Global standards for open BIM

Annual Report 2014

buildingSMART®
International home of openBIM®

Contents

*The Standards, Chapter and
Compliance programmes underpin
industry improvement*

2014 – a year of change and progress

Chairman's welcome

I am pleased to report a year of substantial progress, against a background of external and internal change.

Externally, we have widened our membership to include corporate members. I would particularly like to make mention of our Strategic Advisory Council members who have provided valuable advice and the resources to move on to the next level of activity.

Internally, we have worked to fulfil the task of improving our processes. Our buildingSMART standards are respected – rightly – around the world and implemented in many software products. But until now our processes for development and acceptance have not always been clear and consistent. Our new standards management process, with its open, transparent structure, enhances efficiency and will strengthen trust in our standards.

We must ensure that we have the resources to meet the global industry's need for the tools that enable open work flows. During the year, we appointed a full-time CEO and made provision for a director of operations. Having full-time staff within the organisation equips us better to interact with stakeholders, understand their needs and deliver our programmes of work.

Our work is key to the way in which industry is changing. Governments, countries and individual users require the tools that allow seamless digital collaboration. With these changes in the external environment, we now find ourselves in the front line. Thanks to the skills of our technical people and funding from several stakeholders, we are creating standards, in our traditional core areas of IFC, information delivery and the Data Dictionary, as well as in infrastructure, a field that is newer to us.

It is these outcomes that have the power to catalyse change in industry. I would like to thank all our colleagues within buildingSMART and within our partner organisations for their work during 2014.

Patrick MacLeamy
Chairman
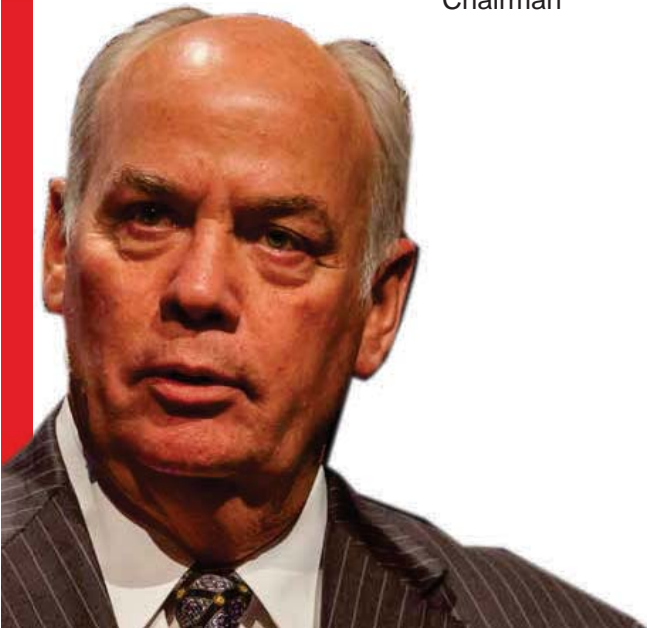
Highlights of the year

Membership

- A Strategic Advisory Council was formed with external members to advise on standards and compliance.
- New categories of membership were created to make membership broader and more inclusive.

Programmes

Standards

- The prospective Alignment standard was fast-tracked by the Infrastructure Room and reached the final stages of review.
- Version 2 of the BIM Collaborative Format was accepted as a buildingSMART standard.

Compliance

- Seven software products were certified as compliant with IFC2x3.

Chapters

- Two new chapters – Malaysia and Spain – were formed.

The buildingSMART rooms

- The two parts of the Model Coordination View – the reference view and the design transfer view – made good progress towards imminent adoption and will provide an essential tool for IFC4 implementation.
- Progress was made in developing infrastructure standards on alignment, roads and bridges.
- Work started on a project to create generic BIM guidelines.
- Four commercial products were using the buildingSMART Data Dictionary as development continued.
- A fifth 'room', the Regulatory Room, was launched to cover planning permission and building codes.

Other activities

- BuildingSMART launched its awards programme, Business Gain through Open Technology, and recognised four 'heroes of interoperability'.

CEO's review

Against a changing global background, there has been change within bSI, together with swift progress on standards. Richard Petrie answers key questions about 2014.

How would you summarise 2014 for buildingSMART?
The two big developments in 2014 were: opening up membership to organisations in addition to chapters and introducing the new standards process. As a result bSI has a broader base on which to build its authority and a more rigorous process for the production of new standards. The highlights of the year are summarised on page 4.

How would you describe the external environment in which buildingSMART has operated over the last year?
The external environment has changed radically. From a position where buildingSMART was working in an area with interesting potential, it is now working on issues which are seen by leading companies and clients as crucial to their future business success. Much more is expected of us and in a tighter timeframe.

What milestones were reached during the year?
First, we set up our Strategic Advisory Council and recruited our first SAC and international members, which widens our immediate membership. Secondly, on the standards front, the IFC4 Model Coordination View (with its two subviews) neared completion, and the Alignment project – an essential part of infrastructure design – was fast-tracked through its development, as our new standards process took shape.

We know that our user-facing activities are important – they include conferences and workshops at our summit meetings, training at country level and certification – and to back them up a new website was launched.

Project work is carried out through our 'rooms', and the 'room' system picked up momentum in project creation. We started the year with four rooms – Building, Product, Infrastructure and Technical – and in October a fifth room, the Regulatory Room, was created.

Finally, provision was made for a second full-time staff member, a director of operations, to be appointed.

Are government activities having an impact?
I'd like to single out the UK government's construction strategy goals, which are targeting 50% faster delivery and a 50% reduction in greenhouse gas emissions caused by the built environment, together with a reduction in costs of 33%, both in the initial cost of construction and the whole life of the asset. These are big goals. Targets like these can't be achieved without the efficiencies that open BIM brings.

Where would you have like to have seen greater progress?
I would like to have seen more new members and more new projects, allowing us to build up a stronger full-time staff.

What are the highest priorities for 2015?
The first priority is membership. The second is standards and third is chapters.

Membership

Wider membership and a new Strategic Advisory Council are transforming bSI into a more inclusive organisation

BuildingSMART International is part-way through a programme of strategic changes. In May 2014, the International Council voted in changes to transform bSI into a more effective and inclusive organisation.

The changes concern both the membership of bSI and the way it structures its activities. Existing activities have been grouped into three programmes, covering standards, compliance (or certification) and the chapters.

Categories of membership

New categories of membership were created as part of the changes. Until May 2014, bSI membership was made up solely of buildingSMART chapters. Under the revised approach, three new types of member were created.

The first type is the strategic member – an organisation who is a member of the Strategic Advisory Council (see below). The second is the international member – a category designed for organisations of all types who are active in multiple countries and want to participate in chapter activities in a number of countries as well as our standards programme. The third is the standard member, intended for organisations who want to play an active part in the standards programme but not in the chapters.

Chapters are automatically members of bSI. There are tiered benefits for other members, but only chapters are members of the International Council.

The standards developed by buildingSMART are internationally respected but until now they have been developed and approved by a small constituency made up of a somewhat narrow membership. With wider membership, our standards will be approved and accepted by constituents representing a wider spectrum of the industry – a move that will benefit everyone.

Current members, who are drawn from companies around the world, are shown on our website.

