THE VECTORWORKS UK BIM GUIDE 2016

A CAD User PUBLICATION, IN ASSOCIATION WITH: VECTORWORKS

BIM, ESSENTIALLY

No limits to information re-use in BIM

THE TAMARIND SEED

BIM delivers "A single source of truth" for The Design Büro

THE PEARL IN THE OYSTER

A small architectural practice's journey into BIM

THE TOWER

Global BIM collaboration exercise wins international plaudits

THE CUBE

Exploring Levels of BIM

VECTORWORKS®

CLOUD SERVICES

What if you could store, synchronise and share your Vectorworks files in the cloud to make decisions from any location?

Now you can.

www.vectorworks.net/service-select/cloud-services

COMPUTERS UNLIMITED
AUTHORISED DISTRIBUTOR

For more information visit
www.vectorworks.co.uk
or call **020 8358 6668**

In partnership with:

OPEN BIM · buildingSMART UNITED KINGDOM & IRELAND Member · NBS

INTRODUCTION

When the Government mandated architects and construction companies to become BIM compliant by the beginning of April 2016 if they wished to be given the opportunity to tender for public sector projects, they had two things in mind. The first was the substantial savings that they believed could be achieved in public procurement - in the order of 20% or so - for both construction and building life-cycle management. The latter was the main incentive, as the cost of maintaining and operating a building is variously estimated at between 60 and 80% of its life time cost.

The second consideration was the knock-on effect to smaller architectural firms and local builders who would be able to take advantage of the developments in 3D modelling, BIM and collaboration tools, fast-tracked by the Government's initiative, to look at their own business processes and integrate some of the best practices of BIM to make their own cost and efficiency savings. No coercion here, but an opportunity for both the public and private construction industry to streamline their operations.

This guide supports the belief that the benefits of BIM will accrue to companies working at all levels within the industry. Based around the widely used Vectorworks Architect suite of 3D building modelling tools, it looks at the involvement of BIM in a number of different scenarios, focusing on levels of development within BIM and the delivery of a Building Information Model using COBie, collaboration on a global level with BIM, landscape design with BIM as a main factor - and a couple of case studies that outline companies experiences in adopting BIM.

BIM, ESSENTIALLY

BIM is more than just a Government Mandate.

Although you can quite happily design a building in 2D using Vectorworks Architect, the reason you are using the software is because you can switch from 2D to 3D at will, view your designs orthographically, apply materials and render and a whole lot more. No great shakes - we have been able to do that for a while - so why the fuss about adopting a BIM workflow and all that it implies? Unless you've had your head in the sand for the last six years, you will have noticed that the Government has mandated that every company that wants to get involved in public projects has to be BIM compliant. Why is Building Information Modelling so important, then? Why does it matter to me if I only get involved with local social housing projects?

The clue is in the word 'Information'. A line is just a line from 'a' to 'b' in a 2D drawing. Switch to architectural mode, and you are in another world. The line you draw is a parametric component that has height and depth. When you select another element, such as a window or door, you can insert it directly into the wall, and scale it to fit the design. Remove it and you have a blank wall again. But you know all this already...

The amount of information that you can handle with each component is theoretically unlimited, though. Instead of having a basic wall, you can select a predefined style from hundreds, or create your own - an outside brick course, insulation, inner frame and even plasterboard or panelling. Each wall component has its own characteristics that influence the detailed design of a building needed to start construction - the outer brickwork extending to the upper floor slab, and the inner framework just going up to ceiling height. A serious bit of detailed design work has become an automatic by-product of modelling in 3D.

That's just the immediate benefit of BIM, though, with the same facility applicable throughout the whole design process. Significantly more efficiency savings are made through sharing the information in the model with clients and partners. BIM is, above all else, a collaboration tool.

The quantity of materials used to create the walls can be assessed by multiplying coverage per metre by area, for instance, and the numbers of different components can be added and sorted by size, type and dimension. If you add in cost elements to each, you can begin to get a handle on probable costs. If that looks like breaking the budget, modifying elements of the geometry and changing expensive elements for budget items brings that under your control.

Already you have, therefore, a model for the quantity surveyor and a heads-up for building material suppliers - with the ability to link directly into their supplies catalogues to keep abreast of costs and deals. You also have a model that you can show to the client which is vastly more understandable than 2D plans and elevations. If you have included complex components that need fabrication off site then you can package each of these with the information that fabricators need for manufacture - a process used extensively in the structural steel industry, and known as Fabrication Information Modelling.

Building Performance Analysis takes the information from an intelligent building model and uses it to assess energy usage, carbon emissions and even a typical occupant's comfort. Much of this is dependent not just on the geometry, but also on materials used, glazed areas, the inclusion of MEP components together with performance levels and fuel requirements and even on building orientation and location. Solar studies, CFD analysis, Finite Element Analysis for wind flows and stress studies, are all much simplified when engineers can use information from the same 3D model as the architect.

BIM also takes larger scale projects into 4D and even 5D modelling. The fourth dimension, Time, adds construction requirements to the model information - the length of time it takes brickies to build a given section of wall, for example - to a detailed schedule of construction, and then adds a timeline so that you can visualise its actual construction, check where it's at, against where it should be, and thrill the client with a bit of virtual reality. Add costs to each phase of the construction - 5D - and you start to introduce cost and budget control.

The standards and file formats used to share information - COBie and IFC being the most important - are perhaps the grammar that governs the sharing of information. BIM provides the information that allows us to communicate our ideas to others. Without wishing to sound too pretentious, you could say that BIM is the vocabulary that allows us to share information about every aspect of design and construction with contractors, suppliers, project members and clients.

On your next project, consider what information you are already accruing and where that could be used to your advantage - quantifying and speeding up material delivery, comparing component costs, even undertaking building performance analysis, with the new Vectorworks 2016 feature, Energos. The tools are all available in Vectorworks Architect, so take advantage of them.

THE CUBE

Achieving BIM Level 2 using Vectorworks 2016 was recently demonstrated by taking architects through the creation of a hypothetical project - 'The Cube' - and the BIM processes related to it

An introduction to the workflows and practices within BIM was recently given to architects by Vectorworks Inc. Entitled 'The Cube', it consisted of a hypothetical four storey project in the heart of London, and was comprised of two phases - site development from imported shapefiles, and creating the building from a massing model - taking it through each of the design stages and ending up with the detailed construction model. Throughout, the relationship to BIM Level 2 requirements was emphasised.

