Twinmotion
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A Legendary Release
Bluebeam Revu 2016

BIM Unbound
BIM Unlimited scores a major success at Build New York Live

A Signal Improvement
Enhanced collaboration with Bentley’s Promis.e

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Cloud-based collaboration

Along the Right Lines
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A SIGNAL IMPROVEMENT  
Hatch Mott MacDonald enhances collaboration and reduces risk during rail signal design using Bentley Promis.e’s 3D modelling capabilities.

March/April 2016
Comment

Toasted!

by David Chadwick

I was going to do something entirely predictable and boring for this month’s Comment, as it will be landing on your doorstep right upon the BIM deadline - but if your organisation hasn’t already committed itself to the process after half a dozen years of expositions, conferences, seminars and tuition courses, you have probably decided that, despite the undoubted benefits it will bring you, that is outweighed by the effort of changing the way your company works.

Instead, and inspired by the use of the Internet of Things (IoT) in the Dassault Systèmes article in this issue, I thought it would be interesting to extrapolate a bit about its benefits and shortcomings.

The principal benefit of IoT, as the article suggests, is the extension of the wealth of information that we are able to glean from a building using Smart Control Systems - taking the dream of Building Information Modelling to more extreme levels - to where they ‘answer back’, monitoring and controlling building performance.

The gist of it is that everything is connected via the Internet and can, therefore, be controlled externally. You could be turning up your central heating while sitting in a branch of Costa, or noting how the control systems with banks of sensors around the building are responding and so has links to your name, as the owner, your address and other sensitive information.

But then I remembered some other stories that have emerged over the last couple of months. Several marques of cars have had their onboard computer systems hacked, meaning that drivers could potentially find themselves driving along the road only to have control of the vehicle quite literally taken out of their hands.

The possibilities that this raises are quite troubling. Imagine your bank account being raided via your fridge! You’re a busy person, so, when you are getting low on milk or butter, you have set up your system to reorder said items from a home delivery service as required - and to pay the supermarket directly when you order. Your fridge, therefore, has an Internet connection to your bank and access to your basic account details.

Of course, you have the best security systems installed on your computer, and use these to set up and monitor every Internet-enabled device in the building. But if your car has an Internet connection then it’s also part of the World Wide Web, and so has links to your name, as the owner, your address and other sensitive information.

Crooks are getting cleverer. I had a long conversation with a friend recently who nearly got scammed after an ‘outside source’ took control of his computer. He is a very careful person, but was impressed with the professionalism of the ‘company’ that contacted him. Alarm bells were only raised by a tiny illogical lapse in their spiel. Within minutes, they had money transfer requests being presented at his bank - stopped only by the vigilant bank fraud squad alerted by the amount.

I hope developers involved in the Internet of Things have security as a prime directive. Imagine how you would feel, if you were fleeced by your toaster?
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— Mark Patis, Technical Executive, Design
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— Mark Williams, Senior Vice President
Tetra Tech, Inc.

www.bentley.com/ProjectWise
Comercial property developer Bruntwood has unveiled design plans for ‘City House’ - Leeds’ biggest collaborative workspace to date. City House is Bruntwood's vision for the future of office workspace, incorporating the physical, social, and digital needs of businesses, from large-scale to start-ups, across a shared building.

The innovative design will provide diverse co-working areas, meeting and event spaces, a business lounge and a roof garden, with a panoramic view of the city centre.

www.bruntwood.co.uk

MERGER TO CREATE WORLD MARKET LEADER

Aconex, provider of a leading cloud and mobile collaboration platform for the global construction industry, is to acquire Conject Holding, a leading cloud and mobile collaboration service provider in Europe and other regions, for a total cash consideration of £65 million. The transaction was expected to close on or about 31 March 2016, subject to customary closing conditions, including approval by Germany's Federal Ministry of Economics and Technology.

“This acquisition will significantly expand our market penetration and user network throughout Europe, and will further consolidate our position as the leader, by revenue, in the global market for cloud-based construction collaboration solutions,” said Aconex CEO Leigh Jasper. “Conject's customer base, business and culture are highly complementary to ours. Their footprint across Europe's largest construction and infrastructure markets - particularly Germany, the UK, France and Russia - will measurably strengthen our presence and further drive our global economies of scale by leveraging our existing infrastructure. We look forward to welcoming Conject's management and employees, integrating their operations and serving their customers.”

With the close of this transaction, the merged company will be the world's market leader, by revenue, in cloud-based construction collaboration, said Dr Ralf Händl, CEO of Conjet. “We have worked beside Aconex for many years, building the construction collaboration industry and helping our customers deliver successful projects. We respect the strength of the company's global customer base and industry-leading technology. “Together, as one organisation, we can expand our penetration throughout the construction and infrastructure markets of Europe, the Middle East, Asia, and other regions,” he continued. “This business combination has the potential to accelerate the growth of our industry and deliver increasing value to our joint customers worldwide.”

www.aconex.com

‘EVOLVING’ CITY HOUSE DESIGN UNVEILED

In tandem with the 16th Pavilion in 2016, the Serpentine Galleries has expanded its internationally acclaimed programme of exhibiting architecture in a built form by commissioning four architects to each design a 25sqm Summer House. The four Summer Houses are inspired by the nearby Queen Caroline's Temple, a classical style summer house, built in 1734 and a stone's throw from the Serpentine Gallery. In line with the criteria for the selection of the Pavilion architect, each architect chosen by the Serpentine has yet to build a permanent building in England.

The Serpentine Pavilion, designed by Bjarke Ingels Group (BIG), is an ‘unzipped wall’ that is transformed from straight line to three-dimensional space, creating a dramatic structure that by day houses a café and free family activities and by night becomes a space for the Serpentine's acclaimed Park Nights programme of performative works by artists, writers and musicians. Kunlé Adeyemi's Summer House is an inverse replica of Queen Caroline's Temple - a tribute to its robust form, space and material, recomposed into a new sculptural object. Barkow Leibinger was inspired by another, now extinct, 18th Century pavilion also designed by William Kent, which rotated and offered 360 degree views of the park. Yona Friedman's Summer House takes the form of a modular structure that can be assembled and disassembled in different formations and builds upon the architect's pioneering project La Ville Spatiale (Spatial City).

www.serpentinegalleries.org
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LOFTY SOLUTION FOR BRAZIL’S TALLEST BUILDING

Located in the fastest growing business region of Sao Paulo, Brazil, the W‘torre Morumbi is the tallest corporate building in Brazil. With a modern and innovative design, it has two towers of 38 floors each, with a central span of 35 metres in length, interconnected through five suspended walkways. The structure of the W‘torre Morumbi building consists of two structural systems, the first being responsible for the horizontal stability and the second used to ensure the absorption of gravitational load.

Medabil Sistemas Construtivos was contracted to develop the structural design of the W‘torre Morumbi. The key business objective of the project was to provide a structural solution for the reinforced concrete core: a metal structural work, composite columns from the ground floor, and all interconnected structures (walkways). The structural design focused on streamlining the materials available in the market. Each element employed was used where it proved to be economically justifiable, taking into account the overall analysis of each solution. Medabil’s objective was to demonstrate a differentiated, efficient and cost-effective way to build multiple floor buildings in Brazil, while considering all the possible gains along the way. The team reduced time spent on the basic and detailed design by 65% and reduced project costs by 50%.

www.medabil.com.br

ZERO BILLS HOME ENERGISES MARKET

Zero Bills has a bold ambition: to make home energy bills obsolete. With a clever design that minimises energy requirements, the very low energy needs of the household are met by a roof-integrated PV and energy storage system that, it is claimed, can also generate enough power to service a small electric vehicle.

The home is heated by a small air source heat pump that recycles heat recovered from stale air that’s been processed by a mechanical ventilation with heat recovery system. With the average annual household spend on home energy exceeding £1,300 and car fuel exceeding £1,000, significant lifetime savings can be met for the Zero Bills householder. It comes as a kit of parts - a steel frame with timber wall panels, the bulk of which is manufactured in the UK. The system is affordable at £1,350 per sq m, and quick and easy to build with. Zero Bills is aiming to be one of the first homes assessed under BRE’s new Home Quality Mark, which provides consumer-friendly, impartial information via a star ratings system on the quality and sustainability of new homes. It has already been commissioned for use on a development in Newport Essex for the Sir Arthur Ellis Trust (subject to planning permission). Zero Bills is located on the world-renowned BRE Innovation Park in Watford, a mini-demonstration community of homes and buildings of the future.

www.bre.co.uk

GUIDING LIGHT TACKLES INDOOR AIR QUALITY

VTT Technical Research Centre of Finland has developed a design accessory for monitoring the indoor air quality in facilities such as offices and classrooms. It detects carbon dioxide, temperature and humidity, and uses light signals to guide people to healthy space. The monitor resembles a sailing boat, and is ideal for facilities where staff welfare and productivity are especially important. The monitor, which is based on IoT technology, uses comfort light signals to guide people if, for example, carbon dioxide levels in a room become too high.

www.vttresearch.com

APPROVED DOCUMENTS IN THE SPOTLIGHT

NBS Research has been conducting a survey on behalf of the Department for Communities and Local Government (DCLG), with a view to making the use of Approved Documents a more user-friendly experience. The survey explored how two Approved Documents are being used, namely Part B, which covers Fire Safety, and Part M, which concerns Access to and Use of Buildings. DCLG sought feedback from architects, engineers, contractors, designers, manufacturers, consultants, self-builders, building control officers and approved inspectors. The research will be used to inform future improvements and updates to the Approved Documents.

www.nbs.net
Dassault Systèmes is developing Smart Facility Solutions based on the 3DEXPERIENCE Platform, demonstrated by the LifeCycle Tower ONE building in Austria.

Hailed as the next generation of sustainable management and operations, LifeCycle Tower ONE (LCT ONE) demonstrates what can be achieved by putting together BIMs operations management and smart building control solutions - and all courtesy of the Internet of Things (IoT). Dassault Systèmes, the 3DEXPERIENCE Company, a world leader in 3D design software, 3D Digital Mock Up and Product Lifecycle Management (PLM) solutions, participated in a landmark smart office building project in cooperation with Rhomberg Group, Zumtobel Group, Bosch Software Innovations, and Modcam AB. With this project, Dassault Systèmes aims to introduce more sustainable management of homes, commercial buildings and factories to smart cities of the future.

