IFC4 poised for wider reach as ISO 16739 launched

IFC4 becomes an ISO standard

In spring 2013, the new release of IFC was formally published as an ISO standard – ISO 16739. At the end of a long and meticulous process, IFC emerges stronger and better, and ready to win new fans around the world.

‘Accreditation of IFC4 was a welcome achievement after the efforts of everyone involved,’ says Thomas Liebich, AEC3 DE, who led the work through buildingSMART’s Model Support Group. ‘At the last round of voting, the response to ISO 16739 DIS [Draft International Standard] was overwhelmingly positive – 11 ‘yes’ votes and zero ‘no’ votes. It doesn’t get better than that.’

Route to accreditation

The process has involved intensive internal and external reviews to highlight and resolve the issues. As the process took its course, the IFC4 issue database accumulated a total of 1,100 issues that had to be resolved. ‘Software companies usually come in late in the review process,’ explains Thomas. ‘And there was more feedback on the last release candidate than ever before.’

Benefits of ISO accreditation

ISO accreditation carries clout around the world, offering reassurance that the standard has undergone the stringent ISO process. Many public sector clients – especially in Asia – will make use of an ISO standard as a requirement on a project, which means that IFC and open BIM will reach new constituents around the world. This is something that an industry standard cannot always do on its own.

As Thomas emphasises, IFC is the ‘only open, comprehensive and international standard covering most of the workflow in construction projects which uses BIM’. Other standards, whether national or international – cover only certain parts of the workflow, such as energy modelling or FM asset definition. So the ambitious coverage of IFC4 gives it a powerful edge and enables support of numerous new workflows, enhanced by its new status as a stringent ISO standard.

‘With IFC4 now a fully fledged ISO standard, a new world of implementation and use of open BIM on projects lies ahead,’ says Thomas.

Timeframe ahead

The next step is for the software vendors to incorporate IFC4/ISO 16739 in their software interfaces, which is likely to happen from mid-2013 to mid-2014. Then buildingSMART will certify the quality of the implementations over the following year. And from 2015, we can expect to see real-world construction projects getting the benefits.

IFC4 at a glance

• enhances the capability of the IFC specification in its main architectural, building service and structural elements with new geometric, parametric and other features
• enables new BIM workflows – including 4D and 5D model exchanges, manufacturer product libraries, BIM to GIS interoperability, enhanced thermal simulations and sustainability assessments
• links all IFC property definitions to the buildingSMART data dictionary
• improves readability and ease of access to the documentation with numerous implementation concepts and fully linked examples
• contains ifcXML4 schema, fully integrated into the IFC specification in addition to the EXPRESS schema
• has been developed in line with the new mvdXML methodology (as the baseline for future computer-readable model views and data validation services)
• corrects technical problems found since the release of IFC2x3
• enables the extension of IFC to infrastructure and other parts of the built environment

Some software houses are leading the way. In order to keep ahead of the game, DDS in Norway developed prototypes using an earlier IFC4 release candidate, without waiting for publication of the release as an ISO standard (see page 3).

Conclusion

IFC4 has come a long way since the early releases in the mid-1990s. End-users will feel the benefits once IFC4 is implemented in commercial software, and there will be a ripple effect as clients get their projects built more efficiently and sustainably. Until then, newly certified IFC2x3 software should be used.

Image above: IFC4 introduces major improvements in structural steel and enhances the analysis model.

IFC helping designers and the construction industry
Music Centre, Helsinki

Senate, the lead developer on this major cultural project, required the use of an IFC-compliant BIM, where front-end work included energy simulation and life-cycle analysis, with later use of BIM on-site when construction company SRV used models in numerous tasks.
Roll-out of IFC4/ISO 16739

Software vendors urged to come on board

The accreditation of IFC4 by ISO is a milestone in the development of the standard. Now it is down to the software vendors to implement it. Rasso Steinmann, who is responsible for implementation and certification within buildingSMART International, shares his views on the roll-out of the newly accredited standard.

For a standard to be readily accepted by the software industry, it must be easy to access. This is the case for IFC4, which is available on buildingSMART’s technical website (details below). This is the easier part; the harder part is penetration within the industry. People may be reluctant to change unless they are persuaded that it is to their advantage. ‘Industry players, end-users and software vendors need to understand the benefits of IFC4, as against the earlier IFC2x3,’ says Rasso. Marketing efforts will concentrate on spelling out the key benefits and ‘lighthouse implementations’ will show them in practice.