The Cube was one in a series of live educational demonstrations created by Vectorworks Inc. to answer client specific questions. This particular presentation concentrated on levels of development (LOD), first of all utilising a single software platform to create early massing studies (LOD 100), which were then refined to create concept walls, slabs etc. (LOD 200), and then further refined to show construction intent (LOD 300).

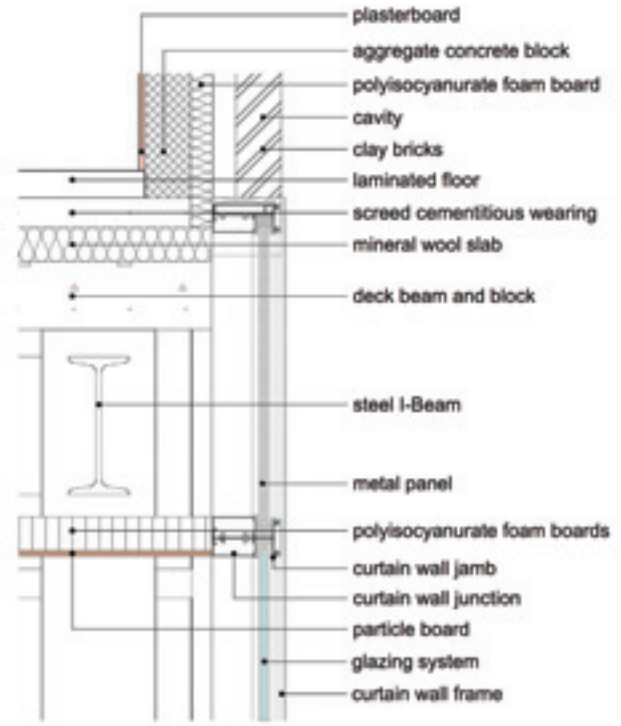
The presentation covered LOD's for both geometries making up the virtual building model, as well as the information/data attached to these objects (schedules, data extraction). "Refine, not remodel" was very much the key principle here, but it also showcased some of the new features Vectorworks 2016 had to offer. Throughout, attention was paid to the many BIM standards & protocols and how they impacted the varying LOD's.

EARLY MASSING STUDIES

Vectorworks 2016 was used throughout the presentation and proved very useful, as it provides site-modelling capabilities in a linked module. Terrain survey data in the form of shapefiles –provided by partner Promap - was used initially to develop a highly detailed 3D model of the site, close to London's Soho Square, in which to place the building. The shapefiles describe vector features - lines, polygons, points - through attributes, and they will ultimately be incorporated within the Building Information Model.

Simply through the Import menu, the first shapefile was imported into the software: it consisted of 3D points, each endowed with its Latitude, Longitude and Altitude values expressed in millimetres. Simply by selecting all the points, it was possible to create a site model, which translated the data into three-dimensional geometry. A further shapefile was imported from Promap, this time consisting of 3D polygons, representing the buildings, the roads and the natural elements of the site.

Vectorworks is not only able to visualise the vectors of a shapefile, but also to retain the attributes that describe that geometry. So, by clicking on any element, the software provides a huge set of data that changes according to the nature of the element itself (for example, it shows the date of the survey, the type of element, the characteristics of it, whether it's manmade or natural, etc.).



The "Modify by record" tool was used to edit the polygons by applying colours to different categories of them, so that the buildings were then easier to visualise from the context and subsequently to be modelled. In order to do that, the team used the "Massing model" tool, an intelligent parametric object that can be personalised with the object info palette. Alternatively, the Massing Models can be created using the "Create Object from Shape" tool by right clicking on one of the polygons.The data contained within every massing model, e.g. number of floors, usage, slab and roof thicknesses, etc., can be shown into reports and schedules, that are directly linked and incorporated in the model.

Having designed the building, the next step was to create adjoining roads using the "Custom Roadway" tool. Its main properties allow controlling items like the kerb, its height, the road thickness and the general rise of the road.

Vectorworks Landmark 2016 also features an enhanced "Hardscape" tool that enables users to specify components for construction intent thanks to its slab behaviour. The Hardscape tool was used to create the pavements of the model, that was eventually populated with street lamps, trees, cars, zebra crossings and other street furniture - all available out of the box with the Vectorworks libraries. Once the site model was finalised, closer inspection of any element was achievable using the Clip Cube live section capabilities.

ARCHITECTURAL DEVELOPMENT OF THE BUILDING

The Cube presentation demonstrated BIM workflows within Vectorworks 2016, refining the model as the demonstration went through each process. This dealt with the Levels of Development within BIM - the geometry of the model, and the data associated with it - both of which can be exported in IFC format, making them capable of being understood and read by other platforms.

The various BIM protocols and frameworks were taken into consideration using the digital Plan of Work, and looking at Level of Detail 100, which relates to Concept Design - general spacing and massing. Level of Development 200, focuses on the Developed Design covering concept walls and slabs, whilst Technical Design equates to Level of Development 300, which is comprised of fully integrated BIM with the ability to extract construction intent detail. The information generated at each stage was fed into the Suppliers Information Exchange as COBie drops. This was correlated with the Product Delivery table (pictured top of column, right), an overview of deliverables which states what information has to be delivered at what point of development, and to whom.

Typically, to assist in BIM project development, the Vectorworks 2016 'Project Sharing' feature was used throughout, giving users permission levels to control who is doing what, and who is able to edit and modify files.

