Ordnance Survey Demonstrates BIM Potential with Pioneering Project in Singapore

By combining building information modelling (BIM) with geospatial technologies, Ordnance Survey (OS) is breaking down barriers in Singapore. OS has spent two years in the Southeast-Asian nation championing the use of BIM data and its potential to transform urban planning. Britain's mapping agency lent its expertise to a project with the University of Singapore and the Singaporean government that aims to make Singapore a world leader in smart technology. OS's role was to develop data processing and 3D data modelling to help Singapore plan its future city more effectively. It contributed knowledge about the CityGML data model, an exchange compatible with BIM that stores digital 3D models and cities, so that data can be automated.

Limited space

This comes at a vital time for Singapore. The densely populated country, roughly the size of London, has ambitions to grow from 5.5 million to 7 million people. But space is limited. Housing is high rise, with people living in 30 to 40-storey buildings. At the same time Singapore has a height restriction on new developments because of airports at one end of the city.

OS senior technical product manager, James Crawford, said: "There is a real premium on space, and a real premium on space for people. They have got ambitions to grow their population, but they have constraints from their geography, and all the different demands they are trying to manage as a city nation.

"Not just where buildings fit it in, but what it looks like and how. They have a real need for managing construction design and development, because how do you meet those challenges? The investment they have chosen to make is in digital copies of their buildings. This essentially is where BIM models could provide an ongoing resource for them to use."

Lego for buildings

For the construction industry, using BIM data is a step forward because it pulls together every element of the building process into one place, from each domain, using an exchangeable data format. Historically, for example, design teams, or electrical teams, stored their individual data in different formats and places. Working together in BIM gives a clearer and more rounded vision for everyone involved.

"It's hard to get your head around the complexity involved in making a building come to life," said Crawford. "You have many different specialisms across engineering and design each with their own data formats. But with BIM, it is like having Lego for buildings. To a level of detail where even the type of light bulbs, door handle materials can be specified – potentially everything that the construction, planning and engineering teams use to put the building together. It is insanely complex, but BIM gives you a road map for getting there easier. All parties can comprehend it."

Digital city model

Singapore's geospatial industry and urban planning departments are responsible for deciding what the city will look like in 20-30 years' time. Having more data, such as BIM, enables them to plan and design areas with specific groups in mind, such as the young, the elderly, and community groups. Construction can take two or three years, so if urban planners can access information at the earliest stages, preferably before new buildings are built, it affords time to make changes that impact both the building and the outdoors environment.

James said: "Both the urban planning and geospatial teams have access to new information that they didn't have access to before. They can now improve the depth of analysis they can do, by extracting the information they need from BIM models. For example, if you want to optimise pathways and mobility access between the indoors and outdoors, are the current building plans achieve this result? How do you figure out what and where changes are required? You need connected digital models to do those types of analysis."

He added that Ordnance Survey had made important steps towards helping Singapore's construction and geospatial industries, by encouraging the use of Open Geospatial Consortium's City GML data standard. This was having a galvanizing effect on getting both sectors to collaborate.

James said: "Building trust and relationships between the construction and geospatial industries is paramount. The construction industry knows what is going to be built. The geospatial industry knows about location and context. Consequently, geospatial planners, who plan what the geography of urban areas is going to look like in the future, they have some requirements that can influence what gets built in the

first place. There is kind of an iterative circle.”

Removing the technical complexity

OS is working alongside other leaders in the domain, such as the Centre for Digital Built Britain (CDBB) programme for Digital Twins to ensure the learnings discovered from the research project in Singapore can be transferred back home. Despite the obvious geographic differences, and the time taken to adopt emerging technologies such as BIM between both nations, Crawford believes a lot of aspects from the project offers value if implemented in the UK context.

He said: “The use cases that were developed, and the requirements for information that planning departments need, is applicable here, because we have urban planning departments in local authorities that are all looking at how to manage space more effectively and so on. The key thing to get across is to remove the technical complexity so people can have a conversation. The world is becoming more complicated at a speedy trajectory that is hard to keep up with.”

“When you have senior decision makers that don’t understand the technical detail, it’s our job to simplify this right down and explain why it is worth investing in technologies that improve collaboration and how beneficial this can be when planning cities in the future.”