

ISO/TC 59/SC 13

Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)

Email of secretary: lla@standard.no

Secretariat: SN (Norway)

IFC Governance - Report from Group established by JWG 12

Document type: Other committee document

Date of document: 2019-06-03

Expected action: INFO

Background:

Dear all,

Referring to **Resolution 225 (Beijing 04) JWG 12**

"SC 13 endorses JWG 12 recommendation to establish a group to develop a report that addresses the governance of the development of ISO 16739-standards. The group is convened by Standards Norway and will feed into TF02, with the preliminary report being sent to TF02 by 20 May 2019."

Standards Norway asked buildingSMART International to lead work to write the report: "Internal JWG12 report: Governance of the development of ISO 16739- standards" (documented in: "JWG12 N27; IFC governance – follow up on SC13 resolution 225"). The leader of the Technical Group in buildingSMART Norway, Jan Erik Hoel, was appointed project leader for the report editing group. The report editing group consisted of up to 10 persons attending in 10 on-line meetings. Some participants have been more active than others.

A preliminary report was presented in JWG12 meetings March 28th 2019 (in conjunction with buildingSMART standards summit) in Dusseldorf and May 16th 2019 and in Toulouse (in conjunction with ISO/TC184/SC4 meeting). Comments from these meetings have been included in the final report.

The final report from the editing group, dated 2019-05-27, was sent to Standards Norway, which sent the report to SC 13 secretariat to be circulated to TF 02 and SC 13.

This report is here attached and will feed into TF 02 work on strategy and planning.

Committee URL: <https://isotc.iso.org/livelink/livelink/open/tc59sc13>

N XXXX

ISO TC 59/SC 13/JWG 12

Date: 2019-05-27

Secretariat: SN

Internal JWG12 report - Governance of the development of ISO 16739- standards

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Foreword	iv
Introduction.....	v
Internal JWG12 Report on Governance of the Development of the ISO 16739 Standard.....	1
1 Scope	1
2 Normative References.....	1
3 Terms and Definitions	1
4 IFC Overall Architecture.....	3
4.1 Normative Parts	3
4.2 Informative Parts:	4
5 IFC Standard Development Process	5
5.1 Background.....	5
5.2 Current buildingSMART Standards Development Process.....	6
5.3 Improvements to the buildingSMART Process	9
5.3.1 Areas Being Enhanced	9
5.3.2 Process Areas Being Created.....	10
6 ISO standards development process	11
6.1 Existing ISO <-> buildingSMART Interaction	13
7 Classification of the Standardization Processes.....	13
7.1 Strategic Development	13
7.2 Content Development.....	14
7.3 Documentation/Content Clarification	15
7.4 Methodology for Development	15
8 Process for IFC Development Using ISO Directives	15
8.1 Note Regarding Use of “Fast Track”	16
8.2 ISO/TC184/SC4 Standardization Process.....	16
8.3 Justification for Moving ISO16739 to ISO/TC59/SC13	Error! Bookmark not defined.
9 Alternative Levels of Collaboration	17
9.1 Existing Collaboration.....	17
9.2 Other Frameworks for Collaborations for Consideration	18
9.2.1 ISO/TC184/SC4 Standards Process	18
9.2.2 Joint ISO and buildingSMART IFC Strategy.....	19
9.2.3 Publicly Available Specification – PAS.....	19
10 Funding.....	20
10.1 ISO	20
10.2 buildingSMART International.....	20
11 Conclusions.....	21
Annex A: (informative) Minutes from ISO/TC184/SC4 and Previous JWG12 meetings	22
Annex A.1: Minutes from ISO/TC184/SC4	22
Annex A.2: Minutes from previous JWG12 meetings.....	22
Annex B: (informative) buildingSMART – ISO Copyright Agreement	29
Annex C: (Informative) ISO/TC59/SC13 Work program	31
Annex D: (Informative) Decisions regarding establishing of JWG12.....	34
Bibliography	38

Foreword

Standards Norway's mirror committee for BIM standardization in ISO and CEN sent a note for discussions concerning management of ISO 16739 to ISO/TC59/SC13/JWG12 meeting in Tokyo, October 2018. In the note, Standards Norway proposed to establish a Project Group to deliver a report with recommendations regarding the topic to SC13. The note was discussed in JWG12 who made a recommendation to SC13 meeting in Beijing the week after and SC 13 made the following resolution:

Resolution 225 (Beijing 04) JWG12 SC 13 endorses JWG 12 recommendation to establish a group to develop a report that addresses the governance of the development of ISO 16739-standards. The group is convened by Standards Norway and will feed into TF02, with the preliminary report being sent to TF02 by 20 May 2019.

Standards Norway asked buildingSMART International to lead work with the report that addresses the governance of ISO 16739-standards. The group shall report to Standards Norway, and a preliminary report shall be sent to SC13 secretariat and SC13/TF02 by May 20th 2019. This due date was later changed to beginning of June 2019 to ensure SC4 involvement. The project group asked for comments in the JWG12 meetings March 28th 2019 (in conjunction with buildingSMART standards summit) in Dusseldorf and May 16th 2019 in Toulouse (in conjunction with ISO/TC184/SC4 meeting).

This report is an ISO/TC59/SC13/JWG12 document. Background documents used in this report and minutes from meetings are uploaded to the JWG12 Drop in folder on the Livelink service and can be reviewed by JWG12 experts.

Introduction

buildingSMART International is a non-profit membership organisation developing standards and industry specifications in the field of Building Information Modelling (BIM).

buildingSMART International (buildingSMART or bSI) develops and maintains the IFC standard which has been approved by ISO as ISO 16739:2013. Latest update of the standard is ISO 16739:2018.

buildingSMART has liaison A status within ISO which is approved both by ISO/TC184/SC4 and ISO/TC59/SC13.

ISO/TC59/SC13 develops standards for Building Information Modelling (BIM). These are standards regarding Information Management using BIM, Information Delivery Specifications, Dictionaries, Product Data Templates, etc.

ISO/TC184/SC4 is responsible for industrial data. ISO/TC 184/SC 4 develops and maintains ISO standards that describe and manage industrial product data throughout the life of the product. The IFC standard use 3 SC4 standards as Normative references.

JWG12 is a Joint Working Group between ISO/TC184/SC 4 and ISO/TC59/SC13. ISO/TC59/SC13 is the responsible committee.

There is a close relationship between the standards developed by buildingSMART and ISO. buildingSMART uses ISO standards in their work and vice versa, as well as there being some overlap in the community of experts and members.

While ISO/TC59/SC13 only develops standards, buildingSMART does pre-standardisation work in collaboration with the stakeholders, as well as supporting deployment of such BIM standards in the market.

Adoption of BIM in the built asset industry is growing rapidly world-wide. In Europe, the European standards organization, CEN/TC442 has adopted ISO 16739 as a CEN standard (EN) with the consequence that IFC has become national standard in 34 European countries. (CEN member states are obligated to make CEN standards to national standards and replace any conflicting national standards with the equivalent CEN standard.)

For this reason, it is important that the relationship and interaction between ISO and buildingSMART regarding development and maintenance of the IFC standard is open and transparent. The relationship between ISO and CEN is regulated via the Vienna Agreement.

This report gives some thoughts regarding governance of ISO 16739 as an input for further discussions in and between ISO/TC59/SC13 and buildingSMART International. The report focuses only on ISO 16739.

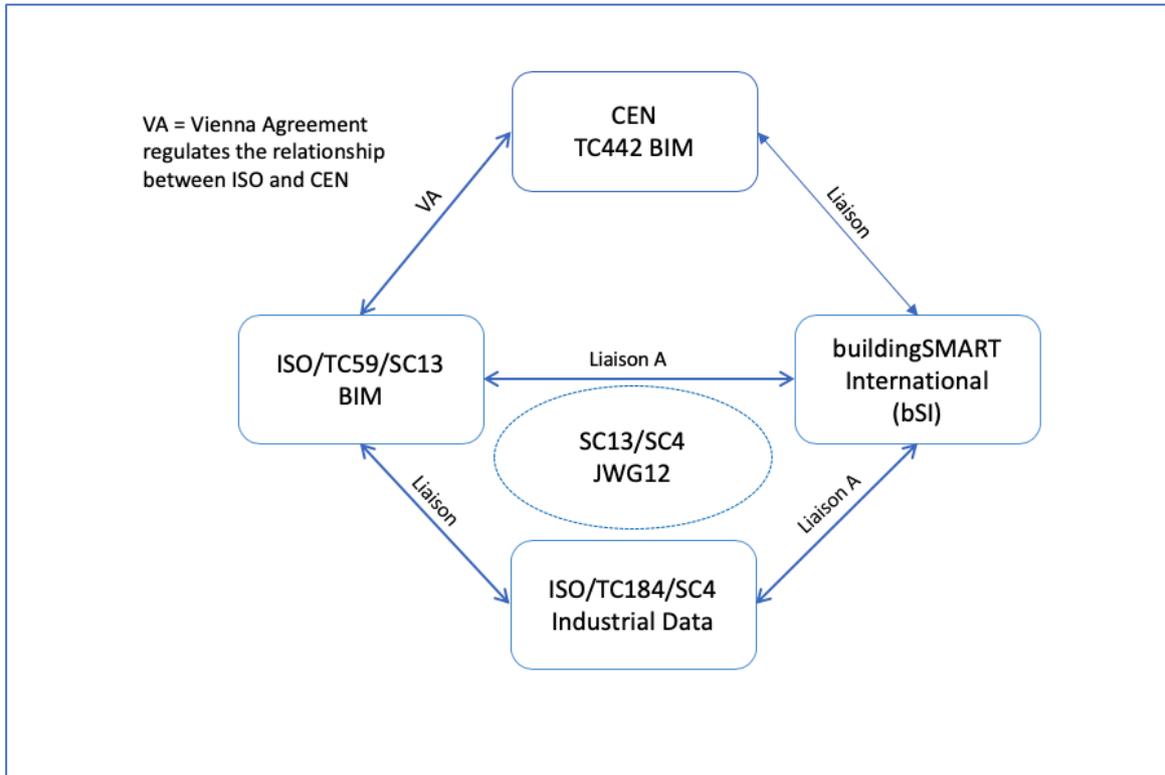


Figure 1: Existing formal relations relevant for this report

Internal JWG12 Report on Governance of the Development of the ISO 16739 Standard

1 Scope

This report is about ISO 16739 only. Main topics include the interaction between ISO and buildingSMART International regarding development and maintenance of ISO 16739 and how to support high level technical discussions regarding the standard. This includes:

- Coordinating the organisations on strategic level;
- The impact ISO directives have on the collaboration between the two organizations;
- Liaison Member A roles, responsibilities, and impact;
- A proposed framework for technical conversations.

2 Normative References

There are no normative references in this document.

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply:

3.1

OGC

Open Geospatial Consortium - www.opengeospatial.org

3.2

W3C

World Wide Web Consortium - www.w3.org

3.3

IAI

International Alliance for Interoperability, former name of buildingSMART international – www.buildingsmart.org

3.4

NP

ISO New Project

3.4

NWI

Task to be done in a new ISO project

3.4

CD

Committed Draft, First draft from the Working/Project Group for comments

3.4

DIS

Draft International Standard – First Enquiry stage

3.5

FDIS

Final Draft International Standard is the last enquiry stage before publication. Will be skipped if there are no technical comments after the DIS stage.

3.6

IDM

Information Delivery Manual. Describe which, when, and how information should be exchanged in and out of processes. Often described by process maps and Exchange Requirements. The method for developing IDM's is defined in ISO 29481 part 1 and 2.

3.7

MVD

Model View Definition. Part of the ISO 16739 schema that is needed to support one or more specific IDM. The method to developing MVD's is a buildingSMART specification.