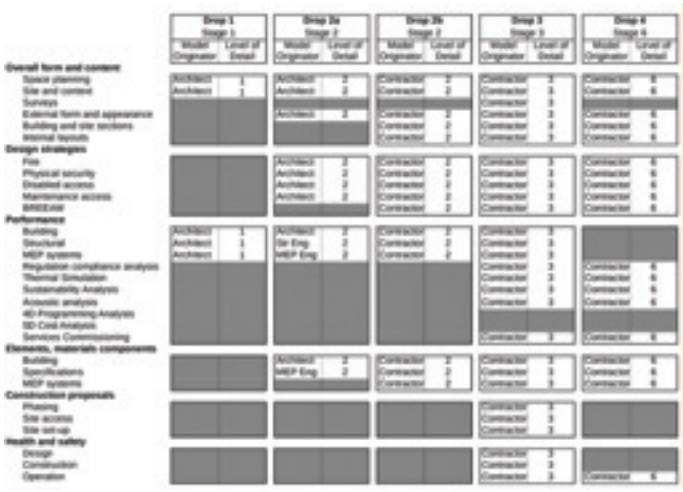
LEVELS OF DEVELOPMENT

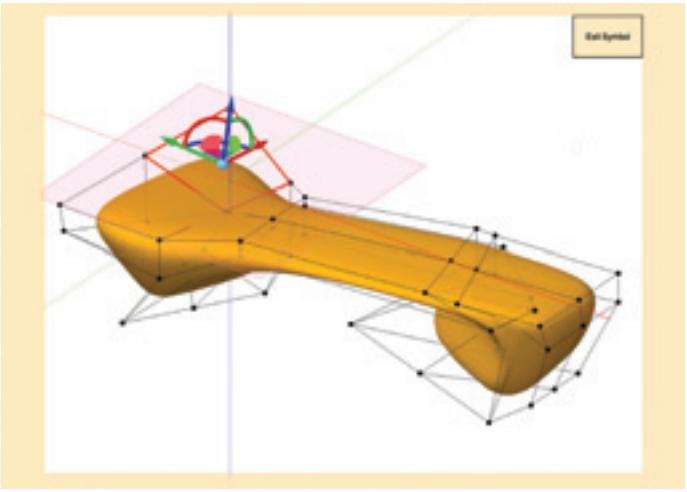
All projects start with spaces - intelligent objects with data attached to them so that reports can be extracted from them at a very early stage. A space for stairs, for example, enables it to be seen immediately in both 2D and 3D, enabling a live and dynamic space report to be automatically generated.

In addition to space information we need to include, for COBie purposes, assigned zones. Security areas for example - are they accessible by the public or are they private spaces? HVAC spaces can also be established here, and configured with all of the HVAC requirements for that space, in addition to more general information like room dimensions, volumes, etc. Once created, the Clip Cube can be used to create Viewports.

Organisation is key to taking the model forward in 3D modelling. Take developing concept walls for instance, which use Stories to define them, and which may simply consist of a Slab level, a Finished floor level and a Suspended ceiling level. At concept level the entire wall will snap to one of these levels, but as the model is further refined, components within the walls will snap to varying levels - exterior walls going from the floor slab to the slab above and interior walls snapping to the suspended ceilings.

Classification is another important factor. Using Uniclass 2015, you can class walls as being merely internal or external, or go into more depth and define components within the wall and the classes they fit into. Early stage wall location establishes its configuration and extent, but no information about construction intent has been supplied. We know how the walls fit at that point but not what they are made up of.





During this stage of the demonstration an auditorium space was configured with dedicated lighting. To understand circulation and other factors, the model was populated with furniture and other components - supplied out of the box with the Vectorworks software. Rows of seats were automatically placed by drawing a rectangle, and using the Object Info Palette to populate it with seats and then edit, offset, or rearrange them in different formats. Other intelligent components included a wall-mounted video screen which, with a further click, instantly showed its coverage zone.

With Stage decking even at such an early point we were able to produce a detailed rendered view of the furnished auditorium, using the built in Cinema 4D render engine. At the end of LOD 200, therefore, with refined spaces and the depths and thicknesses of walls established and approved, it was possible to move on to developing construction intent detail.

Walls defined at Concept Design level could be selected and, using the Vectorworks 2016 Magic Wand tool, replaced with preconfigured wall styles using intelligent wall join tools, which understand junctions and finishes off the walls for you. 'Hide Details' was also used to hide the details in plans that architects don't wish to share with contractors. Part of the external walls used the Curtain Wall tool, a hugely editable tool that enables users to edit mullions, put slants on mullions and edit any other parameter within the curtain wall itself - or to select individual panels, covering stairs or suspended ceilings, and blank them out.

ACHIEVING A LEVEL OF DEVELOPMENT 300 BIM MODEL

Some architects worry that you have to model every part of a building for BIM. Not so: at 1:50 or 1:100 scale you can copy the BIM section across, select the part you want to highlight, zoom into it, crop it out, discard the cropped element and scale up the crop, showing model details (as illustrated in the technical detail image at the top of page 6). This can also be achieved using the Callout Tool.

With the developed model we are able to isolate the areas of it that we need to concentrate on - the structural shell, for example - and display these to focus on complex construction issues. This is possible because of the level of organisation, hopefully introduced early on in the model, in the form of design layers, stories and classes.

