

DIGITAL CONSTRUCTION WEEK 2019

Seeing the Future: AI, BIM and Digital Twins



During Digital Construction Week (DCW), which was held at the Excel in London from 16-17 October 2019, there was one seminar stream on geospatial surveying and two specifically on building information modelling (BIM). But relevant topics such as artificial intelligence (AI) and visualization, as well as BIM, cropped up in many of the other sessions. The most used buzzword was '*digital twin*', which was heard in many talks and in the exhibition booths.

The term digital twin is used quite flexibly, but essentially it implies that an object must have a digital representation

which can be presented visually, i.e. a virtual object. At a more advanced stage, the components of the object, represented digitally, can be controlled and updated and can be interrogated in real time. They can be linked to the Internet of Things (IoT) and analysed with artificial intelligence (AI), usually operating in the cloud.

So, what are the main developments and what is their impact on construction and, in particular, geospatial practice?

A presentation on the Main Stage by Anne Kemp (Atkins and the UK BIM Alliance) gave an excellent summary of the current position. BIM is clearly a driving force and new publications from the UK BIM Alliance set out the [framework](#) and stress the need for a common framework and for standards. The relevant publications are the second edition of Guidance Part 2: Processes for Project Delivery with additional insight on the activities associated with ISO 19650-2 clause 5; and the updated Guidance Part 2. The UK BIM Framework is also releasing revised guidance for the public sector on applying BS8536 parts 1 & 2 – Government Soft Landings.

□ Robots are everywhere, but how useful are they?

National Digital Twin

It is essential that all partners in the construction/build/maintenance cycle speak the same language and avoid confusion and this becomes even more important when we consider the ambitions of a digital twin. The objective of a (UK) National Digital Twin involves connected digital twins creating an ecosystem, embracing transport, energy and the built environment.

The [Gemini principles](#) support this through requiring a clear purpose, being trustworthy and functioning effectively. The concept of the Golden Tread, linking all changes in a building, was held up as an ideal which could have saved lives in the Grenfell Tower disaster.

All of this is promoted and developed by The Centre for Digital Built Britain (CDBB) which is a partnership between the Department of Business, Energy & Industrial Strategy and the University of Cambridge, to deliver a smart digital economy for

infrastructure and construction for the future and to transform the UK construction industry's approach to the way we plan, build, maintain and use social and economic infrastructure. [CDBB](#) was presented as an organization to develop this digital nirvana which could help reduce our carbon footprint and reduce air pollution.

Artificial Intelligence

AI was another major topic in the conference and seminars and an important rhetorical question being asked was 'what can robots do?' There were few answers to this. A concrete example of successful AI was the UK start-up [Vercator](#). David Selviah from Vercator discussed the problems of extracting information from scans and the challenge of processing big data. He did, however, show that AI could identify features from point clouds such as planes, edges and specific objects such as chairs. He also painted an optimistic picture of future research and stressed the value of the cloud to speed up processing and store large volumes of data.

Matt Armstrong-Barnes from HPE stressed that AI needs to be used appropriately and that it is particularly good at finding anomalies and for identifying safety issues on construction sites. It has been shown to be very effective at spotting defects in aluminium.

A survey has shown that 40% of digital companies see AI as essential. He said that much work has been done but that it needs to be put together to solve problems.

□ A key message repeated around the hall.

InSAR and BIM

Maria De Farago from Telespazio presented developments in the use of SAR interferometry. De Farago demonstrated how InSAR from satellites could be used for Structural Health Monitoring (SHM) and asset management using a development site near Excel. The InSAR data can be integrated into a BIM model. This involves no in-situ instrumentation and can measure building deformation to centimetre level. InSAR monitoring can also be used to predict landslips.

Many geospatial companies were present at the exhibition including Bentley, Bluesky, FARO, GetMapping, Hexagon, Korec, Leica Geosystems, Murphy Surveys, Plowman Craven and Skanska. Companies such as Royal Haskoning DHV offered services in the fields of aviation, buildings, energy, industry, infrastructure, maritime, mining, transport, urban and rural development and water, and set great store by the digital transformation and supporting a sustainable environment.

Virtual, Augmented and Mixed Reality

Virtual Reality and Augmented Reality were centre stage during the Visualization Track of the seminar programme, proving that both technologies are more than just a buzzword. VR can be a fantastic tool for training purposes; however, the isolated nature of VR headsets is not always a very suitable solution. Igloo Vision demonstrated a different way: shared VR in projection domes or cylinders, allowing for whole teams to be immersed not just in training scenarios but also in BIM.

While many professionals are getting familiar with VR and AR, mixed-reality is less mainstream. Augmented reality is delivered through a handheld mobile device (a smartphone or a tablet); mixed reality is delivered through head-mounted see-through glasses. Mixed Reality is a fusion of real and virtual worlds, enabling the production of new environments and visualizations where physical and digital objects co-exist and interact in real time.

[Keltbray](#), a leading UK civil engineering group, demonstrated how they incorporated Microsoft HoloLens mixed-reality headsets into their planning and proposal stages of development. Thanks to this forward-thinking approach, they are able to enhance and optimize the process, reducing costs and inefficiencies at early stages, allowing a collaborative environment between developer and services provider.

□ A typical seminar session at the Digital Construction Week.

Conclusion

Overall, the exhibition and presentations at [Digital Construction Week](#) can be seen as a dichotomy between the here and now, characterized by instrument companies and survey companies aiming to make money from supporting the construction industry, and those looking to make money in the future by exploiting digital technology. Since many contractors in the Architecture, Engineering and Construction (AEC) industry are lagging behind when it comes to embracing the digital transformation, there are still many opportunities ahead for the geospatial world.