



## **Embrace BIM it's a great tool for sustainable design**

**BIM is well worth exploring says Elrond Burrell, who explains here how he and his colleagues at Architype have embraced BIM – as a key tool for innovation, collaboration and the rigorous attention to detail needed for sustainable design that really works.**

“BIM”, variously understood to be Building Information *Model*, Building Information *Modelling* or Building information *Management*, has become a buzz phrase in the UK construction industry, since last year’s Government Construction Strategy mandated fully collaborative 3D BIM as a minimum on all government projects by 2016. Before then it had been an acronym only used by early adopters in the industry.

BIM is about developing an information-rich 3-dimensional building model, coordinated between different disciplines, so that the right information is available at the right point in the delivery process – theoretically from design and construction through to facilities management, maintenance, future alterations or refurbishment, etc. At the moment, in the UK, BIM is most developed at the design stage, and is starting to take off in the construction stage.

For a design consultant, this means getting into more sophisticated modeling software than 2D or 3D CAD. In BIM software a virtual building is created with construction components, elements and materials and specification information all included.

Architype are among the early adopters and we have been exploring and using BIM for over five years now. When we first started using BIM none of our consultants were ready or willing to engage in a collaborative 3D process. However, more recently we have been working in teams where the Structural and M&E consultants have also started to embrace BIM, and we have been able to work with coordinated models from each discipline and see the wider benefits.

Structural and M&E elements can be seen in a 3D context and it is far easier to simplify and coordinate across the disciplines. Structure clashing with building fabric, duct lengths and routes and

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30 Linden Road, Earby, Barnoldswick, Lancashire BB18 6XR

plant room layouts are all good examples where we have seen immediate benefit from BIM – it's a great way to spot and deal with nasty surprises at the design stage, rather than discovering them on site.

Even when we were doing BIM on our own ("Lonely BIM") we found considerable benefits over our previous, more traditional, way of designing and documenting. Instead of drafting 2D drawings and surface based 3D models, we focussed on creating an information-rich 3D building model.

While modelling sometimes takes longer than drafting (not always though!), once the model is developed, drawings and schedules are quick to produce. These snapshots of the information already integrated into the model can be produced at any stage – whether for sketch & illustration purposes, presentation or contract documentation. Views can be presented as anything from rough sketches to technical drawings to photo-realistic renderings, all from the same building information model.

Producing drawings and schedules from a 3D information rich model means that the views and information are inherently coordinated and current, whether presented graphically or numerically. It eliminates the need to cross-reference drawings, to trace over drawings or to count or number doors and windows manually. In this way, BIM reduces considerable risk by removing many manual processes that easily lead to errors and inaccuracies.

The useful information available in the model reduces duplicate work. As well as room areas, the model contains room volumes; room schedules can include factors to convert room areas to treated floor area; and material and element quantities can all be scheduled. Additional views or drawings can be produced as and when required; sections can be cut through the building anywhere, 3D views can be set up to illustrate any view or part of the building.

Compared to a series of 2D drawings, so much more can be understood in the data-rich 3D model – by all parties involved. Structural and M&E elements can be seen where they really are in the building. Complexity can be spotted and simplified. We have found this valuable at every scale, from a large development, to a single building, right down to a specific detail.

BIM does not mean there has to be a single model floating "in the cloud" that everyone on the project works on at the same time. Architype uses a 'confederated model' approach, whereby different specialities create (and own) their own linked models, based on shared master co-ordinates, and updates are shared regularly. Different approaches including closer amalgamation are also being explored in the industry, as are the issues of ownership and intellectual property rights. But BIM neither replaces designers, nor replaces communication and discussion – the main benefit is it allows people to see and understand the different aspects of the design, and solve problems together, quickly and effectively.

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### **So what about BIM for sustainable design?**

We firmly believe that people, not software, design sustainable buildings. At Architype we use BIM to support our design process by focusing on productivity, quality assurance and on generating *useful* information from the model. Using BIM we can remain sustainable-design-led in our approach, knowing that quality data and documentation can be produced swiftly. Even in this time of austerity where programmes are rushed and cut short, we can still find time for crucial client consultations, considered design development and project related research.

For instance, BIM played a critical role in the design and development of our award winning Passivhaus schools, including one of the first in the UK. The use of BIM allowed the team to focus on the vital detailed research and design development and coordination, rather than data and document production. BIM has also been a huge benefit in driving simplification of the M&E design and reducing thermal bridging.

Quality assurance – central to a sustainable building that works as intended – is another important benefit of BIM. Views generated from the model are consistent across all drawings, as are specification notes and schedules.

For Architype, useful information derived from BIM is mainly in the form of transparent data for entry into PHPP, and critical fabric issues such as airtightness details. We use BIM to schedule room areas (true and treated floor area), room volumes (true and occupied volume for ventilation), and window and door sizes and heat loss areas.

We use the model to review the design with the contractor, and it helps us to resolve the design and buildability, as well as the thermal and airtight strategy. It's easy to fudge an airtight line in a 2D section taken in a convenient location, but seeing it in 3D and moving the section to review all parts of the building quickly exposes this! Thermal bridges and penetrations through the fabric are just as quickly exposed in the same way.

In summary, we have found the benefits of BIM to be considerable. For us, BIM plays a vital role in sustainable design. By making us more productive, it gives us more opportunities for innovation – it frees our designers to design. BIM has proved an invaluable tool for the rigorous design that is essential for sustainable buildings that really deliver — both in radically reduced running costs, and in creating buildings that people love to use.

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*Elrond Burrell is a UK Architect and an Associate in Architype's Hereford Office with over 8 years experience using BIM. He also speaks at conferences on sustainable design, BIM for SMEs and BIM for sustainable design.*

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