3.8

GUID

Global Unique Identifier. A Globally Unique Identifier (GUID) or Universal Unique Identifier (UUID) (as defined by ISO/IEC 11578:1996 *Information technology -- Open Systems Interconnection -- Remote Procedure Call (RPC)* specification and more recently in ITU-T Rec. X.667 | ISO/IEC 9834-8:2005) provides a way of uniquely identifying an object. GUID generation algorithms have been developed for most software development framework environments and methods exist within these frameworks for persistence.

3.9

MSG

Model Support Group (MSG) is an expert group within buildingSMART to support the building and maintenance of the buildingSMART IFC data model standards. MSG is responsible for the integrity and maintenance of the IFC specification and related buildingSMART specifications

3.10

NSB

National Standardization Body (NSB) is a national member of ISO. Each country can have one member in ISO.

4 IFC Overall Architecture

4.1 General

The IFC Specification is a complex work comprising several parts as shown in figure 2. It also depends on a technology stack that is developed within other groups in ISO and elsewhere. Basically, the IFC Specification consists of:

4.2 Normative Parts

- **IFC Schema:** The schema comprises the definition of computer-interpretable constructs, such as entities, types, relationships and attributes, that are compiled into executable code to build software interfaces and that determines the file structure of exchange data sets.
 - The language to define the IFC Schema is EXPRESS (ISO 10303-11), currently using EXPRESS Version 1 TC2
 - An alternative representation uses an XML Schema (W3C Recommendation), the XSD is auto-generated using the early-bound EXPRESS-to-XSD mapping defined in ISO 10303-28 for the individual EXPRESS schema with a configuration file
 - The whole IFC Schema is broken down into individual sub-schemas for specific parts, such as units, geometry, core, products, etc. Those sub-schemas are exposed as short form EXPRESS schemas. For implementation, they are combined into a single EXPRESS schema, also referred to as long form.
 - The organisation of those sub-schemas is also called “IFC Schema Architecture” and consists of 4 layers, resource layer (entities without GUIDs), core and extension layer, shared element layer and domain layer (the latter with entities having GUIDs).
- **Property and quantity sets:** Reference data, organised in sets of properties or quantities (specific properties representing measured values in terms of dimensions from model elements, such as volume or area), that provide the meaning for the keywords used in the exchange of extensible properties. The IFC Schema only provides a generic definition for property sets consisting of properties, the meaning of the individual properties is determined by a key that is captured in the reference data. The property and quantity set definitions are published as XML data sets following a specific XSD.
- **Documentation:** The Documentation consists of scope, normative references, terms and definitions, fundamental concept, and the documentation of each component organized by the sub schema.

4.3 Informative Parts:

- The graphical presentation of the IFC Schema using EXPRESS-G (ISO 10303-11)
- The series of examples of IFC data sets using the STEP physical file structure (ISO 10302-21) and the XML document structure (W3C Recommendation)
- The multi-lingual translations of IFC Schema and Property / quantity set keywords into natural languages

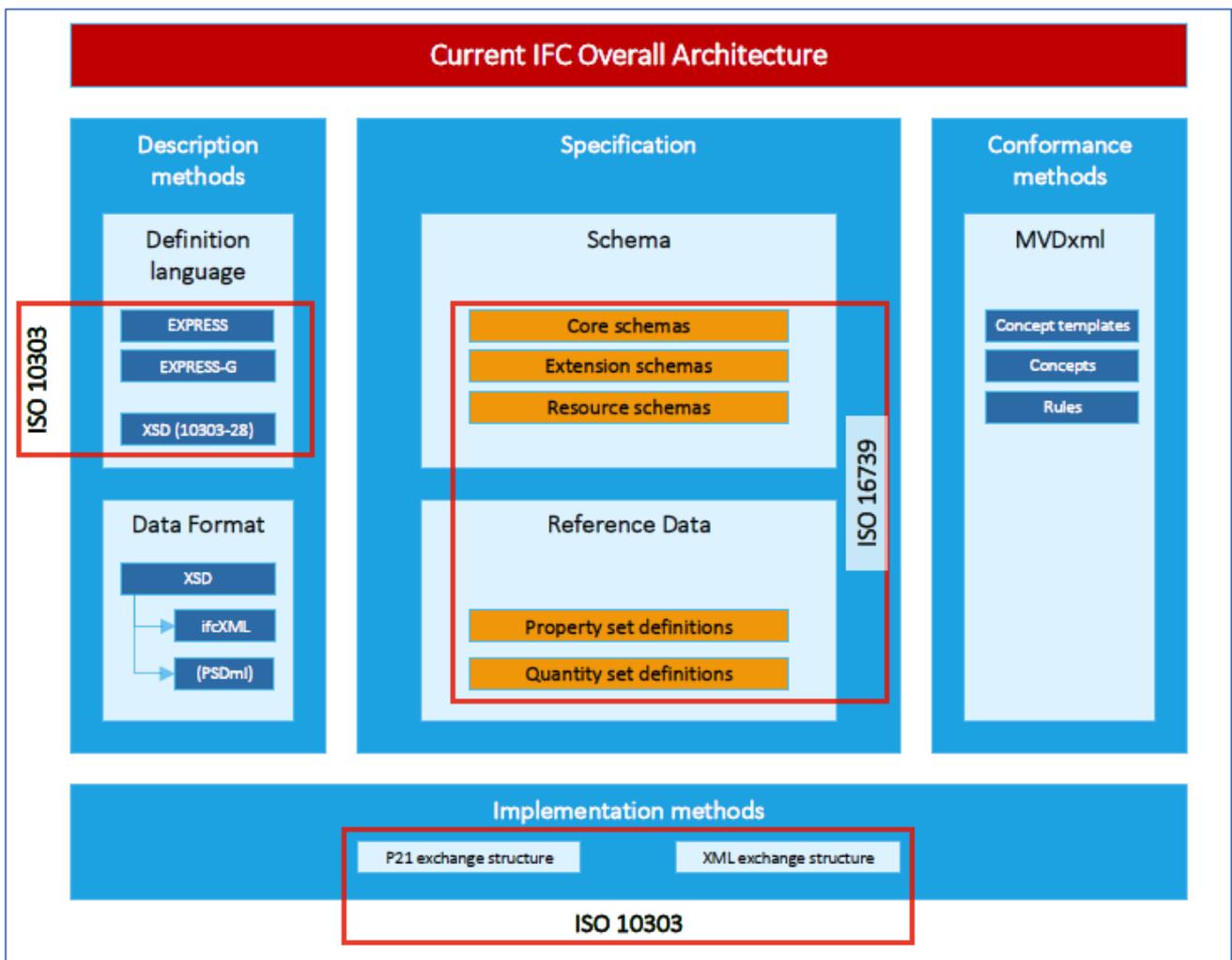


Figure 2: IFC overall architecture as is today

5 IFC Standard Development Process

5.1 Background

The IFC standard is developed following buildingSMART's rules for standards development and approved as an ISO standard following the regulations as described in the ISO directives part 1.

The buildingSMART internal rules for standards development have been under development for some years. In this report, the process is described "as-is" when this report was written.

The International Alliance for Interoperability (IAI) was as approved as liaison A by ISO/TC184/SC4 in June 1997 (resolution 317). (IAI is the former name on buildingSMART International.)

It is buildingSMART that proposed to ISO that IFC should become an ISO standard and with it committed to following the ISO directives when relevant.

RESOLUTION 503 (San Francisco, USA - June 2001)

Relationship with IAI

SC 4 welcomes the cooperation with the Industry Alliance for Interoperability on processing its existing specifications as ISO deliverables, and the efforts to ensure consistency between IAI and SC 4 deliverables.

SC 4 encourages its member bodies to develop cooperation with national chapters and experts of the IAI in order to facilitate the international activities."

Originally the ISO responsibility for ISO 16739 was with ISO/TC184/SC4. In 2012, it was approved that the responsibility for ISO 16739 was joint between ISO/TC184/SC4 and ISO/TC59/SC13 with SC13 as secretariat. A Joint Working Group (JWG12) was established with Thomas Liebich as convener.

IFC2x3 was approved by ISO/TC184/SC4 as ISO/PAS 16739 in 2005. PAS (Publicly Available Specification) is described in ISO directives part 1, clause 2:

"A PAS may be an intermediate specification, published prior to the development of a full International Standard"

"A PAS is a normative document. Normally, the decision to develop a PAS should be agreed at the outset, i.e. simultaneously with the approval of the new work item proposal."

"PAS shall remain valid for an initial maximum period of 3 years. The validity may be extended for a single period up to a maximum of 3 years, at the end of which it shall be transformed with or without change into another type of normative document or shall be withdrawn."

ISO/TC184/SC4 approved IFC2x4 (now IFC4) as a New Project (NP) after a proposal from buildingSMART, as a liaison A member, in November 2010. The standard was published as ISO 16739:2013 in March 2013. IFC4 Add2 TC1 was approved in 2018 as ISO 16739-1:2018.

ISO 16739:2013 was adopted as European standard EN ISO 16739 by CEN/TC442 in 2016. The subsequent version ISO 16739-1:2018 is currently in the process for adoption as EN ISO 16739-1.

Table 1: IFC publications

Formal Name	Publication Name	ISO publication	Published by buildingSMART
2.3.0.0	IFC2x3	ISO/PAS 16739:2005	Dec. 05
4.0.0.0	IFC4	ISO 16739:2013	Feb. 13
4.0.2.1	IFC4 ADD2 TC1	ISO 16739-1: 2018	Oct. 17

5.2 Current buildingSMART Standards Development Process

buildingSMART has a defined process for creating new open digital workflow standards. The buildingSMART Process considers the progress of standard initiatives, development and publication, the organisation, and governance required to operate it and the technology required to support it.

buildingSMART has three programs; User, Standards & Solutions, and Compliance. The User program identifies the needs. Standards & Solutions produce the response to these needs, and Compliance evaluates the quality of the output.

The majority of the buildingSMART Process (at this time) is focused on the Standards & Solutions Program.

- The Governance of the Standards & Solutions program is through the Standards Committee (SC). The SC is representatives of all buildingSMART Members and Chapters.
- The Standards Committee Executive (SCE) has executive oversight on behalf of the SC. The SC vote to endorse progress through the buildingSMART Process.
- The Standards & Solutions Program is subdivided into domains called Rooms. Each Room has a Steering Committee that is responsible for the Room long term plan (roadmap) and the Room Charter. The Room Steering Committee have the authority over the projects that deliver the new standards and solutions.