Product Lifecycle Management, a mainstay of Dassault Systèmes’ product design and manufacturing solutions, translates readily into building lifecycle management - one of the principal aims of BIM. The use of smart solutions, similar to those implemented on LCT ONE, will enable real-time fine tuning of environmentally-sensitive building components through the use of strategically located sensors, providing accurate feedback that can be used to monitor and control equipment settings. Performance simulation helps architects design buildings that ‘perform’ better under all operating and occupation criteria. The installation of smart solutions provides real data that not only can be used to enhance sustainability and comfort for its occupants, but also delivers results that can be compared to earlier simulations - to be used to modify future designs - a learning curve for future cities.

THE LIFECYCLE TOWER
Hence the pilot project - the LifeCycle Tower ONE building in Dornbirn, Austria, which was presented during the 2016 Bosch ConnectedWorld event in Berlin, Germany. The modern LCT ONE, owned by Rhomberg Group, has been equipped with a state of the art Zumtobel lighting solution and smart controls system, turning it into an innovative connected building targeting the highest standards of sustainability and user comfort. The LCT ONE project is the latest from Dassault Systèmes’ 3DEXPERIENCE City initiative to virtually represent, extend and improve the real world and manage data, processes and people of sustainable cities. This initiative addresses architecture, infrastructure, planning, resources and inhabitants, so that stakeholders can virtually explore a city’s future and its effects on its citizens and the planet.

In this context, Dassault Systèmes’ 3DEXPERIENCE platform offers a unified virtual environment for design, simulation and seamless exchange of information between electronics, mechatronics and sensors of each system in smart objects, buildings or vehicles. The real-time monitoring and analysis of Internet of Things components and systems operations can help provide feedback to advance the next generation of design. In the LCT ONE project, the 3DEXPERIENCE platform provides real-time insights into the building’s usage and technical health to make best use of energy efficiency and occupancy. These include energy usage and savings per luminaire, per floor or for the entire building, 3D visualisations of presence data and a heat map that shows occupancy to help optimise usage. Maintenance insights, falling precisely within the remit of BIM building operation or facility management, include luminaire failure notifications, operating hours and the usage history of the lighting system. Knowledge about preferred lighting scenes helps augment light settings and, as a result, increase end-user satisfaction.

"The IoT is evolving into the ‘Internet of Experiences,’ where devices are digitally connected to the physical world around them to become part of a living experience shaped by interactions among people, places and objects," says Monica Menghini, executive vice president, chief strategy officer, Dassault Systèmes. "By cooperating with Bosch Software Innovations and other innovators in their respective industries, we can demonstrate how sensor information can be easily harnessed from any big data repository in real time and linked to the 3DEXPERIENCE platform's realistic representation of a virtual environment. In this case, the 3DEXPERIENCE building actually becomes the master reference for planning, simulating and operating the estate. Sustainable cities can become a reality sooner than we think."

If you want to learn more about Dassault Systèmes’ 3DEXPERIENCE City, visit www.3ds.com/stories/ and check out how technologies will shape future cities. www.3ds.com
I learnt a new word recently - ‘mentee’ - which apparently means one who is being mentored, itself a current buzzword which you will no doubt have noticed frequently. It reared its head in during the release of Bluebeam Revu 2016 via a global webcast, which, instead of focusing on a demonstration of new features, presented three demonstrations from US construction companies; Black & Veatch, Turner Construction, and Sundt and Gensler, which paired AEC mentors with their younger mentees.

Each pair demonstrated new product features and improved workflow solutions, with an interesting touch, I felt, as the mentees proved to be exceeding their brief somewhat by introducing original contributions to the software themselves. The presentations covered three of the main announcements in the latest version; Batch Markup Summary, Legends and Tags.

Bluebeam, of course, is a leading developer of PDF tools for the AEC and oil and gas industries. It has been my preferred PDF application almost since the first release and I’m delighted to see how it has now developed into such a comprehensive and versatile tool for the construction industries.

**BATCH MARKUP SUMMARY**

With Bluebeam Revu, you can accumulate large amounts of data from multiple PDFs from a project or within single PDFs comprising numerous documents. To simplify the communication and management of this information, Batch Markup Summary can be used to create annotation summaries that report on, or extract data, relevant to different technology teams within the project. This gives users more control over output, enabling them to create single or multiple reports from information in the Markup lists across multiple PDFs. It is used in conjunction with extensive filters and sort options, and, being customisable, as well, gives users almost limitless options for creating individual and focused reports.

The mentee at Black & Veatch, Jason, took over the presentation to show how he honed the feature to provide enhanced management reports. Starting with a list of markups, categorised by importance, a report template was opened with discipline chosen as the first selection option, adding other selections - subject, name, comments etc. and setting page breaks per level of importance. Variable-sized thumbnails and hyperlinks were attached, linked directly to each document, and four types of report were set up pertaining to each of four disciplines. The batch was loaded and run after popping the files to be included in the selection window - the result being vastly improved reports coded by discipline and levels of importance.

**LEGENDS AND LEGENDS FOR TAKE-OFF**

The new Legends feature is designed to give users a better understanding of PDF markups. Legends can be customised to show specific information from a drawing, linked to its properties held within a table, and more accessible for take-offs. Symbols can be displayed with basic descriptions or with additional information from the Markups list, including take-off quantities, markup status and more.

As Adam Della Monica of Turner Construction explained, by taking a plan-view of the foundations of a project Bluebeam allows users to add up different elements, such as the pieces of steel cast in with concrete and other components, highlighted with different colours for each markup. Legends also clarify annotations within PDFs, automatically updating the drawing, and its revision level, as annotations are added, deleted or...
modified - extended to cover or update properties on multiple legend reference sheets - an improvement over the old way of doing things, which relied on spreadsheets to keep a track of revisions. The versatility of the new Legends feature enables architects, using hyperlinks attached to legends, to keep track of and access individual items in documents hundreds of pages long. The same capabilities are just as useful for producing accurate punch, or snagging, workflows. Customising levels of detail to be either extensive or minimal enables users to set them up to reflect their specific purpose and then to add them to tools for re-use on other documents, retaining the same automatic updating capability.

**TAGS**

PDFs from any number of sources can be accumulated within sets for easier management, as they can be viewed as single documents within a single tab. Revu 2016 takes that further by enabling users to tag sheets by sheet number, sheet name, drawing date, revision number and other details. Once tagged, the information can be used to create sets, identifying drawing revisions, sheet types, disciplines and categories, using information already found in a document. Tagged information can even be used in order to generate complete drawing logs from sets, and to export drawing logs as Excel spreadsheets, with the ability to add hyperlinks, and to use standard Excel tools to select and organise columns at will. Looking at tabs, rather than tags, for a minute, Bluebeam has introduced a handy new feature that shows a preview of drawing whenever you hover your mouse over an open document tab. Part of this functionality also allows files to be opened in background mode, while working on another document.

**REVIT PLUG-IN**

The Revit plug-in section was covered by Sundt and Genssler, who used Bluebeam to punch-list a 65,000 seat stadium. Because of the size of the project, they split the stadium into quadrants, and used aRevit plug-in and Revit BIM tool to provide punch lists. They were assisted by the latest feature in the Revit plug-in, which gives users the ability to generate Spaces from Revit Rooms when creating PDF sheets and create markups directly in them. Users can also export Revit Rooms to area measurements, creating smarter PDFs that, besides facilitating the tracking of the location of all annotations, make area measurements easier and faster to calculate. According to Henry Lan of Sundt and Genssler, this is a huge, time-saving improvement. The 3D PDF tool has been enhanced, and can handle linked Revit models. It can also transfer colour and material properties across to the PDF document to improve the appearance of 3D models, including effects like greyscales, bricks and translucency. Bluebeam believes that PDFs can be a great format to communicate ideas to clients or to demonstrate design ideas to project teams. Bearing in mind that a typical Revit model size could be around 400Mb, a PDF version with materials included might be no more than 8 or 9Mb and, given the ability to toggle selections within the 3D PDF model, adjust visibility levels and so on, the different elements within a building - bricks, glazing - can be isolated and identified.

Other enhancements include Revu eXtreme's optical character recognition technology, OCR+, which has been updated to offer faster processing speeds and the ability to recognise vertical, as well as horizontal, scanned text. Three new alignment tools have also been added to enable markups to be placed with even greater precision, namely Align Center, Align Middle, and Center in Document. Users can also automatically place highlights on hyperlinks across multiple PDFs, then flatten or make hyperlinks visible without appearing on Markups lists, getting rid of the usual clutter associated with the practice. Additional enhancements include dynamic XFA support, bookmark export formatting, more annotations alignment options, as well as the first opportunity for side-by-side installation of Revu 2016 and Vu 2016 for Open Licence customers. The Bluebeam Mentor-Mentee relationship is an important feature of the software's development. As Bluebeam president and CEO Richard Lee explains: "Revu 2016 was developed through partnerships with our customers to help users push the boundaries of PDF navigation and reporting better than ever before. To showcase the value of these partnerships, we invited our customers to demonstrate Revu 2016, and we're happy they could help make it the best Measurements and Take-offs Revu launch ever."
# BIM Unbound

The recent Build New York Live awards recognised BIM Unlimited for Best use of Sustainability or Constructionability.

BIM Unlimited is one of the Build Earth Live events, held recently, and at which BIM Unlimited was honoured for Best Use of Sustainability and Constructionability. The virtual global design competition revolved around a site location in New York City and, like previous competitions such as Build London, Sydney and Qatar, participating teams had just 48 hours to publish their proposals to Asite’s Acodde cloud-based collaboration platform. A great idea that has had some inspiring outcomes, but I just hope that the word ‘Constructionability’ is an Americanism that won’t survive a transatlantic crossing. BIM Unlimited’s BIM manager for the event was Martyn Horne, whose task was to lead an international team in creating an innovative architecture within an organised and collaborative workflow. As you can imagine, the project - taking a Hudson Yards site in lower West Manhattan, and re-imagining it with a proposal for a 60-storey residential tower and a multisport community outreach arena adjacent to the High Line elevated urban park - was pretty demanding, and that’s even without the 48-hour deadline.

