Singapore summit

Milestone for Infra Room with project funding

With over a hundred delegates, including a large group from China, it was a busy week in Singapore at the buildingSMART standards summit during 12–15 October.

With 27 activities underway, drawing on the expertise of delegates from 24 nations, all five of the buildingSMART rooms reported progress at the end of the week.

MOU agrees funding

The Infra Room took a major step forward with the signing of an MOU to fund its IFC projects. The release of the Alignment 1.0 project was widely welcomed earlier this year. Now three national authorities – the Finnish Transport Agency (Liikennevirasto), the Dutch Rijkwaterstaat and the Swedish Transport Administration (Trafikverket) – have agreed to fund the completion of the alignment extension project, Alignment 1.1.

Funding has also been committed to other Infra Room projects: a requirement definition from the asset management perspective, a project definition of IFC Roads and future country-specific deliverables. A total of €158,000 has been committed in an agreement that runs for a 14-month period. 'We have seen a drive to achieve results at this summit, culminating in this most welcome funding from Finland, Sweden and the Netherlands,' said Henk Schaap, Infra Room leader.

Also within the **Infra Room**, there were plans to set up a working group for an integrated digital built environment (IDBE), and confirmation of the alignment deployment with pilots in France, Korea, Japan, Russia, Australia, China and Sweden. An overall architecture working group is to be established, and a master list of integration issues was developed. Project summaries

for IFC Bridge and IFC Roads and Railways were accepted. The Infra Room welcomed the participation of the China Railway BIM Alliance, acknowledging its pioneering work on IFC Rail (see page 2).

Other progress

Over in the **Building Room**, five areas were formally recognised as immediate candidates for developing a model view definition (MVD) or use case: handover to FM, energy simulation, scheduling, quantity take-off and annotation. Early steps were agreed to explore prospective projects in façade design and fabrication, model set-up and an IDM configurator.

The **Regulatory Room** commissioned one of its members to draft a letter of intent for government regulatory authorities committing to support BIM – thereby securing buy-in and expediting a BIM-based e-submission process. It also resolved to set up a project to seek a common way of representing regulations, ie one that is not 'hard coded' into any particular tool.

The bSDD, within the **Product Room**, has formed a new working group on product data templates and took the opportunity offered by the summit to set its priorities. It also agreed to form a group on classification to explore a standard approach aligned with buildingSMART standards.

The **Technical Room** considered the short-term and long-term maintenance of standards, the latter

Clockwise from top: Signing of MOU in Singapore; knowledge-sharing between sessions in the Infra Room; discussion of linked open data

planned as a roadmapping exercise. With the explosion of activities, the Technical Room recognised the need to understand the bigger picture of where technical guidance is needed, to enable collaboration and avoid redundancy. A linked data working group on ifcOWL is to be set up formally (see page 2).

In **compliance**, preparation for certification to IFC4 and the new GTDS (global testing documentation server) were explained.

Responses to the summit

The range and ambition of activities were acknowledged by the delegates, who had found the week energising. One delegate summed up his impressions: 'My positive take-aways were that a workable system has emerged from the buildingSMART community that would enable an organisation or project to sustainably deploy level 2 BIM, and that the community is highly talented and capable.'

The Semantic Web and IFC

If you google 'building information modelling', you get over 9 million results. If you google 'Shakespeare' you get 115 million results. That is the power of the web. But is it powerful enough?

'The Semantic Web will [create] an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users,' wrote Tim Berners-Lee, originator of the World Wide Web, back in 2001. '[This] new form of Web content that is meaningful to computers will unleash a revolution of new possibilities,' he said – an idea that has been gaining ground ever since. At that time, the web already allowed access to unimaginable amounts of information, with links to other documents – but they could only be understood by humans. Documents did not talk to each other. Nowadays, Semantic Web technologies offer a whole new level of data exchange on the internet.

At the heart of the Semantic Web is the data model known as Resource Description Framework or RDF, complemented by the Web Ontology Language or OWL. This extension of 'web technology stacks' – the collection of software needed for web development – allows the modelling and linking of logically consistent information identifiable by a string of characters known as a Uniform Resource Identifier (URI) across networks. It has exciting prospects for the construction industry.

'The Semantic Web technologies have the potential to enable building data to be linked across various sources, including those outside the traditional building environments,' says Pieter Pauwels from Ghent University, who co-chairs the Linked Data Working Group that is being formed within bSI.

What is the role of IFC in this developing field? At present, the IFC data model is available in the EXRESS or XML formats. To join in the semantic web, IFC would need to be available in the OWL format. This sounds like a daunting task, but much of the groundwork has been done.