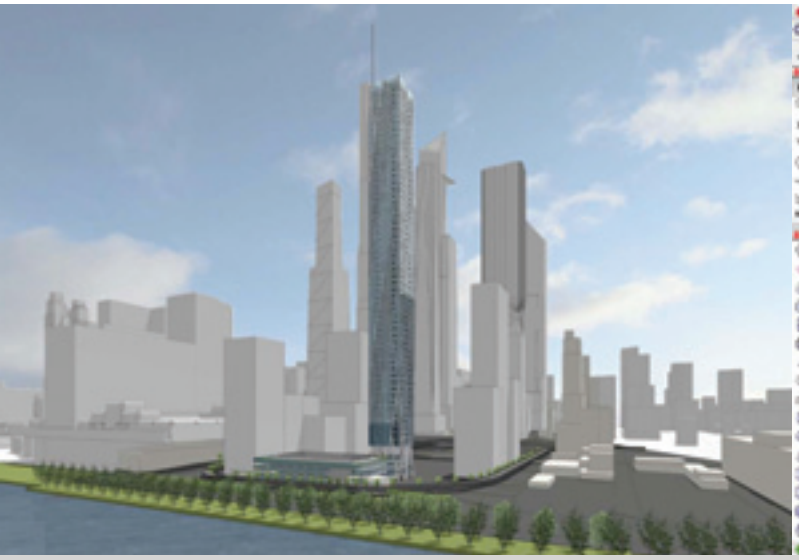
SUBDIVISION MODELLING

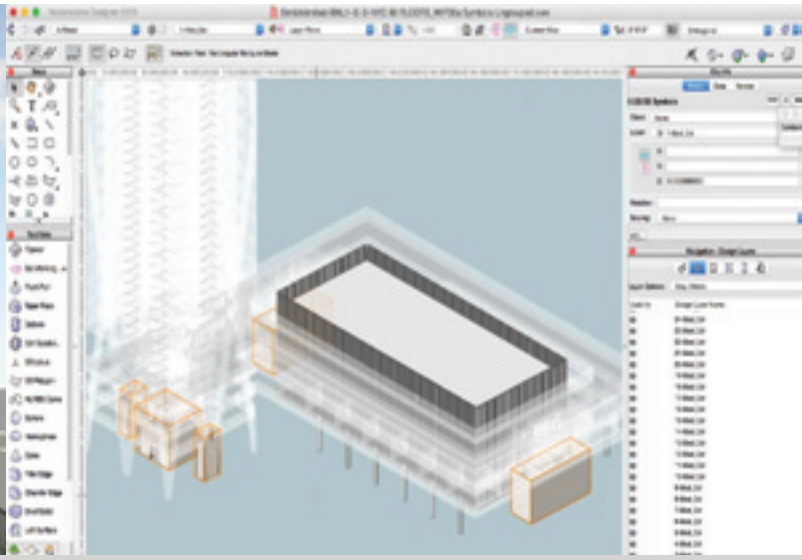
Other tools were also demonstrated. To create specific items, such as organically shaped furniture, Vectorworks 2016 has the Subdivision Modelling tool for creating bespoke freeform elements. Clicking on it reveals cages that defines each sections, which can be pushed or pulled to extrude shapes. OpenGL uses realistic shadows in rendering, depending on the object's geographical location, and ambient occlusion enhances shadows at corners and junctions to give the model further depth.

The demonstration ended with a full LOD 300 model - a fully integrated building with associated views, and with dynamic sections that will update automatically as the model is developed further. The space the building is located on was populated with landscape features and trees. For presentations, Vectorworks 2016 also includes 'White Card' renders - a sophisticated model to show to the client.

From the same design model, therefore, it is possible to create any 2D or isometric construction view and display it on sheets, with consistency of information throughout. Views can be shown as traditional or orthogonal, all editable within the Object Info Palette. Vectorworks 2016 also enables architects to create a wide range of special views, including exploded views of stories and other details - so you don't have to leave Vectorworks 2016 to produce special effects.

www.vectorworks.co.uk





BIM UNBOUND

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

Build New York Live is one of the Build Earth Live events, and BIM Unlimited was honoured for Best Use of Sustainability or Constructionability at the event held in September 2015. 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 Adoddle cloud-based collaboration platform.

BIM Unlimited's BIM manager for the event was Martyn Horne, whose task it was to lead an international team in creating 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 Lane 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 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 new members for the first time, 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 Oliviera said: "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. Going into 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 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."
> - David Oliviera, BIM validation and analysis manager

The Residential tower is conceived as a flexible structure, supported by an external diagrid. The diagrid structure defines the composition of the façades, 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 eradicating 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. Oliviera 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 set back 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 the 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."

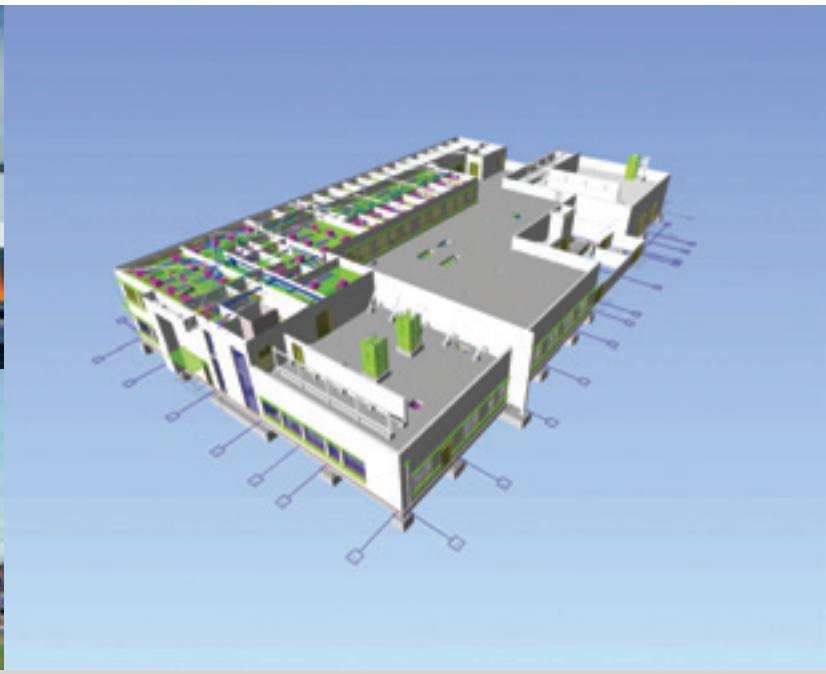
Synchro PRO was also used to create a schedule and a 4D animation demonstrating the construction sequence and timeline for the proposal. With the architecture and structure IFC files created separately by different teams, Shaohua Guan from Synchro Software was able to integrate these separate files into 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 veiwpoint 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 a lot away 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.vectorworks.co.uk



THE TAMARIND SEED

The Design Büro used the Tamarind Centre in Birmingham as an important step in the germination of their involvement in BIM via Vectorworks Architect

When the United Kingdom's Cabinet announced in 2011 that all government buildings must be delivered using Building Information Modelling (BIM) by 2016, some architectural firms may have questioned their ability to meet this demand. The Design Büro, however, didn't bat an eye.

Upgrading their software and learning how to adopt a BIM workflow was crucial to The Design Büro because they primarily work on government-funded projects. Founded in 1991 in Warwickshire, The Design Büro specialises in creating health and social care facilities that contribute to one's wellbeing. The firm's designers believe that environments play an important role in the healing process, so they work closely with the people to ensure they get the features they need to meet their clinical goals. "Our designs focus on the needs of patients, their families, and staff members who work in the facilities to provide a supportive, inspiring, and flexible environment," BIM Director, Neil Marshall says. Doing all this while keeping their projects sustainable, practical, and within budget has made the firm successful.

TEST PROJECT: THE TAMARIND CENTRE

Before the firm jumped directly into a BIM workflow, designers tested Vectorworks Architect software with a traditional 2D process on The Tamarind Centre in Yardley Green, Birmingham, a state-of-the-art, medium-secure mental healthcare facility. Named after an African herb said to promote healing and recovery, the Centre, delivered in 2012, is important to The Design Büro. "We have a long-standing relationship with the Birmingham and Solihull Mental Health Foundation Trust" says Marshall. "We were involved with the project for six years, and it was important for us to meet our clients aspirations."