Strategic Advisory Council

A Strategic Advisory Council (SAC) was launched in July 2014, with four members: the software companies, Autodesk, Nemetschek and Trimble and the global architectural practice, HOK.

The SAC will advise bSI on its standards and compliance programmes, providing insight into the standards and tools most needed by the industry. It will have a direct role in shaping bSI strategy and helping to determine priorities.

When fully established, the SAC is expected to comprise 12–15 members, representing owners, contractors, manufacturers, software vendors, operators and consultants. Work is continuing in 2015 to increase SAC membership and attract a broader range of members.

Planned representation of the Strategic Advisory Council, which was launched in 2014

Standards programme

*A new stringent and transparent standards process
is being introduced*

During the year, a new process for developing and approving standards was put in place. The expansion of bSI membership will ensure that our standards are based on a broader consensus.

BuildingSMART standards are respected and used around the world. The quality of our tools and standards is key to our reputation. But the processes surrounding our work programme have sometimes been slow-moving and unclear – at odds with the clear thinking and technical excellence of our work.

The overall object of the Standards programme is to put in place clear and transparent ways of working on new standards which will encourage participation and consensus building.
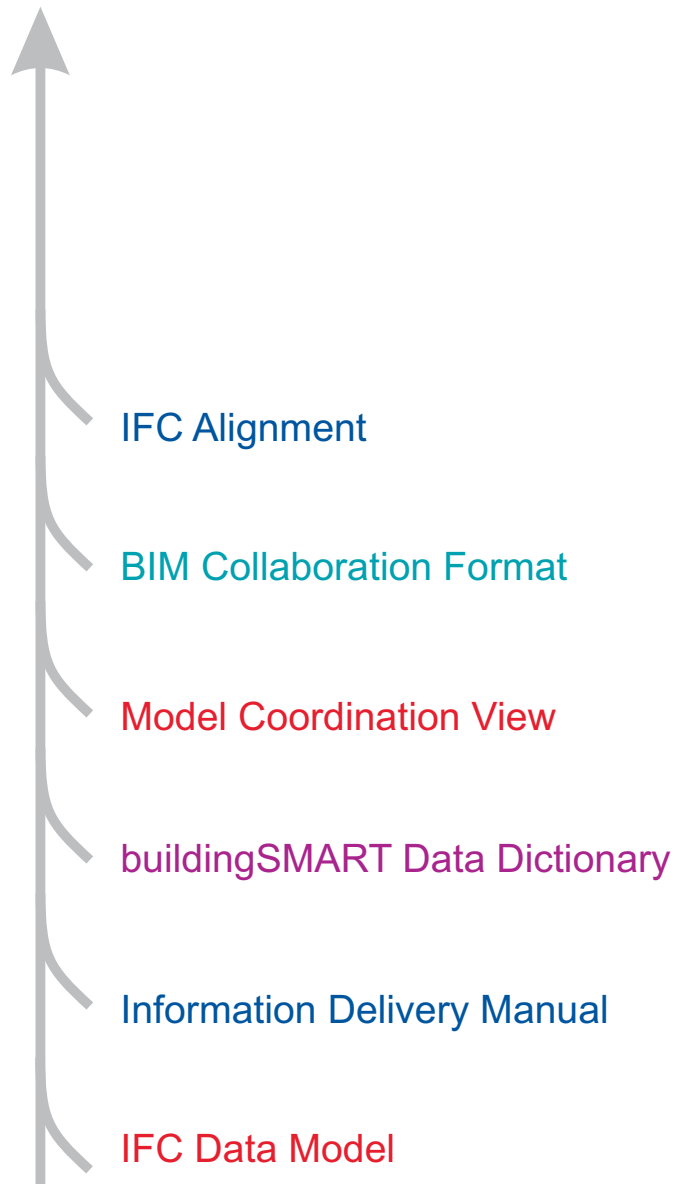
In future, new projects will come from three sources: the buildingSMART rooms, the chapters and third parties. While some projects will continue to come from with the buildingSMART family, others will be 'harvested' from outside it, so that work which is often done independently and in silos achieves greater distribution and impact.

Overseeing the standards process is the Standards Committee, made up of representatives from members and chapters. Reporting to the Standards Committee will be the Standards Committee Executive, who will manage the standards process and liaise with third parties such as ISO and the Open Geospatial Consortium.

As standards are created, they pass through three stages: initiation, development and approval. The elements of each stage are clearly spelt out and reviews are built into every stage. A series of 'gates' will regulate the progress of each project, with projects formally voted through the milestone gates in a stringent process.

Standards in progress are referred as standard proposal, working draft standard, draft standard, candidate standard and final standard.

As at the year end, the structures had been put in place and awaited the first projects to go through the new system.

IFC Alignment

BIM Collaboration Format

Model Coordination View

buildingSMART Data Dictionary

Information Delivery Manual

IFC Data Model

Compliance programme

Seven software products were certified, as our compliance programme moves into its next phase

In the second of our programmes, certification of software to IFC2x3 continued, while discussion centred on the need for the certification of people and organisations as BIM competent.

Software certification

The value of IFC is realised when software vendors follow the standard in their commercial products. To give end-users – architects and engineers – assurance that a product is compliant with the standard, IFC first introduced certification in 2001. Then, in 2010, a new and more stringent process, Certification 2.0, was launched. The scheme is run by the Technical Room through the Implementation Support Group, with assistance from the Model Support Group.

IFC2x3 CV2.0

Products are certified to IFC2x3, using a web application, the Global Testing and Documentation Server (GTDS), which provides for the automated online testing of IFC files. This is a place where candidates for certification can run tests to ascertain compliance.

In 2014, seven products completed their certification to IFC2x3, bringing the total number of certified products to 21, as at the end of the year. Certification to IFC2x3 continues.

However, changes to buildingSMART certification are planned. The adoption of IFC4 as an ISO standard and the imminent completion of the IFC4 model coordination views have led to a rethink on certification.

In April 2014, buildingSMART officers met representatives of CSTB (the French construction research body) and BRE (its UK counterpart) to discuss how industry needs for certification can be met. The details of how certification to IFC4 will work are still under discussion, but it is clear the new certification will make a stronger contribution to seamless collaborative working.

Changes to the centres of software certification were also discussed during the year. To date, certification activities have been carried out in Germany, but one new centre in France has been proposed.

Certification of organisations and people

As open BIM accelerates, clients and companies will need to know that their suppliers, and even individuals, are BIM competent. Certification schemes are already available in some countries and courses offering BIM training abound, but these schemes and programmes are not independently endorsed.

At bSI, we see a need for certification to an impartial third-party standard, and we are exploring ideas of how this might be achieved. In October, we launched the first stage of an international project to develop a consistent high standard of BIM training for learners around the globe, with six chapters taking part.

A working group has begun efforts to produce a 'learning outcome framework' (LOF) for training professionals, which will ensure consistency of content and standards, and to develop a franchise model for use by bSI and training bodies. Once these tools are available, they will allow training organisations to equip design and building professionals with the right skills, consistently across the globe. At the same time, they will allow bSI to ensure a high standard of proficiency and promote interoperability.