'For the past ten years, there has been an academic interest in making IFC available as an OWL ontology,' says Jakob Beetz, from the Technical University of Eindhoven and co-chair of the Linked Data Working Group. 'The momentum has recently increased and we now have reached consensus regarding a reliable ifcOWL ontology.' The Linked Data in Architecture and Construction (LDAC) workshops – the most recent held in the Netherlands in July 2015 – have shown how mature the work has become.

The time is now right for action by a buildingSMART group in this area. At Singapore, the working group agreed to formalise its status. The group is finishing the work and the consensus-building on the ifcOWL ontology, which will ultimately become a buildingSMART standard. Since most of the essential work is already done, the group aims to complete its efforts by spring 2016 in order to finalise the standard and seek accreditation during buildingSMART's spring summit. Subsequently the group will provide support to those using the ontology.

Once ifcOWL is up and running as a standard, all sorts of possibilities open up on the Semantic Web, linking in to weather data or sensor data and integrating a BIM with standards from other fields.

'Singapore was a milestone in bringing our ifcOWL efforts into buildingSMART,' concludes Pieter. 'With project-based inputs provided by experts from the construction industry and expertise from Semantic Web technology professionals, linked building data is well underway, shaping the future of data exchange in construction.'

To find out more about the group, contact pipauwel.pauwels@ugent.be or go to http://www.buildingsmart.org/standards/standards-organization/groups/linked-data-working-group/.

News round-up

Board meeting

A buildingSMART board meeting was held in London on 27 October in the morning, with board members Tiina Koppinen, Jan Myhre, Dirk Schaper and Rasso Steinmann all present, along with Patrick McLeamy, Richard Petrie and Chris Groome. Recruitment of new members was among the topics discussed, with the board members asked to use their own networks to boost bSI membership.

SAC meeting

In the afternoon of 27 October a meeting of the Strategic Advisory Council was held. The board members also participated. Strategies for the future were discussed, with strong support for early deployment of IFC4 and the alignment standard.

Chapter charter

A buildingSMART/chapter agreement – the chapter charter – is in draft and has gone out for review to chapter leaders. The aim is to get it into operation for fiscal year 2016. If your chapter leaders have not yet received a copy, please contact Chris Groome.

BIM standards for China's railways

The Singapore summit heard about China's ambitious programme for its railways. The country has 112,000km of railways, including 16,000km of high-speed railway (HSR) – more than the half of the world's total HSR. In 2013, the China Railway BIM Alliance was set up to promote the use of BIM on the country's railways. Three standards are being created: a railway BIM classification standard (deriving from ISO 12006-2, completed in 2014); a railway BIM data standard (underway, based on ISO 16739 or IFC4); and a railway BIM delivery standard (early development, based on ISO 29481). There is huge scope for BIM applications, from station architecture and structure to tunnelling work, from offsite steel fabrication to simulation and planning. Where IFC objects and property sets exist, the standards are being used. In addition, a new alignment and chainage standard is being developed and will be used. China Railway has agreed to seek buildingSMART International accreditation for its standards and will work to integrate them with the IFC standards and definitions for alignment, roads, tunnels and bridges.

A global approach to user certification

As BIM gains traction around the world – and is already mandatory in some countries – client companies want to be confident that their supply chain is competent in BIM. Certification schemes are emerging to meet the need. Is there a role for a buildingSMART framework scheme to help achieve a globally high standard of certification?

In parallel to its software certification, which has been available since 2001, bSI is just entering a new and exciting area – offering high-level guidance and certification for training providers. To kickstart the process, an international user certification task group was formed in October 2014 and is now working on a scheme for endorsing training and certification organisations, distilling best practice from existing work in chapters.

BuildingSMART Norway, for example, provides a set of teaching curricula that course providers are free to use. Anyone registered on a course can also take the web-based exams to achieve certification. The curricula and exams are available in Norwegian and English. BRE's courses in the UK are also offered as a model for this initiative. And the Korea chapter provides a certification system where participants can opt for one of four levels of qualification.

The buildingSMART group, with members from Canada, Norway, Germany, Finland, Korea and the UK, has defined the minimum learning outcomes expected from a basic two-day course on BIM (BIM maturity levels, model federation, bSDD benefits and model view definitions are among the 35 or more elements identified).

The aim is to provide bS guidance on training and certification at three levels: fundamental, professional and academic. Course content from UK and Norwegian sources is being analysed and adapted as buildingSMART develops the framework.

Once the bSI user certification scheme is up and running, how would a training organisation use it? The trainer will use the bSI learning outcome framework, together with tools developed by the local chapter, to structure its BIM course. It will then submit the course material to buildingSMART, where the local chapter and bSI will review it, and if the course satisfies the audit, certification will be awarded.

