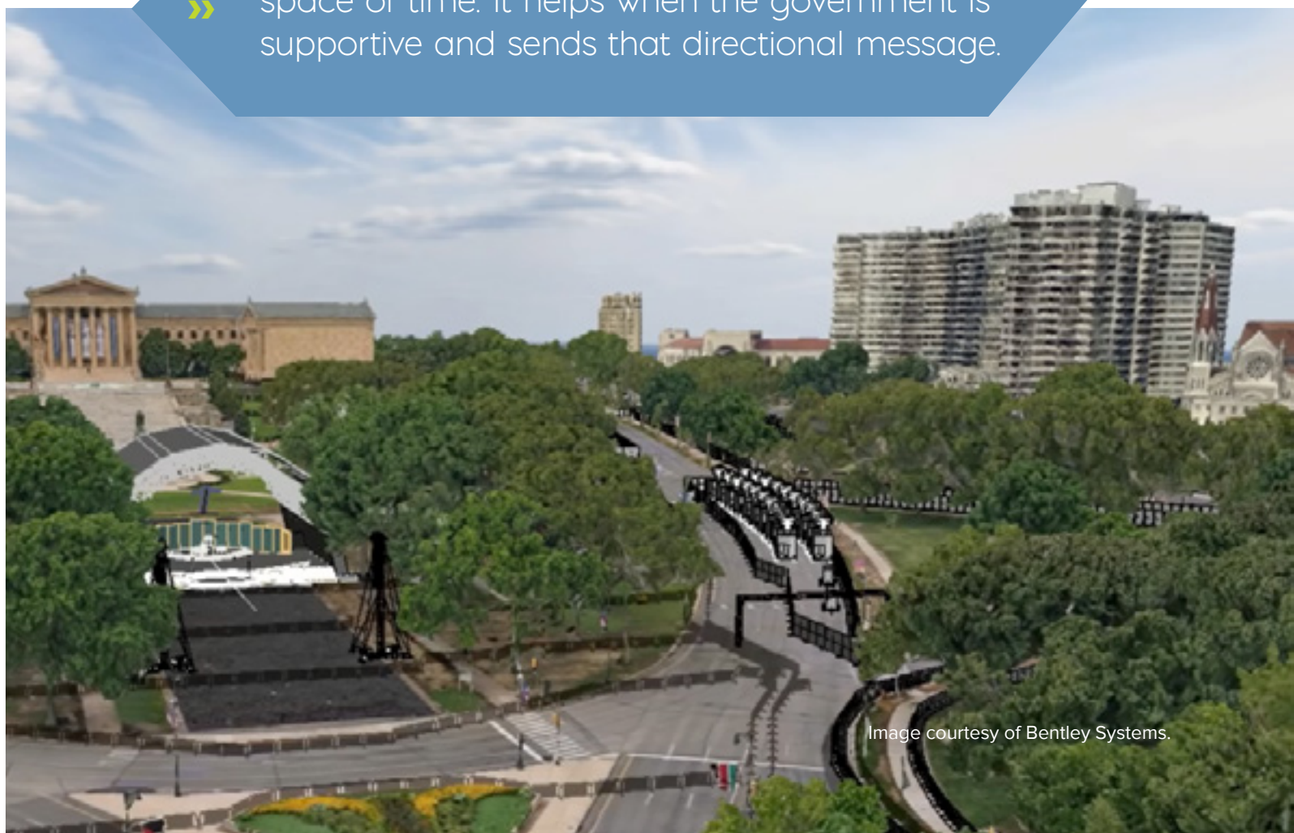


Image courtesy of Bentley Systems.

HOW DO YOU GET YOUR BOSS TO TAKE UP THIS COOL NEW SOFTWARE?

Cory Banks

PRINCIPAL CONSULTANT
ON ADOPTION AND CHANGE
MANAGEMENT AT MICROSOFT

We know BIM is good, we know it can change the way the industry does things for the better and be a great boon for your business, but how do you convince your boss to invest in the bright new digital world? Here is how Cory Banks put it to the symposium.

Identifying what is most important is crucial to selling something.

In the mid-1990s a gentleman named Bill Gates made a statement that launched, basically, a thousand internet start-ups. What he said was: "Content is king." This saw a whole bunch of people that had a whole bunch of content, like Time Warner, say, "Okay, let's get into this Internet game."

