# BIM'S BLOODY REVOLUTION

## BIM IS AN IDEA THAT ON PAPER, OFFERS UNDENIABLE BENEFITS AND SHOULD BE WIDELY ADOPTED. IN REALITY, IT'S NOT THAT STRAIGHTFORWARD. ANDREW NORRIE EXPLAINS

The biggest challenge for building information modelling (BIM) is not technical, but human – it's resistance to change and BIM doesn't offer a gentle change in attitude so much as a bloody revolution.

In industries such as mechanical engineering, the transition from 2D to 3D through to all-encompassing 'cradle to grave' solutions (product lifecycle management) was gradual. However, the construction sector has been stuck in 2D CAD environments for more than 20 years and with the arrival of BIM, most of the industry suddenly found itself having to adapt to working in 3D. In an industry dominated by large corporates, where those in management are facing unfamiliar technology, there is a natural reluctance to change.

On the bright side, in a world where children are growing up with smartphones, high-performance gaming devices, 3D interaction and virtual reality headsets, we are seeing a generation that is completely at home with new technologies. The construction industry is vibrant and recruitment is bringing in graduates and trained technicians who are proficient in 3D modelling and the technology behind BIM.

However, while new arrivals in the workplace – the so-called millennials or Xbox generation – are more tech-savvy, they don't yet have control over projects and convincing those above of the benefits can often be an uphill struggle.

Ten years ago, when BIM was in its infancy, the plethora of entrenched legacy systems was a big problem. It remains an issue today, with large companies lumbered with major IT investment and software that is familiar, despite being seriously outdated. However, there is now wide adoption of industry foundation classes (IFC), an open standard data model developed to facilitate interoperability in the building industry. IFC has become a global standard for BIM data exchange.

When 2D digital mapping first arrived, you could go off and make a cup of coffee while the computer slowly processed the data and eventually a complete map appeared. Computer memory and storage has grown exponentially but the hardware in most organisations has historically been geared for 2D. Start playing with 3D models and the current hardware just cannot cope with the large file sizes.

## The power of the cloud

This is where the cloud becomes important. Using a cloud service such as 3D Repo enables project stakeholders to share large data sets without having to worrying about file type, hardware or specialist technical skills. The system loads models and data directly into either the web browser or virtual reality headset, over the internet, and provides an easy to use interface so all stakeholders can engage.

In the geospatial world, online maps first appeared two decades ago and Google Earth really brought mapping to the masses, although it appears to be taking longer for professional GIS to make the move. For BIM, the benefits of the cloud are more significant. Firstly, the whole industry functions on collaboration; you have hundreds of participants in a construction project from architects to planners, consultants to builders, plumbers to electricians. Walk into any construction firm and you'll find meeting rooms full of stakeholders discussing progress and, in many offices, you'll still find people huddled over piles of 2D drawings struggling to work out what went wrong and when!

BIM of course aims to bring everything – all those plans and data – into a single model that everyone can access. However, using conventional software systems it has been really difficult, if not impossible, to implement BIM in the way it was envisaged. Different parties have different systems and it's often a case of transferring files from one tool to another to update the BIM model. Main contractors have invested in BIM software and the people to manage it, but for smaller contractors, it is costly and requires extra resources they do not have or necessarily need full time.