At country level, certification bodies are starting to explore ways of certifying companies as BIM competent. For example, in the UK, part of the BRE Group – which hosts the UKI chapter – has created a scheme for certifying companies to show that their business systems are compliant with the requirements of BIM level 2. The certification includes a yearly on-site audit. Schemes like this could benefit from being endorsed themselves by buildingSMART.

Certificate

Standard :
IFC2x3 ISO/PAS 16739

Scope :
Coordination View 2.0 - Export Architecture

Certified Product :
ARCHICAD 16

Certification Owner :
GRAPHISOFT SE

Date of Certification :
12 March 2013

Validity :
The certificate is valid from March 12, 2013 until March 11, 2015
www.buildingsmart.org/certification

Certification Logo :

Chapter programme

The new chapter programme is stimulating the strengths of the chapters

In the third of our programmes, a new chapter strategy was launched to reinvigorate the relationship between bSI at the centre and the chapters.

BuildingSMART consists of a central organisation (known as International) and in-country groups (the chapters). Chapters are themselves members of bSI, contribute to global projects and run local activities.

They often provide a valuable input to their own governments on technology development, open BIM and collaborative working. Two representatives of each full chapter are members of the International Council.

Strengthening the network

The chapter programme was launched in May 2015, with the principal aims of strengthening links and exchanging best practice.

Meetings are held online, hosted by bSI's CEO and its business manager. The underlying principle of the chapter programme is to help the components of buildingSMART – both International at the centre and the chapters in the countries – to 'do what they do best' and encourage closer relationships in the future.

In other words, the countries play a valuable role in identifying the need for standards, liaising with their own governments and with users, working with training and certification providers and collaborating with other chapters on development projects. The role of International is to host projects and coordinate resources from its various rooms and to develop new international standards.

The improved communications between International and the chapters, and among the chapters themselves, is already strengthening collaboration. Going forward, there are plans to dedicate one full day to chapter workshops at the next International Council meeting in Paris in June 2015.

Chapter representation

As at the end of 2014, there were 17 chapters: Australasia, Benelux, Canada, China, France, Germany, Hong Kong, Italy, Japan, Korea, Malaysia, Nordic, Norway, Singapore, Spain, UK & Ireland and USA. Some chapters are full paying; others pay only a half subscription (see box). The half-paying chapters are strongly encouraged to become full members.

Two countries formed new chapters in 2014: Malaysia in September and Spain in November. When a country wants to join buildingSMART, it must show that the chapter organisation will be impartial, not-for-profit and well supported, with a sound business plan. The fledgling chapter receives help and advice from bSI, whose business manager has a dedicated role in working with chapters.

The creation of the Malaysian and Spanish chapters was warmly welcomed. Malaysia is experiencing vibrant growth in its construction, with government interest in the role of ICT, while in Spain, despite its recent difficult past, a new chapter has emerged with great enthusiasm for disseminating the practice of open BIM. Occasionally, chapters close down, a situation much regretted by bSI. At the end of 2014, one chapter appeared to be failing.

Chapters (as at 31 December 2014)

Australasia*
Benelux
Canada
China
France
Germany
Hong Kong*
Italy*
Japan
Korea*
Malaysia
Nordic
Norway
Singapore*
Spain*
UK & Ireland
USA

* Not full-paying chapters

Global standards for open BIM

The practical work of buildingSMART is done within the 'room' system. The rooms are open groups, drawn from chapters all around the world, who develop projects to help industry professionals and project owners.

The rooms may initiate their own projects or work with an outside organisation in developing them. Standards are progressed and tested according to the buildingSMART standards process.

Building Room

A project to develop BIM guidelines got underway in 2014

The Building Room, formerly known as the Process Room, covers the way in which a building project is designed and built. BuildingSMART's Information Delivery Manual (IDM) was adopted as an ISO standard in 2010 (ISO 29481-1:2010, Building information modelling – Information delivery manual, Part 1: Methodology and format). The Building Room has used the IDM methodology in its various activities.

IDM: next steps

Several years on, it has become clear that the IDM, as embodied in the standard, requires simplification. The existing IDM standard was not sufficiently generic and overlapped in places with the model view definition (MVD). Updating took place in 2014.

Although this is an ISO standard (rather than a purely buildingSMART standard), input into the ISO updating process was provided solely by buildingSMART members. By the end of the year, the revised IDM had been sent out for voting as a draft ISO standard. (A unanimous 'yes' vote was received at the beginning of 2015.) It is expected to be adopted as an ISO standard in 2015.

Also during the year, a Dutch-initiated standard on IDM was accepted as a buildingSMART standard. The standard had already been adopted by ISO as 29481-2: 2012, Building information models, Information delivery manual – Part 2: Interaction framework. The standard covers the management of formal communication in construction projects and has been used in large projects for several years. A number of software products now support the standard. Public sector clients were the first to adopt the standard and mandate its use by project participants.

BIM guidelines

Now the Building Room has directed its sights onto a BIM guidelines project. BIM guidelines exist in many countries and are usually specific to an organisation or even to a project. The Room is asking whether the strengths of individual BIM guidelines can be garnered to create generic guidelines.

To kickstart the whole project, a pilot was created in 2014 to review a selection of existing guidelines. Nine countries took part, with meetings online for participants every two weeks. Volunteer reviewers assessed the guidelines against a template, and a group member from

National Oceanic Atmospheric Administration HQ, Hawaii Source: HOK

the French chapter created a wiki platform to provide a repository for the reviews, allowing users to search the website and comment on the reviews. At the end of the pilot period, 57 guidelines had been registered and ten of them had been reviewed by three different reviewers.
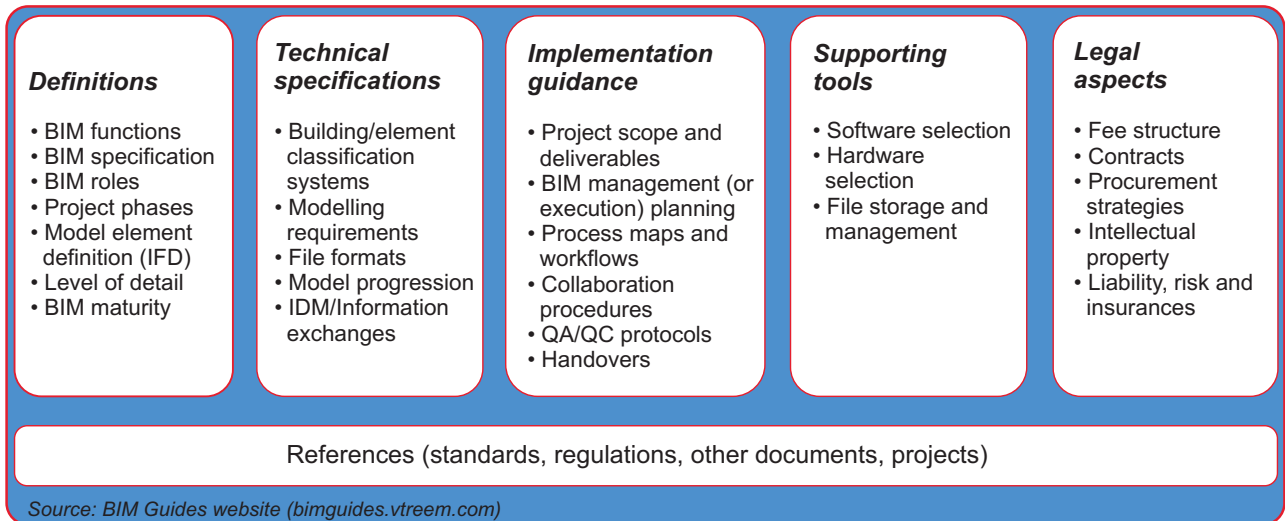
Thereafter, the emphasis of the project shifted to the need to find a common approach to guidelines that enables a modular structure. As part of a multi-chapter project, buildingSMART Norway has drafted a generic table of contents that can be used to map the content of existing guides. It will also provide the structure for a planned 'configurator' or 'BIM guide builder' – a tool that will enable users to build their own BIM guidelines. The Korean chapter is interested in developing a prototype for the 'BIM guide builder'.