At the turn of the century, though, this was superseded by the semantic web, not the social web. What was then touted was "context is king" – having all this content wasn't much use without having context.

Convenience is king

What we're seeing now is a completely different shift. With the advent of the cloud and mobility, convenience is now king. So it doesn't matter how much content or context I have, if it's not convenient for me to consume where

and when I want to be able to do that, then I'm not going to get involved.

This is one of the crucial selling points of software – the convenience of it.

> It doesn't matter how much content or context I have, if it's not convenient for me to consume... I'm not going to get involved.

New products, new staff, new markets, new resources, new locations all vie for the same dollar from a technology-spend perspective.

So, first you need to understand what the problem is that you're trying to solve with the technology you're looking to implement and whether it's a convenient fix. You also need to understand what people do, not just what they say they do.

I might ask someone what their requirements for a new system is, and they will either tell me, or won't be able to tell me. They may say: "I don't know what the technology can do for me. I need to know what is possible first before I can tell you what I want to do." So you need to understand exactly what it is that people do, as they may not be able to tell you – and even if they do, they might not tell you all the system processes.

And, even if they tell you the formally documented procedure and processes they undertake, you may find that people don't actually do that to the letter. When you sit down and watch them, suddenly they are opening spreadsheets or external databases, or veer off and use cloud-based solutions, which are outside procedure. So, they may follow procedure up to a certain point, but in order to do that, they have to use different workarounds.

The case might be that they don't actually fix a problem, and the exception becomes the norm. So the solution you provide needs to be simpler than current practice.

Understanding complexity and strategic direction

Understanding complexity is also important, as you wouldn't want to try to implement a simple solution to a highly complex problem, as that can lead to catastrophe.

Strategic direction needs to be understood before making any changes.

No one is making five-year strategic plans anymore, because no one has found a good crystal ball for technology yet. The speed of change is accelerating continuously so to say "this is the vision for five years' time" is very high-risk.

So strategic direction should be more about guiding principles that influence decisions taken as an organisation, rather than specific and prescriptive actions.

You should also touch base with that intent and establish whether it is still aligned or whether the intent needs to be reviewed and changed.

Once this has been identified, traceability should be highlighted. When putting forward a business case you need to show that not only is it going to create value for the organisation, but it's also going to hit these different strategic outcomes.

Bosses can't argue with that.

For example, if a company is looking to improve the length of engagement staff have with the organisation, and you can show that changing to a new system can improve that strategic role, it will help solidify the necessity of the program in a tangible way.

Ready for change?

However, readiness for change is also to be considered. Just because you can do something, doesn't mean you should.

Far too often investments are made and people run off doing things thinking that as it's affordable, it should be taken up. But what they should consider is the size of the change.

> You wouldn't want to try to implement a simple solution to a highly complex problem, as that can lead to catastrophe.

How big a jump is it for the market to take or for the customers to take? Are we asking them to jump too far? It's good to try to transform the industry, but if it's too far away from where people are now, they may not want to take that step. So how can you help them get there with smaller steps?

Identifying the appetite for risk is also important when looking to implement change. I've worked with a financial institution in Queensland where we said we wanted to invest $20,000 upfront to prototype a product, which would help decide where the next $3 million is spent. But the feedback we got back was, "What am I getting for my $20,000, and what is my return of investment?"

We wanted to use the prototype to learn from it so that we could invest smarter in the future, but there were barriers to that – as people wanted to see something tangible straight away.

The amazing thing was that when I got involved with the engineering and construction industry, we were spending half a million dollars in a pre-feasibility study to work out where to spend $10 million in a feasibility study to figure out where to spend $10 billion!

So, it's all about making sure you're qualified and measuring yourselves against criteria.

What's the capacity for change?

Capacity for change should be a factor before implementing anything new.

While the business may decide the direction of business, what other changes are going on at the same time?

I've been working with a client who wanted to implement a piece of software, but then a new CEO joined the organisation and restructured it.

So, although there were advantages from a productivity perspective to use this technology to enable new ways of working, people were distracted because they were worried about their jobs.

Understanding what other changes are going on and what else is shifting is quite important. They're not just competing for an investment perspective but also from an attention perspective in the organisation.

It should be remembered that technology is only an enabler.

> Just because you can do something, doesn't mean you should.

