BUILDING ENGINEERS: BRINGING BIM HOME

Jason Ruddle, COO of Elecosoft, explores the pivotal role that building engineers may have in enabling BIM to unlock the long-term benefits that are fundamental to its purpose

What exactly is our role when it comes to BIM? That question is not only one that faces the building engineering profession, but one that has been exhaustively considered by almost all of the myriad professions that play a role in the complex construction sector. Ever since the Level 2 standard was stated as a goal back in 2011, every profession and trade involved in the built environment, especially that which is publicly funded, has had to step back and try to envision a new future. It hasn't been smooth. While professionals like designers and architects could quickly rationalise their role in creating the 3D CAD files that appear the foundation step of creating digital models, for others it has been less obvious. The challenges of information sharing, the mismatch between the IT systems tuned to support different professions, and the complexities of actual compliance have required education, discussion, compromise and a significant degree of investment.

Building engineers play a vital role in the construction process, and must comprehend their role and contribution within BIM as much as any other profession – yet, due to the breadth of different focus areas and expertise that building engineering covers, this can be hard. Areas of focus cover structural, systems, services or safety considerations; involvement can be isolated to specific phases of a build, or span the entirety of construction, and play a major role in technical co-ordination and planning. However, they are also united by common aims, including a duty of care for the ultimate effectiveness of the ensuing asset. Building engineers are trained to comprehend the whole, not just part, of the construction process. This aligns incredibly closely with the vision of BIM for construction that is not just functional but efficient, sustainable and manageable, which means that building engineers should have a very significant role to play in BIM.

It is important not to see BIM through tunnel vision. BIM and the processes and standards for evolving digital data models are only part of the change within construction. Digital transformation is altering construction businesses' relationship with data, empowering them with cloud, social and mobile technologies that will ultimately make them more agile and able to operate in a global economy. New construction operation models are emerging to leverage offsite manufacturing, and new materials are evolving fast. Building engineers, indeed all engineers, tend to be technically minded, forward-looking and data-driven; this environment is ideal for them to showcase their value.

With the above in mind, what opportunity does BIM offer building engineers?

Injecting expertise

In addition to bringing valuable knowledge, building engineers can advocate for the essential value of technical advice. Today's de facto standard is for clients to engage architects and consulting engineers for the design model creation and planning – yet this often fails to incorporate vital expert insights in the critical early stage. Our client Robert Berry of Caunton Engineering says: '*There can be a knowledge gap for architects and consulting engineers about the details that a specialist will bring. We know what will work, and be cost effective, or not. In the current commercial climate, however, the specialists aren't joining the design and development party until far too late in the process – much earlier collaboration is needed.*'

Integration insights

Building engineers are ideally placed to push for increasing planning transparency and integration throughout the construction phase, and the tools to support it. They will often hold the responsibility for co-ordinating technical interfaces, ensuring that key system installations dovetail together both technically and in timing terms, or may hold overall systemic responsibility for the safety or function of the final building. The construction management skills that many learn or develop mean that they can gain significant insights, and opportunities to influence, from programme plans – if those plans are highly accessible and fit for purpose.

Planning is moving further up the priority list for many contractors. Cullum Detuners Limited designs, manufactures and installs high-specification engineered equipment to help its customers reduce acoustic impacts of equipment not just in buildings but in the built environment, on ships, and more. Working to exact timescales, project planning was always a factor, yet more action was spurred by economic turbulence: the leadership wanted even greater

consistency in delivery, more repeatable practices, and a reduction in business risk from project delays or issues. The company decided to refocus on planning. Now it says: *'Using our software, we can now show the engineering team how any delay in getting drawings out to the manufacturing team or sub-contractors can directly cause project delays. They always knew that delays might mean missing a manufacturing slot – but never really had to take responsibility. People are now really being made responsible for their tasks.'*

Today planning software, such as our own Asta Powerproject, offers powerful, integrated 4D views enabling a detailed understanding and visualisation of current, and future, activities. The ability to see development of key systems and the impact of changes anywhere on those systems through BIM-optimised plans promises more co-ordinated multi-disciplinary operations. The systemic thinking and analytical skills of building engineers can only be empowered by the ability to see complete project views. Integrated planning will increasingly show financial impacts of changes too: 5D BIM has already arrived within our portfolio, enabling cost estimation to be managed within the same integrated space as scheduling and resource planning. With cost estimation often part of a building engineer's role, they can gain yet more advantage here.

Focus on the future

BIM is increasingly discussed in the context of the Government's longer term Digital Built Britain strategy. This goes beyond considering the demolition of barriers between different construction players and the open flow of information between stages. It looks toward a smarter, safer, and more sustainable built environment. This, if nothing else, should reinforce the very significant role that building engineers will play; their specialisms will be key, from smart security and fire, to intuitive building and environmental controls, to the deployment of Internet of Things sensors to aid operation and maintenance.

Data, data, everywhere

Building engineers understand the essential role that complete, accurate data plays in the successful transformation of concept design models into real spaces. It is specialist contractors who create the true data foundation for BIM; some have created digital prototypes for years before the term BIM emerged. Whether talking of the tight tolerances of structural steel, or the target efficiency of an energy management system, it is engineers who put hard data into the design model, starting it along the path from the idea of a space, to the reality of a physical entity. Building engineers are often in pole position to help ensure that the data parameters set out in the Employers Information Requirement can be met. In fact, if they can become involved earlier in the process to advise clients, they and specialist suppliers can help to inform the EIR itself. Today, EIRs are a challenge for clients and that creates challenges for specialist contractors tasked with execution: *'Few clients can yet provide their professionals with clearly defined EIRs and that's a challenge in terms of how we can produce it. So, we must do what we do: the integrity of our model, and the data within it, must be right or the building won't work'*, was how Robert Berry outlined it.

Construction is facing a new era of more data-focused operations and processes, which heralds a time in which the role of all engineers should become more influential, including building engineers who so often bring key elements together. Extracting all the many benefits that BIM might deliver will depend on more than that, however – it is going to be important for all to get involved, earlier, in constructive, collaborative planning, from client, to contractors, to specialists. There are no supporting players any more – everyone needs to be on the same team.

It is becoming increasingly important for building engineers to work in ways that integrate with the main planning, become involved early, invest in BIM tools and ways of working, share their ability to analyse and plan for optimal end outcomes. The opportunities for them to do so are already enhanced by 4D BIM, and will become even more prominent with 5D BIM. They, and everyone from contractor to client, to FM and building users, stand to gain, but can only do so if BIM models are built well, with every professional bringing their own unique value to the table. Or, as Robert Berry neatly put it: *'The key to the construction industry's future success is just good people, working collaboratively, sharing data effectively and just ... doing BIM'* and we can wholeheartedly agree with that. If everyone steps up, gets involved, and contributes their expertise, the future of construction looks bright.

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