The Tamarind Centre is a 7,800-square-metre, purpose-built, 89-bedroom facility that provides a cohesive healthcare campus and a high-quality, positive healing environment. The unit forms part of the overall development plan for the Yardley Green Campus and was centrally located on the site to ensure that more quiet, therapeutic external spaces could be formed. Its location, away from main roads, also aids security and provides natural screening. The facility consists of a three-storey administration building and seven single-storey wards with space for patient bedrooms, a dental suite, occupational therapy rooms, and recreation. All wards and buildings are linked within a secure courtyard via covered walkways with views of the recreational sports area.

The Tamarind Centre was The Design Büro's last major project to be completed entirely in 2D. It won the Birmingham City Council Building Consultancy's 2013 Built in Quality Award due to the firm's high standard of work, excellent communication and collaboration with all parties involved, and careful attention to the requirements of the end users.

TAKING A LEAP OF FAITH WITH BIM

But BIM was where the Design Büro needed to be heading if it was

going to secure more public projects like the Tamarind Centre, and the next project, its first large-scale BIM endeavor, using Vectorworks, was to design the Pathology Department building for the Ysbyty Glan Clywd Hospital in North Wales. "A leap of faith for us because we didn't really know what BIM meant at that time," Marshall says. The Pathology building has since become a landmark project for the firm. Completed in 2013, the facility houses the Microbiology, Histopathology, Cytology, and Blood Sciences departments on the ground floor, as well as staff facilities and offices on the top. Despite its serious purpose, the exterior of the building is refreshingly bright and vibrant. Multi-coloured windows decorate the sleek façade, bringing light and warmth into the modern interior.

Close collaboration with key stakeholders was paramount to match functionality with design. The firm sought to use the full capabilities of BIM, freely exchanging information during the conceptual, design, and construction phases with specialist subcontractors brought into the workflow to help with building solutions and digital fabrication. "We were able to utilise our BIM model to have the building's pre-cast elements made off site by Laing O'Rourke's Explore Manufacturing," says Marshall. "This is where we started to see the real wins for BIM in cost, speed, and health and safety."

Since this was The Design Büro's prototype BIM project, the firm set up parallel design teams. One group worked in 2D to create sign-off materials, and the other team worked in 3D to model the building. The contractor told them that they could revert entirely to 2D if the BIM transition became too much to handle. However, designers picked up the intuitive workflows of Vectorworks Architect quickly and soon moved the whole project into 3D. "We realised as the project progressed that the 3D team was not only working faster than the 2D team, but that they were also producing better outputs from the model to aid user signoff," says Marshall. "We converted the 2D team to assist the 3D team and delivered the whole project more efficiently."

NEW WORKFLOWS, NEW STRATEGY

The Design Büro learned a lot from its transition to BIM, as well as from the contractor who helped them through their first major project, teaching the firm its tested protocols for extracting information from models like floor areas, linear measurements, and wall areas, as well as how to use the model for clash detection. The Design Büro subsequently implemented a new business management strategy for staff members to follow when completing projects using 3D with BIM, committing the firm to using the best practices available.

"Staff now have a go-to guide in terms of how to put all the project and asset information, documentation, and data together, as well as how to set the model up to deliver it within the required standards," says Marshall. "We have a central server of libraries through which we develop content, and we run everything through the Solibri Model Checker, a quality assurance solution for BIM validation, compliance control, design review, analysis, and code checking, to ensure our core content is correct."

The firm also enlisted the help of Computers Unlimited, the Vectorworks software distributor in the UK, to train them in model setup and optimisation and to improve their collaborative abilities through Industry Foundation Classes (IFC) testing. "We knew, from an early stage, that we needed to share our model. The best way to do that with such a large design team was via IFC," says Marshall. "We fully support the open standard and open route to BIM, so we've engaged with our consultants and supply chain to test and prove that our models can fully interact with other software platforms. We challenged the requirement for native models and delivered a successful project using IFC alongside other designers who use Revit and Navisworks. Vectorworks gave us true interoperability." Whilst users are wary of collaborating with others using unfamiliar software, he added, those issues soon disappear after they see how easy it is.

The firm also did a lot of reading, Internet research, and attended conferences to educate themselves on BIM. However, the best education came with working on a live project. For The Design Büro, the Pathology building provided that experience because the contractor defined a BIM workflow for designers to emulate. Vectorworks Inc. also played a role in The Design Büro's transition to BIM as designers rely on tutorials listed on the Vectorworks YouTube page as part of their training. For example, when new employees come onboard, they spend time watching the videos and exploring the software, quickly becoming comfortable with the workflows and able to do more detailed work.

THE LIGHT BULB MOMENT

All of this change, testing, and exploration meant a revamping of practices and strategies for The Design Büro. "People have a trusted way of getting their work done, in a way that they understand," Marshall says. "You have to take a step back and show people that there is another route to delivering that information, which might take longer in the first instance, but once you get used to it, you've got a model that is a single source of truth. That for us at The Design Büro was the light bulb moment."

The Design Büro has managed all new projects with a BIM route since January 2014, which gave the firm plenty of time in advance of the government mandated 2016 deadline to learn, to make mistakes, and to manage a system for delivering information and scheduling building construction from a BIM model. "We did a thorough job on that system, and that's enabled employees to jump onto new projects and have a good resource to help them move forward with speed and efficiency," says Marshall.

Currently, the firm is working on an integrated care facility in the UK for a large contractor, applying knowledge gained through projects already delivered with a BIM workflow. "Knowledge has been fed back into the practice, with a whole new team working on the project that haven't previously been involved with a BIM project with Vectorworks," says Marshall. "This is going to transform our workflow, making our business much more economical and straightforward."

www.vectorworks.co.uk

VECTORWORKS AND BIMOBJECT

Vectorworks' half a million users around the world will have direct access to manufacturers building components courtesy of the company's collaboration agreement with BIMobject

Anybody using BIM is familiar with BIMobjects. They serve two main purposes - to provide architects and designers with a valuable library of building elements which they can use in their designs, and a vehicle for manufacturers to present their products in a digital catalogue to prospective users.