I was with a financial organisation in Sydney who said that they wanted help with report generation. They said someone would get a request and they'd pull that stuff together, compile it, and hand it over to someone else who would put it in a PowerPoint, who would hand it on to someone who would review it, who would then give it to someone else to get presented.

I asked them what happened next, and they didn't know the answer. To them, they had done the job. I had to highlight that what happens next is that someone uses it. Someone actually picks it up, reads it and uses it to help them make a decision.

So it's about the fact that the business outcome is better decision making through better reporting, not the fact that you have more data, more reports, or better analysis. It's the fact that it gets used to do something.

With data, information and knowledge, value is not realised until it gets used.

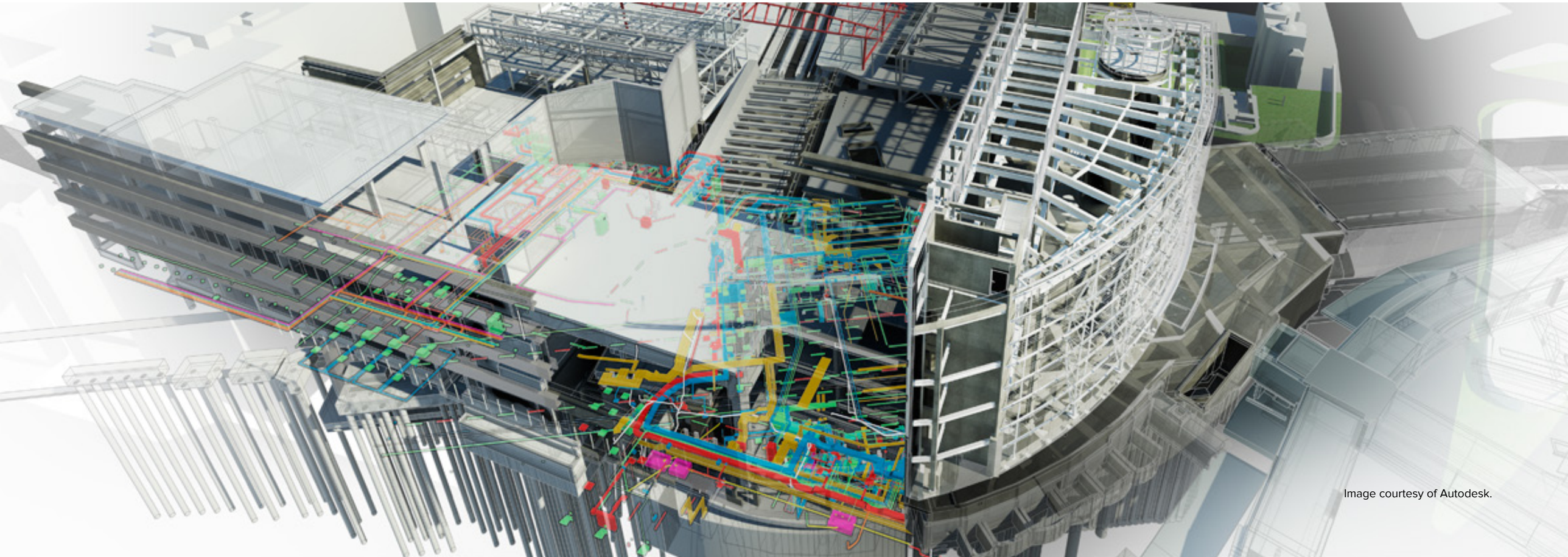


Image courtesy of Autodesk.

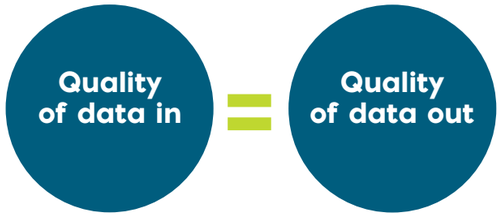
» DESIGNING WITH DATA

Rory Martin

NATIONAL SUSTAINABILITY LEADER, DWP|SUTERS

"In God we trust. Everyone else bring data."

William Edwards Demming



The following article was presented at the 2015 International Green Building Conference, held 2-4 September at the Marina Bay Sands Hotel, Singapore.

Data is becoming more and more critical in how we design and plan for future communities. The amount of data in the world currently doubles in volume every two years, depending on who you talk to. So how do we, as designers, harness the benefits of all this information? How do we use it to design buildings and communities that are sustainable in every sense and provide the best possible outcomes for residents, workers and visitors? This piece aims to start to address these questions by sharing some of the work dwpIsuters has been undertaking over the past year in this area.

