Get smart

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Building information modelling can revolutionise building control ? but only if it is adopted comprehensively by the construction industry, argues Peter Caplehorn

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Building information modelling (BIM) and digitalisation are now key topics in construction. While some in the profession still only read about these, for many they are becoming everyday business ? and for a few, they are changing business out of all recognition.

Many still express doubts, however; where is the proof that BIM will provide the much-?promised benefits, they ask? The answer is that these are not yet available: BIM?s full potential will only be realised when all parts of the profession are operating on a comprehensive and coordinated digital platform.

At present, significant numbers of consultants and contractors are using BIM, but these are mainly the larger companies. While clients are pushing for it, and indeed many require it, progress varies in many areas, especially the supply chain.

The major challenge of the next few years is going to be ensuring the more comprehensive use of BIM, especially among micro, small and medium?-sized enterprises. However, many of these are already moving rapidly into BIM. The supply chain and the manufacturing and product industries are likewise on the cusp of a joined-?up, digital approach, and so is regulation.

Construction regulation

The industry-?wideBIM4Regs steering group has spent time looking at the key aspects of regulation in construction, including planning, the Building Regulations , fire, and health and safety.

The latter has attracted considerable interest, due to the involvement of the Health and Safety Executive , while addressing fire safety has received the support of that particular profession. The core document on health and safety, PAS 1192?-6, is in development; it will become the 6th in the family of BIM standards for the UK, with others due to follow for the European and international markets.

By contrast, planning has foundered, mainly due to other significant changes being made in the area, but this should soon change.

Building Regulations

This brings us to the Building Regulations, with several UK groups working on digital approaches. Some are looking at analysis of the approved document text and diagrams,

others at software that analyses the design, and others again are combining approaches to prevent non?-compliant designs. These commercial approaches are in their early days, and it remains to be seen how they will progress, aside from any measures prompted by the government.

Globally speaking, interest has been fired up by the significant gains to be made from BIM, with Singapore, Scandinavia and the USA having attempted to develop digital codes for their respective construction standards, for example.

Every country has its own approach to compliant construction. UK regulation is based on a target set out at the start of each approved document, followed by guidance that explains how this can be achieved ? an approach allowing for a range of solutions, meaning that is difficult to assess compliance digitally. Countries where a building code defines compliance numerically or by limiting descriptions will find digital assessment much easier.

Fire and accessibility are good examples of qualities where compliance can either be targeted or prescribed, respectively requiring that occupants shall be safe from the effects of fire, or by defining the distance that occupants must travel to reach safety or the capacity necessary to ensure the numbers involved can escape safely.

In design and approval terms, a system where compliance is supported and checked by software will help ensure accuracy and efficiency, both across a team and for a client. The output can be verified and shared with building control surveyors, and in time they will have systems that allow much of their checking and sign-?off to be at least assisted, so they can confirm and approve some criteria digitally.

From procurement to development, using the same data ensures that nothing is lost, and compliance can easily be checked back against the original information. Finally, at handover ? and in use if necessary ? the same information, using actual measurements, will determine far more accurately than we can today the status of the building and its systems.

In the mean time, even though UK Building Regulations are target?-setting principles ? not easy to formalise and often full of grey areas ? progress is being made. Several approaches are being considered to reform their structure.

All elements to which mathematical analysis can be applied, such as the distance an occupant has to travel to reach a place of safety in an emergency or the thickness of materials, can be straightforwardly integrated with the design as it takes shape.

For other areas, machine-?readable data is emerging on materials? ability to perform in a certain way, such as how fire-resistant they are. In time, it will be possible to incorporate the whole marketplace or supply chain into this.

Approved documents

All building design, specification and performance data will eventually be machine?-readable and interoperable

All building design, specification and performance data will eventually be machine-?readable and interoperable, enabling software to track a project?s regulatory compliance. Background calculations can also be run, ensuring that structure, fire safety, thermal and acoustic performance, and ventilation are continuously calculated and recalculated, allowing assessment of how well the design is doing at any stage.

With time, these systems should become even more integrated, devising approaches and even learning for themselves, perhaps jumping steps to arrive at solutions more speedily. This would free the designer to experiment, develop new approaches and achieve compliance sooner.

However, this does not mean that those properly skilled in regulatory compliance will be made redundant by software: automating routine functions will let the design team establish the control and confidence to handle difficult situations.

Access to models

BIM will transform the way building control is carried out. While surveyors will have to acquire new skills, they will also be much better connected to the projects they are reviewing.

In the shorter term, building control surveyors will be provided with access to building information models, but over time they will be able to view the software that is managing data, giving readouts of parameters and, eventually, recommendations of pass or fail criteria.

Clearly, there needs to be certification to ensure that standards are being met. As well as confirming the certification itself, digital systems need to check the project and must be checked themselves, ideally digitally.

The system should be transparent and, if need be, provide the person responsible for checking compliance with robust evidence. Bearing in mind that the data is highly accurate and comes from exact dimensions or certified product information, this should not be difficult.

BIM offers many advantages for building control, including checking and comparing information from both routine and complex situations; integrating building control information and analysis with that from planning applications, the geospatial location of the building and the checking of service provisions or fire separation will complete the picture.

Site revolution

Scanning existing buildings and sites is becoming an everyday activity. Linking the original scanned information with both the approved design and current progress on site, as observed by an inspector, enables the reliable and near-instantaneous assessment of what is being built.

Although the technology is already being used in part on some larger projects, this is only on a stand?-alone basis, so it will not take off until the whole construction industry is using the same systems and compatible software.

Under the recently formed UK BIM Alliance , work is in progress across the industry to try to ensure that everyone is moving in the same direction. The Building Regulations and those who develop, use, certify and are affected by them, are part of this process and should be able to reap the benefits.

In the longer term, we should consider drawing up new regulations and regulatory formats for digital platforms. While it may seem fanciful, the government recognises that this is the future under its Digital Built Britain programme, with work being carried out to understand what BIM may mean for regulators. It is still early days, but there is full support across government for digital working, and it is now a question of ?when and how? rather than ?if?.

This is about built performance more closely resembling, if not matching, designed performance. It is also about taking decision-?making off site. Some may call this using off-?site or modern methods of construction, but the vision is a little more than these terms imply.

If we have a design fully worked out, a supply chain providing every part of it and, as far as possible, all those parts either assembled or delivered to the site in such a way that the only way to put them together is the right way, no decisions need be taken on that site. Everything reflects the agreed, compliant solution. That?s not just modern construction ? it?s smart construction.

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Further information

- Related competencies include Building information modelling (BIM) management
- This feature is taken from the RICS *Building control journal* (June/July 2017)