BIMobject, the company, has taken the ball and is running with it, providing the construction industry with a cloud-based Portal to access a library of BIM objects, offering full development, maintenance and syndication of their products, stored as BIMobjects. For Vectorworks users that covers free access to 850+ objects from more than 20 brands with over 5,000 article numbers - brands such as SCA Tork, Smedbo, Focus Lighting as well as others - delivering them directly into an architect's BIM workflow, thanks to Vectorworks Inc., who recently signed a cooperation agreement with BIMobject AB to support each other's BIM technology, enhancing the design capabilities of users of Vectorworks software worldwide.

As part of the agreement, BIMobject will host Vectorworks native file formats in its cloud-based web portal. In addition, BIMobject and Vectorworks Inc. will assist manufacturers with developing BIMobjects for the Vectorworks software.

There are more than half a million Vectorworks users around the world. This represents a significant community of architects joining the BIMobject Cloud platform. As a first step, BIMobject and Vectorworks Inc. will together build up an initial set of manufacturers objects, starting with pre-existing BIMobject content, all of which will be available and distributed by Vectorworks Inc. through a multivendor private cloud, offered with the support of BIMobject Cloud solutions. Future plans include developing tighter integration and enhanced collaboration between the Vectorworks software and BIMobject's cloud platform.

Commenting on the agreement, Stefan Larsson, CEO and Founder of BIMobject stated, "This partnership is meaningful as we've seen a huge demand from Vectorworks users over the last year for content from our BIMobject Cloud portfolio. For our building product manufacturers, this completes our offering across BIM platforms and delivers a significant user base dedicated to the Vectorworks platform that will benefit in additional business and customer satisfaction."

BIMOBJECT ADVANTAGES

Besides providing a more advanced design environment, BIM models can be used for estimations, BOMs and other purposes, created automatically from door, window and other equipment schedules, or they can provide a basis for more advanced calculations, energy usage simulations and environmental efficiency. This requires greater and more accurate information to be included with the objects. Accordingly, BIMobject's Cloud holds all BIMobject information and BIM files about products from real manufacturers, now available for Vectorworks users in native Vectorworks format - completely free to download and use. All you have to do is register at bimobject.com

MANUFACTURERS SUPPORT

BIMobject comes with numerous facilities for manufacturers, such as BIMobject Open property Cloud (BOPC), where they can add properties and classification systems to their catalogues of objects. BIMobject Hercules enables them to develop and publish their own BIM objects in a controlled way to protect proprietary design data, whilst BIMobject Mosquito allows anyone with a license to create BIM objects directly in the Cloud platform. BIMscript and LENA are designed to streamline the process of BIM content creation by delivering an open and freely available scripting language and a BIM object authoring solution.

This is all good news for Vectorworks users, according to Robert Anderson. "We joined forces with BIMobject to deliver a streamlined way for Vectorworks designers to access up-to-date, manufacturer-approved BIM content," said Robert, VP of integrated practice at Vectorworks.

www.vectorworks.co.uk

THE PEARL IN THE OYSTER

Innovative BIM and the small practice

Jonathan Reeves Architecture - jra - is a familiar company to many Vectorworks users, as Jonathan, the principal, has led a number of regional Vectorworks events bringing the joys and benefits of BIM to local architects. His expertise is based on personal experiences, many of them in the North Devon area of the country, where his practice was located for some years. Recently located to the East Midlands, he has also found the time to produce a book, "Innovative Vectorworks BIM", that showcases some fabulous building projects using both BIM and Vectorworks.

The first section of the lavishly illustrated book includes a number of jra projects, highlighting Jonathan's growing involvement with BIM, from when jra collaborated with Quattro Design Architects on the Kingsway School in Gloucester, and the benefits BIM brought to each project, even for a small practice working with local builders and developers.

One of these developments - Oyster Catchers - involved the replacement of a non-viable structure in an area of outstanding national beauty on the South West Coast Path with an environmentally sustainable building. An initial 3D site massing study was commissioned using Vectorwork's Site-modelling suite and accurate surveyors data which allowed accurate building models to be created and assessed.

Because of the ultra-sensitive nature of the project requests from the planning officers and the changing requirements of the client, the parametric nature of the model and BIM were used to provide contextual views of the project from key vantage points. BIM also assisted structural engineers in producing designs for ground beams, incorporating 22 piles within the structure for building stability. Clients alterations to the original design also had to be assessed for their impact on neighbouring properties.

BIM played a significant role in the project's services strategy, the building lying off the mains gas grid, and a number of different solutions were assessed - ground and air-sourced heat pumps, photovoltaics and thermodynamic panels, assisted by the virtual heliodon within the Vectorworks software, to analyse sun-shadow patterns over the course of a year to demonstrate the effectiveness of each. All heat source options were subject to Synergy's SAP assessment using information from the BIM. The use of BIM on this project allowed late design changes to be incorporated relatively easily and to be communicated with the entire design team, including the client, planners, contractors and structural and SAP consultants.

Following on with the success at Oyster Catchers, jra was keen to establish further relationships with local clients. While a number of contacts were developed, it was clear that North Devon fee structures

were tighter when trying to tempt potential new clients from their existing firms. Approached by a developer who already had planning for two terraced houses on a tight town centre setting in a conservation area of Ilfracombe, jra was asked to look at the possibility of getting planning for three units. An initial concept design was required in a very short time and for a very competitive fee.

Once again, BIM was exploited to produce a convincing concept design that persuaded the client to commission a planning application. Full sets of coordinated documentation and 3D views were rapidly provided, instead of traditional 2D drawings. BIM made it possible to offer more for less - important when the commercial pressure is on, making a practice more competitive.

Following planning approval, the BIM model was developed to produce working drawings, schedules and information on quantities. Detailed scheduling was paramount on such a small project. Costs could be assessed without needing a quantity survey. Accurate quantities of materials could be ordered as required, at the right time, which saved multiple orders - notably for the timber framing members required for each roof. Alternative forms of construction and different design options could also be explored and assessed at a relatively early stage in the build process.

The developer generated sales interest in the development using perspective views for marketing, making the estate agent's job easier and cheaper, with good visual material to show potential buyers. All properties were sold before completion, helping the developer with the funding required to complete the project.