The BIM guidelines will have an implication for buildingSMART's dictionary work, as definitions will be required as the guidelines take shape. The Building Room is planning collaboration with the Product Room, so that the new definitions are lodged within the buildingSMART Data Dictionary.

This is consistent with the practices of collaboration among the rooms: the Building Room, for example, has provided user input into the Model Coordination View which the Technical Room is developing.

template
framework
wiki database insight
BIM interactive processes
guidelines
resource searchable
procedures compendium

Definitions	Technical specifications	Implementation guidance	Supporting tools	Legal aspects
• BIM functions • BIM specification • BIM roles • Project phases • Model element definition (IFD) • Level of detail • BIM maturity	• Building/element classification systems • Modelling requirements • File formats • Model progression • IDM/Information exchanges	• Project scope and deliverables • BIM management (or execution) planning • Process maps and workflows • Collaboration procedures • QA/QC protocols • Handovers	• Software selection • Hardware selection • File storage and management	• Fee structure • Contracts • Procurement strategies • Intellectual property • Liability, risk and insurances

References (standards, regulations, other documents, projects)

Source: BIM Guides website (bimguides.vtreem.com)

How the Building Room is analysing existing guidelines

Infrastructure Room

The Infrastructure Room was created to extend buildingSMART standards to infrastructure. With such an ambitious aim, it was clear from the start that the Room would need to link into the development work already underway. It was also considered key to host a project that would allow a quick win and show that IFC for infrastructure has real potential.
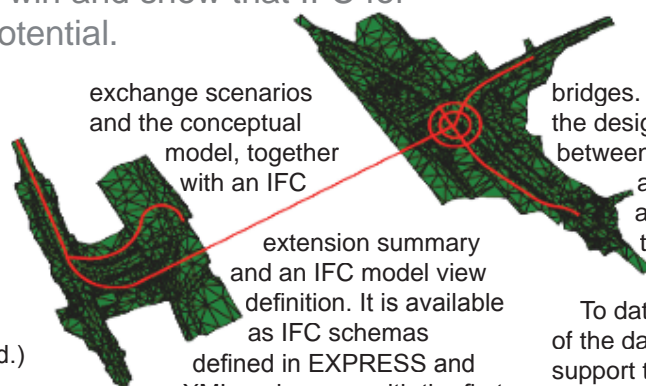
Alignment project

The IFC Alignment project has realised this aim and, as the year ended, it was going through the last stages of review. (It was approved as a buildingSMART candidate standard on 5 January 2015, with a further review before approval as the definitive standard.)

Alignment is at the heart of infrastructure design, defining the route of the road or rail track as a series of lines and curves. The construction of roads, tunnels, rail tracks, waterways, bridges, sewers and power lines all depend on alignment.

The standard will meet a pressing need: the ability to exchange alignment information throughout the lifecycle of an infrastructure asset in open non-proprietary workflows. With IFC Alignment, information will be passed from planning to design and on to construction and asset management in a compatible workflow. Importantly, the standard will also allow alignment information to be linked to other elements of infrastructure design and construction, such as cross-sections and the full 3D geometry of infrastructure elements.

The draft standard comprises exchange scenarios and the conceptual model, together with an IFC extension summary and an IFC model view definition. It is available as IFC schemas defined in EXPRESS and XML and comes with the first test cases that are the results of early software prototypes.

The Alignment project was funded by the Dutch and Swedish governments and by the EU through the V-Con project. Once it has been accepted as a buildingSMART standard, it will be put forward for adoption as an ISO standard. The next stages will be implementation in software products by vendors and testing in pilot projects.

The rapid development of the standard is providing a strong fillip to the work of the Infrastructure Room and is expected to enhance bSI's reputation.

IFC Bridge

Bridges are complex civil engineering projects, with elaborate curves. The modelling work to be done within IFC Bridge is intended to enable vendor-neutral data exchange over the entire life-cycle of bridges. This will include work during the design phase (such as exchange between design and structural analysis applications) as well as the subsequent handover to the owner for use in operation and maintenance.

To date, only a preliminary version of the data model is available to support the description of the basic bridge entities and their relationships. Substantial development work is still required before IFC Bridge can become a bSI standard.

The project is a multi-country, multi-partner collaboration, with valuable technical contributions from France, Japan, Germany and the US. IFC Bridge contains a rich set of building element types to describe bridges, with the means of representation adapted directly from IFC, but work is needed to make it into a truly serviceable data model.

Much has already been done. The current version draws on two earlier versions and prototyping done in 2007–10. In 2014, modest progress was made, including some integration with IFC4. Future priorities are a description of the substructure, integration with the IFC Alignment model and more flexible geometry. The immediate aim, going into 2015, was to structure IFC Bridge as a formal buildingSMART project and to secure funding.

Once IFC Bridge has been developed into a full buildingSMART standard, it will allow open data exchange and offer a format for long-term archiving and life-cycle management, meeting a global business need.

Sources: (above) Alignment image Technical University Munich; (below) Bridge image SOFiSTiK

IFC Roads

Significant work to extend IFC to roads has been going on in buildingSMART member countries, notably by the Korea Institute of Construction Technology (KICT), which has developed an IfcRoad model, now in version 1. Japan, France, Sweden, Germany and the USA also have research programmes.

Like alignment and bridges, roads is an area strongly in need of a global open standard for design. There is a role for bSI to coordinate and harmonise the scattered worldwide efforts to provide IFC extensions that would be universally accepted. Again, there is an urgent call among transport authorities for a standard that would permit open workflows.

The Infrastructure Room has proposed a project to define common requirements among stakeholders and compare them against what is already available in the KICT IfcRoad model. That would pave the way to the development of a bSI standard for roads.

Funding and external partners need to be secured for this project. But once they are in place, a fully-fledged bSI standard for roads could be rapidly developed, thanks to the work already done.

Future infrastructure projects

Moving into 2015, the Infrastructure Room identified two further areas for priority development. The first is asset management for infrastructure, in which existing standards would be enhanced and new open BIM standards developed. The second is to tackle the urban environment as a whole, in a project to create an integrated built environment life-cycle model. These plans are at an early stage and require scope definition, funding and stakeholder commitment before they are formally proposed as bSI projects.