Team member and lead architect Ruben Hernandez Fontana and his team of architects at CAEDRO/Estudio Caribe were able to rise to the challenge, creating a sophisticated architectural concept with non-standard geometry, which is the rest of the multi-discipline project team was able to feed into its own BIM workflows.

**MULTI-DISCIPLINE BIM**

The intention of Horne’s team was to demonstrate a truly interoperable approach to BIM, incorporating the use of different technologies by a widely dispersed team using BIM processes. Users of the major disciplines within the team could employ their preferred software, specialising in the fields of architecture, structural design and analysis, MEP design and 4D construction scheduling, and were able to exchange their BIM models using IFCs. The team also welcomed the first time new members, including research students from the University of Tokyo and Tokyo University of Science with expertise in the area of external airflow, led by Yasin Idris.

Stressing the benefits achieved by embarking on such a project, the team’s BIM validation and analysis manager David Oliveira says: “The Build Earth Live events are a great example of what can be created in the short timeframe allowed when team disciplines work collaboratively and in parallel.” This sentiment was echoed by the judging panel, which commented on the impressive amount of detail that the BIM Unlimited team was able to present in the short time allowed.

**CHECKING OUT THE BRIEF**

New York’s City Planning Department provided the team with site data, which the team set about analysing - prompting a rapid response from lead architect Ruben Hernandez Fontana. He commented on the features that made it an ideal community space - the efficient connection between the three different areas of the project: the sport arena, the residential tower, and a pleasant spatial and visual connection with the High Line. He also pointed out the good accessibility to the metro stations, making it eminently suitable for future urban development.

In more detail, the 796,000 square feet area, together with the striking Hudson Yard Diagonals, provide a particular connection with the different contextual elements found in the Hudson Yard area. The most immediate is the visual and operative connection to High Line Park, maximising, at ground level, the use of the public spaces, and incorporating an elevated public and green space that connects the High Line Park, the view to the river and the team’s proposal for the Sport Arena + Residential tower - visually and spatially, the Residential tower is conceived as a flexible structure, supported by an external diagrid. The diagrid structure defines the composition of the facades, staying underexposed and covered by a Curtain Wall, which reflects only one of the directions of the diagrid. Cleverly, this defines an optic pattern that breaks the usual image of diagrid-designed structures (which were the main inspirations for this building) and changes the way a High Rise building is perceived.

The Sport Arena has been conceived as a horizontal building with a direct relationship with public spaces - a relationship that is found in other successful New York buildings, such as the Lever House at 5th Avenue. The Sport Arena, which comprises a multi-use sports hall for community use, complements the tower, whilst at the same time strengthening the project relationship with the ground-level public space and the river front.

Extending the concept even further, the top of the sports arena consists of a green and open space that complements the High line, but, at a higher level, producing different visuals of the site and the river. And, to combine both elements of the project, direct communication to the Residential tower has been provided, making it an ideal space for the residents of the project.

**BIM ELEMENTS**

The principal vehicle for the development of the project was Vectorworks Architect software, which was used to import SHP file geometry with embedded metadata to produce parametric visualisations of the ‘big data’ or GIS data, creating an effective communication tool for all disciplines and eradicated the need for trawling through
lists of tabulated data. A preliminary use of the data enabled an airflow analysis of the site, using Flow Designer to simulate wind patterns over the site and existing buildings employing local weather data.

Early concept modelling, testing alternative designs using a diagrid structure, combined with volume massing and the spatial layout of objects, allowed both the structural engineers (via Scia Engineer software) and the MEP engineers (via DDS-CAD) to begin working on IFC files exported out of Vectorworks Architect by the architectural team. Olivier was also able to carry out clash tests, evacuation escape route analyses and room accessibility tests at this early stage, using Solibri Model Checker.

The airflow analysis feedback from the massing studies provided by the University of Tokyo team led to the distinctive vertical louvered façade of the sports arena, the setback core of the ground floors of the residential tower and the appropriate placement of trees in the landscape design to create an informed solution for the reduction of prevailing wind velocity at the corner of the buildings.

Probably one of the most important features of such a short time-scaled competition is being able to present your project as attractively and informatively as possible, a task given to UK architect Jonathan Reeves and architectural technologist Samit Patel from Computers Unlimited. Using Vectorworks rendering application Renderworks, they were able to create a series of visuals that communicated and documented the constant refinement of the proposals as the project evolved. As Reeves explains: “I was able to federate the existing site buildings and engineers IFC models with the native Vectorworks Architect files and render them in a single solution.”

Synchro PRO was also used to create a schedule and a 4D animation demonstrating the construction sequence and timeline for the proposal. With the architecture and structure IFC files created separately by different teams, Shaohua Quan from Synchro Software was able to integrate these separate files into one model and bring 3D BIM to another level - 4D.

To complete the presentation - and the remarkable feat of co-ordinating a team located in vastly different time zones, which must have meant, for some, at least one sleepless night - a series of plans, sections and elevations were generated directly from the BIM within Vectorworks Architect.

From the viewpoint of Martyn Horne, the team's BIM manager: “BIM allowed the architectural team to interact with all the project disciplines, gaining genuine feedback, which allowed our team to create a more innovative and informed proposal. And, of course, it's in 3D, so it provided for the construction documentation in a shortened timeframe, which allowed us to hit the extremely challenging deadline.”

Build Earth Live events are stimulating competitions, enabling participants - both veterans and newcomers - to take away a lot from their involvement in the competition. Irrespective of their backgrounds, they will all find something they can take back to their workplaces. Martyn Horne told me that his team unanimously agreed they can't wait until the next Build Earth Live event - wherever it turns up in the world.

www.unlimited.co.uk
Tekla Structures 2016

Tekla Structures users were recently given a sneak preview of the features likely to be included in the upcoming release of Tekla Structures 2016.

Tekla, now part of the Trimble group, recently gave its users a sneak preview of what they should expect to find in the next version of Tekla Structures due out later this year. No guarantees, of course, but as most of the new features and enhancements derive from customer input, it might be churlish of them not to come up with the goods announced! The preview focused on a number of different areas, from the new user interface, through its enhanced organiser and modelling features, to more detailed CNC enhancements, drawings, Tekla Warehouse, and extensions to model sharing.

NEW, INTUITIVE USER INTERFACE
Intuitive is an oft-misused word when it comes to describing user interfaces. It should mean that the software leads you through processes in the way you would expect it to. Most intuitive UIs don't exactly come up with the goods, but Tekla's does, making it easy to change over from traditional UIs or learn the new one, if you are a newcomer to the software, and find rarely used commands quickly and easily.

That's thanks to a combination of features, starting with its new look, with larger icons and simpler layout, and its use of keyboard shortcuts and contextual toolbar. Most impressive, though, is the Quick Launch feature - found in the top right of the screen or invoked with Ctrl Q, which takes a couple of your input characters, and then searches commands, components, macros and warehouse content to bring up suggestions as to what you were looking for. It highlights where these can be found in the ribbon for future use or, as a last resort, draws up a list of commands for you to select the one you need. The new UI also allows users to customise keyboard shortcuts, adding commands together, and to check out existing shortcuts and possible conflicts between them - ideal for power users who want to fine-tune their productivity.

The contextual toolbar is another productivity gainer. Another customisable tool, this allows you to check and edit model content properties, where previously you would have used the properties dialogue boxes. You can use it to edit common properties and control property locations within the model - basically combining the functions of the mini toolbar and the property dialogue box in one simpler function.

ORGANISER
Tekla says that the Organiser tool has now become a much more powerful means for supporting workflows. One of the new features to come will be the ability to break down model categories into layers of sub-category groupings and to colourise these, based on object groups, property category and status. From this, object category and status information can be written to the model for collaboration within the same model or via IFCs to external users.

Categories are auto-filled from model content properties, which automatically synchronises, fetching information from all assemblies and phases, providing an overview of the model for planning purposes - or estimation, as this quick high-level model breakdown tool counts up instances of individual objects at any phase of the project.

Fabrication workflows are, perhaps, the best way to describe how the Organiser manages workflows. After setting up a category as fabrication status, assemblies requiring fabrication can be selected and dragged into successive fabrication status columns - in fabrication, 'ready to ship' etc. The next step is to select all assemblies and synchronise these to write UDAs to the model and to update values in the object browser. Once synchronised, the model view indicates groups coloured for easy identification of fabrication status - which is subsequently submitted to the Delivery Management Process. Users can set up and daisy chain processes from one inbox to the next, leveraging the Organiser and model to walk through both processes and workflows.

MODELLING
The enhancements to Modelling reflect requests from users and are quite specific. Hidden object snaps, for instance, have stopped snapping to the wrong hidden geometry, an annoying little quirk. Construction circle snaps have also been improved by enabling 'intersections of circle' and 'perpendicular to circle' snapping.

CNC EXPORT ENHANCEMENTS
The enhancements in CNC are all about making it easier to set up the export model for specific manufacturers’ machines and includes, in addition to hard stamp placement controls, access to advanced set-up options, additional output controls and the ability to customise DSTV headers - supported by an improved CNC log.

DRAWINGS
Some new, and some enhanced facilities have updated Drawings. Amongst the new is Drafter Configuration, requested by users, which will optimise the workflow involved in creating drawings. Drafter can produce drawings without having to interrupt drafting to number drawings.

There are also enhancement to drawing editing tools, which include, besides a list
Easier modelling and learning with new user interface

Utilising model information with Organiser

of standard details, the ability to use Rich Text, word-wrap and Excel input within drawings - providing, of course, access to many more fonts and font types. Enhancements also include new snap and dimension pull-outs and flexibility in the hatching of surfaces - all designed to make drawings more productive.

TEKLA WAREHOUSE

A principal feature of Tekla Structures is Tekla Warehouse - a free source of BIM standard and custom components and assemblies available to all users - and quite a bit more; applications, report templates, drawing and model set-up files, profiles and materials.