As designers, the leading data management tool for us today is building information modelling, the powerful software we are utilising to design, analyse, document and deliver projects of all shapes and sizes.

BIM offers a fantastic opportunity to improve the environmental performance of our designs from an early stage in a project. The key, however, is in knowing what it can do, when to do it and how to do it.

You get out what you put in

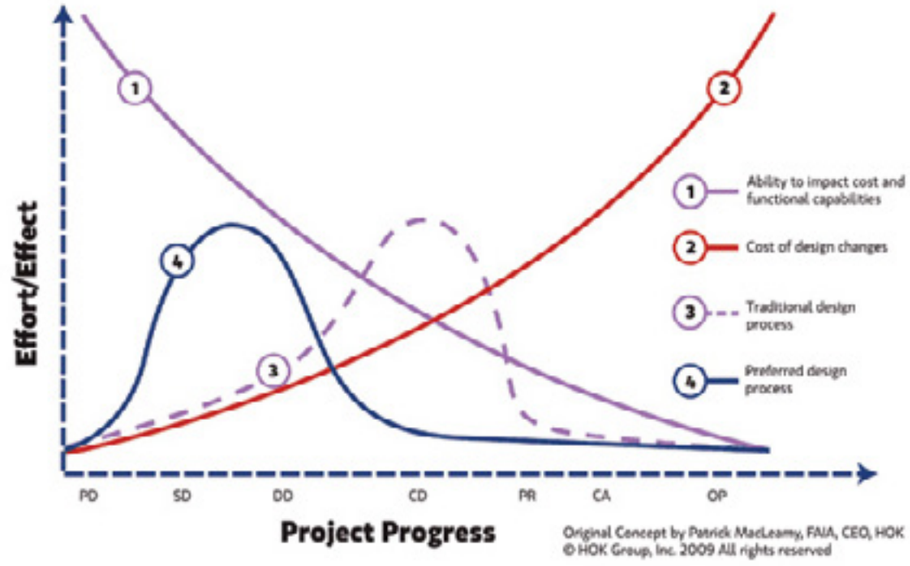
In using BIM, it is important to understand some of the fundamentals around data use in design that at first might seem obvious, but – if not adhered to – can make the benefits of its use redundant.

The golden rule in data use is that results in analysis will only be as good as the data used.

For example, if running an energy model with data sets, utilising climatic, material thermal conductivity, building parameters and user profiles, and one of these sets is inaccurate, then the whole exercise could likely prove futile as the according results could also be inaccurate.

The other fundamental is that we cannot solely rely on quantitative data for design, as qualitative data is just as important. Anything we can assign a value to can start to become quantitative and we can therefore utilise it to run simulations and analysis that can provide great design input. However, if we neglect the qualitative, or the experiential, then we are in danger of designing to numbers and values, and run the risk of failing to design for people and their potential experiences.

It's a fine balancing act, where quantitative data can help set a direction that can be well supported by qualitative information.

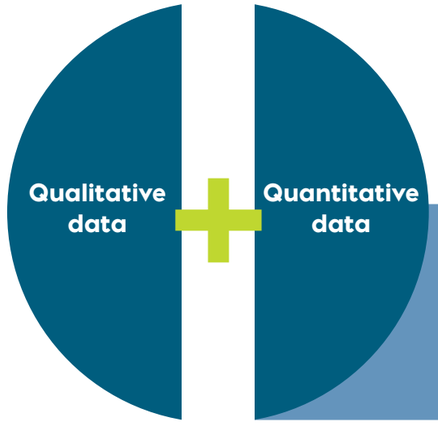


Source: Patrick MacLeamy, HOK Group

The earlier the better

One of the greatest challenges in incorporating sustainability within projects, and securing it through to completion, is timing and its integration within the design process. One of the greatest missed opportunities for sustainability is that it is often considered too late in the design process. In order for the maximum environmental performance of any design to be realised, it has to be considered at the concept stage when orientation, massing and facades are being designed.

We have to move beyond processes where a "pretty building" is conceptualised and then we think about "making it sustainable", to one where sustainability is fully ingrained from the start.



» We cannot solely rely on quantitative data for design, as qualitative data is just as important.