Project, Program & Portfolio definitions

For clarity, the buildingSMART Process adopts the following definitions from the Association for Project Management Body of Knowledge:

A project is a unique, transient endeavour undertaken to achieve a desired outcome

A program is a group of related projects, which may include related business-as-usual activities, that together achieve a beneficial change of strategic nature for an organisation

A portfolio is a grouping of projects, programs and other activities carried out under the sponsorship of an organisation

Figure 3: buildingSMART Standards Program

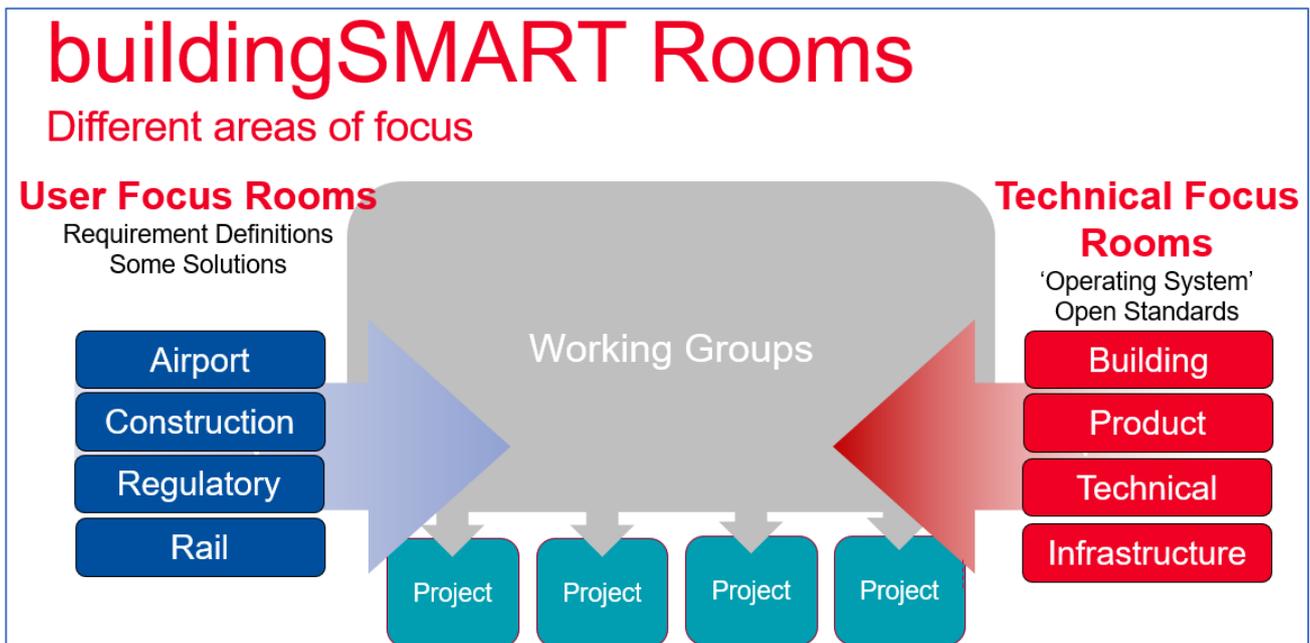


Figure 4: buildingSMART Standards Development Organization

Anyone from the buildingSMART community can propose a new digital workflow standard.

The activities that take place before the proposal is accepted to enter the development process are:

- Proposal received and directed to the most appropriate Room Steering Committee for assessment. The proposer is required to submit using the buildingSMART Activity Proposal template;
- If the Room decides that the proposal meets buildingSMART goals, they request the Standards Committee Executive (SCE) to review and advise the Standards Committee (SC);
- The SC is advised of the proposal and has the opportunity to comment;
- Unless there is strong objection, the Room asks the proposer to work up a full project proposal (using the buildingSMART Project Proposal template);
- The project proposal must identify benefits of outcomes, milestones, resource levels, expert panel, funding levels, and funding sources. It is then known as the Standard Proposal;
- An MoU will be signed between buildingSMART and the funders for a specific project. Cash and work-in-kind contribution is identified on the MoU;
- The Room asks the SCE to send the Standard Proposal to the SC for voting on whether the project can enter the development phase of the buildingSMART Process;
- If a majority of the SC endorse the Standard Proposal, the Room appoint a Project Leader and the project begins.

The Project Leader is obliged to keep a dashboard which is presented to the Room Project Steering Committee each month. The committee reviews progress against the Key Performance Indicators (KPIs) and helps to unlock any issues arising. At this stage, the project is delivering a Working Draft Standard.

The Room asks the SCE to submit the Working Draft Standard to the SC for voting on whether sufficient progress has been made to publish as a Candidate Standard. Once a proposal has been published as a Candidate Standard, software vendors/developers are then invited to deploy the standard for testing and evaluation.

At this stage, international consensus building of prescribed workflows and software deployment validation continues.

When the project is deemed complete, the Room asks the SCE to submit the Candidate Standard to the SC for voting to endorse as a buildingSMART Final Standard.

If a minimum of 65% of the SC vote to endorse that the process has been correctly followed and international consensus is complete, the Standard is published.

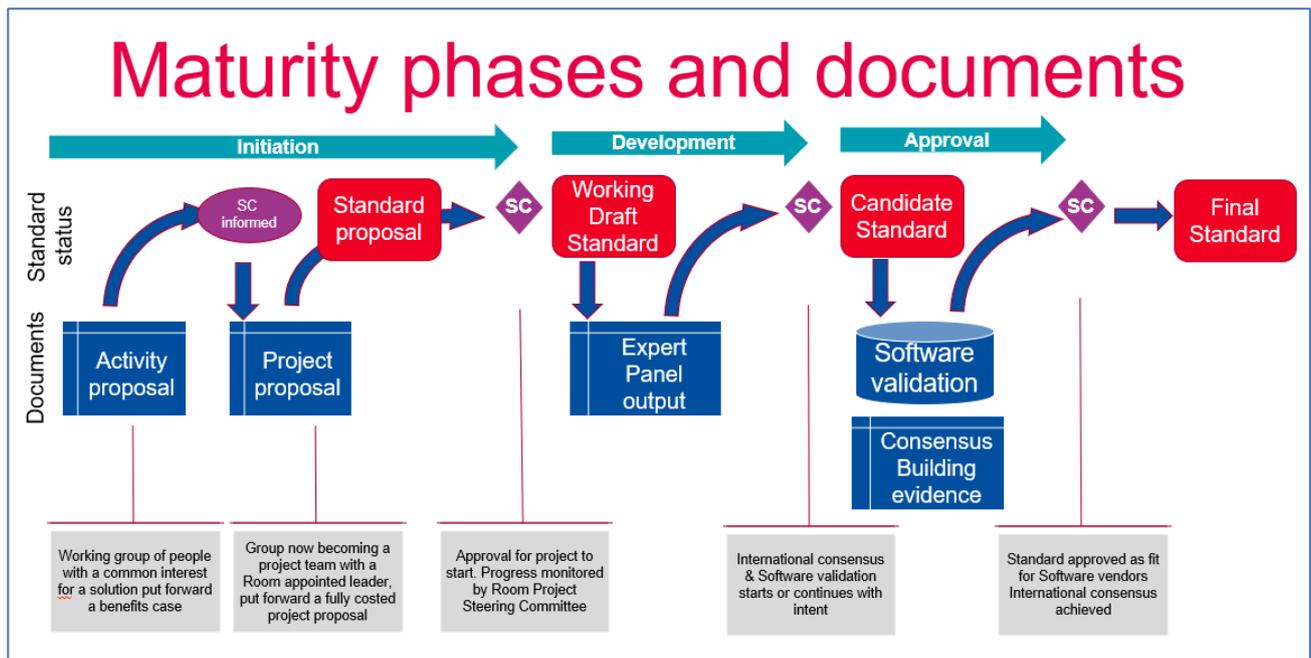


Figure 5 buildingSMART Consensus process

5.3 Improvements to the buildingSMART Process

5.3.1 General

While a great deal of work, to date, has been done to define and refine the process for developing and delivering standards, there is recognition that improvements are needed. This includes enhancements to existing parts of the process and the introduction of additional supporting parts.

5.3.2 Areas Being Enhanced

Improvements, or enhancements, to the existing process include:

- buildingSMART Process definition documents are now divided into; Process, Organisation, and Technology platforms;
- Activity start up - 2 types; introduction of brand-new core concepts and/or technologies & solutions which build upon existing core standards an technologies;
- Distinction between Standards, Solutions, and Technical Reports;
- Definition of project funding model;
- Committee elections;
- Standards Committee Technical Executive (SCTE) remit enhanced to evaluate project expert panel outputs;

ISO #####-#:####(X)

- ISO integration matrix being populated with named people from the Rooms to liaise on specific Working Groups. It should be noted that this usually depends on volunteer engagement;
- Revision of existing standard version control redefined.

5.3.3 Process Areas Being Created

In addition to enhancement, there is a need to further supplement the existing processes as follows:

- Specific definition of the Scope and Deliverables of a Standard (see diagram below);
- Software vendor/developer community engagement throughout the standards development process, especially emphasizing earlier and more robust engagement to deploy and test candidate versions;
- The creation of Expert Panels to review and validate project work.

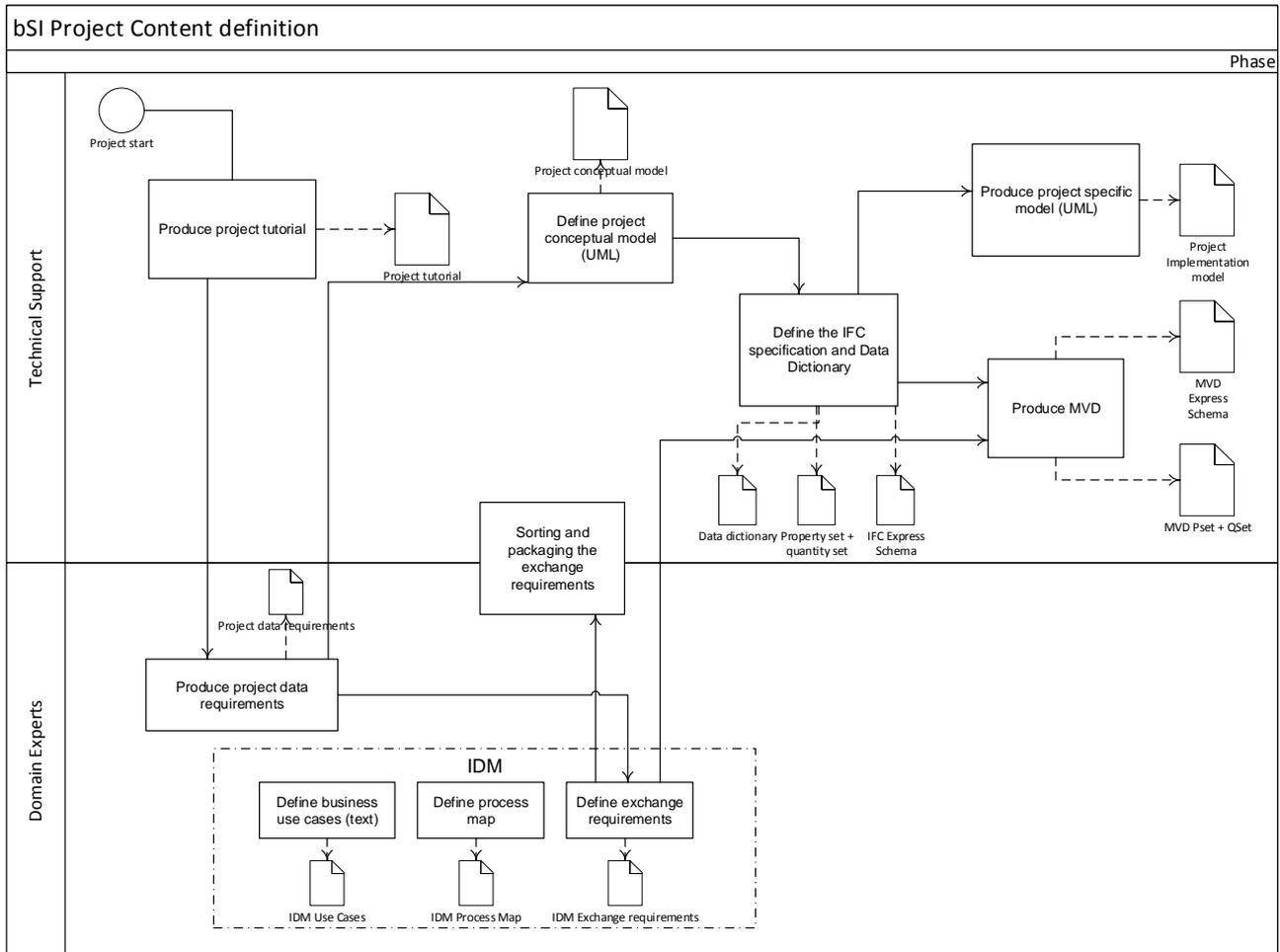


Figure 6 buildingSMART Project Content Definition

6 ISO standards development process

6.1 ISO process

The ISO standard development process is defined in ISO Directive Part. In ISO, the responsibility for the standard development processes is with the Technical Management Board (TMB).