Tekla Structures 2016 will add even more assemblies to the list - Metal Framing, which helps users model pre-fabricated units, partition walls, ceilings, shaft walls and fairing panels. Users can choose typical profiles when they define walls and will be able to modify stud positions and bracing layouts or configure acoustic ceilings.

Transmission Towers have specific requirements as well, and Tekla Warehouse can be used to bring in templates to quickly design towers, selecting the required braces from a library of configurations.

Users are able to specify arm types, locate double braces, where required, both inside and outside legs, and - one of the latest components - install a tower base component with a fixing layout already defined.

The Warehouse can also supply all of the features of per-engineered buildings, quickly defining 3 plate beams with all of the correct outputs in place, picking up the right connections from the Warehouse library. And, like all of the above industry-specific steel structures, they come with all fabrication requirements in place.

EXTENSION MANAGEMENT

Tekla users are encouraged to make any useful extensions they have devised available to other users. Using the .TSEP (Tekla Structures Extension Package) both Tekla and externally supplied extensions to Tekla Structures are managed, informing users what extensions are available, what they do and how they can install - or remove - them. Extension management also enables corporations to set up and administer the extensions they have internally installed.

TEKLA MODEL SHARING

Remote teams working on the same model in globally dispersed locations can use Tekla Model Sharing to collaborate more effectively. Using low network bandwidth, only modified data is transmitted to update the model, optimising sharing by polling team members to detect packages due for input and alerting users when the line is clear for them to send in their own updates.

The actual process has also been greatly speeded up, and is now some 6 to 10 times faster. Additionally, you now have the opportunity to review changes from other users and, because some projects involve many disciplines and engineers producing reams of modifications, set up filters to drill down to identify areas of concern that require their input.

PRODUCTIVITY

Promised for Tekla Structures 2016, then, are a number of features that are designed to improve productivity, either by making the user interface easier and quicker to handle or by updating features that had previously caused more frustration than errors. Plenty to look forward to then!

www.tekla.com/uk
Autodesk has announced the expanded distribution of A360 Collaboration for Revit, a service that works with Revit software to connect project teams with centralised access to BIM project data in the Cloud. It allows teams to stay connected in real time, using a Communicator chat tool within models. Integrated with Autodesk A360, Collaboration for Revit enables the entire project team to work in shared building information models.

Project teams are now able to overcome the barriers of corporate firewalls and physical location by enabling centralised access to Revit. Now, instead of having to use FTP sites to share models and software or resort to other workarounds to collaborate, team members in all disciplines, from multiple firms or sites worldwide, can access and work on models hosted in the cloud. A360 Collaboration for Revit provides significant benefits that are amplified for global building project teams.

Initially the firm checked out faster network appliances to speed up data flow across WANs, but found that they were expensive and would require ongoing investment. Other workarounds were suggested, including establishing a VPN connection between the design firms and a virtual desktop for Revit software. This required additional hardware, more powerful graphics cards, increased bandwidth and extra software licences/subscriptions for the firm hosting the Revit central file.

Jeff Cap, director of IT at Newman Architects, comments: “Beyond the access and security risks caused by such an arrangement, the host company would have to shoulder a significant IT burden, in terms of cost and support.”

The firm need a scalable solution that would not pose an unacceptable load on its own IT resources and that would satisfy the financial constraints of management. That solution was A360 Collaboration for Revit, which it started using as soon as it was available in 2014. The immediate reaction to the software was amazing. “Our jaws dropped when we first tested the activity.”
service,” states Gonzales. “We could open or save our work to a Revit central file in the cloud in virtually the same amount of time as it does on our local area network.”

This was confirmed by Cap, who says: “Partners and consultants can now access Revit projects as if they’re sitting in our office, but without the risk of accessing our internal network and without the cost of additional hardware or Revit software licences.”

He expands on that further. “External team members and project contributors who do not use or have access to Revit software can view, search and socially interact on models, discuss challenges and successes, and stay current with project activities. This is ideal for building owners or others who want to have visibility to the project status, but don’t need full access.”

A360 Collaboration for Revit has other benefits, including the reduced need for in-person meetings or colocation of teams, helping companies to lower travel expenses and providing a better work-life balance for project team members.

Physical distribution of teams enabled by Collaboration for Revit can also relieve the requirement for office space for all project team members.

Finally, with location no longer a limiting factor, project leaders have more options for accessing people with the right skill set for a project, resulting in better allocation of team resources.

A principal feature of the cloud-based software is Communicator for Revit, a chat tool that enables project team members to communicate directly with each other, in real-time, within the project models. It means a designer in any location can chat with other team members and attach files, images or Revit screen captures. Teams may not be sitting together, but they’re connected better than ever before. Using real-time chat within project models helps designers not only to stay in touch, but also to know instantaneously who is working in the model and what they are doing.

“Communicator makes it easy for our designers to collaborate and communicate with each other, and without leaving their design environment,” says Kal Houhou, director of technology at Martinez + Johnson Architecture, another early adopter of the software. “They don’t have to open their email or pick up the phone. They can stay engaged in their design environment and the design process.”

Martinez + Johnson specialises in the restoration and adaptive re-use of historic structures and performing arts venues in New York City, and Washington DC (a current project involves modernisation of the Martin Luther King Jr. Memorial Library).

The firm, which also uses Revit as its primary design tool, works on joint ventures with other design firms using Revit. Like Newman Architects, the firm had a lot of experience with WAN optimisation, acceleration and other virtualisation process providing shared access to Revit models, but found that it required additional software, costly hardware, and a substantial IT commitment for implementation and ongoing management.

They also found project communication based on these solutions occurred outside the main design environment, using Skype, email or instant messaging - thereby disrupting design work. These workarounds also posed security risks when design partners were accessing internal networks and servers.

Investigating cloud services from mid-2014, Martinez + Johnson became one of the first A360 Collaboration for Revit users, as soon as it became available.

“Collaboration for Revit was like a dream come true,” recalls Houhou. “As soon as we began using it, we knew it was going to revolutionise our collaborative design process.”

COLLABORATION FOR REVIT IN OPERATION

Like all cloud services, Collaboration for Revit requires no installation or maintenance. It is built on and tightly integrated with Autodesk A360’s project collaboration platform, which facilitates the sharing and viewing of data by project teams. “Setting it all up was very straightforward,” says Houhou. “You simply had to download and install a Revit plug-in. It only took 30 minutes to train a dozen designers on how to access the Revit project information, and how to collaborate and communicate from within the Revit environment.”

One year into the use of the software, the feedback from designers is still as positive. “The most common words we hear from our designers are ‘flexible’ and ‘user-friendly,’” comments Houhou, adding that using the cloud to collaborate on Revit projects is “no longer on our wish list - instead it’s just how we work.”

www.autodesk.com
Anyone with a PS4, Xbox One or souped-up gaming PC will attest, the videogame industry is now also the driving force behind some major innovations in software aimed at architects and designers, most notably when it comes to high quality, real-time animation and visualisation.

You don’t even need the multi-processed, advanced graphic card-running PC beasts that you might use to run something like The Witcher 3 on full settings either, as the average workstation running the latest Windows OS is more than adequate to get the best out of Twinmotion, Abvent’s current animation and visualisation application available as a plug-in for ARCHICAD. Abvent are the developers of Artlantis, which has been around for some time in the industry.

In fact, it’s probably the current evolution of hardware that allows the software to do in real time what was previously only achievable after much offline processing in some remote render farm.

Twinmotion provides ARCHICAD users with the ability to deliver high quality animation and visualisation in real time, says David Chadwick

TWINMOTION FEATURES
Any effect that you want to display in Twinmotion 2016 can be carried out while you are sitting in front of your client. If they make any suggestions regarding the design and the content, you can incorporate them immediately and demonstrate the results. If the client wants to see what their project would look like in winter or in the middle of the night, then a couple of clicks would be sufficient to show them.

The ability to do this is now vastly improved with the introduction of BIMmotion to Twinmotion 2016, a free, self-executable file - in both mono or stereoscopic modes - that includes both the project model and the Twinmotion engine. Clients and partners can view the model on their own computers and change perspectives, follow animations, move freely in 3D or follow a predefined path and access project alternatives.

You can even include Project Phasing with your BIMmotion files, which then enables you to set up the project as it progresses, enabling you to look at it at various stages of its evolution.

CREATING MODELS
The game analogies are very apt, as models in Twinmotion are manipulated directly, as you would in a 3D game engine, choosing how you move and allowing you to walk, drive, fly or proceed step-by-step through the immersive ‘walkthrough’. A chronological tab keeps track of all stages, and you can build the scene by taking any viewpoint in both perspective and orthographic views. The Object Manager provides advanced features to customise workspaces further.

Twinmotion can import many model types directly (FBX, DWG, DAE, SKP, C4D, LI3), and merge multiple Twinmotion projects or other formats in a single scene. Imported files can be updated at any time, while keeping your modifications and materials. Images and videos can likewise be imported in DDS, PNG, PSD, JPG and TGA formats, or as...
MP4, AVI, OGV, WMV, FLV, MOV, DIVX, MPG, and MPEG files.

THE LIE OF THE LAND
All Twinmotion projects start with the laying out of the terrain, usually imported as a 3D mesh or from a point cloud, which are then automatically converted to a Twinmotion landscape. Alternatively you can opt for something from the Twinmotion terrain library, which can be edited, sculpted, painted (pushing and pulling the surface to create hills and hollows, and painting the result with different materials, such as rocks, sand) - and vegetated at will.

All library components have also been updated in Twinmotion 2016, with additions that include cyclists, cranes, boats, wind turbines and even fountains. There's nothing like a bit of atmosphere for adding verisimilitude, and Twinmotion also allows you to add clouds, fog, rain or snow, and wind - as well as its impact on vegetation. These choices are previewed in an adjacent window. Surfaces can also be 'flooded' to create ocean colours, reflections, and the size and type of waves. You can also play around with sun settings to reflect location and time of day or night - and also allows UV scales, opacity and halo effects, and illumination and brightness to be adjusted. Bump mapping adds further realism to materials.