Innovative Vectorworks BIM is available from:
www.jra-vectorworks-cad.co.uk/innovative-vectorworks-bim.html

Image courtesy of Holcombe Norton Partners, Inc.

LANDSCAPES FROM WORKSHEETS

Intelligent design practices meet smart site objects, as Holcombe Norton Partners use worksheets to calculate and create landscapes

When most people hear the words "environmental sustainability," they think of fossil fuels and government initiatives, but for Stephen Schrader, associate landscape architect at Holcombe Norton Partners, Inc., sustainability arises from careful calculations and informed design decisions. The full-service landscape architecture team at Holcombe Norton Partners uses smart objects within their design software to perform these calculations quickly and efficiently, making their projects inherently information-rich. And while this decision may seem like a no-brainer, Schrader says that many landscape professionals have yet to jump on the smart object bandwagon.

"Landscape architects had little reason to join the revolution as architects made 3D modelling and BIM workflows standard practice," Schrader says. "Traditionally, CAD packages were geared toward the practices of architecture and engineering, offering few mainstream tools for landscape architects. But now, designers, product manufacturers, and industry associations are creating site-oriented BIM content, and the specialised software tools for landscape professionals are more helpful than ever."

The smart object is the crux of this new era in landscape design, combining an object's geometry with appended data about said object, which can then be used by data-harvesting worksheets to run in-depth site analyses. Worksheets can do everything from calculating water-use reduction and organising plant data to verifying compliance with green codes and quantifying construction costs, helping designers make intelligent choices as their project progresses.

"I use worksheets to help meet all kinds of local codes and landscape ordinances," Schrader says. "Once I balance out those requirements, I'll put the worksheets right onto the design drawing. This makes it easy for reviewers to see that I've completed all the background work, and met all the legal requirements for a site plan.

SOWING THE SEEDS OF SUSTAINABLE DESIGN

There are three competing sets of demands to address when beginning a successful project. The first comes from the client in the form of an initial site program - their desired uses for the space, required parking, spatial constraints, and budget limitations - often conflicting with the second set of requirements faced by landscape professionals: meeting landscape ordinances.

"Landscape ordinances are becoming increasingly common, which is great because it means more sites will benefit from a landscape architect's influence," Schrader says. "But it adds complexity to your site plan because now you don't just have to think about your building, parking, and grading. You also have to allow for things like extra spaces for landscape areas within a parking lot, perimeter planting and buffer regulations, and saving existing trees."

And if a client wants to go beyond meeting local and state regulations and have their site achieve BREEAM or SITES certification, a third set of demands has to enter into this balancing act. Designers now have to consider issues like open spaces versus buildings in their plan, as well as heat island effects, opportunities for shading, and reducing water use for irrigation. "While it's great that clients want their

sites to be more sustainable, it can be difficult to prioritise so many sets of regulations," Schrader says. "This is where designing with smart objects makes all the difference."

TAKING STEPS TOWARD SMART WORKFLOWS

A project file must act as a database to truly make use of BIM workflows in landscape design. Rather than designing in one file and recording information in another, designers can combine their entire workflow into one document using smart objects. At Holcombe Norton Partners, this process begins with creating a digital terrain model (DTM).

"Landscape architects can use DTMs to produce more accurate, complete pictures of the costs of implementing their designs," Schrader says. "Tasks like terrain and slope analysis can be accomplished by adjusting a few of the DTM's smart object parameters, helping you reduce the amount of waste material you haul away, as well as minimise your project's impact on the environment, existing utilities, and other site constraints like road routes and buildings."

Creating a DTM is useful for making big-picture decisions at the beginning of the design process, and it also continues to inform decisions as a project develops. Since DTMs are composed of smart, parametric objects, each change made to a design impacts the data stored within those objects. By connecting this data to worksheets that run analysis for landscape ordinances and sustainability accreditation, designers can test the effects of every decision they make in real time.

"A quick example of how DTMs help in the balancing act of designing a site plan is looking at whether the plan provides adequate building area, parking, and hardscapes while preserving enough vegetated open space to meet credit criteria," Schrader says. "Preparing a worksheet to draw area data from a few smart polyline objects, and modifying those polygons to match the layout as it changes, is a simple way to track compliance throughout the project."

PUTTING DTM INTO PRACTICE

This way of designing was put to the test at Auburn University, Montgomery's Student Wellness Center in Montgomery, Alabama. The university wanted the site to be a dramatic announcement that the school was reaching out to become a part of the community. However, the site was lower than the highway that ran alongside the campus. Additionally, civil engineers had calculated that a large amount of earth would need to be moved to give the center the prominent position that the architects and clients desired. The task of accomplishing this practical goal for the client fell to Schrader and the team at Holcombe Norton Partners. Adding even greater complexity, the clients also wanted to have the building BREEAM certified, requiring creative solutions to meet the university's needs.

Holcombe Norton Partners began by using a DTM connected to various worksheets, each calculating everything from elevations and slopes to the cost of moving materials and the amount of green space on the site. From this they developed a grading plan that allowed for the build-up of the Wellness Center site and turned the borrow area into intramural fields, while carefully weaving the access walks and retaining wall into the design in order to save a heritage-quality red oak tree with an 85-foot canopy.

More work was needed to make the site truly sustainable, so the site design also included smart hardscape and planting objects. Worksheet analyses reduced the project's overall heat island effect despite having nine different hardscape types on the site. Water usage was cut in half through plant species selection and plant density reduction. In fact, the campus' landscape crew is currently preparing to remove the drip irrigation system installed during the construction process now that the plantings are established. Thanks to the smart design process used in its creation, the Wellness Center is on its way to being certified BREEAM Silver.

"This is one of the projects I'm most proud of, and not just for the sensitive siting and selection of sustainable planting and paving materials," Schrader says. "We were really able to create some exciting showpieces in the design." This includes bringing the architects' concept to life with the inclusion of a 5,000-square-foot, granite-faced reflecting pool outside the Wellness Center's cardio room, as well as the creation of two naturalistic water features that appear to flow beneath a faux bridge leading to the main entrance. "We originally conceived of the naturalistic water features as a method of capturing and treating stormwater collected on the expansive roof of the Center," Schrader recalls. "But the university chancellor liked the idea so much, he wanted water at the entrance all the time." Roof water is instead diverted to a bioswale between the walking track and the campus perimeter road on the side of the site facing the highway.