» In order for the maximum environmental performance of any design to be realised it has to be considered at the concept stage.

The beauty of BIM as a tool is that it allows this analysis to be undertaken at the conceptual stage. This data – and that added throughout the design and delivery of a project – can now stay with a building throughout its life. This enables further performance optimisation and integration within building management systems by facility managers, as well as helping assist with renovations, additions or demolition as required.

It is important that we now consider that what we capture in BIM during design is likely to stay with a building long beyond its opening day and will have a critical role to play in its operations.

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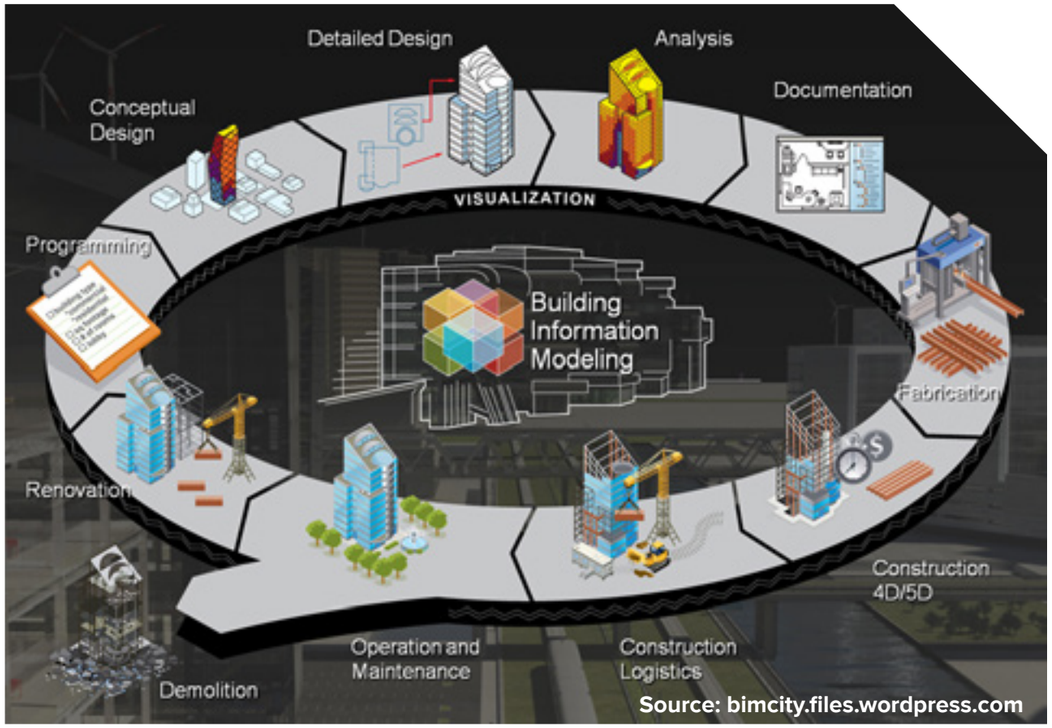
BIM enables further performance optimisation and integration within building management systems and assists with renovations, additions or demolition.



Source: bimcity.files.wordpress.com

So how is dwp|suters actually applying BIM to maximise environmental performance? Different BIM packages have different analysis tools that can be applied during the conceptual design phase, while third-party plugins are also available offering further analysis enhancement.

It should be noted that these tools, though often invaluable in early design, couldn't achieve the same level of analysis conducted by engineering software that looks at computational fluid dynamics (and heat transfer), energy and other modelling.

At present, analysis within BIM is great at a conceptual level but detailed analysis still requires input from the whole design team.