Intelligent, animated vegetation can be added singly or as complete forests, using broad strokes of the brush tool. For variety, you can also adjust tree species, sizes and densities and animate them to react to the seasons and wind.

A selection of animated people can also be placed in scenes and propelled along Bezier-defined paths, with characters dressed in professional or casual gear as befits the scene. Cars and other transport can be placed to run along similarly defined roads, created using a few clicks, and the speed and density of traffic can be individually adjusted, even on different sections of a multi-lane highway. With the new addition of cyclists to the library, I suppose it’s only a matter of time before skateboarders are also added.

Different light effects can be added to illuminate day or night-time scenes - spot, level or multi-directional - or users can import and use their own IES files.

VISUAL EFFECTS
Twinmotion is as much about enhancing reality as it is about the creation of lifelike scenes in real time. And reality is not always enhanced purely by creating photographic copies - ask any artist. Twinmotion therefore allows users to get creative with set camera settings, choosing focal, vignette and other lens deviations or by choosing one of 29 types of colours to transform scenes - using the filters to produce 'white models', black and white’ or even Sketch effects.

The tools available with the camera editor allow users to choose the scene or frames that make up animations, or to display the project’s construction phases along specified time lines, and to fine-tune each of the clips to get the best results out of the scenic environment, visual effects, lens parameters, ratios and resolutions.

EXPORTING MODELS
It’s quick and easy to export scenarios at high resolutions in either MP3 and WMV (H.264) formats or even as stereo 3D videos. Images are exported as PNG files.

ENHANCED PERFORMANCE
I mentioned earlier the advances that allow scenarios to be set up and modified in real time. To get more specific, the calculation time and display of images and videos is 2% faster, while real time views are 200% faster, with the new, lower display quality available in draft mode. Users are not constrained to the keyboard and mouse either, as both Twinmotion and BIMmotion can be used with Xbox 360, Xbox One and PS4 controllers as well as Thrustmaster and Logitech joysticks.

www.abvent.com
www.graphisoft.com
Without prior knowledge of Building Information Modelling (BIM) - other than knowing the BIM Level 2 mandate is smack-bang around the corner - understanding what BIM really is can be truly perplexing.

A wealth of information exists, from software vendors, task groups and official organisations, that makes truly understanding what BIM actually is, its purpose and whether you’re compliant, completely baffling.

Does the B in BIM refer to ‘building’ as a noun or a verb? Should the M mean Modelling or Management? What exactly is BIM Level 2 (or even Level 2 BIM)? What exactly does meeting the mandate involve? You could, of course, look towards the accreditations bodies (of which there are now at least four) to provide a definitive answer - and, so long as you get your certification, then you’re doing it right, right?

Unfortunately, the accreditation bodies themselves can’t agree exactly as to what BIM Level 2 is, so what chance has everyone else got?

IFC VERSUS COBIE
Compare two of the major BIM Level 2 Accreditation bodies; one states you must be able to output a data drop in the form of COBie and the other states this must be done in an Open Format, such as COBie or IFC. If you have a choice then, which should you use? The answer must be the one that gives you, your business, the supply chain and the Asset owner/operator the most benefit surely? To understand better, we’ll explore the life of the model.

THE BIM IS BORN
At GroupBC, we understood the importance of IFC data files from day one. IFC files underpin everything we do as a BIM software vendor and, along with those who also put IFC at the forefront of BIM, we know that it supports design, build and operation through the International standard for interoperability (ISO 16739:2013).

FEDERATION AND CLASH AVOIDANCE
It’s this interoperability that allows a building information model to begin life, using data that has been provided by many different specialist modelling tools as IFCs. These are combined (federated) inside a Common Data Environment (CDE). The CDE will subsequently analyse the model for clashes. Any detected are reported, workflows are issued to authors of the offending model and required fixes then applied.

SHOULD CHANGES BE MADE TO THE IFC DIRECTLY?
Changes should only be made in the originating specialist application, as such software will carry out specialist functions to ensure the integrity of the model, such as specialist structural calculations. Moreover, if, through coordination, conflicts are discovered or data is found to be invalid, changes should only be made to the original, else these conflicts will persist through all subsequent revisions and wasteful conflict resolution will be required every time - hardly giving us the benefits of BIM! When federated in a CDE, IFCs provide us with invaluable insight, such as what the combined model would look like, if built there and then, and ensure that the models are
accessibility to all project members without the need for users to purchase and install heavy-duty 3D visualisation and clash detection software.

Once the changes are made in the specialist application, the revised model should be resubmitted to the CDE (together with its corresponding IFC) and the process rerun until all key stakeholders are satisfied that the design is clash free and meeting the client's brief.

At GroupBC, we also place the embryonic model in a GeoBIM environment for optimisation purposes.

**BUT WHAT ABOUT DATA DROPS?**
A key aspect of BIM Level 2 is the periodic delivery of (gradually developing) information to the client as ‘data drops’. Data drops demand a combination of native/original files, documents (PDF sections and elevations) and data. For the latter, our recommendation is to provide a snapshot of the IFC (which, after all, contains geometry, data and documents interlinked). A COBie could be cut from the embedded IFC data, if required.

**THE BIM NEEDS FEEDING**
Once modelling is complete, it’s time to procure and build. The model needs feeding with information and lots of it as well. Without it, it’s not a building information model and it definitely won’t grow into one.

**WHERE DOES THE INFORMATION COME FROM?**
Everyone involved in pre-tendering, tendering, procurement, construction, installation and so on is invited/required to deliver information (typically both data and documents) directly to the model via the CDE. This information is connected to objects in the federated IFC.

**THE SEMANTIC WEB AND TRUSTING DATA ACCURACY**
Past performance, reputation and warranties in the contract go so far, but, nonetheless, manual errors are all too common. Data validation systems can test that data has been entered in the correct format and contains the required digits etc, but this will never eradicate errors.

However, using Semantic Web technologies to link directly to manufacturers’ data would remove errors created by the middle man. This would give the model a healthy, nutritiously rich diet of information and is a key part of GroupBC’s ‘Semantic BIM’.

Once the asset is fully built and the model is fully fed, handover can be as simple as handing over a set of keys to the physical building, and a username, password and web address to their new digital asset.

**THE BIM FLEES THE NEST**
The model has been given the best possible start in life and is ready to stand on its own two feet.

The fully populated BIM now contains everything that asset owners, facility managers and operations require to manage the asset successfully - combined geometry, data and documents - which can then be queried virtually from the model or instantly and directly by scanning the physical asset’s QR code.

At GroupBC, we then take information management to yet another level. Using Semantic Web techniques, we connect data from both external sources and existing assets in a portfolio to the new asset.

And, where these existing assets may lack modern information models, we use RetroBIM techniques, in order to help build them up.

**IS THE SEMANTIC WEB THE KEY TO BIM MATURITY?**
We believe it is. Linked data (or connected data) holds the key to many of the AECO industry’s existing pain-points. We’ve used it to enable our customers to connect and update data and make external, yet highly relevant, data available to all models, in real time, alongside existing asset information in the IFC. Semantic data connections allow the building of the digital information model to be enriched and to mature into adulthood. This could be with manufacturers’ data sets, Highways England traffic data, Ordnance Survey geospatial data, MET office data, EA’s flood data or Land Registry land ownership data.

**THE COBIE FACTOR**
But what about COBie for BIM Level 2 compliance? If COBie is part of what you’ve agreed to deliver, then use it. But if COBie is, as we are told, just a subset of IFC, then the full IFC, rich in both data and geometry, gives customers much more benefit.

COBie was designed to organise information about new and existing built assets, to simplify data across all stages of their lifecycle and to enable the data to be standardised for understanding across software platforms easily. However, COBie does not transfer or integrate with any detailed geometry in the information model. Using IFC as the foundation for digital information delivery does. And that’s why we support, use and work with IFC to create living, breathing, building information models for true asset lifecycle management.

There is a significant amount of investment being made into IFCs, especially in Europe. So, while it may not offer the perfect round trip from a native file and back again today (what Open Format does and is this actually required?). they add tremendous value, save significant costs, engage the whole team and survive through the three key stages of a model.

Used correctly, IFCs have a significant part to play in BIM and we believe they can only continue to do so.

www.groupbc.com
The force waiting to be unleashed

thinkBIM believes it’s high time to deal with the elephant in the room: the skills shortage.

As I write this article, we are only one day away from the Level 2 2016 BIM mandate and whilst the focus has been on compliance, case studies and the successes and failures of BIM-enabled projects, we at thinkBIM think it’s high time we addressed the elephant in the room - the skills shortage.

The skills shortage in construction has been widely reported by much of our media and with good reason. It has been predicted that the industry will create around 190,000 new jobs by the end of 2018, but there is a growing fear that there will not be the talent within the country to fill them. The lack of new industry entrants, along with a growing gap between older and newer construction generations, has been compounded by an exodus of talented professionals to post-recession growth markets, such as Asia and the Middle East. Here at thinkBIM, we are aware of some fabulous organisations that are trying to redress the balance by attracting young people into our industry (G4C and the impressive Class of Your Own, to name but two) but what are we doing to attract older and experienced workers into the industry? What are we doing about giving our existing workforce the tools to meet these demands?

From 1 April 2016, all centrally funded projects will need to be undertaken using Building Information Modelling (BIM) to the full level 2 standard. In order to be ‘BIM ready’, companies will not only need to develop new processes, systems, but their employers will require skills and knowledge of digital technologies that many of them simply don’t have yet. Yes, there is the option to recruit, bring experienced BIM professionals in to help train and upskill the workforce during the transition, but we believe it is the responsibility of employers to invest in training their workforce and thereby future-proof the industry, equipping the organisation with the skills to be truly collaborative and competitive.

Recruitment is just one strategy and, with trained BIM professionals services in high demand, it is always a risky strategy to rely on being able to hire in the skills you need. With that in mind, thinkBIM has developed a suite of CITB and NCC approved courses to bring your employees up to speed.