The Technical Committees (TC) are responsible for the standards development to follow the directives. Sometimes the TCs establish sub-committees (SC) and delegate some decision power to the SC. Decisions are done by resolutions in meetings or online ballots.

Only P-members (participating) of the TC or SC have voting rights. P and O-members (observing) and liaison A organizations can propose new work.

In ISO, one country can have one member/vote only. The ISO member organizations are called the National Standardization Body (NSB), e.g, BSI (UK), DIN (D), AFNOR (F), ANSI (US) etc.

P-members have committed to follow specific TC/SC and are obligated to vote and be active.

Collaboration outside a TC happens through the liaison procedures.

A Liaison can be internal between TC/SC's, between ISO and the International Electrotechnical Committee (IEC), or with organisations outside ISO/IEC. There are different levels of liaisons with liaison A as the highest level. buildingSMART International is approved as liaison A. The Liaison A organizations make an effective contribution to the work of the TC or SC for questions dealt with by this TC or SC. Such organizations are given access to all relevant documentation and are invited to meetings. Liaison A member may nominate experts to participate in a Working Group (WG) on the same level as P-members. They can also attend the TC/SC meetings, but they have no voting rights. A liaisons are obligated to be active and follow the directives in interaction with ISO. Liaison A liaison can propose new project, and some A liaison are accepted to send new project directly to Draft International Standard (DIS) stage (Fast Track).

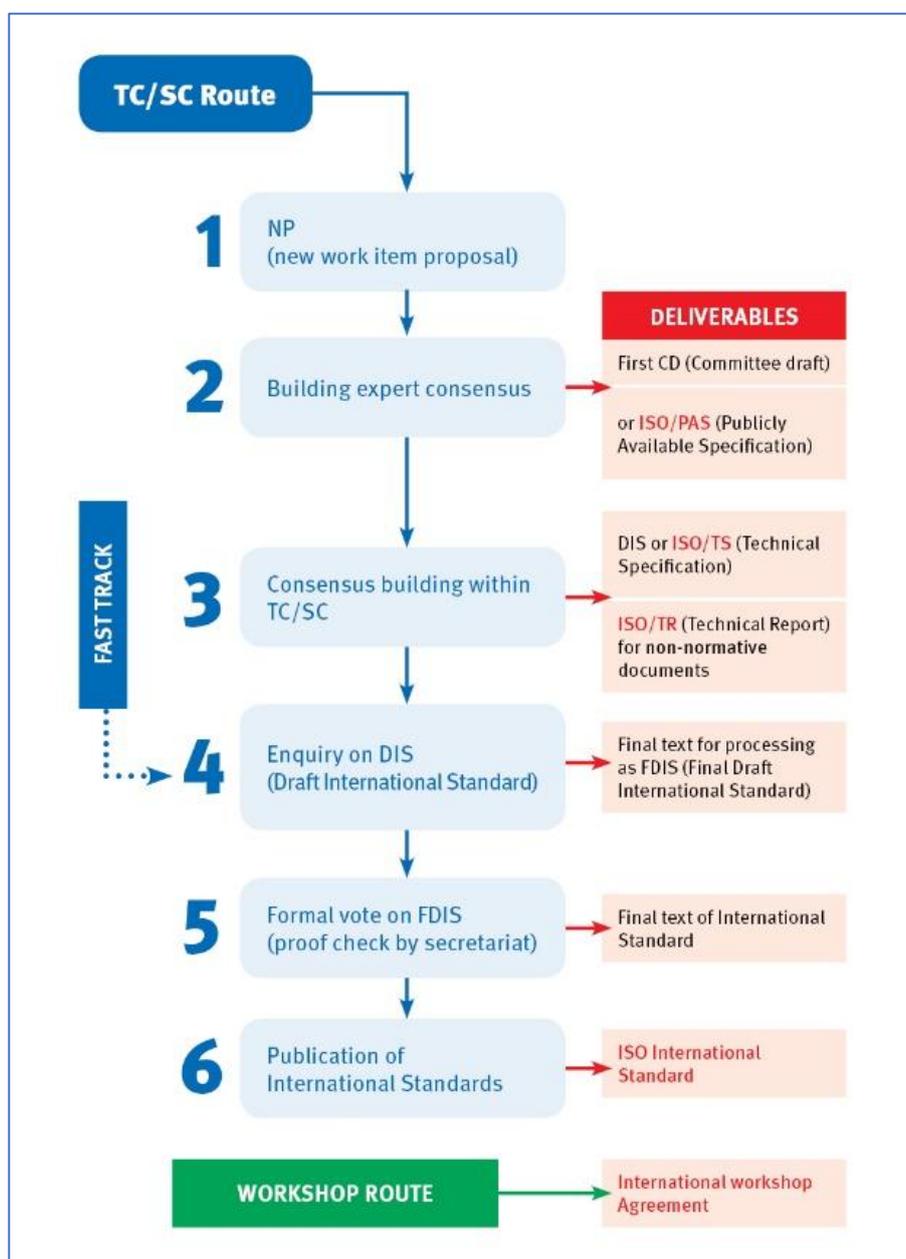


Figure 7 ISO consensus process

ISO is NOT normally responsible for the innovation or deployment of the standards. Traditionally, ISO codifies industry “best practises” into standards.

6.2 Existing ISO <-> buildingSMART Interaction

In the most recent standardization work between ISO and buildingSMART, the IFC standard is developed following the buildingSMART standardization process. After the final version of the standard is approved and published on the buildingSMART website, the standard is proposed as new work to ISO/TC59/SC13. The standard is then sent out for enquiry to ISO/TC59/SC13 P-members. If there are no technical comments, the standard will be published directly after DIS without the FDIS stage.

7 Classification of the Standardization Processes

7.1 General

Clause 7 describe the different level of changes and development in the IFC schema. Some changes are just “bug” fixes and other are major extension that changes the scope of the standard. These different natures of changes should follow different processes. Full standards consensus process for a bug fix is not necessary.

Overall, there is a general release strategy for IFC schemas which reflects the different natures of development based on the extents of changes and/or additions to the previous version. The table below is a general summary of that strategy and general process. The points below explain this in more detail.

Table 2 Classification of IFC standardization processes

Overall IFC Strategy Proposal									
Major release	Minor release	Addendum	Corrigendum	Release name	Release justification	Governance	Examples	expected average frequency	ISO / CEN
1	0	0	0	1.0.0.0	Major extension of scope (e.g. new technology platform, new schema organisation (changes to core definitions, adding new sector to the scope)	Requires a strategic agreement by STCE and Technical room, leads to a balloting by SC. Technical under the auspices of technical room.	IFC2x, IFC4, IFC5	minimum 5 years	yes
1	1	0	0	1.1.0.0	Extension to the schema to satisfy new use cases, out come of extension projects (e.g. major schema additions, adding new disciplines to the scope)	Requires a standard process governed by STCE and balloting by SC. Expert panels are overseen by the domain and technical rooms.	IFC2x3, IFC4.1	every second year	no?
1	1	1	0	1.1.1.0	Minor modifications to the schema due to implementation feedback, adjustments for certification, updates to psets.	Handled within the technical room on request by MSG or ISG based on implementation feedbacks	IFC4 Add2	once a year	no
1	1	1	1	1.1.1.1	No schema changes, only changes to the documentation and the psets, based on feedback by implementation and community	Dealt with internally by MSG	IFC4 Add2 TC1	twice a year	no

7.2 Strategic Development

At the highest level of schema standard development process, there is the introduction of new concepts from schema Definition Language to Data Format, Testing Frameworks, and

Implementation Methods, as highlighted in the dark green boxes in the figure below. These developments have a significant impact on the overall architecture and use of the standard, integrating new, forward-looking methodologies and technologies to the existing platform, while maintaining support for existing, legacy ones to ensure posterity of data access.

Such major developments require a great deal of research and testing before final consideration and implementation, so as not to disrupt legacy uses and workflows while properly addressing current and future needs without unnecessary rework or reversal of previous work. These developments typically have the most significant impact on “major” releases of the standard (e.g. IFC2x3 > IFC4 > IFC5 > etc.) versus incremental content development (e.g. IFC2x3 TC1, IFC4 ADD2 TC1, IFC4.1, IFC4.2).

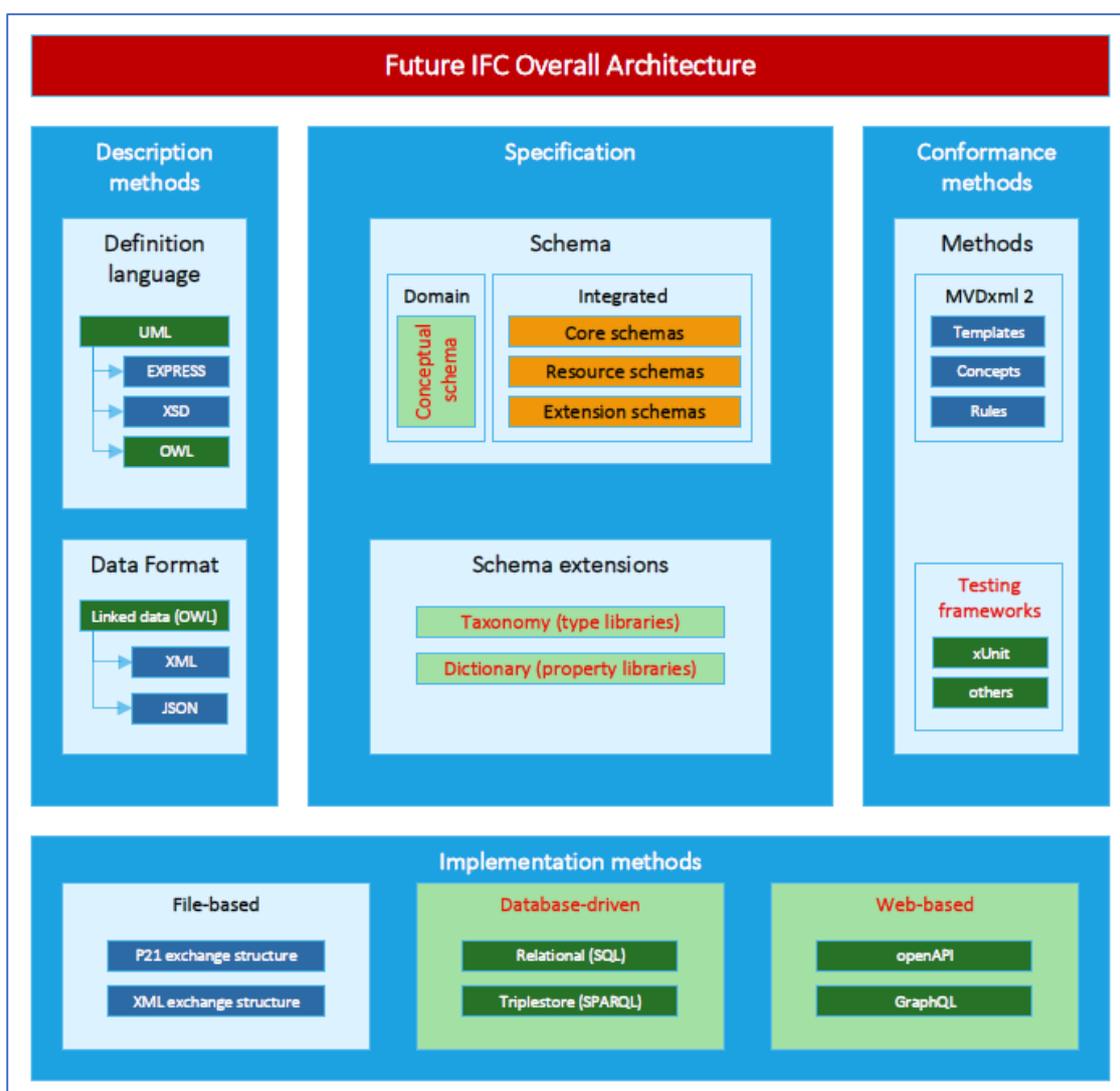


Figure 8 Possible future IFC Overall Architecture

7.3 Content Development

At the next level down, there are the developments specifically related to the contents of the schema, such as Domain Concepts, Taxonomies, and Dictionaries - including the various concept classes, associated attributes, and property sets - which impact implementation for

end users by addressing an ever-expanding scope of the built asset environment. These developments can also have a significant impact on “major” releases of the standard (e.g. IFC2x3 > IFC4 > IFC5 > etc.) because of the scope of additions and or changes, but also have significant impact on incremental releases (e.g. IFC2x3 TC1, IFC4 ADD2 TC1, IFC4.1, IFC4.2).