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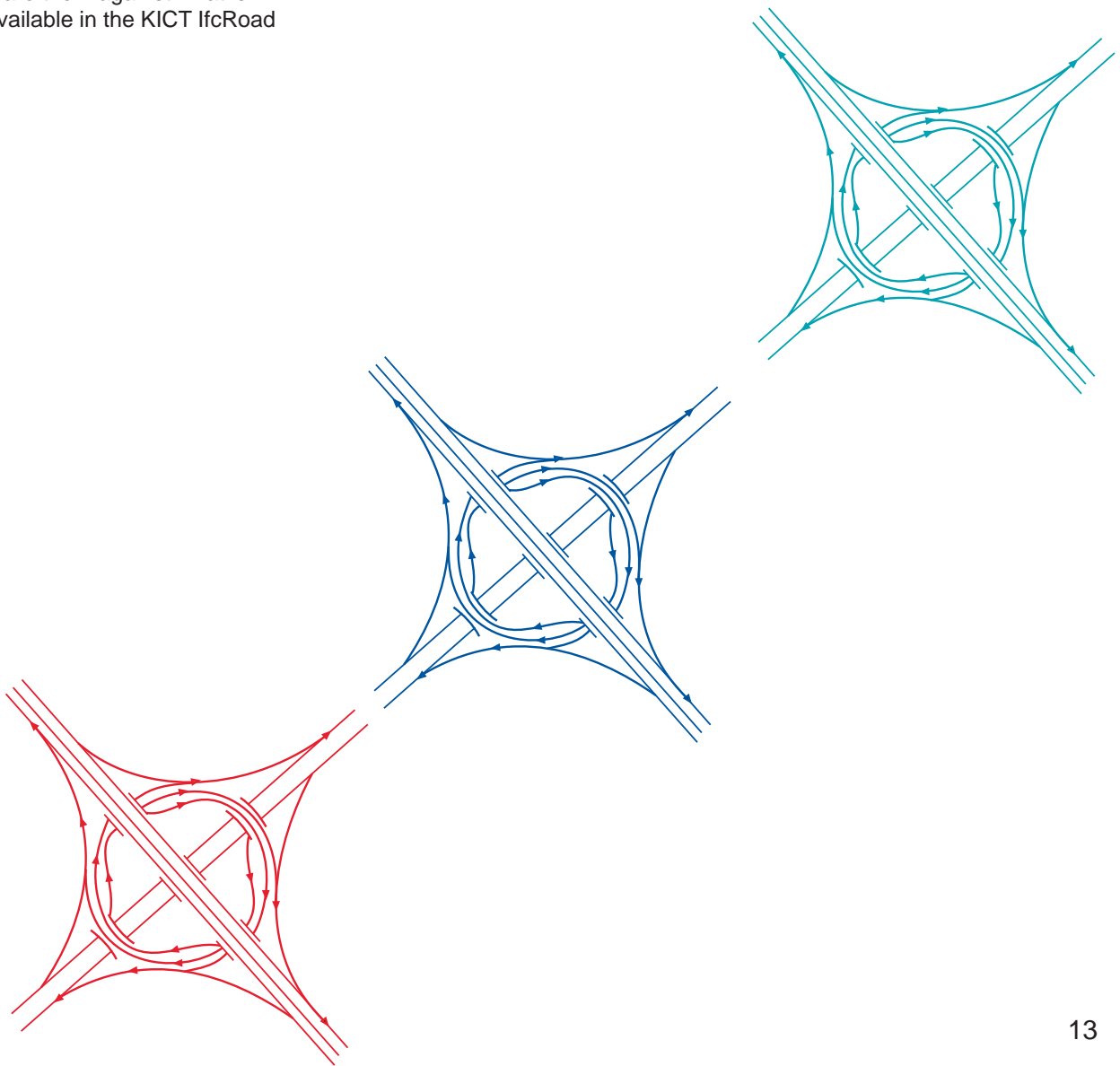
Product Room

The buildingSMART Data Dictionary structures, connects, harmonises and translates building data – through neutral language and a culturally agnostic approach

The Product Room is responsible for the standards and services that allow harmonised communication, not just on how to exchange data but on what data is being exchanged – a key enabler of collaborative working with open BIM. The principal output of the Product Room is the buildingSMART Data Dictionary (bSDD), a service provided by buildingSMART International and supported by local chapters and members.

Product data templates

The Product Room has begun the development of a buildingSMART standard for product data templates to help product manufacturers around the world to use the IFC model and the bSDD to organise product data that can be integrated with open BIM. The new bSI standard will build on the IFC for Product Libraries as well as work done by Product Room members from Austria, France, Germany, Norway, the UK and the US in local standards and developments.

Data Dictionary

The bSDD (formerly known as the International Framework for Dictionaries or IFD) is one of buildingSMART's core standards and allows product information and other types of information (eg from knowledge systems or environmental information) to be shared among manufacturers, designers and operators. It is a detailed language-independent framework that can be used by practitioners to create their own libraries for storing construction information. It is fully operational, and commercial providers are already using the bSDD service through the open application programming interface (API) in their production environments.

The bSDD service is available online, hosted on Google's infrastructure. BuildingSMART International is responsible for maintenance and operation, and provides technical support and services through the bSDD website at www.bsdd.buildingsmart.org, in conjunction with the Norwegian software company, Catenda. Anyone with the right formal connection to bSDD can contribute content but needs to be a registered user with rights.

In 2014, the bSDD Group further developed and enhanced the tools and content available online to all users and editors. A table tool to support mapping between content collections was developed with help from buildingSMART Norway. In support of local activities, the FreeBIM Tirol project in Austria worked on the development of a duplicate checking and batch uploading tool, which will be available to other users in 2015.

Content development was significantly advanced in 2014 through a project with Norwegian sponsor CoBuilder to add the IFC4 entities and enumerated types. The pilot project continued working on demonstration cases for ceiling and HVAC products.

The Product Room also supports in-country activities where local organisations who are members and sponsors are developing their own terminology libraries. In 2014, projects in Australia, Austria, the Netherlands, New Zealand, Norway, the UK and the US were working with the bSDD to adapt existing content and create new content.

Commercial and organisational implementation is an indication of the uptake of bSDD. In 2014, six entities (some working collaboratively) released products that are integrated with bSDD. Examples are given on the next page.

Catenda bimsync

Catenda's open BIM platform, bimsync, is a model server enabling easy collection and distribution of IFC-based BIMs. The platform has built-in support for the buildingSMART Data Dictionary and allows digital models to become a true connection box for all relevant information. It is possible, for example, to attach real product information from bSDD-enabled product libraries such as the coBuilder system to objects through an intuitive interface. The platform fully supports open international standards, such as the buildingSMART standards, helping to achieve the buildingSMART vision.
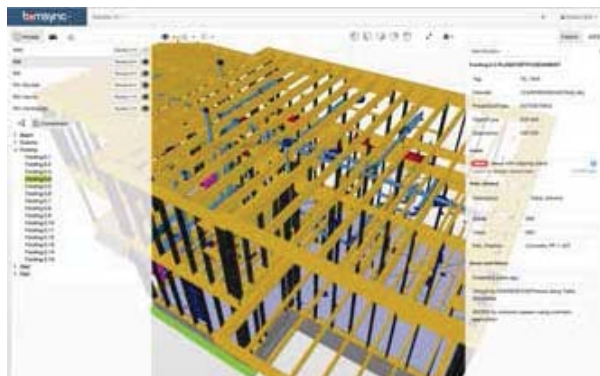
Bimsync from Catenda is one of the commercial products that support bSDD

Norwegian sponsor coBuilder is developing the ProductXchange system for the construction industry, using the buildingSMART Data Dictionary.