INTRODUCTION TO BIM HALF-DAY COURSE

Our popular half-day course provides an overview of Building Information Modelling, presents drivers, needs and benefits of BIM, as well as doing an early diagnostic for your organisation, in order to help identify opportunities and risks. The workshop covers:

- The key topics surrounding BIM and the benefits to be gained from its adoption
- BIM technology
- The impact of using BIM and how to progress with it in your working practices
- How to review your current and future position in relation to BIM
- The software tools available to the construction industry
- How to start using BIM on projects.

thinkBIM has so far delivered introduction to BIM sessions to over 450 people representing 150 different organisations.

BIM FOUNDATION COURSE

A nine-module course; delivered over a day, aimed at all, but principally suitable for Site Operatives and Site Managers who don’t currently have an existing route to training through a professional body (ie, ICE, CIOB etc) and who are required to work on BIM enabled projects. This course covers the following topics:

- Overview and Introduction to BIM
- BIM across the life cycle of a Project
- Documents and Standards
- Soft Landings
- Roles and Responsibilities
- Context
- Barriers to BIM
- Managing Data
- Security and Legal Issues

BIM PRACTITIONER COURSE

Our 3-day blended learning BIM Practitioner course is designed for BIM Champions and/or BIM Managers who are required to have in-depth knowledge of all aspects of BIM and how to implement processes for it to be used on projects. This course addresses the following aspects;

Day 1: This session will introduce BIM and Collaborative working, whole life approach, soft landings, BIM in the global context, documentation and standards, barriers to BIM adoption, the value of high quality data and vulnerability issues.

Day 2: This session will focus upon the development of your understanding of the implications and value proposition of the introduction, and use of BIM within your organisation.

Day 3: This session will focus upon the supply chain and BIM implementation.

The learning activities across the course include a mix of self-study, face-to-face seminar and reflective practice.

For any information about these courses or information about how thinkBIM can help you train your employees, please contact Liz Schofield on 0113 812 1902 or by email to: e.a.schofield@leedsbeckett.ac.uk
In the hands of Tekla users, architect’s drawings evolve into constructable 3D models, that develop into real buildings. That’s made possible by Tekla software and Trimble.

**Together we are shaping a smarter future for construction.**

Join the evolution.
[tekla.com/evolution](http://tekla.com/evolution)

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Aki Luntamo
BIM Master, Sweco
Tekla BIM Awards 2015 winner
It's been a while since I used SketchUp. I drifted away after Google took it over, but, now that it is part of the Trimble line-up, it has become interesting again, with some new features to play around with. It's still a fun product to use - simple to learn and extremely flexible - but has grown in maturity to become a serious tool for building design with some major development projects being undertaken entirely within its scope.

SketchUp, as I am sure everyone knows, is a highly modifiable 3D modelling tool. Drawn shapes are extruded to create 3D volumes combined with, or extracted from, other volumes, to build up complex structures. What prevents all of this free-form modelling from being an uncontrollable volume floating in 3D space is the core feature of the software, inferencing, the positioning of a figure in a defined space, initiated by that bit of inspired content - the figure standing on the x,y,z axis. This is what orients SketchUp geometry, its tools, and you as the architect, in 3D space.

**INFERENCING UPDATES**

The latest SketchUp release has added some new functionality to the inferencing engine. Most useful is probably the display of parallel and perpendicular inferences, which can be forced and locked, using the Down Arrow key. The Shift key can also be used as an inference lock where you may want to use a SketchUp tool, including parallel and perpendicular. The number of tools that can be used with Arrow key locking has been increased, used to toggle on or off an axis lock. Drawing facilities in 3D are enhanced with smart centre-pointing for circles and arcs: useful changes that may quickly become part of how you draw in 3D. Enhancing inferencing logic has also greatly expanded the options that are available within tools such as Circle and Rotate.

The benefit of all this enhanced logic is that you don't have to create as much reference or construction geometry as you previously had to - things like using guides or edges to position the centre of protractors for the rotate tool. But with SketchUp 2016 you merely have to lock the protractor orientation to a surface orientation with the Down Arrow key.
then find the intersection of two edges for placing the protractor centre.

**FORGET INFERENCING**
While the inferencing improvements are great, they don’t necessarily change the way you are used to modelling in SketchUp. They’re handy, but not intrusive. For instance, as even SketchUp itself claims, “You can draw edges and faces without all the ins and outs of inferencing. You can create geometry without creating groups.”

You can also make copies, but not components, and set styles without having to get involved in unnecessary style configurations. Likewise, it’s possible to export images without using LayOut. In fact, you can use SketchUp the way you want, without getting lost in the weeds (its terminology, again!).

**WORKING WITH COMPONENTS**
Why use Components and LayOut, then? Components can speed up model creation, if you need to insert numerous instances of a single object - windows, for instance. Transforming geometry into a component, either within the model you are working on or in a separate SketchUp file, endows it with behaviours and capabilities, and separates it from any geometry to which it is connected. Components are therefore reusable and can be edited within the model or within its definition file. You can also add metadata to a component, such as IFC classification types.

**LAYOUT**
Something I never had in the last SketchUp version I owned (a much older one) before I downloaded SketchUp Pro 2016 is the LayOut, which enables users to lay out elevations, highlight details and set up title blocks, and to insert SketchUp model views alongside them, creating Viewports linked to the model. When a model changes, all viewports are updated too.

As well as managing the creation of drawing sheets with multiple layers, LayOut helps to eliminate some ambiguities that could occur in laying models out. Amongst the organisation improvements made by SketchUp to LayOut are multi-layer groups, where entities on different layers can be grouped together, instead of (as earlier) collapsing grouped entities on different layers into one single layer.

Another significant enhancement is the introduction of new tool colours, and highlights helps you notice when you’re creating or selecting entities on a shared layer. The benefits of all this are easier cutting and pasting across pages, the organisation of groups of entities and the ability to keep track of where things are.

SketchUp has also introduced a new API, so that designers can now create and customise layout files from SketchUp models. Likewise, LayOut’s reference objects have become web friendly, enabling projects to reference and update files stored and synced with services such as Dropbox, Google Drive and Trimble Connect Sync.

Sticking with LayOut, the dimension system has been improved to handle smaller dimensions. Dimensions in small spaces tended to get squeezed by arrows and extension lines. Now, when dimension text is deemed to be too big for the space available, LayOut shifts the text out to the side with a leader line that you can customise it at will. (Actually, you can already create dimension chains using a double-click technique).

**UTILITY DIALOGUES**
Tidying up the appearance of the screen layout appears to have been another focus of SketchUp 2016. You can now use the utility dialogues on Windows machines to pull supplemental menus, such as Styles, Materials and Outliner, into customisable, collapsible trays - while still retaining their ability to float, if you want them to. Dialogues that you might want to group together can be grouped into trays. Designating a custom ‘Model Organisation’ tray, for instance, for Entity Info, Layers and Scenes, which is useful for calling up and hiding go-to utilities, and readily accessible when not actually in use.

The work done by SketchUp in developing LayOut had a spin-off: the foundation for a new C API which will open a new chapter of extensibility for LayOut, enabling SketchUp users to share their add-ons and their custom enhancements with the whole SketchUp community, which is already well-served with the wealth of contributions found in SketchUp’s 3D Warehouse.

**SKETCHUP COLLABORATION**
From humble beginnings as a concept design tool to becoming an important building design application, SketchUp is no longer the province of the lone architect, and model development is now very much a shared process. To facilitate this, SketchUp has continued to make the software work better with people, information and tools, both inside and outside of the SketchUp environment.

When you export information from a .skp, users now have more control of what data is included and how it’s organised. To facilitate this, the generate report tool lets users pick just those attributes they would like in takeoffs and estimates. The custom reports generated can be saved as templates and used with other projects.

**TRIMBLE CONNECT**
Last year, thanks to its new ownership, SketchUp was also able to announce the availability of Trimble Connect, a new way to collaborate on projects to store, sync, reference, share and collaborate on design/build projects, using a number of different file formats, such as .skp, .pdf, .dxf, .ifc… whichever you prefer to work with.

Now Trimble Connect is available to all SketchUp Pro users, who can sign up for a free account that will enable them to start publishing to shared project folders, import reference models from Connect into projects and publish updated models directly from SketchUp. SketchUp files can then be managed directly from a browser: it’s a useful tool that allows users to compare versions, annotate models, create to-dos and a whole lot more.
CASE study

A Signal Improvement

Hatch Mott MacDonald Enhances Collaboration and Reduces Risk during Rail Signal Design using Bentley Promis.e’s 3D Modelling Capabilities

Global consulting engineering firm Hatch Mott MacDonald had used a conventional CAD-based system to design rail signal systems when serving its public and private clients around the world. However, this approach had serious limitations in an industry where building information modelling (BIM) and the processes and standards that define it are becoming a critical success factor. Traditional methods mean designs have no added intelligence or connections to related documents, including bills of material (BOM). Designers have no way to model their work in 3D or collaborate on designs, which slows down projects unnecessarily and makes adherence to the required standards a challenge.

As part of a wider BIM initiative, Hatch Mott MacDonald’s management chose to invest in a new system - powered by Bentley software - that introduced the required intelligence into the rail signal design process, significantly reducing design time and effort, improving accuracy, enabling collaboration and driving standardisation.

HITTING THE LIMITS OF TRADITIONAL DESIGN PROCESSES

Traditionally, signal designers at Hatch Mott MacDonald have used an in-house design workflow. While trusted and proven, procedures are manual, time-consuming and tedious, and there are no automated controls to ensure the latest versions of CAD elements are used. In addition, design checking involves significant manual effort; everyone works sequentially, and there is little collaboration.

“3D design automation and the use of intelligent metadata within the design process is becoming the norm in many industries, including rail,” explains Hatch Mott MacDonald signal designer/Promis.e® administrator Robert Henderson, C.Tech. “In order for Hatch Mott MacDonald to maintain its competitive edge, we understood that we must leverage industry best practice and the latest technology.”

To stay ahead of the competition and meet the required Institute of Electrical and Electronics Engineers (IEEE) and International Electrotechnical Commission (IEC) standards, Hatch Mott MacDonald invested time to create a single database for project data and owner catalogues. Henderson adds, “Promis.e has a comprehensive database and client catalogue system for electrical disciplines, but our rail signals database had to be tailored to each railway’s independent standards for CAD and design.”