7.4 Documentation/Content Clarification

Finally, there is the development related to documentation revisions and/or minor “fixes” to classes, their attributes, and/or properties. These have the most impact at the lowest level of incremental release (e.g. IFC2x3 TC1, IFC4 ADD2 TC1), but may also be reflected in extension releases (e.g. IFC4.1, IFC4.2, etc.).

7.5 Methodology for Development

In the strategic and content development for the IFC schema, the recognition of end user use cases is important to provide the proper context and goals. In buildingSMART, this is typically done through projects which develop IDMs establishing the end user processes and data exchange needs (Exchange Requirements) that lead to the creation of Model View Definitions, a subset of the overall schema, where the Exchange Requirements are mapped to existing IFC schema concepts or propose additions and/or changes to address the requirements. These IDMs/Model View Definitions may be part of an iterative process where the creation and testing of the Exchange Requirements and Model View Definitions ends up influencing changes to the processes identified in the IDM and thus informing new Exchange Requirements and revised Model View Definitions.

The goal of such a process, whether strategic or content related is to guide the development to be immediately useful to the end user.

8 Process for IFC Development Using ISO Directives

8.1 General

As described in clause 6.2, so far, ISO 16739 has been fully developed by buildingSMART and buildingSMART has used its right as a liaison A organization to submit the IFC standard to ISO for approval.

Is important to be aware that P-members of ISO/TC59/SC13 and buildingSMART equally have right to propose new work item connected to ISO 16739. The ISO/TC59/SC13 secretariat must send the proposal for new work out for ballot. If the new work is approved, it will be sent to JWG12 who will run the standard consensus process according to the ISO directives.

CEN and ISO have an agreement (Vienna Agreement) that regulates the collaboration between the two organizations. CEN/TC442 has adopted the ISO 16739 as European Standard EN ISO 16739 according to the Vienna Agreement procedures. Vienna Agreement give CEN/TC442 right to propose changes to ISO 16739.

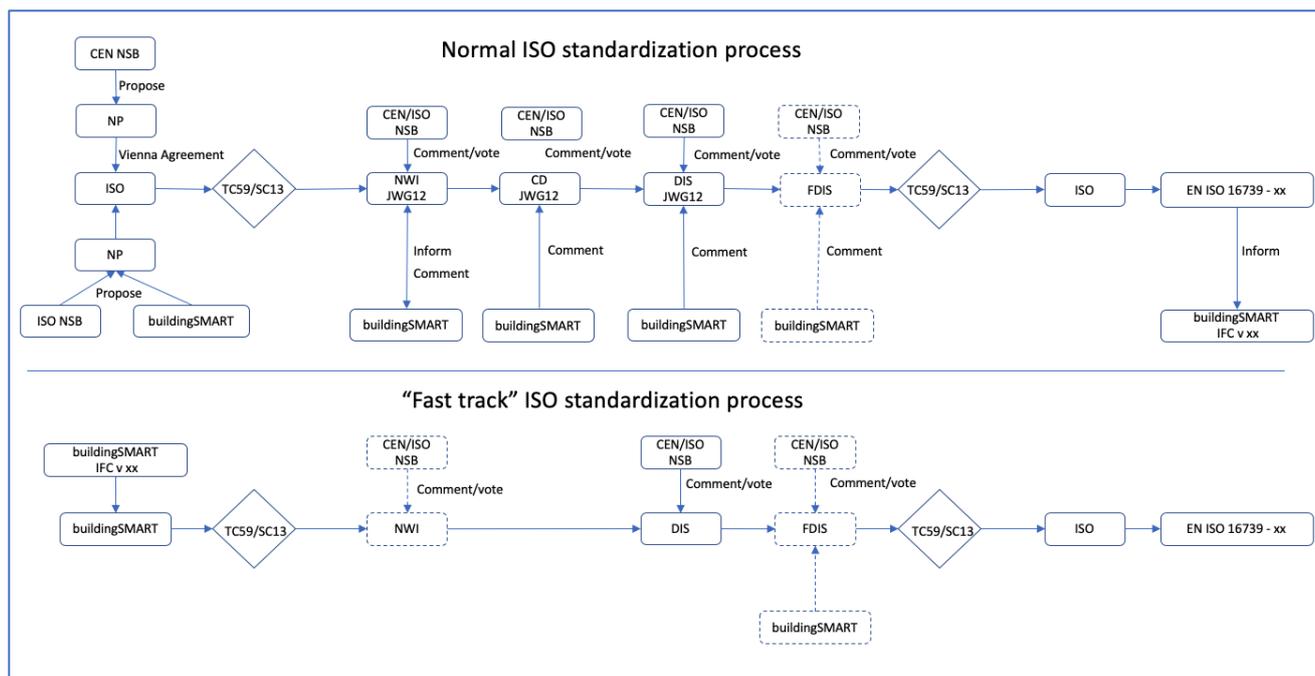


Figure 9 Possible process "tracks" for ISO 16739 update

8.2 Note Regarding Use of "Fast Track"

It is sometime possible to skip the New Project stage (from ISO Directive):

"The NP stage (clause 2.3) is not required for:

- *the revision or amendment of an existing standard, a TS or a PAS (if within its 6-year lifespan),*
- *the conversion of a TS or PAS to an IS.*

However, the committee shall pass a resolution containing the following elements: 1) target dates, 2) confirmation that the scope will not be expanded, and 3) the convenor or project leader. The committee shall also launch a call for experts (Form 4 is not required).

For the conversion of a TS or a PAS to an IS, a two-thirds majority resolution is required.

If the revision or the amendment results in an expanded scope, 2.3 applies (NP ballot shall be initiated, and Form 4 is required)."

The Fast Track procedure has been used for the ISO 16739-1:2018 version of the standard because it was only an amendment to the existing standard. ISO 16739:2013 followed the normal process.

8.3 ISO/TC184/SC4 Standardization Process

ISO 16739 has a strong relationship with the ISO 10303 standards which are developed and maintained by ISO/TC184/SC4. ISO 16739:2013 was approved by ISO/TC184/SC4. In 2012, it was decided to move the responsibility for the standard to ISO/TC59/SC13 and JWG12 was established. ISO 16739 is now on SC13's work programme.

In the first meetings in JWG12, it was decided to organize the work within JWG12 the same way as ISO/TC184/SC4 do with the ISO 10303 standards – Following ISO directives part 1 Annex SK – Standards as database. MSG would function as a maintenance team and JWG12 as validation team.

After this decision was made, Annex SK is removed from ISO Directives, Part 1, and JWG12 decided in the #3 meeting to operate as an ordinary Working Group, see annex A.2.

During the process of writing this report, it has been recognized that SC4 still seems follow the SK procedures. (ISO/TC 184/SC4 N3215 – SC4 Handbook – Standing Document Ballot). It might be useful for buildingSMART and ISO to consider if some of the SC4 procedures are relevant for development and maintenance of ISO16739.

9 Alternative Levels of Collaboration

9.1 General

The relationship between buildingSMART and ISO is not unique. The Project Group has done some research in how the relationship ISO has with other “industry consortia” e.g. OGC, W3C. They have different MOU’s that regulate the relationship, but all have to accept the ISO directives.

This report only surveys different paths how buildingSMART and ISO can collaborate regarding development and maintenance of the ISO 16739 standard and does not give any recommendations or decisions. It is up to buildingSMART and ISO/TC59/SC13 to agree on how to collaborate in the future.

9.2 Existing Collaboration

So far, all strategic decisions and technical development for IFC have been done by buildingSMART. ISO has adopted the standard from buildingSMART without any changes. This is a process that has worked well for more than 20 years and has been a success story. buildingSMART decides when to send new versions of IFC to ISO for adoption. ISO/TC59/SC13 secretariat runs the ISO procedure and SC13 decides to adopt the standard or not.

Depending on the scope of the work, the tracks are defined as follows:

Type of new project	Process
Strategic documents	buildingSMART standard processes
Major extensions of scope	buildingSMART standard processes
Major extension of schema inside scope	buildingSMART standard processes
Minor modification of schema	buildingSMART standard processes
No schema changes	buildingSMART standard processes

9.3 Other Frameworks for Collaborations for Consideration

9.3.1 General

The result of the success has been that people and organisations outside the buildingSMART community are becoming more interested in IFC. Some of them go to buildingSMART and extend the community, but many do not and engage primarily with ISO. Therefore it should be considered whether the process and responsibilities should stay as they are today or if there should be any changes.

The following ideas are alternative frameworks to support discussion for future collaboration between buildingSMART and ISO for consideration:

- Copy relevant part of the ISO/TC184/SC4 process for developing and maintain the ISO 10303 standard family, by introducing a handbook that describes how JWG12 operate within the ISO directives;
- Create a joint ISO and buildingSMART strategy to describe how ISO and buildingSMART can collaborate on strategic level as a foundation for a joint road map;
- Employ the ISO Publicly Available Specification process to bSI “Candidate Standards” – PAS is the way W3C and ISO collaborate on some of the W3C standards.

The is not an exhaustive list. Other alternatives probably exist. The Project Group did a wide, but not exhaustive, investigation of all opportunities. It might be useful to involve ISO/CS in a further investigative process.

9.3.2 ISO/TC184/SC4 Standards Process

In this alternative, buildingSMART uses the ISO/TC59/SC13/JWG12 as a tool for the maintenance and development of ISO 16739 as done under the ISO directives.

JWG12 sets up a Maintenance team and Validation team with SC4 as a model.

Depending on the scope of the work, the tracks are defined as follows:

Type of new project	Process
Strategic documents	ISO standard process
Major extensions of scope	ISO standard process
Major extension of schema inside scope	ISO standard process
Minor modification of schema	Maintenance and Validation Team Process
No schema changes	Maintenance Team

A way to organize this alternative can be:

- buildingSMART has the convener of JWG12, and a P-member of SC13 provide the secretariat function;

- JWG12 is open for all experts nominated by P-members and buildingSMART;
- JWG12 is the Validation Team;
- buildingSMART appoint the Maintenance Team (This could be the buildingSMART Model Support Group - MSG).

All processes and decision would be documented on Livelink (ISO common document environment) to ensure transparency.

9.3.3 Joint ISO and buildingSMART IFC Strategy

In this alternative, buildingSMART and ISO/TC59/SC13 collaborate close on strategy level. Strategy documents are developed through the ISO consensus process to ensure involvement of a wider stakeholder community than buildingSMART membership can offer.