‘At buildingSMART we are communicating the benefits in material such as this supplement, a news release and direct contact with vendors,’ adds Rasso. ‘The bSI website will also be used as a channel of communication.’

IFC4 is a significant step forward from the previous release and it has overcome some technical issues and gaps in IFC2x3. ‘Technically very attractive is Simple ifcXML, which was introduced in IFC4,’ says Rasso. ‘This makes it easier to support specific downstream workflows with focused IFC data.’ This view is endorsed by Bjørn Stangeland of DDS (see page 3).

Last but not least, IFC4 contains new domain objects, which are attractive to software developers and have not so far been implemented in their applications.

Further down the road, buildingSMART certification for IFC4/ISO 16739-compliant software will be available. The Certification 2.0 system for IFC2x3 is set up so that it can also be used for IFC4, using the present web-based certification platform GTDS.

It is important, Rasso stresses, that the majority of leading software vendors move to IFC4 implementation in a concerted way. If they do not, end-users will find themselves having to deal with files that derive from different IFC releases – a situation that no one wants to see. So what would he say to a software vendor who was considering implementing the new standard? The industry needs to move swiftly: ‘Dig the well while you are not yet thirsty!’ he urges.


IFC helping designers

Pioneering IFC4 at HOK

Some of today’s architecture features complex shapes which up till now have defied efforts to bring them into the architectural design model. An architect at HOK in New York – Christopher Zoog – has been exploring new workflows that have been made possible by IFC4. Software vendor Geometry Gym is an early adopter of IFC4 and has used the new standard in the Grasshopper/Rhino plug-ins which allow architectural forms to be created using generative algorithms. Thanks to the IFC4 support and Christopher’s pioneering work, a complex form could be brought into the main architectural model – a promising step in the world of better workflows to come.

Why software vendors should implement IFC4/ISO 16739

Rasso Steinmann offers his tips:

• Keep your customers happy by improving your IFC support
• Take advantage of the technical improvements of IFC4
• Remember, it is now possible to support model view definitions and validate them
• Benefit from IFC the easy way with Simple ifcXML
• Broaden your IFC support with the new IFC4 objects and workflows – it will help you to attract new customers
• Reach a wider market with IFC4 – as a full ISO standard, it will become a pre-condition for tenders in some markets

IFC helping the construction industry

Olympic Stadium, London

In 2012 London impressed the world with its suite of Olympic buildings, not least the Olympic Stadium, completed in March 2011, on time and under budget. At the instigation of the main contractor, a BIM was created to de-risk the project and validate the service information.
Implementing IFC4

A Norwegian software vendor champions open BIM

For the design and construction industry to benefit from the IFC4/ISO 16739, it is essential for software companies to grasp the nettle and implement it in their software products. One software developer in Norway, Data Design System (DDS), is doing precisely that.

DDS has been developing software solutions for the construction industry since 1984, first in CAD and subsequently in BIM. It claims to be among the first in the world to use the term ‘building information model’ back in 1985. The company is a member of buildingSMART and a firm supporter of open BIM – and its commitment to IFC goes way back. ‘For several of the earlier IFC releases, DDS participated in some of the extension projects,’ says Bjørn Stangeland, CEO at DDS.

Early adopter

DDS has always been among the ‘first movers’ when new buildingSMART standards are developed, so it was no surprise to find DDS on the scene when IFC4 was extended with new capabilities. ‘DDS was particularly involved in both the electrical domain and the Simple ifcXML capabilities,’ explains Bjørn.

This aligns with DDS’s main product lines. The first is DDS-CAD MEP, a BIM authoring tool for the mechanical, electrical and plumbing functions that allows interdisciplinary co-ordination. The second is DDS-CAD Architect & Construction, which targets Scandinavian-style homes.

Simple ifcXML

Bjørn believes that the benefits of IFC should be made available to functions which do not need the full paraphernalia of the standard. A format that derives from IFC, Simple ifcXML, provides an answer to the problem, and DDS was active in its development. ‘When the Simple ifcXML capabilities in IFC4 started to emerge, we could base a number of exchanges on that, since it does not require any in-depth IFC understanding by the implementers at the other end of the exchange,’ he says. ‘These are downstream applications rather than typical BIM authoring tools and deploy the easier XML schema.’