What do the group members think?

Inhan Kim (Korea),Steen Sunesen (Norway) and Nick Tune (UK), members of the user certification group, take questions from Betzy Dinesen

What could a buildingSMART framework for certification offer?

IK Through a BIM education framework, we can provide practitioners with a BIM training service that is structured to their needs.

SS As BIM projects become mainstream, software of a proven quality, good company performance and individuals with BIM knowledge are in high demand. At buildingSMART we can help the industry by specifying basic requirements for minimum performance.

NT There are so many BIM standards in the world and different angles as to what BIM is. It is important that bSI states what open BIM is and the skillsets required to deliver it.

What steps need to be taken if we are to develop a buildingSMART framework for user certification?

IK To develop our own framework for certification, schemes offered by individual chapters should have common parts and a similar accreditation process which are mutually agreed.

SS And we need to standardise the framework components. For user certification, that would involve basic definitions like roles, stages, expected learning outcomes and a taxonomy of education.

NT We need to agree on a 'learning outcome framework' for open BIM; bS Norway has done this and produced a curriculum that training organisations should use. I recommend we roll it out across the world.

Are there any obstacles to developing this buildingSMART framework?

IK We need to set a global educational standard, and an early task is common educational materials or requirements as well as standards.

SS Business processes and models as well as business culture vary a lot between countries. Those differences are the main obstacles, not the technical part. The way to overcome them is to break down the standardisation process to a global core of common definitions and allow flexibility into how they are implemented locally.

NT It is obviously difficult, as so many countries have their own BIM standards and people have different views on what is important. That's why we should focus only on open BIM and the skills required to deliver it.

Bringing BIM to a heritage bridge

Every year 5 million pedestrians and cyclists cross the Pyrmont Bridge at Cockle Bay in Sydney. Opened in 1902, it is the oldest electrically operated swing span bridge in the world. Although it has been closed to vehicles since 1981, repair, conservation and maintenance have remained a complex business.

Until this project, the annual condition assessment was a manual paper-based process, taking up to four months from inspection to report delivery and determining the work packages for maintenance – hardly surprising, with some 8,000 structural timber components to inspect.

Surely, in the 21st century, there was a better approach to asset management?

The Sydney Harbour Foreshore Authority (SHFA), which owns and manages the bridge, had been monitoring the evolution of BIM and the potential benefits of applying the technology to an existing structure. Modelling the bridge, it believed, would provide immediate benefits, such as the ability to pinpoint elements with accelerated deterioration, to streamline engineering assessments and to inform the work package tendering process better.

Creating the BIM model

As the BIM project was developed, SHFA worked in collaboration with the New South Wales Roads and Maritime Services (RMS) to develop the brief. The task of creating the BIM model was given to the engineering firm, GHD, which produced a model of 927MB, using a BIM platform developed by the Australian software company, Zuuse. The model had to follow the National BIM Guide from the standards authority, NATSPEC, and to use the IFC and COBie standards. It also had to be compatible with the SAP asset management system used by SHFA. And importantly, from a local perspective, it followed the Heritage Conservation Guideline, the Burra Charter.

Outcome

The project has transformed the way that the condition assessments are done. Manual transcription of data is a thing of the past, and data is now entered once, on-site, using portable tablets. Photos are also taken and linked to the records using smartphones and iPads. The new data is synchronised with the SAP system and 3D colour visualisations can be generated. Digital reports enable certifying engineers to monitor and project the structural integrity of all bridge elements to determine where remedial work is most needed.

The model can also be used for remediation tenders, with contractors using the model to develop submissions, dramatically reducing construction risk, complexity and preparation time.

The first BIM inspection achieved a 30% saving on inspection costs for SHFA, a figure which is expected to improve as the new system beds in. Going forward, SHFA will apply 3D BIM to a number of local heritage buildings, while RMS is conducting a similar tablet-based inspection trial on a number of timber bridges.

A longer version of this case study will be available on the bSI website. YouTube has several videos of the swing span bridge in operation.
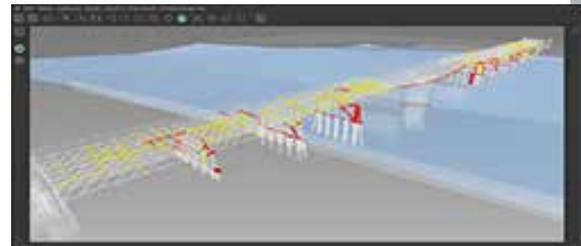
Clockwise from top: Pyrmont Bridge and Cockle Bay; old photo of bridge; model of bridge showing original v non-original fabric deterioration; information being entered on a tablet in situ; inspecting the bridge

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Global standards for openBIM