Depending on the scope of the work, the tracks are defined as follows:

Type of new project	Process
Strategic documents	ISO standard process
Major extensions of scope	buildingSMART internal processes
Major extension of schema inside scope	buildingSMART internal processes
Minor modification of schema	buildingSMART – include changes in next ISO version
No schema changes	buildingSMART – include changes in next ISO version

The industry should use the buildingSMART version of the standard since it will be most updated. JWG12 is only involved in strategic level projects and decisions.

9.3.4 Publicly Available Specification – PAS

A Publicly Available Specification (PAS) is published to respond to an urgent market need, representing either the consensus of the experts within a working group, or a consensus in an organization external to ISO. As with Technical Specifications, Publicly Available Specifications are published for immediate use and also serve as a means to into an International Standard. Publicly Available Specifications have a maximum life of six years, after which they can be transformed into an International Standard or withdrawn.

Depending on the scope of the work, the tracks are defined as follows:

Type of new project	Process
Strategic documents	ISO standard process
Major extensions of scope	ISO PAS Process
Major extension of schema inside scope	ISO PAS Process
Minor modification of schema	buildingSMART – include changes in next ISO version

No schema changes	buildingSMART – include changes in next ISO version
-------------------	---

buildingSMART used the PAS process to have IFC2x3 approved as ISO PAS 16739:2005. The project group has not been able to find the decision in SC4 that gave buildingSMART the directive to submit IFC as a PAS. The ISO directive might have changed because W3C has made a formal agreement with ISO to use the same process (<https://www.w3.org/2010/04/pasfaq#L373>).

This process might be complicated to implement. It is today used only by ISO/IEC JWG1 and a MOU including ISO and IEC might be necessary. ISO/CS do not recommend this alternative and should be involved if further investigation is wanted.

10 Funding

10.1 ISO

ISO committees have no budget they control. It is expected that the officers and experts have their own funding. NSB's do have funding, but normally this funding is only for running the NSB's (secretariat etc.) We can use Norway as an example; Standards Norway get some base funding from the Government, sales of standards, and project funding from stakeholders. The elected officers and experts are paid by their home organisations (in-kind funding). Standards Norway uses a great deal of resources to get project funding from stakeholders in the construction industry and government bodies. Other countries can have a different model. Standards Norway has good income of standards sales. Expert participation in committees is free. For other countries, the NSB's might have a different finance model.

10.2 buildingSMART International

The buildingSMART management office that runs the standards process is financed by membership fees. Standards development and maintenance projects have project funding, some cash and some in-kind. Before a project to develop a standard can pass into to the development phase, a full project proposal shall be submitted and endorsed through voting by the Standards Committee.

The full project proposal will include the delivery milestones and the funding model, listing the stakeholders and the amount of in-kind or cash they are providing.

The funds are invoiced by buildingSMART. The relevant Room Steering Committee is responsible for the governance of the project. They appoint the project leader and other providers in conjunction with the stakeholders. The Room Steering Committee makes the request to buildingSMART management when milestones have been achieved to pay the project provider.

It must be recognised by all parties that the costs of any desired cooperation and liaison between buildingSMART and ISO must be funded from the community and it is therefore incumbent upon everybody involved to ensure that such cooperation and liaisons are as efficient and practical as possible. Burdensome processes will not be realistic.

11 Conclusions

buildingSMART International is the originator and the owner of the IFC standard. ISO has recognized this and approved buildingSMART as a highest-level liaison, liaison A. buildingSMART has used the liaison A status to have IFC approved as a full ISO standard – ISO 16739.

There is existing documentation that regulates ISO's right to publish and sell the ISO 16739, while the ownership stays with buildingSMART. This document only regulates the copyright regarding ISO 16739. A broader MOU document between buildingSMART and ISO that describes how to collaborate might be useful and should be investigated.

The IFC standard will be developed further and must have a transparent and sustainable maintenance regime. In this report, it has been discussed how this can be organized in the future. It has been identified that there is "room for improvement" in the interaction between ISO/TC59/SC13 and buildingSMART and a need for more clarity for "who is doing what, when". There is a significant overlap of experts and tasks between the two organizations, and future collaboration should seek as cost- and time-effective processes as possible.

When IFC is an ISO standard and buildingSMART is liaison A organization, the ISO directives have to be followed, when relevant. Today, the interaction between ISO and buildingSMART is quite loose. The group has discussed alternative cooperation that gives a closer interaction. Conclusions on the pros and cons for all alternatives are not up to this Project Group to conclude and there was not time enough to propose a solution.

Similar kinds of collaboration issues between ISO and other industry standardization organizations (e.g. ISO/TC211- OGC) have been identified, but there is no single blueprint that solves such collaboration issues because they are all "same but different". The ISO Central Secretariat has experiences in how different organization collaborate with ISO and is willing to help buildingSMART and ISO/TC59/SC13 to find an agreed way forward.

The conclusion from this Project Group is to recommend buildingSMART and ISO/TC59/SC13 to develop an agreement that regulates the interaction between the two organizations. The agreement must follow the ISO directives and be approved in both organisations.

Annex A: (informative) Minutes from ISO/TC184/SC4 and Previous JWG12 meetings

Annex A.1: Minutes from ISO/TC184/SC4

From ISO/TC184/SC4 N2641:

“The original ISO/NWI 16739 ed2 ballot was circulated in 2008 as N2330 and accepted as documented in SC4N2364, ISO Ballot Results, IFC - Industry Foundation Classes for AEC/FM data sharing current status ISO/PAS16739 (Industry Foundation Classes 2.x) dated 2008-07-21.

Unfortunately, the New Work Item was never registered by ISO, and would in any case now be approaching the end of its timeframe. ISO CS is unwilling to register the item with a current start date on the basis of the original ballot.

The buildingSMART consortium has now prepared a draft document in line with the original NWI, ready for DIS ballot. The Secretariat is therefore requesting a confirmation of the original New Work Item (NWI) and the nomination of experts, in order for the Work Item to be registered.”

This delay was one of the reasons why the process to move the responsibility for ISO 16739 from ISO/TC184/SC4 to ISO/TC59/SC13 where other BIM relevant standards were developed. The result was that ISO/TC184/SC4 and ISO/TC59/SC13 agreed to establish a JWG with ISO/TC59/SC13 secretariat. The argument for a JWG was that IFC is based on ISO/TC184/SC4 standards.

Annex A.2: Minutes from previous JWG12 meetings

Minutes from #1 meeting 2013-10-02 in Oslo, JWG12 discussed how ISO 16739 should be processed within JWG12:

Jean Brange and Håvard Hjulstad explained how ISO/TC 184/SC 4 works with standards in database format, using ISO Directive, Part 1, Annex SK. Annex SK describes a procedure for the development, maintenance, review and withdrawal of ISO standards consisting of “collection of items” in databases.

Possible solutions for the maintenance and development of ISO 16739 were discussed. Validation team should preferably be JWG 12. Maintenance team needs to be real experts, could in fact be the technical team in bSI (Model Support Group, MSG)

A model for the operational procedures, with further questions, is summarized in the attached document by Jean Brange.

Conclusions:

- The basic procedures for the support of ISO 16739 should
- be described and proposed to ISO/TC 184/SC 4 and ISO TC 59 / SC 13 in a document. Thomas agreed to prepare a document in time (4 weeks a head of the meeting at the latest) to be put on the agenda for the SC 4 meeting in November. The document should preferably also be presented, as information only due to the time limit, on the SC 13 Plenary meeting in Munich 11th October.
- The detailed operational procedures should be developed, and should be ready by spring 2014. The procedures shall be based on Annex SK.
- Validation team and Maintenance team must be clearly defined
- It is important that the procedures describe the development of the standard in one process only, not parallel work both in bSI and ISO.
- The responsibility for ISO 16739 should formally be moved from ISO/TC 184/SC 4 to ISO TC 59 / SC 13. The document prepared for SC 4 and SC 13 should also address this, and SC 4 needs to resolve this at their next plenary meeting.

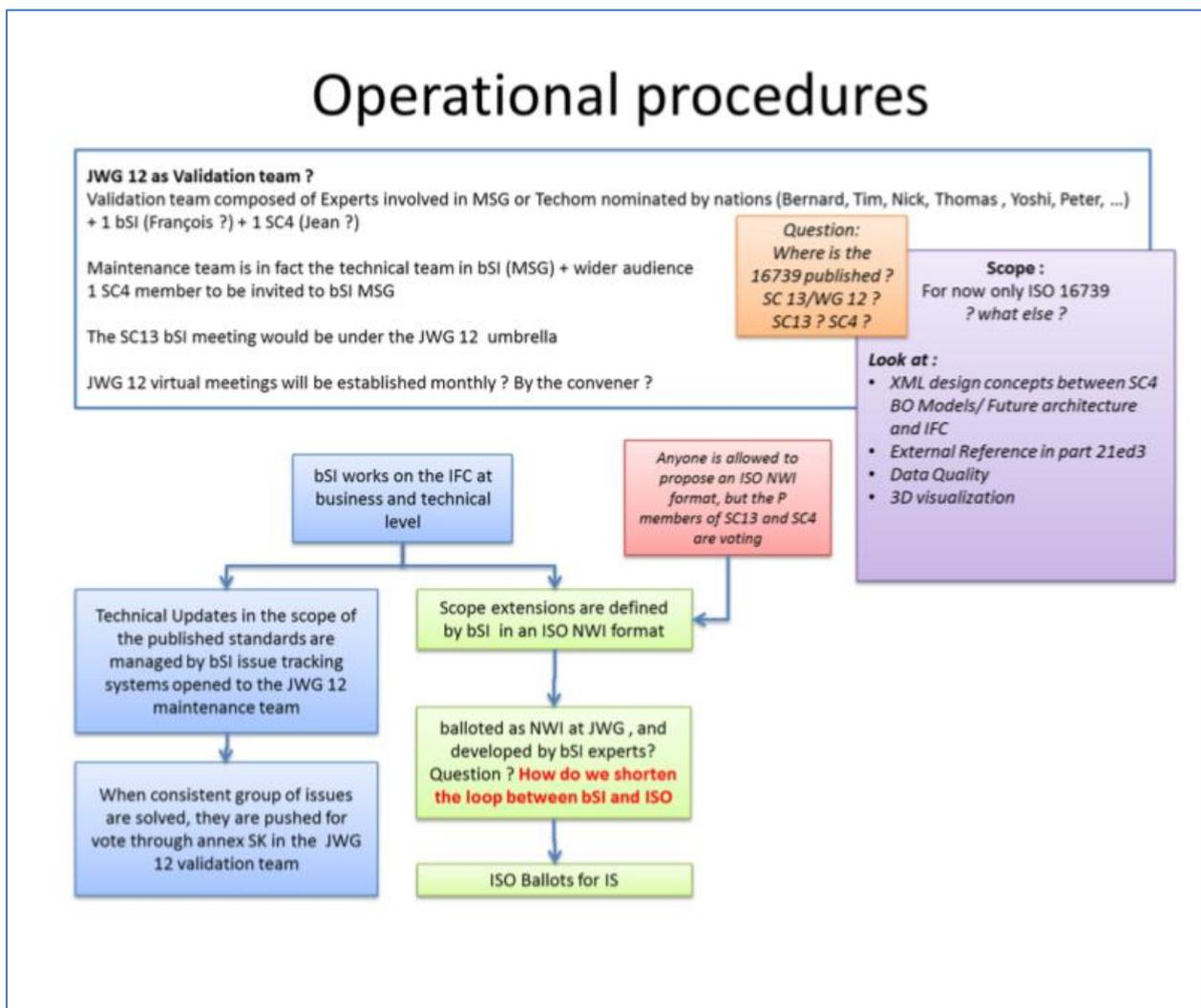


Figure 10: Discussed Operational Procedure from the"1 meeting

Minutes from #2 meeting 2014-09-25 (joint with SC4 Lafayette hill, PA US)

Determine maintenance team and validation team

- Maintenance team consists of MSG
- Validation team consists of working group; 1 nominated person per country from working group, when there are many people from one country, need agreement on who is official member

NOTE (after the meeting)

- The "Standard as a database" as an ISO procedure and thereby the Maintenance and Validation team are not anymore ISO rule

Resolutions:

Resolution 1.