CoBuilder is leading the EU-funded project ProductInfoX (PIX) which is making it possible to input various essential characteristics (properties) given in harmonised technical specifications (including technical, chemical, health and environmental characteristics). ProductXchange evaluates or compares the declared product values, and adds selected products to projects.

CoBuilder inputs IFC4 properties defined in harmonised standards, ISO standards and translations for 12 countries across Europe.

Also engaging with the bSDD

CB-NL – the Dutch concept library

A country-wide concept library is being developed in the Netherlands by CB-NL (CB stands for 'conceptenbibliotheek'). This is a large-scale project, with development budgeted at €2 million, provided by the big public-sector agencies. The primary aim of the project is to increase the efficiency of the country's supply chains. Once ready, the CB-NL will be uploaded to the bSDD for collaboration outside the Netherlands.

In 2014, efforts were put into developing the taxonomy and the description of the concepts using the technique of discriminators. The core of CB-NL has reached a point where it is more or less stable.

Going forward into 2015, plans were in place to make an early start on the definition of use cases, which will be further developed for over the year and beyond. Five use cases have been developed for a simplified application of a small part of CB-NL. Significantly, at the year end, it was clear implementation could start shortly, and that the process of implementing CB-NL in the Dutch building sector was imminent.

Technical Room

The Technical Room does the technical development of buildingSMART standards. It also provides technical support to the other rooms.

There are three support groups within the Technical Room: the Model Support Group, the Implementation Support Group and the Technical Advisory Group.

Under its old name of the International Technical Management Committee (ITM), the Technical Room goes back to the early days of buildingSMART in the late 1990s. It supervised the development of the IFC definitions by the Model Support Group and has provided input into the associated standards, such as the Information Delivery Manual, the buildingSMART Data Dictionary and the Model View Definitions.

IFC4 coordination view project

A model view definition (MVD) is a tool to translate business processes into technical requirements. It is the crucial adjunct that allows software developers to create a commercial product supporting IFC. For IFC2x3 – the previous release of IFC – a coordination view was developed and widely implemented by software vendors. To allow IFC4 – the latest release and an ISO standard – to be implemented, an MVD project was launched in January 2014.

While the IFC2x3 model coordination view was well respected, it was often too generic to accommodate the specific use cases. The new MVD project has tackled the drawbacks head on. It has split the MVD into two subviews: the IFC4 reference view and the IFC4 design

transfer view. The reference view will be particularly useful to design professionals, as it will allow the swift, accurate exchange of information between disciplines. The design transfer view will allow the BIM model to be handed over to the next stage of editing.

Developing the subviews took longer than anticipated but by the end of 2014, the penultimate public review had taken place and the two subviews were formally accepted as buildingSMART candidate standards, with just one further public review before being finalised.
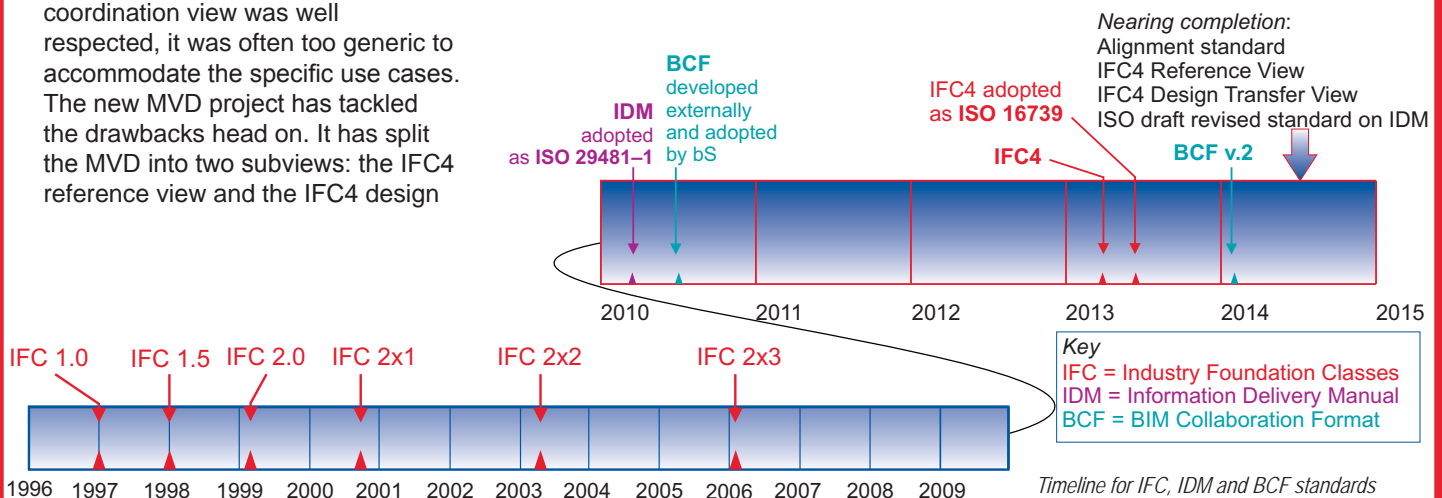
BIM Collaboration Format

A relative newcomer to the buildingSMART family of standards is the BIM Collaboration Format (BCF), initially developed by three software companies – DDS, Solibri and Tekla – in 2010 and subsequently accepted by buildingSMART.

BCF met an immediate need. Now it became possible to exchange 'lean topics' – individual 'BCF messages' – rather than the entire data model. This small-scale exchange of information can be used for a host of purposes (such as communicating issues, clashes and proposals for change) and attached to emails.

During the year, a task group of the Implementation Support Group concluded its work to specify version 2 of the BCF. An enthusiastic group of innovative vendors, as well as a few end-users, contributed to the new version. In October 2014, version 2 of bcfXML was adopted by buildingSMART. The new version offers greater flexibility and better exchange mechanisms.

A further improvement is offered by a new web service, bcfAPI which was launched in 2014 by the Institute of Applied Building Informatics (iabi), part of Munich University of Applied Sciences. The application programming interface (API) tackles the problem of dealing with hundreds, even thousands, of BCF messages in the course of a project when they are sent as attachments to emails. Through the API, end-users no longer have to manage BCF messages manually, as they can be integrated and synchronised automatically. This also paves the way for the development of new functions to support BIM workflows based on BCF messages.

Software vendors are ready to implement the standard, providing a practical way to exchange day-to-day 'lean' information during a project.