HARNESSING THE LATEST TECHNOLOGIES

Using a combination of solutions from Bentley, Hatch Mott MacDonald works with intelligent 3D models linked directly to the electrical schematics required for signal design, costing and construction. The new system includes functionality to automate the creation of project workflows via templates that will also streamline basic checking processes.

Leveraging the combined capabilities of Promis.e, Bentley Navigator, and ProjectWise®, Hatch Mott MacDonald will operationalise its intelligent system for rail signal design as follows:

- **Content building** - Using the Promis.e for Rail Signaling database, design teams can create schematic symbols that link directly to project databases and 3D layouts.
- **Project building** - Through an application programming interface (API), custom template scripts drive individual client standards, equipment selection, tag generation, schematic creation and layout generation. As a result, designers simply input basic client and location information to arrive at an accurate, preliminary design that’s about 75 per cent complete. The solution also ensures that owner-specific content created in the first step ripples through and is correctly used at every stage of the process.
- **Engineering design considerations** - Promis.e features automated checking tools that can be triggered by the designer. The system will perform a series of electrical circuit checks, verifying that users have not over-assigned the equipment’s electrical contacts and ensuring that all tags have been generated. The rules that Promis.e’s engineering design considerations are based on are integrated with the existing Hatch Mott MacDonald Quality Environment and Safety (QES) standards.
- **SQL Server and ProjectWise integration and roll-out** - A significant element of the system is its integration with ProjectWise, enabling the sharing of project drawings. Multiple users can access the Promis.e project database, the ‘single source of truth,’ through the SQL Server located at Hatch Mott MacDonald’s corporate headquarters.

March/April 2016
SUPPORTING A WHOLE NEW WAY OF WORKING
Bentley’s Promis.e adds intelligence into the Hatch Mott MacDonald’s design process using 2D schematics and 3D models, ensuring that designs conform to client standards as they progress.

“As Promis.e users draw wires, they automatically populate databases with information that the software uses downstream in the design process. Users create wire tags and cable schedules without realising it,” says Henderson.

The system allows designers to leverage information mobility to develop all client deliverables and, as a result, Hatch Mott MacDonald designs hold an abundance of information never before seen in rail signal design. With each component placed into a drawing, a bill of material is created automatically, along with associated project estimates and updated budgets.

The solution significantly reduces design time, improves accuracy, and enables both collaboration and standardisation across projects.

BIM METHODOLOGY DELIVERS DOWNSTREAM VALUE
The BIM methodology also provides the potential for information gathered during the planning and design phase to feed and combine with additional project and asset data collected during construction, and deliver greater value downstream. Spatial and contextual information that might include design codes used and current legislation can be used during construction to accurately define and record what has been built on site and therefore requires maintenance into the future.

REALISING THE BENEFITS
Hatch Mott MacDonald has started to see a return on investment, in terms of quality, flexibility and interdisciplinary operability.

“Using this technology will allow us to drive our already very-high level of quality to a level that just can’t be matched,” states Henderson. “We can also react to scope and design changes with relative ease, and to a degree not seen anywhere else in this industry.”

Hatch Mott MacDonald expects a 50 per cent reduction in time spent on the first level of its design workflow, which will translate into a 20 per cent cost reduction at modular design locations. Modular designs typically account for approximately 80 per cent of the overall design plan sets on a given project.

The automation tools apply site-specific information and equipment, virtually eliminating the human error factor associated with the repetitive work within standard CAD template. Henderson commented that “an additional 25 per cent reduction in design checking time during the second level of the design process is expected, which will translate into a 28 per cent cost reduction. Add in the time saved by automating a project’s BOM and, given that a large signalling project could include up to 200 design locations, the potential overall cost reduction of up to 35 per cent per rail signal design location is significant.”

Hatch Mott MacDonald also explored the use of Bentley Navigator, Navigator Mobile and ProjectWise Worksite within the team to review, analyse and communicate its designs through i-models. Project stakeholders can use i-models to share information across the team securely and accurately.

RANGE OF BENEFITS
As well as enabling greater project insight, the use of integrated apps allows Hatch Mott MacDonald to further demonstrate the value of its innovative offering to existing and potential clients using iPads for fieldwork, along with the potential for new or non-traditional deliverables.

Hatch Mott MacDonald’s practice leader rail and transit, Nathan Higgins, P Eng, PE, PMP, says: “Bentley’s Promis.e has enabled Hatch Mott MacDonald to make a paradigm shift in design methodology, thereby saving owners time and money, while providing innovative services and ensuring quality.” In addition, by integrating rail signal designs with the 3D civil engineering design models, the company can achieve its goal of moving toward a multi-disciplinary design process in a 3D framework - and ultimately to a 5D framework that incorporates time and cost.
A team was set up by Atkins and O’Rourke to explore the processes involved in the Government’s ‘Digitising the Railways’ project to ascertain the benefits of working in a BIM environment.

As part of the Government’s innovative digitisation of the UK’s rail industry, started two years ago, Innovate UK co-funded a research programme, together with RSSB (the Rail Safety and Standards Board), and led by Laing O’Rourke, with partners Atkins, DHP11 and Imperial College. This was to show how they could improve all of the processes involved in the lifecycle of the digitisation project: from survey, design and manufacture, through to construction and operations, using all of the benefits of BIM.

At first sight, this appears to be a straightforward project, but, on closer inspection, improving just this part of the rail infrastructure involves a wide range of engineering disciplines, and not just mechanical and software engineering, using different CAD applications. All infrastructure elements are involved in rail projects, including the electrification project - the line itself, electricity supply, associated buildings, bridges, tunnels and, because of this, use Bentley’s Microstation to handle the overall design - Bentley being foremost amongst infrastructure software developers. Also, SolidWorks is used by Laing O’Rourke to detail the gantries down to nuts and bolts. To provide overall management of the project, the data is then fed into Project Management software - in this case, Bentley’s Projectwise.

To enable them to come up with a solution to the problem, Atkins and Laing O’Rourke proposed the Digitally Enabling Electrification project, partnering with software specialists DHP11 and Imperial College to ensure that the full range of skills was brought on board. The work is designed to help deliver the Government’s BIM Strategy and become a key component of Network Rail’s Digital Railway. It will also be of interest to a range of people in the wider BIM, engineering, information management and construction arenas.

The intention of the team is to pass on knowledge learned to all contractors involved in the digital electrification project. It involves looking at current processes which involve the creation of PDFs that outline the different elements...
in the electrification process and are then used to manually update each project member’s own models - hardly state-of-the-art - and coming up with a more efficient data exchange system to handle the complex interactions between each of the disciplines.

A significant part of the process was the development of a standard form of information exchange to allow a Rapid Data Transfer process between stakeholders. This enables accurate manufacture, off site pre-assembly, rapid installation and finally effective asset management of the overhead line system. The priority, therefore, was to define an open standard that allows any designer, manufacturer and constructor to share data.

**INFORMATION EXCHANGE**

Basing this upon the government BIM leadership, a workflow was proposed for the Electrification lifecycle that takes advantage of digital capability and standards set by BS/PAS1192, further enhanced by extending the Common Data Environment for design & deliverable management systems, such as Cabinet & Projectwise, into Product Life Cycle (PLM) systems for manufacture and construction.

**A TRIAL PROJECT**

To demonstrate how immediate benefit might be delivered to the industry, the team trialled potential techniques in a real railway environment, using an urgent ongoing problem as its basis. This was done by assessing the state of the art in a wide range of survey technologies to quickly and accurately pinpoint the location of an installed foundation, and using that information to resolve a costly and time-consuming problem.

Part of the Great Western Rail network was chosen to provide the real-life trial system - and it involved 5,000 signal gantries alongside the railway line. The complexity of the singular problem was compounded by the size of the project, as it required electrification gantries to be surveyed. Earlier inspections had ascertainment that the gantries that carried the electrification cables were not always placed exactly where they should have been. Ground conditions sometimes prevented installation on the precise spot and the length of cable required between gantries was affected. This meant that considerable work had to be undertaken during installation to trim the cabling to the lengths required - multiplied, of course, by the numbers involved.

It was felt that much time could be saved by pre-adjusting the equipment prior to installation, but this required a more precise measurement of the distances between each foundation. This was undertaken using a number of surveying techniques, including LIDAR and photogrammetry, to more accurately place the position of the foundations post-installation.

**IN PURSUIT OF ACCURACY**

The surveys were able to place the foundations to within a 20mm accuracy. That doesn’t quite solve all of the problems, though, as the cables expand or contract in different weather conditions and wind speeds. The calculations that are required to handle this are very complex, but essential for creating accurate infrastructure models. It was found that savings could be made by linking the Microstation models to the calculations, then using the software’s BIM capabilities to release the BIM model to other project members using a Common Data Environment.

The technology and processes were developed to allow designs to be quickly updated and approved, both when the foundation is accurately placed and also when the foundation is not positioned as designed. This allowed the electrical equipment to be accurately pre-adjusted off site to actual foundation positions to reduce the time required to install during possession and minimising the potential for possession overruns. Improving all of these areas would, it was felt, have a substantial impact on safety, cost and programme delivery.

**WHY THE NEED?**

It is well known that the Network Rail project is falling behind on all of its deadlines. Part of the problem is that the industry is quite constrained by the lack of available engineers with the skills needed to move it forward at a faster rate - merely a tenth of those required and such skills can’t be acquired overnight. This might well be somewhat alleviated by the efficiency savings that could be made here, which would cut the nine-month design programme to around three months.

The use of a common data environment also enables participating companies to use a range of different design products, on the strict understanding that involvement by companies in the digital electrification project would require full participation in all BIM processes.

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**WHAT DOES DIGITALLY ENABLING ELECTRIFICATION DELIVER?**

- Define Electrification specific digital information required in an Open Data Transfer Standard
- Prove that it is practical to move BIM models and digital information through the Electrification Lifecycle in a BIM Level 2 & BS1992 compliant workflow
- Demonstrate the potential for Augmented Reality in Electrification
- Demonstrate that by combining new surveying technologies with advanced BIM Modelling techniques the industry could, in the relatively short term, improve safety, and reduce cost and disruption.
software review

AV Schematics

connectCAD provides a quick and intuitive audio-visual schematic designer for Vectorworks users.