Using the cloud as the platform for communication offers the potential to resolve these technical issues that have so far held back BIM. In fact, without the cloud, BIM could never reach its potential and all the promised savings would not be achievable
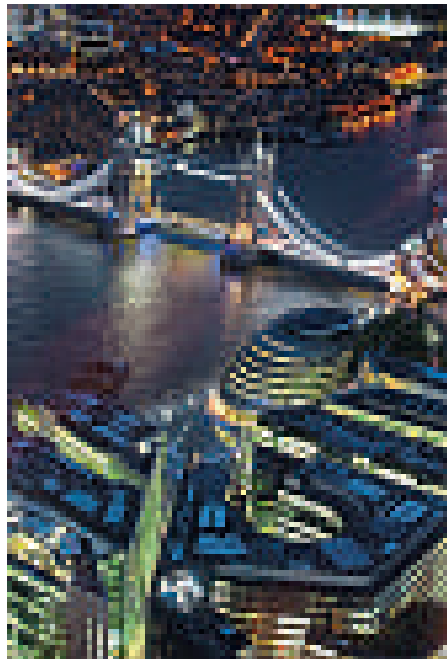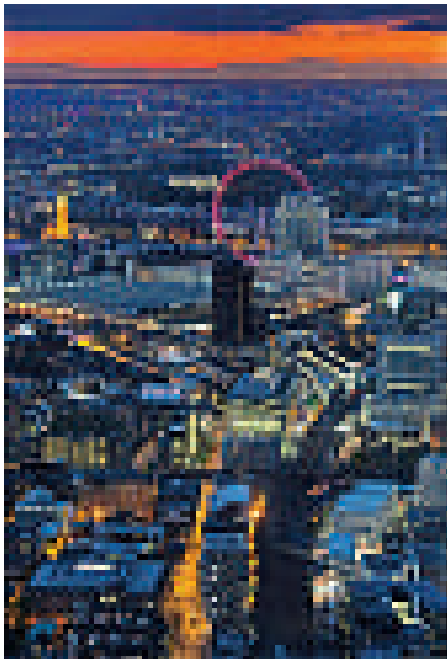
## BIM needs openness

Despite an industry built around collaboration and daily communication amongst stakeholders, BIM requires openness and more sharing of information. This means that things that could previously be 'hidden' are now accessible to people with the right credentials. Naturally, this level of transparency is quite different from the working practices of the past and can contribute to the resistance to change.

Although the industry is starting to accept that cloud computing is the way forward, objections are often raised due to concerns about data security. It's no surprise, since many of the largest projects involve public buildings and key infrastructure, such as transport hubs and nuclear power stations. However, it is also accepted that for the vast majority of organisations, their internal servers are less well protected and less resilient than high-security internet servers, and thousands

of SME contractors are simply not equipped to store and communicate securely. It's also worth noting that current data exchange often involves attaching files to emails something that is far from secure.

So, although a fully encrypted cloud collaboration solution provides the most secure platform to date, a spate of recent cyber-attacks is an important concern. The European Commission's 'Horizon 2020' Cyber security project is backed by a project fund of €5m and involves a consortium of 11 leading IT companies including CNR, Italy's National Research Council, HP Enterprise, BT, SAP and 3D Repo. The aim is to define a collaborative and confidential information sharing, analysis and protection framework as a service for cyber security management.

## BIM needs to succeed

BIM will ultimately require commercial success to be proven and that involves working towards practical applications. 3D Repo is already delivering real-world solutions to the likes of Balfour Beatty, Crossrail and Canary Wharf, and is looking to commercialise these with new versions of the software and further investment.