Nearing completion: Alignment standard / IFC4 Reference View / IFC4 Design Transfer View / ISO draft revised standard on IDM

IDM adopted as **ISO 29481–1**

BCF developed externally and adopted by bS

IFC4 adopted as ISO 16739

IFC4

BCF v.2

2010 · 2011 · 2012 · 2013 · 2014 · 2015

IFC 1.0 · IFC 1.5 · IFC 2.0 · IFC 2x1 · IFC 2x2 · IFC 2x3

1996 · 1997 · 1998 · 1999 · 2000 · 2001 · 2002 · 2003 · 2004 · 2005 · 2006 · 2007 · 2008 · 2009

Key
IFC = Industry Foundation Classes
IDM = Information Delivery Manual
BCF = BIM Collaboration Format

Timeline for IFC, IDM and BCF standards

Regulatory Room

The latest of buildingSMART's rooms, the Regulatory Room, was launched in October 2014. It will cover the area of planning permission and digital code checking.

A handful of pioneering countries – among them Norway, Singapore and Korea – have had digital systems for building permission and automated code checking for over a decade. Other countries are debating how best to set about moving to a digital system.

The Regulatory Room will be a forum for exchanging technical understanding and boosting interest, bringing together building regulators, researchers and implementers. It will define its mission and charter in 2015.

Marketing and communications

We communicate through conferences and meetings, as well as our own twice-yearly summits

The standards programme summits, held twice a year in different locations, provide an opportunity for our officers and experts to 'market' the message of open BIM.

Many companies, authorities and governments are hesitant about committing to the use of open BIM. Activities to explain the benefits of open BIM and how it works in practice are carried out both by bSI and by chapters, with buildingSMART representatives giving presentations at BIM events. Chapters regularly put on workshops to stimulate interest and exchange experience. Officers of bSI also visit companies individually to explain our activities.

Twice a year buildingSMART holds a summit week, with meetings and workshops attended by members of bSI, its rooms and the chapters, along with local members. The week ends with an open industry conference, where buildingSMART colleagues give presentations on the latest developments. These events, which are hugely rich in content, are an important way of highlighting our work among delegates from industry.

Marketing remains a key activity for buildingSMART, with conferences, newsletters and its websites

We have several communications tools. Our website was redesigned during the year to reflect the recent strategic changes. It explains our structure and purpose, with regular updating on the progress of our standards, news, events and case studies.

The buildingSMART newsletter appears four times a year and highlights activities, summit meetings and chapter news. Its broad and balanced coverage makes it popular with an international readership; other organisations comb its content; and local chapters are free to post it on their websites or reuse the material. 'News extras' are published from time to time on a single issue. In 2014, there were news extras on the Alignment project, the BIM guidelines

project and the changes within buildingSMART.

The first-ever buildingSMART Heroes of Interoperability competition was held in 2014, with the winners announced in Toronto in October (see page 19). This competition was organised not just to recognise excellence in the use of open BIM but also to promote the benefits of buildingSMART standards. Case studies of the winning entries were being prepared as at the year end.

Standards

Standards Library, Tools & Services
Activities
Standards Process
Standards Organiz
Technical Vision

Standards Summit Program

Heroes of Interoperability

Our first-ever awards programme attracted projects that showed
how buildingSMART standards are being used

In 2014, buildingSMART set up its Business Gain through Open Technology Awards to showcase projects that had used its solutions and to raise awareness of the business benefits. The entries, which had to deploy one or more buildingSMART tools, were judged on how effectively they had used open standards in their projects.

Award
Business Gain
through Open
Technology
Heroes of interoperability ® **2014**

The winners, known as Heroes of Interoperability, were announced during buildingSMART week in Toronto in October. The overall winner was the New Hospital Project in Østfold, Norway, which impressed the judges with its far-sighted and wide-ranging use of open BIM.
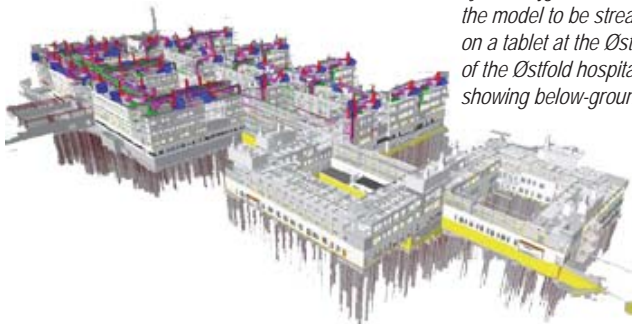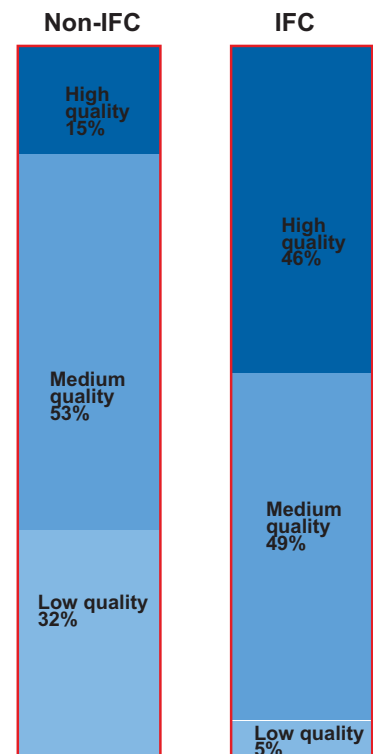
Special mention was given to other projects in separate categories. Two SMEs were recognised: Bond Bryan Architects for its IFC file exchange in the David Hockney Building at Bradford College in the UK, and Juul Frost Architects for promoting open standards in its role as BIM coordinator for the Örebro Business School in Sweden. Finally, the Danish contractor, MT Højgaard was recognised for a white paper which analysed the design quality of 153 projects,

some of which used IFC while others did not. The research showed the positive impact of using IFC.

The competition had a ripple effect, with entrants contributing to the build-up and formal announcements through their own websites. It also underlined the diversity of IFC use around the world. As at the year end, case studies of some of the entries were in preparation, to disseminate the persuasive evidence of the business gains that are being made. The interest in the award programme provides an excellent springboard for the 2015 awards.

Read more on the buildingSMART International website.

Right and clockwise: Bar charts showing quality improvements with IFC from research by MT Hojgaard; Rendra O software allowed the model to be streamed to personnel on-site on a tablet at the Østfold project; Visualisation of the Østfold hospital; Model (in Solibri), showing below-ground piling for the hospital

Non-IFC

High quality 15%

Medium quality 53%

Low quality 32%

IFC

High quality 46%

Medium quality 49%

Low quality 5%

Funding of bSI

Financial statement

Our turnover increased from GBP 392,666 in 2013 to GBP 723,209 in 2014, in line with bSI's broadening of its membership and activities

BuildingSMART International's income derives principally from subscriptions from chapters and other members.

Our expenditure is mainly on programme management, room management and core services.

After last year's deficit, 2014 saw a modest rebuilding of reserves by GBP 16,294 compared with a deficit of GBP 75,311 in 2013. The reserves totalled GBP 74,890 at the end of the year.

In 2014, annual membership subscriptions totalled GBP 467,710. The chapters (17 during the year) contributed 39% of this total and other members contributed 61%. The four members of the newly formed Strategic Advisory Council together made a significant contribution.

Other income came from various sources. Sponsorship contributed GBP 54,925 and came from companies, academic institutions and governments. The UK government in particular contributed to bSI overheads.