SUSTAINABLE DESIGNS FOR A SUSTAINABLE BUSINESS

"Since the advent of rating systems like BREEAM and SITES, design software has become more important to the creative process," Schrader says. "With a couple of clicks, I can quantify my open space, design planting areas, and create a water budget, and to pull information from the site features within a project file we use Vectorworks Landmark software to integrate data management and calculations."

"The depth of the landscape-specific resources available in Landmark, combined with its intelligent worksheet and water budgeting capabilities, makes it a major part of our office's design process," Schrader says. By using smart objects and worksheets, Schrader and his teammates produce designs that both please their clients and help the environment.

HELPING THE INDUSTRY CHANGE

One of the remits of the Landscape Institute BIM Working Group, which was set up approximately two years ago, is to support development and change within the industry. For further information please contact Martyn Horne, Technology Lead of the Landscape Institute BIM Working Group on email mhorne@unlimited.com

www.vectorworks.co.uk

sites to be more sustainable, it can be difficult to prioritise so many sets of regulations," Schrader says. "This is where designing with smart objects makes all the difference."

TAKING STEPS TOWARD SMART WORKFLOWS

A project file must act as a database to truly make use of BIM workflows in landscape design. Rather than designing in one file and recording information in another, designers can combine their entire workflow into one document using smart objects. At Holcombe Norton Partners, this process begins with creating a digital terrain model (DTM).

"Landscape architects can use DTMs to produce more accurate, complete pictures of the costs of implementing their designs," Schrader says. "Tasks like terrain and slope analysis can be accomplished by adjusting a few of the DTM's smart object parameters, helping you reduce the amount of waste material you haul away, as well as minimise your project's impact on the environment, existing utilities, and other site constraints like road routes and buildings."

Creating a DTM is useful for making big-picture decisions at the beginning of the design process, and it also continues to inform decisions as a project develops. Since DTMs are composed of smart, parametric objects, each change made to a design impacts the data stored within those objects. By connecting this data to worksheets that run analysis for landscape ordinances and sustainability accreditation, designers can test the effects of every decision they make in real time.

"A quick example of how DTMs help in the balancing act of designing a site plan is looking at whether the plan provides adequate building area, parking, and hardscapes while preserving enough vegetated open space to meet credit criteria," Schrader says. "Preparing a worksheet to draw area data from a few smart polyline objects, and modifying those polygons to match the layout as it changes, is a simple way to track compliance throughout the project."

PUTTING DTM INTO PRACTICE

This way of designing was put to the test at Auburn University, Montgomery's Student Wellness Center in Montgomery, Alabama. The university wanted the site to be a dramatic announcement that the school was reaching out to become a part of the community. However, the site was lower than the highway that ran alongside the campus. Additionally, civil engineers had calculated that a large amount of earth would need to be moved to give the center the prominent position that the architects and clients desired. The task of accomplishing this practical goal for the client fell to Schrader and the team at Holcombe Norton Partners. Adding even greater complexity, the clients also wanted to have the building BREEAM certified, requiring creative solutions to meet the university's needs.

Holcombe Norton Partners began by using a DTM connected to various worksheets, each calculating everything from elevations and slopes to the cost of moving materials and the amount of green space on the site. From this they developed a grading plan that allowed for the build-up of the Wellness Center site and turned the borrow area into intramural fields, while carefully weaving the access walks and retaining wall into the design in order to save a heritage-quality red oak tree with an 85-foot canopy.

More work was needed to make the site truly sustainable, so the site design also included smart hardscape and planting objects. Worksheet analyses reduced the project's overall heat island effect despite having nine different hardscape types on the site. Water usage was cut in half through plant species selection and plant density reduction. In fact, the campus' landscape crew is currently preparing to remove the drip irrigation system installed during the construction process now that the plantings are established. Thanks to the smart design process used in its creation, the Wellness Center is on its way to being certified BREEAM Silver.

"This is one of the projects I'm most proud of, and not just for the sensitive siting and selection of sustainable planting and paving materials," Schrader says. "We were really able to create some exciting showpieces in the design." This includes bringing the architects' concept to life with the inclusion of a 5,000-square-foot, granite-faced reflecting pool outside the Wellness Center's cardio room, as well as the creation of two naturalistic water features that appear to flow beneath a faux bridge leading to the main entrance. "We originally conceived of the naturalistic water features as a method of capturing and treating stormwater collected on the expansive roof of the Center," Schrader recalls. "But the university chancellor liked the idea so much, he wanted water at the entrance all the time." Roof water is instead diverted to a bioswale between the walking track and the campus perimeter road on the side of the site facing the highway.

SUSTAINABLE DESIGNS FOR A SUSTAINABLE BUSINESS

"Since the advent of rating systems like BREEAM and SITES, design software has become more important to the creative process," Schrader says. "With a couple of clicks, I can quantify my open space, design planting areas, and create a water budget, and to pull information from the site features within a project file we use Vectorworks Landmark software to integrate data management and calculations."

"The depth of the landscape-specific resources available in Landmark, combined with its intelligent worksheet and water budgeting capabilities, makes it a major part of our office's design process," Schrader says. By using smart objects and worksheets, Schrader and his teammates produce designs that both please their clients and help the environment.

HELPING THE INDUSTRY CHANGE

One of the remits of the Landscape Institute BIM Working Group, which was set up approximately two years ago, is to support development and change within the industry. For further information please contact Martyn Horne, Technology Lead of the Landscape Institute BIM Working Group on email: mhorne@unlimited.com

www.vectorworks.co.uk

VECTORWORKS®

A NEMETSCHEK COMPANY

Vectorworks Architect	£1995 +VAT
PROMO Vectorworks Service Select	50% off

- Vectorworks is a fully BIM compliant software solution
- Communicate your designs through IFC
- Offer Expires 31st July 2016

Construction Computing AWARDS THE HAMMERS WINNER

Award winners for 6 consecutive years!

@VWUK bit.ly/vwuk1

Vectorworks Service Select is a maintenance program provided by Vectorworks, Inc. offering discounted upgrades, support and a host of valuable resources

COMPUTERS UNLIMITED AUTHORISED DISTRIBUTOR

For more information visit
www.vectorworks.co.uk
or call **020 8358 6668**

In partnership with:

OPEN BIM buildingSMART UNITED KINGDOM & IRELAND Member