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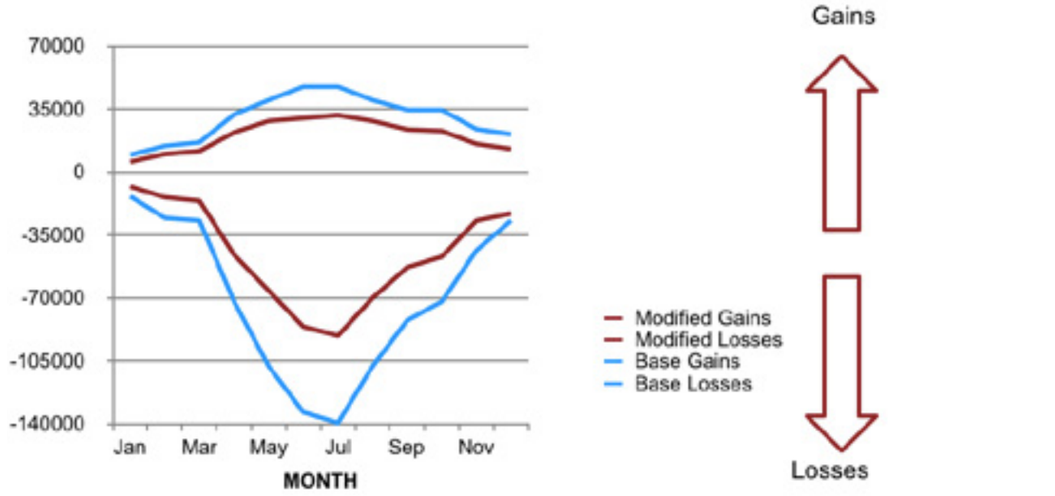
Analysis within BIM is great at a conceptual level but detailed analysis still requires input from the whole design team.

One project where we have recently utilised BIM to help improve the environmental performance of a design from the concept stage is the Fleurieu Regional Aquatic Centre (FRAC), a joint venture between dwp|suters and Hames Sharley Architects.

The speed and flexibility that designing and testing with BIM allows means that many different design iterations can be assessed



quickly to ensure the optimised design is identified as early as possible. This gives designers confidence that their proposal is on the right track from the start.

Analysing options for FRAC's orientation, massing, facades and solar protection, together with climatic, material and user profile data sets within BIM, allowed us to identify design and shading strategies early on. These strategies suggested an approximate 33 per cent improvement in the building's performance (over the base case) and prior to engaging in more advanced design and modelling. It should be noted that these results were based on quantitative analysis.

Qualitative data came to the fore in designing for wind protection. The climatic data identified wind coming from many directions during


Winter Winds


Summer Winds

the winter period and from the south in summer. This presented a design challenge that could not be readily solved from the data alone. In discussing this with the local community, it was clear that the northern winter winds were what they disliked most and the design was enhanced to offer greater protection to users around the northern entry during these periods.


Source: dwp|suters and Hames Sharley

Bridging the gap to community design

Though currently in its infancy, expanding BIM's benefits to community design is one of the most exciting areas of its development.

At present, practices that deliver multiple projects through BIM are generating mountains of data across sectors. When this data is collated and "mined", it creates the opportunity to identify optimum design responses particular to user groups, building typologies, climates and more, based on the designs and performances of past models.

> It is an exciting time - we have access to powerful, easy-to-use tools that can generate a real change within the buildings and communities we design and deliver.

The challenge here lies in being able to synthesise and rationalise all the data so that relevant design data is readily extracted. It should be noted that these analytics do not suggest that we will begin to repeat designs, but instead illustrate what has and hasn't worked previously in design.

When multiple buildings in a precinct or community are mined for data, then the real power of BIM and data management can be unleashed. This information can then feed into the Internet of Things and smart cities.

Correlations between how precincts perform and how their constituent buildings are designed can be identified so that we can start to improve and optimise the performance of our communities as a whole. When this data is made open and freely available we will start to see real strides being made in smart city development. The **Besos project** in Barcelona is an example of where this is starting to happen.

Keeping up with developments

This article only starts to touch on the role BIM is beginning to play in improving the sustainability outcomes of projects today. Whole other areas, such as algorithmic design, are emerging that will accelerate innovation further, and a real challenge for designers will be to keep up with developments. These innovations all contribute to providing designers with a greater understanding of the implications of their design decisions, allowing them to engage in a greater level of detail with clients and other team members on the rationale behind proposals. It also offers designers greater confidence in their proposals, as theories and ideas can be readily validated and supported through analysis outputs.