"We agreed to establish the maintenance and validation team, meeting schedule, and had a discussion on the work program."

Resolution 2.

"We reviewed the issue document of SC13, regarded it as put into action, and recommend to SC13 to close the issue."

Resolution 3.

"The issue of maintaining the standard as a database was discussed, and agreed to continue maintaining the current development environment."

Minutes from #3 meeting 2014-10-27 in Toronto the following was noted:

In the meeting between the convener and the ISO TPM Anna Rossi in Geneva, 12.06.2014 the following was explained:

- ISO does not have "standard as a database" anymore.
- No need to set-up a maintenance team and a validation team
- Organize as a "normal" working group
- The current standard is a XML-based standard, sold as a CD.

- The JWG will now be an open group. BuildingSMART is a member of the JWG as an A-liaison and can nominate more expert members.

Recommendation

The JWG will be working as an ordinary working group without a maintenance team and validation team.

Thomas showed the IFC4 addendum developed in buildingSMART.

A new work item with the amendment (ISO: amendment = buildingSMART: addendum) should be established in SC13. The fast track should be chosen.

It should also include to change the number to 16739 – 1, preparing for further parts. The next part could be MVD

SC13 will check the ISO rules on how a NWI in a JWG is to be proposed, what will be the right process concerning ballots, enquiry etc.

Recommendation

JWG12 recommends SC13 to start the process to initiate a new work item for the amendment of ISO 16739, including a new numbering system starting with ISO 16739-1.

JWG12 recommends SC13 to make total picture/overview over all SC13 standards related to BIM and how they interact.

JWG12 recommends SC13 to include MVD methodology and resulting MVD specifications into the future scope of JWG12.

Minutes from #4 meeting 2015-04-20 in Vico Equense (SC4)the following was noted:

Christophe Mouton suggests to look into the “big picture” document recently created by a TC 184 project.

Recommendation:

- It is considered to be helpful also in context of TC 59/SC 13
- It is recommended to share the methodology and current results with the new task force, TC 59/SC 13/TF 2.

Minutes from #5 meeting 2015-10-14 in Singapore the following was noted:

Going through the last meeting conclusions the JWG12 agreed on the following actions and recommendations.

Recommendation

JWG 12 recommends SC13 to make a total overview over all international standards related to BIM and how they interact. A first draft made by JWG12 will be circulated.

Recommendation

JWG 12 recommends the future numbering of ISO 16739 to be as follows:

1 – 19: IFC schema

20 - 99: General documentation, methodology (ISO standard, TR or TS)

100 – xx : MVD

Recommendation

JWG 12, Jim Plume, will start reviewing existing bSI documents as candidates for general documentation.

Recommendation

JWG 12 recommends a change of name of JWG12 to:“Development of ISO 16739 and other **construction** related standards”.

For recommendations, see above.

JWG 12 then started the work to make a total overview over all SC13 standards related to BIM and how they interact. JWG 12 will present the document for SC13.

It will also ask for feedback by bSI, TF02 and CEN/TC442.

Minutes from #6 meeting 2016-05-24 in Sapporo (SC4) the following was noted:

Just discussions around P42 and IFC

Minutes from #7 meeting 2016-10-08 in Berlin the following was noted:

Recommendation

JWG 12, Jim Plume, will start reviewing existing bSI documents as candidates for general documentation.

Thomas Liebich to send documents to Jim Plume.

Recommendation

JWG 12 will meet twice a year in conjunction with bSI technical summit meetings. The next meeting will be a joint meeting with bSI in Barcelona April 2017.

Recommendation

JWG 12 continues the collaboration with SC 4 on geometric and related issues and representatives from JWG 12 will attend SC 4 meetings at least once a year.

Recommendation

JWG 12 recommends the future numbering of ISO 16739 to be as follows:

1 – 10: IFC schema, mvdXML, other general methodology documentations

11 – xx : various international MVD's (as they are developed by bSI)

Parts could be targeted as ISO standard, TR or TS

Recommendation

For ISO/NP 16739-1 the reference to EXPRESS is removed. The complete IFC4 Add2 documentation with EXPRESS and XSD languages definitions is submitted.

Recommendation

JWG 12 recommends that mvdXML from bSI is proposed as a NWI as a CD draft to be titled as ISO 16739-2, and will ask bSI to propose it to ISO.

Minutes from #8 meeting do not exist on Livelink

Minutes from #9 meeting 2018-10-16 in Tokyo:

6	<p>Development of IFC4. What is changed to IFC 4.1 and will change to IFC 4.2 and eventually IFC 5 and which actions are needed in order to avoid confusions between bSI-IFC and ISO-IFC. A general question is, which release steps on bSI side are reflected in ISO, and which are not.</p>	
	<p>A document from the Norwegian mirror committee was circulated to JWG 12 members on 2018-10-10, to be discussed at the meeting in Tokyo. See document N 24. In short:</p> <ul style="list-style-type: none"> • The Norwegian Mirror Committee expresses its concern about the development and implementation of the ISO 16739 - IFC. There is still no certified software in the market based on IFC4 and the ISO version of the standard, therefore IFC4 is still not implemented • In Norway, IFC was accepted and recommended as a formal archival format for object models in a government Regulation from January 1, 2018. This emphasizes the need to keep IFC as a stable backwards compatible standard, supporting digital preservation of object building models • IFC development happens today in buildingSMART International. Is the development and decision process transparent enough? • The whole IFC schema is "in play" when IFC is further developed/extended. How to ensure that all stakeholders needs are secured? <p>The document further points at issues that could be discussed by JWG 12:</p> <ul style="list-style-type: none"> • How to strengthen strategic control over the ISO 16739 development by splitting up the IFC schema in separate parts of the standard. E.g. Core/resources, common schema, domains in addition to what is already agreed in resolution 172 (from Singapore 2015-10-16) • Agree with bSI how resolution 172 can more effectively be implemented. • There is a need for a strategic document that describes the history, principles - and agreed future as a consensus description for the way forward. This document should be updated regularly. • Extension and change projects should be more clearly discussed and agreed on a strategic level - not evolve from a start at the technical level. Projects should be sent out for comments on CD, DIS and FDIS stages - not only FDIS as today. • Routines for fast update responds for minor changes and errors should be established. • A system for certification of software for compliance with the official ISO 16739 needs to be established. <p>During the discussion that followed, several issues and comments were brought up. Richard Kelly, bSI, and Thomas Liebich, JWG 12 convener, expressed concerns about giving up procedures for IFC development that have been used for 20 years. bSI has a process of establishing and carrying out IFC extension projects involving users and developers and a decision-making process for such extensions leading to new versions of IFC. Also, bSI has developed their routines to be more robust and open, but also acknowledges that further improvements of the development process for defining IFC are necessary. The importance of testing and software approval before publication is crucial and needs to be done in the "bSI route".</p> <p>The Norwegian experts, Kjell Ivar Bakkmoen and Øivind Rooth, explained that the document was meant for discussion, with no intention of starting competing</p>	N 24
	<p>work between bSI and ISO, but rather to secure how we do not do double work. It is important that bSI, ISO and CEN strengthen their relationships in the management of IFC development. The main issue is to clarify "who does what".</p> <p>Following a longer discussion, JWG 12 agreed to the following recommendation to ISO/TC 59/SC 13:</p> <p>Recommendation <i>Establish a group within JWG 12 to strengthen the strategic and practical collaboration and governance in the development of the ISO 16739- and related standards, between and with participation of ISO/TC 59/SC 13, ISO/TC 184/SC 4, CEN/TC 442 and bSI. The outcome shall be a report including recommendations, delivered by 1 July 2019. SN is asked to convene the group.</i></p>	

Annex B: (informative) buildingSMART – ISO Copyright Agreement



ISO LICENCE PROCEDURE
2011

COPYRIGHT LICENCE AGREEMENT

hereinafter the "Agreement"

Re: Copyright protected content (image, text figure, table etc.): ISO 16739 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries

hereinafter referred to as the "Work"

between

BUILDINGSMART INTERNATIONAL LIMITED, 2 Church Road, Kenley, Surrey CR8 5DU, United Kingdom

hereinafter referred to as the "Licensor"

and

**The INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, ISO,
1 Chemin de la Voie-Creuse, Case postale 56, 1211 Geneva 20, Switzerland**

hereinafter referred to as the "Licensee"

WHEREAS, the Licensor holds the copyright in the Work;

WHEREAS, the Licensee develops and publishes standards, and considers incorporating the Work in its entirety, in part, or as an adaptation, into one of its standards (hereinafter referred to as the "ISO Publication");

WHEREAS, this Agreement will set out the terms and conditions between the Licensor and the Licensee (hereinafter jointly referred to as the "Parties").

1. Grant of Rights

1.1 The Licensor grants to the Licensee, without any fee due in return, a non-exclusive licence to use the Work and to include it into the ISO Publication. For this purpose the right is granted to reproduce, to distribute, to adapt, to modify, to translate the Work and to make it available to the public in all forms (e.g. printed or any electronic form), and in all media (whether now known or hereafter developed), throughout the world. The Licensor also grants the right to the Licensee to sublicense ISO members to use the Work in their national adoptions of the ISO Publication in the same way the Licensee is allowed to use the Work.

1.2 For clarification, the Licensor shall retain copyright in the Work.

2. Warranties

2.1 The Licensor warrants to the Licensee that it has at its disposal all rights in the Work which are required to grant the Licensee the rights granted in this Agreement.

2.2 The Licensor shall indemnify and hold the Licensee harmless upon first request for any losses, claims, damages, awards, penalties, or injuries incurred, including reasonable attorney's fees, which arise from any claim by any third party of an alleged infringement of rights granted under this Agreement.

3. **Applicable Law / Jurisdiction**

This Agreement shall be covered exclusively by the Laws of Switzerland.

4. **Entire Agreement**

This Agreement contains the entire understanding of the Parties with respect to the subject matter contained herein and supersedes all terms and conditions in any quotations, purchase orders, acknowledgements or other documents exchanged by the Parties. There are no promises, covenants or undertakings other than those expressly set forth herein. No modification, amendment or waiver of any provision of this Agreement shall be valid unless in writing and signed by the Parties.