A substantial part of Vectorworks Architect is the module for designing stage sets - Vectorworks Spotlight. Unique amongst architectural applications, it provides libraries of elements for designing and erecting stage sets for theatrical productions. Fitting alongside Spotlight is another application that provides the schematics for the audio-visual elements of stage design, and for any other project that involves complex electrical, lighting and audio equipment - such as sports events, museum exhibitions and other public events. This time, though, it comes as a Vectorworks plug-in - connectCAD - well known to all who are involved in setting up audio-visual events.

To put that into proper perspective, Marc Simpson, lighting designer/managing director of Toulouse Group, New Zealand, says: "We use connectCAD extensively, so every cable for the AV installation is detailed. We used it on 'Team New Zealand America's Cup base', 'Gallipoli, The Scale of our War' exhibition... We use it mostly when we need to deal with more wires than we can keep in our heads, really."

Designed as a CAD support tool through design to implementation, connectCAD has just released its latest version - connectCAD 2016 - and, although it shines in the audio-visual world, its features make it ideally suitable for designing any complex electrical or IT configuration, using simple drag and drop tools, automated features and customisable tool templates to populate and lay out any electrical network. In fact, it will most certainly figure strongly in the growing trend for wider IT access throughout industry in 'the Internet of Things' when everything is connected either directly or by Wi-Fi.

Schematic Diagrams

The software has been designed specifically to keep track of all components of an interconnected system, linking schematic diagrams of connections and signal flow using physical layout drawings, that show exactly where equipment is located and the routing of all connecting cables.

The automated commands within connectCAD help users create schematic diagrams quickly and easily, and then link them to physical layouts in 2D/3D plans, complete with wire lists and bills of material. Signal flows and connection lines, along with other components, are marked in detail, providing a clear view of all electrical components for assembly technicians.

A design tool created by designers, connectCAD has a simple direct workflow, with full control over the look of drawings, and includes automated tools, such as drawing-check to highlight errors, duplicates and disconnections. It also enables technicians to compare changes made during installation with the actual plan and to define rooms/spaces at an abstract level for projects for touring shows where the physical space changes with each venue, but the roles of each space remain the same.

CONNECTCAD 2016

The focus of the new release has been to make the job of the designer even simpler, to fight complexity. Accordingly, a number of commands have been replaced with simpler drag-drop workflows, or been subsumed in time-saving automation. If that’s not sufficient, a new customisation feature has been included that allows users to make their own specialised tools.

Customised Device Placement Tools

With the increasingly rapid deployment of new technology in this area, the customising capabilities are especially useful. Designing RF distribution Systems, for instance, you can create your own tools for splitters/taps and so on, using duplicates of insert devices to place custom device symbols, with accompanying characteristics, into the circuit. And it’s not just about new inclusions, but about exclusions as well. Instead of using connectCAD’s ‘Number Cables from List’ feature, the Vectorworks Reports function has been integrated instead. This enables connectCAD to integrate directly with the drawing and for the schematic’s component data to be stored within worksheets in the Vectorworks Resource Browser, for further customisation, branding and importation to any document.

Designing Schematics

Schematics are designed to show in detail how an audio-visual, or other, network works and has to be 100% accurate. The networks they cover are invariably complex, take a lot of effort and are often behind schedule - a factor that connectCAD has taken into account. That is why the initial emphasis is not only on speed of design, but also being able to provide a solution that’s highly visual and free from constraints.

This means that users can get started before they have all the information available, set up a device as a ‘black box’, and connect it up and test it when the final equipment is decided. It also allows mistakes in designs to be corrected before they become real problems by checking drawings for obvious errors, duplicates and disconnections.

Neither does connectCAD rely on pre-made device libraries, which may not be up to date, as manufacturers develop their products. Devices can be defined on-the-fly with the ports needed for specific applications, instead of cluttering drawing with unused sockets.

Furthermore, detailed designs need to be straightforward for wiremen and engineers who will implement and test the system. Signal flows need to be clearly expressed. Connection lines should be routed on the drawing, so the eye can easily follow them, avoiding confusing cross-overs.

connectCAD helps with this by placing
SOFTWARE review

connections exactly where you want them - it doesn’t intervene and decide for you, as other software sometimes does. Even if you should move a device, connectCAD makes sensible adjustments.

CONNECTCAD DRAWINGS.
Drawings produced in connectCAD define a project in detail. With no external database involved, users can visually check designs, knowing that the actual data that will be used for a network is shown, and is available to create reports for purchasing and wiring.

In most real-world projects, goals and budgets change during the course of a detailed design, and even afterwards. Keeping up with these changes can be a nightmare for the designer. But connectCAD was born in this world and created specifically to help users take developments and model changes in their stride. Users report that connectCAD is the only design tool that not only gets you out of trouble again and again, but also enables you do so in a way that makes it actually look easy.

CONCEPT DESIGNS
Conceptual designs have to be ratified in electrical schematics, as well as in other design areas, and connectCAD is particularly useful, capable of producing easily understood drawings so that non-technical people can grasp how the system works. It also enables designers to focus on the essential elements of a design.

Concept drawings also have to look great. The examples provided show an underlying block diagram created using connectCAD tool, which then used Vectorworks advanced planar graphics features to rotate the design in 3D space for a much more exciting look. Annotations were added to the drawing using standard Vectorworks 2D graphics to introduce an extra layer of information. The result is a drawing that clearly encapsulates the key flows of signals and control in a way that is visually pleasing, as well as informative.

VISUALISATION
As an add-on to Vectorworks, connectCAD has access to the full features list of Vectorworks software and, in particular, to the Renderworks add-on that allows users to create realistic 3D presentations of projects that really help clients understand the network and the equipment being promoted, as well as letting designers check out the aesthetics and ergonomics of their designs. Further realism can be added by placing Vectorworks people in the 3D visualisations.

3D views show accurate representations of all standalone equipment and, if racks and console bays aren’t available, users can use connectCAD’s 3D Rack and Console objects to simply model their own - with no difficult 3D design work, but simply by creating the layouts of the racks and console bays, using 2D drag and drop, and then placing 3D Racks and Console Bays on the drawing to visualise the result.

connectCAD also makes full use of Vectorworks’ 3D modelling capabilities to allow designers and clients to walk through installations, as though they had already been built. Very often designers report a strong sense of deja-vu when they inspect the actual systems they subsequently instal.

www.connectcad.com
YOUR GUIDE TO

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The Corporate Innovation Award received by McGee at the 2016 National Federation of Demolition Contractors Corporate Innovation Award is testament to the importance of maintaining comprehensive records of adherence to Health and Safety regulations in all construction projects. McGee won for its Mobile Inspection Manager application, which delivers and exceeds Health & Safety regulations and Company Policy requirements regarding inspections for large and small plant, accessories, scaffolding and more.

As the award illustrates, the maintenance of such standards applies just as much to the dismantling of a building as it does to its erection.

McGee uses Near Field Communication (NFC) technology built into smart phones and tablets to deliver a historically paper-based process. Ruggedised NFC tags can be found on over 2,500 inspection points, which are checked on a weekly basis across 25+ sites equipped with 250+ mobile devices. Inspections are carried out on anything from a 45 tonne Excavator to D-Shackles.

The Mobile Inspection Manager is cleverly able to GPS track and record the location of every single inspection, while a PDF report of each inspection (where applicable) is conveniently created within a minute of the inspection being completed. Should an item fail its inspection, then a workflow is created to effectively track and resolve the issue promptly.

McGee operates successfully in a broad range of markets, and has the professional in-house resources, technical expertise, plant and transport, and flexibility to tackle the most challenging of briefs. The company understands that the requirements of a commercial, residential or retail site differ from those of an industrial, nuclear or transport location. It also appreciates that constructing a telecommunications mast demands a different approach to building a hospital or school and is aware that the needs of a utilities customer are distinct from those of a hotelier or conservationist.

McGee’s experience enables the company to adapt its approach to suit customers’ needs and meet specific requirements - whether it is operating on an industrial estate, busy railway terminal or indeed within a protected national heritage site.

The Mobile Inspection Manager app is just part of a much bigger story for McGee, driving efficiency and improving safety through bespoke mobile applications to simplify time-consuming, paper-based processes.

**ONE NINE ELMS PROJECT**

McGee’s Mobile Inspection Manager has been showing its capabilities at the One Nine Elms Project, in the Vauxhall Nine Elms Battersea Opportunity area, where planning consent was granted to Green Property Ltd, the then owners, to demolish the existing Market Towers buildings and replace them with two new towers containing a mix of residential apartments, office space, retail and a hotel.

Chris Foulser, project manager for McGee on the project, comments that the introduction of the Inspection Manager application into the working environment allowed far greater control and confidence in ensuring all inspection requirements were met and completed.

“It has assisted in significantly reducing the previously large volumes of paperwork generated and allows on-the-spot checks to be made to ensure compliance,” he says.

Site supervisor Andy Hilton, who is also currently based at One Nine Elms, adds: “The Inspection Manager app allows me to check any item at any time, without searching through paperwork files. The automatic notifications when an item is due an inspection saves time and avoids anything being missed and used past its test date. This gives me peace of mind to know that all our equipment is safe and in good order.”

McGee’s mobile applications are developed in partnership with Mobilengine, which specialises in improving business processes through the creation of mobile apps.

Speaking about McGee’s success after the event, Michael Kelly, head of IT & comms, said: “Achieving the highest recognition of innovation for the Mobile Inspection Manager application from our own industry professionals in the NFDC’s 75th year was a fantastic honour and true testament to the tireless pursuit of continuous improvement by McGee, enduring the journey of innovation in an ever-changing digital world.

“This application, together with our suite of applications, provides the Site Management team with the transformation from traditional paper-based management to fully integrated digital tools and workflows.

“I would like to personally thank those persons directly involved in the management and creation of the applications, those involved in the training and delivery of the applications, and those site teams and users who have immersed themselves in the application technology, without whose engagement this project would not have been the success that it has been recognised for.”

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