Product libraries

IFC4 will also help to accelerate the momentum in product libraries. DDS has been involved in the specification of IFC for product libraries, based on IFC4 which has better capabilities for handling these objects, as compared with the earlier IFC releases. He urges product manufacturers to get involved. ‘By using product libraries in open BIM, or IFC, the product suppliers only need to maintain one product catalogue, which then can be used in all open BIM-compliant software,’ he argues in support of his case. ‘The end-users can then select the tool they want based on what offers the best support and functionality for their business processes.’

And Bjørn is enthusiastic about the strengths that IFC4 brings. ‘There are a number of improvements in IFC4/ISO 16739, especially for the MEP and structural domains,’ he states. ‘With the addition of IFC for product libraries and Simple ifcXML in IFC4, the standard covers a much larger portion of the value chain, and is also faster and easier to implement.’ With a lower implementation threshold and investment, he argues, more applications will be able to share information provided in open BIM formats.

As CEO of DDS, he congratulates all the parties on the work done during accreditation. ‘The buildingSMART organisation has already done a great job – in co-operation with ISO – to define and document the IFC4 as an open BIM standard.’
How it all happened –
the back story

Turning IFC4 into a full ISO standard took effort and staying power. The accreditation process was layered and stringent, but the quality of the end result has justified the means.

It was back in 2008 that the process took off when the forthcoming IFC4 was put before ISO as a ‘New Work Item’. From the outset, the goal had been to collaborate with ISO on developing a formal and truly international standard.

The work on IFC4 was carried out by the Model Support Group of buildingSMART,’ explains Thomas Liebich, who leads the MSG, with Tim Chipman as his deputy. At the same time, Thomas acted as liaison officer to ISO TC184/SC4 – this is the Technical Committee responsible for automation systems and integration, with Sub Committee 4 being the ISO working group responsible for industry data.

The work was funded by buildingSMART International, from its central funds, with significant additional support provided by the Norwegian government.

The process involved three rounds of voting. The first was as a New Work Item (NWI), followed by the voting for the Committee Draft (CD) and finally as a Draft International Standard (DIS). ‘The overall development process of IFC4 lasted five years,’ says Thomas. ‘The ISO 16739 accreditation process ran for three years in parallel. Many intermediate releases were issued for international review. No previous IFC release had been subjected to such a rigorous process.’

ISO accreditation added another layer of quality assurance in publishing the standard, so buildingSMART benefited from the long experience of ISO in setting quality rules and publication formats.

‘The result is a better organised and less ambiguous standard that makes it easier to understand IFC,’ concludes Thomas. ‘This should lead to a faster implementation process.’

IFC4/ISO 16739 has a promising future. Public sector clients are often required to mandate formal standards in their procurement, or are at least encouraged to do so. ISO standards are recognised and respected, and they can also be adopted in national standards and regulations. With IFC4 now launched as a full ISO standard, open BIM – which enables integrated working on a construction project – will be facilitated.

IFC helping the construction industry

Keppel Bay, Singapore

Reflections at Keppel Bay, completed in 2011, is a waterside residential complex in Singapore. Local civil engineer and construction specialist Woh Hup – an early BIM adopter – used BIM for design, clash detection and constructability of the complex roof crowns.

IFC helping a university project

Technical University of Denmark in Copenhagen (DTU)

Building 324 at DTU’s Lyngby campus in north Copenhagen is a three-storey new-build addition to the Technical University, intended for teaching, research and office use. This low-energy building, which opens in 2013, has been designed to contribute to the green environment of the campus, with planting both outside and within the building.

‘We should not forget the importance of “I” in BIM,’ says Markus Lampe, BIM co-ordinator at DTU. In common with many practitioners, he sees the ‘information’ element in BIM as crucial, as was clearly evident in Building 324. The ‘punch’ or snag list benefited from tools provided by Danish software company Dalux – the on-site viewer clarified issues and their precise location – and ensured successful snag-free completion. ‘The technique added real value to the project,’ says Markus.

Denmark is among a handful of pioneering countries that require the use of IFC in public sector buildings. As from 1 April 2013, local authorities and social housing providers will also require IFC use in all projects above €3 million – making it the first country in the world to implement an IFC requirement across all public buildings.

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Editor: Betzy Dinesen (betzy.dinesen@btinternet.com)
Designer: Jane Thompson
For further information about IFC4, please contact
Thomas Liebich, tl@aec3.de (technical issues)
Rasso Steinmann, steinmann@iabi.eu or rsteinmann@nemetschek.com (implementation and roll-out)
Website: www.buildingsmart.org