

*BY MARK KING, EMEA BIM SOLUTIONS
MANAGER, LEICA GEOSYSTEMS*

How Industry 4.0 and BIM are Shaping the Future of the Construction Environment



The construction industry is on the cusp of a new industrial age. The fourth industrial revolution, or 'Industry 4.0', will see construction coming in line with more digitally developed industries. This will revolutionise not only how physical structures are designed, built and maintained, but also how they are subsequently used, believes Mark King from Leica Geosystems.



What it means in reality is open to interpretation and the ability to future-gaze. Some anticipate it will mean the use of smart materials and technologies to make our buildings intelligent. Others envisage that it will come to mean autonomous machinery carrying out aspects of production, with minimal human input. But what is commonly agreed is that it represents the use of technology to fundamentally improve the way we design and construct the world around us.

Better availability of relevant information, rapid issue resolution and collaborative working in the design, construction and operation of projects are among the key ways in which digitalisation is improving efficiency and resource use. As a result, engineering and

construction companies plan to invest 5 percent of annual revenue in digital operations solutions per annum over the next five years¹.

At a global level, one practice that is helping to define what industry improvements are possible in the here and now through available digital tools and practices is building information modelling (BIM).

Leaving behind the past

It is not disloyal to say that the construction industry has some challenges to overcome. For centuries the industry has been associated with delays and unforeseen costs, and the precedent for this has led to these failings being accepted as inevitabilities. Industry 4.0 represents an opportunity to evolve and set a new precedent for what is possible, not what has gone before. BIM is the first step in this evolution by attempting to create a central repository to collate digital information about a project or asset.

Even the most precision-based aspects of the industry have been reliant on analogue techniques and processes that come with too much room for costly mistakes. A good example is the tape measure, a tool still used on every construction project around the world but one that relies solely on the ability of the user to interpret and document the results. But this kind of analogue data does not facilitate a collaborative ecosystem needed for today's construction projects.

The value of digital data

A key component of Industry 4.0 is digital data. With increased access to accurate, real-life data throughout all stages of an asset's lifecycle – from design through to construction and maintenance – time and cost efficiencies can be found and errors reduced. The benefits of digital data are already being seen to a degree through initial adoption of BIM. Yet, often, the creation of digital assets to represent the built environment is not based on the real-world data and therefore BIM is not being used to its full potential.

Geospatial experts play an important role within BIM because they can map and position complex, digital data in the real world defining how, when and where a project can be constructed. Conversely they also have the ability to inform the creation of the 'digital twin': a digitised version of the physical asset based on what exists in the real world. With comprehensive geospatial knowledge of the intended site, alongside the stream of digital data captured on-site, errors and delays do not need to be inevitable.

Trust & Collaboration

The availability of digital data, whilst significant, is only a small step in bridging the gap between the analogue ways of working of the past and the construction industry's digital future. Industry 4.0 is underpinned by cross-industry trust and collaboration. Geospatial engineers, surveyors, designers and contractors will need to come together, freely exchange information and collaboratively solve issues as they occur, to maximise the benefit of free-flowing information. For instance, regular ongoing digital data capture and validation procedures of on-site conditions allow project teams to identify discrepancies between design intent and the actual construction. Any disparity can be captured and fed back into the project's digital environment to allow designers and contractors to assess and make informed, real-time decisions on remedial action, thus preventing costly mistakes from occurring.

Surveys, including one by the BIM Task Group in the UK, indicate that awareness of BIM is becoming widespread. However, comprehension of how it should be implemented remains inconsistent; BIM's roots in software still lead some to believe its only relevance is as a 3D modelling tool. This often means BIM's true potential – to guide all parties from initial planning stages through construction to building usage and maintenance – is not fully realised.

A common understanding of how the potential of BIM can be maximised and a joint effort to implement it will have a dramatic impact in bringing forward Industry 4.0. In practice this means all parties involved in a project – from design, planning, construction and maintenance – are working from and feeding into the same BIM data environment rather than working with segregated models or collecting data that is used in isolation. This requires an unprecedented level of collaboration and trust.

A vision for the future

If Industry 4.0 is to be achieved, companies will not only need to ensure staff have the right expertise and culture but also a clear ambition and vision for what success looks like. A good example of this is the UK's BIM Alliance. The British body made up of industry representatives advises how BIM – and, more widely, digital construction practices – can be utilised across sectors. To champion the end goal of BIM rather than its technical components, Anne Kemp, chair of the BIM Alliance, pragmatically defines BIM as 'Better Information Management'.

Similar advisory bodies in other markets, promoting how digitisation will enrich the sector and providing practical advice on how to work collaboratively with new technologies, could help drive Industry 4.0 forward. And by promoting the Industry 4.0 ideology we can all move our industry into the future and reap the benefits.

Further Reading

For more information about unlocking the value of BIM, please see Leica Geosystems' [whitepaper](#):

¹ Source: [PwC](#): 2016 Global Industry 4.0 Survey - Industry key findings

About the author

Mark King is EMEA BIM solutions manager for Leica Geosystems. Mark joined Leica Geosystems in 2014 and is focused on Leica's BIM Field Trip solutions that link the office and construction site through 3D data.