More recently there has been keen interest from those dealing with infrastructure projects to create solutions that integrate GIS and BIM data. One notable example is a project called Visualise, led by Skanska with partners
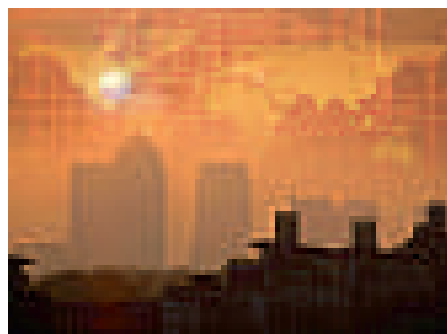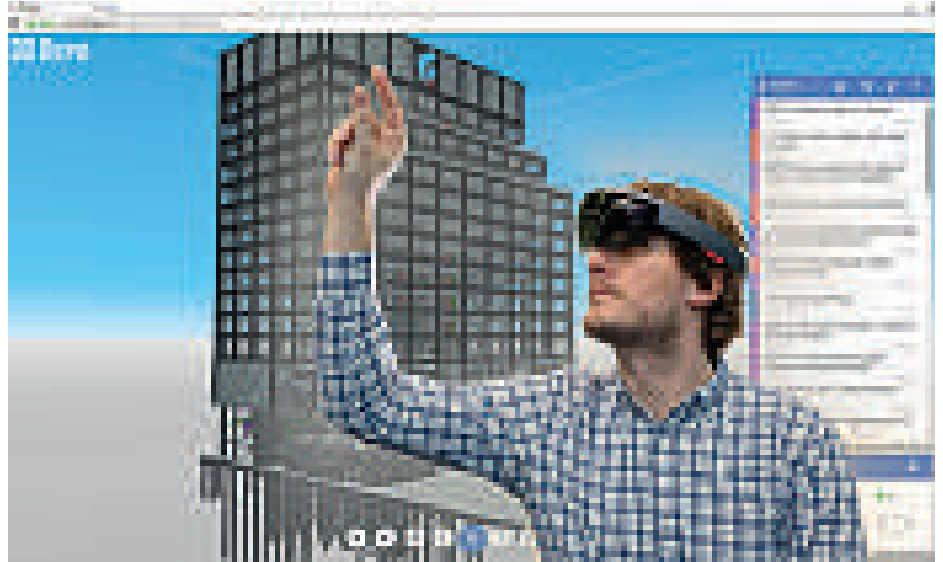






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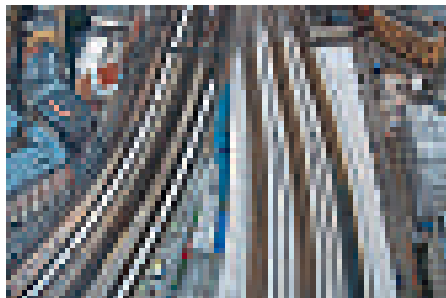
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Building Research Establishment (BRE), UNIT9, 3D Repo and CartoConsult. Our objective is to bring together data from BIM, GIS and other asset databases in a single, integrated and accessible platform, where data relating to every aspect of an infrastructure project can be visualised and analysed.

While addressing the human challenges posed by the revolutionary change that BIM brings, the success of BIM will come down to creating an easy, workable and accessible solution – one that can incorporate all manner of disparate data seamlessly- in a safe and secure environment.

## THE SUCCESS OF BIM WILL COME DOWN TO CREATING AN EASY, WORKABLE AND ACCESSIBLE SOLUTION

*Andrew Norrie is commercial director of 3D Repo (www.3drepo.org)*

## A COMPLETE RETHINK

The cloud alone is not going to help – it's the applications that are on offer and their suitability, affordability and return on investment. In accepting the changes that are affecting the wider IT world, it's important to create and manage data in a format that people are familiar with.

BIM collaboration needs a complete rethink to take into account the potential of the cloud. For a start, the traditional file system approach (such as Dropbox or Business Collaborator) widely used needs to be abandoned. The huge diversity and amount of data in the BIM world – it's a lot more complex even than GIS – means elements need to be broken down and stored at object level. Traditional relational databases such as PostgreSQL store data in rows and columns, but with an unstructured document approach (termed a NoSQL database) additional information can be attached to support many different functions dynamically without affecting the rest of the system.

Without rigid table structures, databases can be optimised for large read/write operations. This allows easy access to associated objects, tracking of relevant communications and revisions and the creation of associations with other 2D and 3D data or objects. The 3D model can then be recreated in a web browser, giving access to any data associated with each object in the context of geographical information loaded from other sources, provided the formats are understood by the cloud system.

As 3D Repo can take objects from all the disciplines working on a project, incorporate them, break them down into small component parts, and store them online. Since it holds the data as individual objects, it can put together models in any configuration – architectural, structural, MEP or infrastructure, as well as federations of all of the above. This enables project members to share data on the project, at any stage of its design and construction, using the building collaboration format (BCF) standard within authoring tools.

3D Repo also acts as a version control system, ensuring that data from any source is always up to date or can be rolled back to previous revisions. It can also visualise changes between any two revisions, in real time, regardless of which modelling package they came from.