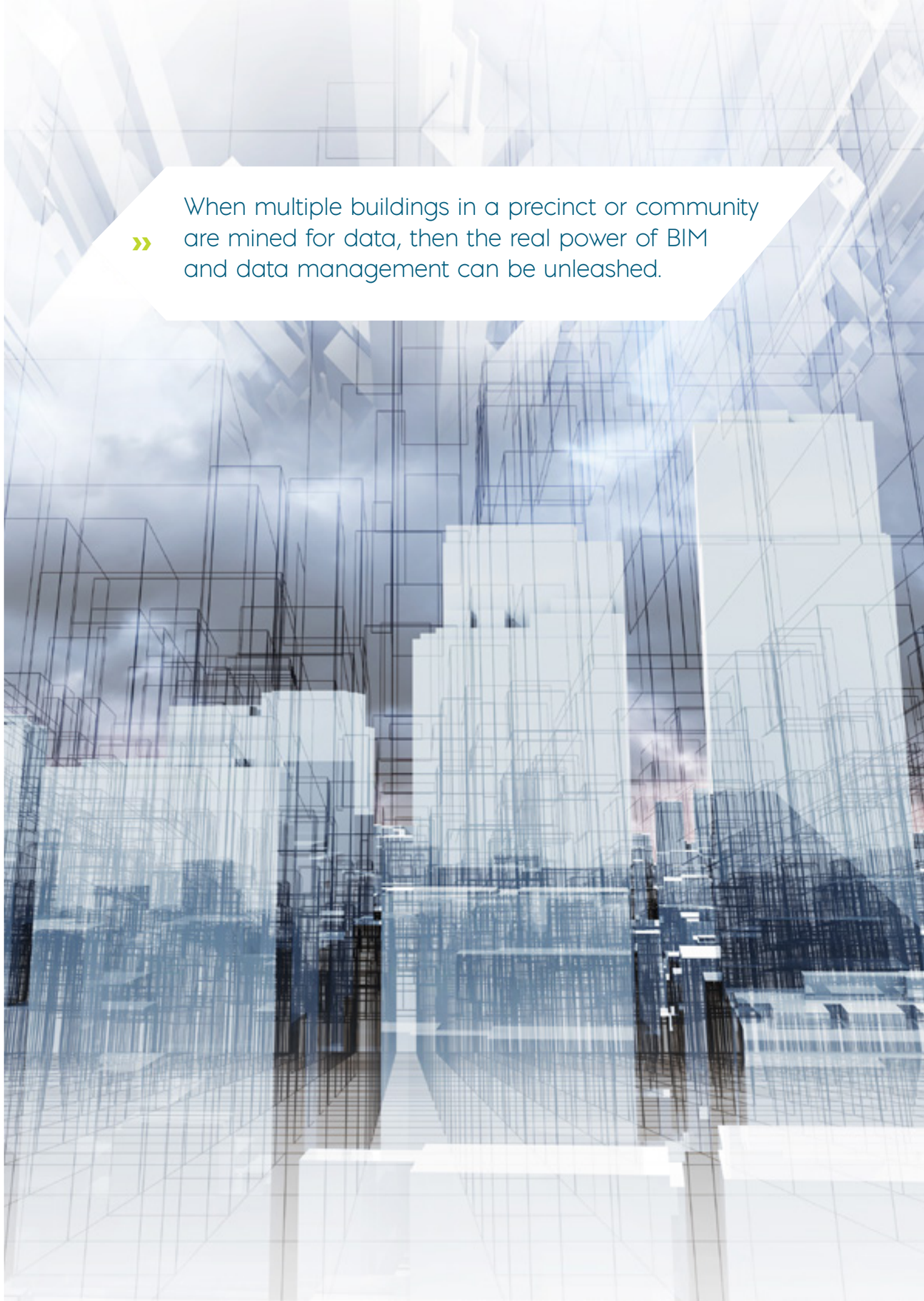
It is an exciting time within our industry – we have access to powerful and easy-to-use tools that can generate a real change within the buildings and communities we design and deliver.

In summary, I'd say that, at present, BIM is a fantastic tool for improving the environmental performance of designs at concept stage and starting a project on the right track. However, more accurate modelling still depends on engineering software.

BIM is going beyond the design and delivery of projects, and the data created will stay with buildings throughout their lifetimes, feeding into whole precinct design and operations. But, like any tool, it is important to know how to use it and to be mindful that we need to consider the qualitative aspects of design along with the quantitative.

Rory Martin is national sustainability leader at dwp|suters. He is responsible for building a sustainable culture internally and for the sustainability agenda of dwp|suters' projects. He aims to develop sustainable, innovative design solutions based on the simultaneous delivery of economic, social and environmental sustainability.

> When multiple buildings in a precinct or community are mined for data, then the real power of BIM and data management can be unleashed.



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