Certification provides a modest income stream, amounting to GBP 51,636 in the year. Software vendors pay a fee to register for certification and bSI in turn pays the certification providers in Germany. Certification activities are expected to increase once the vendors start to implement IFC4.

Our licensing activities involve the buildingSMART Data Dictionary, with outside organisations being licensed to use the bSDD. In turn we pay a commercial operation for services involved in the licensing. A small income of GBP 4,776 was recorded. Services raised a higher income of GBP 20,653. These are both areas where we believe we can improve our income.

During the year, no one was salaried at bSI, but consultancy fees were paid to the CEO, the secretary/ business manager and the book-keeper and to technical consultants for development work on our standards.

We operate virtually without a physical HQ, so there are no office overheads. BRE in the UK makes an office and meeting spaces available to bSI officers and members when needed. This facility is much appreciated and we wish to record our thanks to BRE.

Some of buildingSMART's standards are developed as internal projects, but projects for prospective standards are increasingly being developed externally, funded by governments (and sometimes software companies) who require development to be done locally. We will 'harvest' these projects to allow them to achieve the status of buildingSMART standards, but no funding for these external 'harvested' projects is received by bSI. This makes our expenses relatively heavy in relation to the volume of work going through our books.

The full accounts for 2014 will be presented to the International Council in Paris on 16 June 2015. The accounts will be made available on the bSI website, together with the agenda and papers.

Detailed Profit and Loss Account for the Year Ended 31 December 2014

	2014		2013	
	£	£	£	£
Turnover (analysed below)		723,209		392,666
Cost of sales (analysed below)		(273,665)		(215,741)
Gross profit		449,544		176,925
Gross profit (%)		62.16%		45.06%
Administrative expenses				
Employment costs (analysed below)	(32,513)		(42,637)	
General administrative expenses (analysed below)	(380,924)		(211,002)	
Finance charges (analysed below)	(19,813)		1,403	
		(433,250)		(252,236)
Surplus/(deficit) on ordinary activities before taxation		16,294		(75,311)

Note: Because of a change in the management accounting system the 2013 figures do not align fully with the 2014 figures and are shown in abbreviated form.

Detailed Profit and Loss Account for the Year Ended 31 December 2014

	2014 £	(As restated) 2013 £
Turnover		
Chapter and Membership	467,710	392,666
Software Certification	51,636	-
Services	62,319	-
Licensing	4,777	-
Sponsorship	13,258	-
Project Income	123,509	-
	723,209	392,666
Cost of sales		
Direct costs	-	151,943
Room management	80,603	-
Room expenses	9,657	-
Room services	24,840	-
Certification expense	46,472	63,798
Project expenses	107,899	-
Licensing - Expenses	4,194	-
	273,665	215,741
Employment costs		
Staff training	672	-
Staff recruitment	31,841	42,637
	32,513	42,637
General administrative expenses		
Telephone and fax	1,296	1,848
Printing, postage and stationery	430	-
Sundry expenses	6,023	-
Accountancy fees	7,410	-
CEO and administration	211,500	101,961
Business Manager/Secretary	36,702	53,413
Office administration and accounts	20,246	-
Legal and professional fees	-	2,420
Advertising and marketing	19,031	39,951
Website	17,514	-
Travel and subsistence	43,495	11,409
Bad debts written off	17,277	-
	380,924	211,002
Finance charges		
Bank charges	-	1,161
Foreign currency (gains)/losses	19,813	(2,564)
	19,813	(1,403)

Future prospects

2015 and beyond

*Collaboration will play a key role in our future activities*

Good progress was made in 2014, both with internal restructuring and with our standards development. But the accelerating pace of change in the global industry means that much remains to be done.

We can't do this alone. There is common ground between buildingSMART, Technical Committee (TC) 59 of ISO and the Open Geospatial Consortium (OGC). This year we renewed our MOU with the OGC. Our twice-yearly buildingSMART summits coincide with meetings of the ISO's TC 59. BuildingSMART people contribute to ISO standards, as for example with the updating of the Information Delivery Manual.

More collaboration will be needed in 2015. As an independent and widely respected organisation, we are ideally placed to harvest projects and host work from elsewhere. Our new standards process will ensure high-quality project management and review.

Essential to improving the delivery of new standards is the broadening of the membership base. Beyond that, improvement in compliance activities is necessary to ensure that the standards work.

There are huge savings to be made through collaborative and integrated working. Our aim is to act as an agent of change to bring that about.

buildingSMART
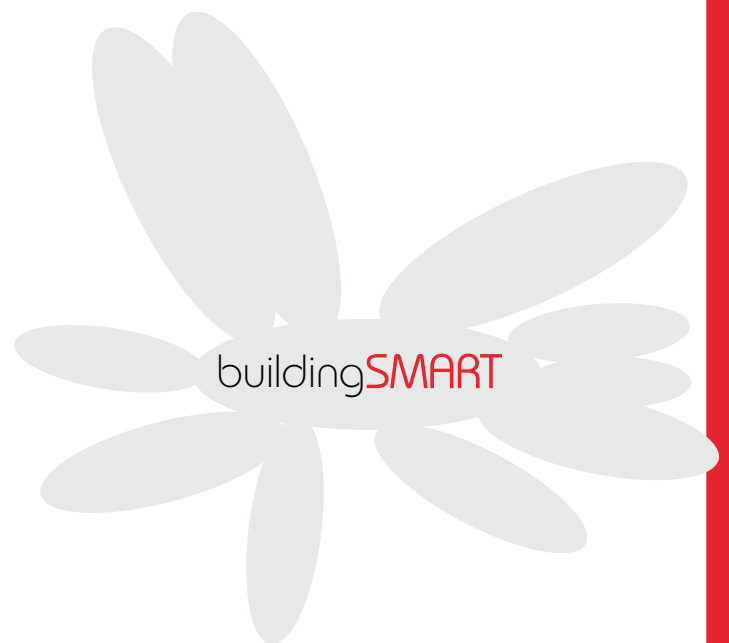
Executive Committee

Chair: Patrick MacLeamy

Deputy chairs: Reijo Hänninen and Rasso Steinmann

CEO: Richard Petrie

Treasurer: Nick Tune

User lead: Kjell Ivar Bakkmoen

Technical lead: Francois Grobler

Members: Alain Maury, Dana Kennish (Deke) Smith

Secretary/business manager: Chris Groome

Leaders of the rooms and other activities

Henk Schaap (Infrastructure Room)

Roger Grant (Product Room and bS Data Dictionary)

Francois Grobler (Technical Room)

Jan Karlshøj (Building Room and IDM)

Thomas Liebich (IFC matters)

Rasso Steinmann (Implementation and certification)

Inhan Kim and Øivind Rooth (Regulatory Room)

Front cover and below: Francis Crick Institute
A new building to house the Francis Crick Institute will open in London in 2016. The Crick is a biomedical research facility designed by HOK, with PLP Architecture. Its vaulted roof recalls features of St Pancras station, which it faces. The roof incorporates solar panels and conceals the heating and cooling units.

Six different authoring platforms were used for the modelling. As lead designer, HOK combined and coordinated all the models from the sub-consultants. The handover model to the client for operation and maintenance will be in Navisworks format and IFC compliant.

Images of Frances Crick Institute courtesy of HOK