Signature (Licensor)

28 November 2011
Date

Christopher Groome, Company Secretary

Name and title of representative of Licensor



Signature (Licensee)

08.11.2011
Date

ISO Legal Adviser

Name and title of representative of Licensee

Annex C: (Informative) ISO/TC59/SC13 and buildingSMART Work program

Standard and/or project under the direct responsibility of ISO/TC 59/SC 13 Secretariat (12)	Stage
ISO 12006-2:2015 Building construction -- Organization of information about construction works -- Part 2: Framework for classification	60.60
ISO 12006-3:2007 Building construction -- Organization of information about construction works -- Part 3: Framework for object-oriented information	90.92
ISO/TS 12911:2012 Framework for building information modelling (BIM) guidance	90.20
ISO 16354:2013 Guidelines for knowledge libraries and object libraries	90.93
ISO 16739-1:2018 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries -- Part 1: Data schema	60.60
ISO 16757-1:2015 Data structures for electronic product catalogues for building services -- Part 1: Concepts, architecture and model	60.60
ISO 16757-2:2016 Data structures for electronic product catalogues for building services -- Part 2: Geometry	60.60
ISO 19650-1:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 1: Concepts and principles	60.60
ISO 19650-2:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 2: Delivery phase of the assets	60.60
ISO 22263:2008 Organization of information about construction works -- Framework for management of project information	90.93
ISO 29481-1:2016 Building information models -- Information delivery manual -- Part 1: Methodology and format	60.60
ISO 29481-2:2012 Building information models -- Information delivery manual -- Part 2: Interaction framework	90.93

Figure 11: List of ISO/TC59/SC13 deliverables

Standard and/or project under the direct responsibility of ISO/TC 59/SC 13 Secretariat (8)	Stage
ISO/WD 12006-3 [Under development] Building construction -- Organization of information about construction works -- Part 3: Framework for object-oriented information	20.20
ISO/CD 19650-3 [Under development] Organization of information about construction works -- Information management using building information modelling -- Part 3: Operational phase of assets	30.60
ISO/CD 19650-5 [Under development] Organization of information about construction works -- Information management using building information modelling -- Part 5: Specification for security-minded building information modelling, digital built environments and smart asset management	30.60
ISO/DIS 21597-1 [Under development] Information container for data drop -- Exchange specification -- Part 1: Container	40.99
ISO/DIS 21597-2 [Under development] Information container for data drop -- Exchange specification -- Part 2: Dynamic semantics	40.99
ISO/WD TR 23262 [Under development] GIS (Geospatial) / BIM interoperability	20.20
ISO/DIS 23386 [Under development] Building information modelling and other digital processes used in construction -- Methodology to describe, author and maintain properties in interconnected dictionaries	40.20
ISO/DIS 23387 [Under development] Building Information Modelling (BIM) -- Data templates for construction objects used in the life cycle of any built asset -- Concepts and principles	40.00

Figure 12: List of ISO/TC59/SC13 deliverables under development

buildingSMART International Standards

These standards have been voted by the Standards Committee as being Final Standards

Title	Ref	Link
IFC Base Standards		ISO IFC
IFC Specification & Tools		bSI Tech
IFC4 Specialist Site		IFC4
BIM Collaboration Format XML	S1005	BCF-XML
BIM Collaboration Format API version 2.1	S1006	BCF-API
IFD: Framework for object orientated information		ISO-IFD
IFC4 Design Transfer View	S1001	MVD
IFC4 Reference View	S1002	MVD
IFC Infrastructure Alignment	S1004	superseded by IFC4.1
Trust in BIM deliverables	S1015	mvdXML
IFC4.1 Infrastructure alignment	S1016	IFC4.1

buildingSMART Technical Reports

Title	Ref	Link
IFC Infra Overall Architecture	TR1009	Report
Model View Definition for LANDXML v1.2	TR1007	LandXML v1.2
Open Standards for Regulation	TR1011	Regulatory report
Infra Asset Management	TR1010	Asset Management

buildingSMART Candidate Standards

Candidate standards are activities that are in the process of acquiring international consensus before being submitted to the Standards Committee for final vote.

Title	Ref	Link
ifcOWL Ontology	P21	Information here

buildingSMART SPEC

buildingSMART SPEC is a document that can be produced by any organisation that wants to standardize best practice on a specific subject but is not yet ready to proceed with producing it as a bSI Standard. It is a publicly available specification

Title	Organisation	Link
IFC Rail bSI SPEC	China Rail BIM Alliance	bSI SPEC Rail part 1
		bSI SPEC Rail part 2
IFC Road bSI SPEC	Korean Institute Construction Technology	See below

Figure 13: List of buildingSMART International deliverables

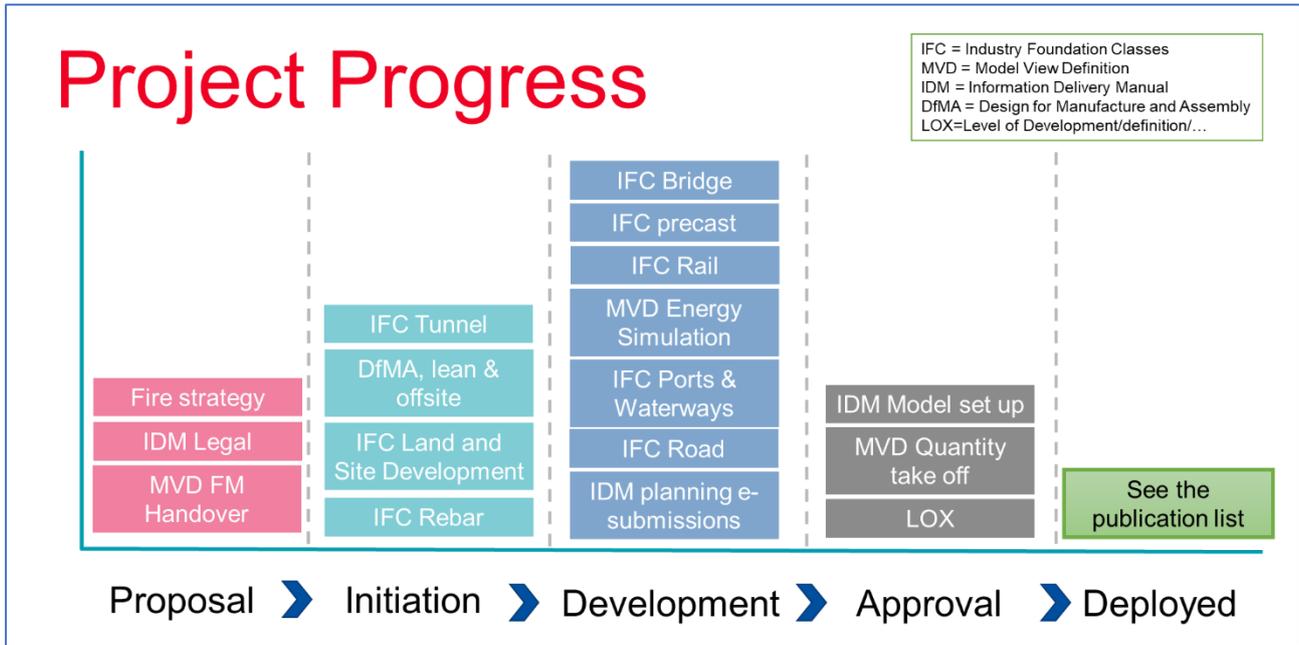


Figure 14: buildingSMART International deliverables under development

Annex D: (Informative) Decisions regarding establishing of JWG12

ISO/TC59/SC13 is “the home” of Building Information Modelling within ISO. In 2012, it was recognized that there was a significant overlap of experts (and still is to some extent). The expert from the construction industry was following buildingSMART and SC13 and close to none followed SC4. To gain better use of limited resources, it was agreed to collect all ISO BIM standards in SC13 and strengthen the collaboration between buildingSMART and SC13. One of the follow-up decisions was to co-locate meetings. The final decision was made by ISO/TC184/SC4, in Miami, November 19th2012, and was supported by the buildingSMART Executive Committee (ExCom). Resolutions from the Miami meeting and ExCom meeting in Washington, D.C., the week before, is in annex D.



SECRETARIAT

Technical Committee 184: Automation Systems and
Integration
Subcommittee 4: Industrial data



The
2007
Lawrence D. Eicher Leadership Award

TC 184/SC 4 N2810

2012-12-11

Resolution “J”
Transfer of ISO 16739 from ISO/TC 184/SC 4 work programme
to ISO/TC 59/SC 13 work programme

Resolution proposed by

Håvard Hjulstad, Standards Norway
on behalf of the Norwegian national mirror committee

Introduction: This resolution relates to ISO 16739, *Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries*. The document has recently completed successfully its DIS-ballot. The document has been sponsored by buildingSMART International (BSI) and has been developed by Team 22, Building and Construction, in ISO/TC 184/SC 4/WG 3. BSI has noted that few if any domain experts have attended the SC 4 meetings in relation to the development of ISO 16739. Technical and strategic discussions related to the use of information technology (IT) in the building and construction industry occur instead in ISO/TC 59/SC 13. Both ISO/TC 59 (“Buildings and civil engineering works”) and its SC 13 (“Organization of information about construction works”) are currently chaired by Norway. SC 13 has indicated that they would like to include ISO 16739 in its work programme and to add it to the set of IT standards for the building and construction industry that SC 13 already manages. However, ISO/TC 59/SC 13 recognizes the outstanding expertise of SC 4 in product models for data exchange, sharing and archival. ISO 16739 incorporates a lot of this knowledge. ISO/TC 59/SC 13 is, therefore, interested in an active cooperation with SC 4. For the purpose of maintaining ISO 16739 a Joint Working Group between ISO/TC 59/SC 13 and ISO/TC 184/SC 4 is proposed. The JWG would be most suitably convened by an expert appointed by ISO/TC 59/SC 13.

Objective: To move ownership of ISO 16739 from ISO/TC 184/SC 4 to ISO/TC 59/SC 13 and to establish a Joint Working Group for the maintenance of this International Standard.



SECRETARIAT

Technical Committee 184: Automation Systems and
Integration
Subcommittee 4: Industrial data



The
2007
Lawrence D. Eicher Leadership Award

TC 184/SC 4 N2810

2012-12-11

Resolution: SC 4 notes TC 59 Resolution 327 and requests participation in the development of the document to be created by TC 59 to facilitate the collaboration between SC 4, TC 59/SC 13 and buildingSMART, in order to establish the necessary operational procedures.

SC 4 asks its PPC, WG 11 and WG 12 to consider the appointment of some of its members as participants of the development activity.

SC 4 agrees to establish a Joint Working Group with ISO/TC 59/SC 13 for the maintenance of ISO 16739 and development of related standards, with appropriate liaison with buildingSMART.

SC 4 requests a report from the joint working group at the Paris meeting.

Attached documents: See below extract from resolutions of TC 59 meeting

TC 59 Resolution 327 (Tokyo 12)

TC59 supports all the resolutions and recommendations made by different SCs of TC 59 during the plenary week, 14-19 October 2012 in Tokyo. In particular, TC 59 acknowledges:

SC13:

Resolution 146 (Tokyo 6) Transfer of responsibility for ISO 16739 from ISO/TC 184/SC 4 to ISO/TC 59/SC 13

SC 13 welcomes the transfer of responsibility for ISO 16739 from ISO/TC 184/SC 4 should the ISO/TC 184/SC 4 resolve this at their next Plenary meeting in Miami in November 2012. SC 13 is positive to the idea of establishing a JWG between ISO/TC 184/SC 4/WG 12 and SC 13.

Resolution 147 (Tokyo 7) Development of formal document on SC 13 and buildingSMART International collaboration



SECRETARIAT

Technical Committee 184: Automation Systems and
Integration
Subcommittee 4: Industrial data



The
2007
Lawrence D. Eicher Leadership Award

TC 184/SC 4 N2810

2012-12-11

SC 13 asks the SC 13 secretariat to develop a formal document to facilitate the collaboration between SC 13 and buildingSMART International by describing the ways in which documents and information are exchanged between the two and provide some guidelines as to how meetings can be arranged. This document should also address the relation to ISO/TC 184.

TC 59 requests that the collaboration document follows the requirements of the ISO Directives and requests that once finished, the document should be applicable also at the TC level.

13 11 12	ExCom	WDC				Resolution from ExCom re ISO 16739 ExCom supports the early transfer of the prime responsibility for ISO 16739 from TC 184 SC4 to TC 59 SC13, subject to maintenance of full liaison with SC4 for issues of common interest.			
----------	-------	-----	--	--	--	---	--	--	--

Bibliography

- [1] <https://www.w3.org/2019/Process-20190301/>
- [2] https://en.wikipedia.org/wiki/HTML#HTML_versions_timeline
- [3] <https://www.w3.org/2011/07/wspas-pr.html>
- [4] <https://www.w3.org/2010/04/pasfaq#L373>