

buildingSMART International

Activity Proposal Standard Committee Review Comments and Responses

Project Name

Facility Management Handover - COBie 2.5

General Information

Room Governance:

Building Room

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Introduction

Following the buildingSMART International (BSI) Standards Committee (SC) vote to approve an activity proposal entitled “Facility Management Handover - COBie 2.5,” the subject project team received detailed comments from SC members. The purpose of this memorandum is to provide responses to these comments.

Acknowledgement

Those on the FM Handover - COBie 2.5 technical team would like to thank the participating members of the Standards Committee who took the time to state their support and express concerns.

In our view, only through such communication will a robust international standard for the delivery of non-geometric building equipment information be adopted and used in all countries across projects from single-family home builders to large industrial facilities.

Comments and Responses

Comments are listed in the order provided to the project team. The order of the comment does not reflect the value of comment or importance of the reply.

Comment 1:

“To strengthen COBie, we strongly recommend and support this Activity Proposal.” (original comment updated to correct typo.)

Answer:

The primary technical purposes of the FM Handover - COBie 2.5 project is indeed to “strengthen” the COBie standard by (1) clarifying the scope of the project as being related to “building equipment,” (2) documenting requirement coverage from all BSI chapters, and (3) updating the COBie MVD from 4.0 to 4.3 using the updated BSI technical Roadmap. We also plan to strengthen outreach through BSI Chapters and expand testing to COBie “merging” and “testing” software.

Comment 2:

“As it currently stands a casual survey of bSI members in 4 different countries uncovered significant division in the perception of the utility and technological foundation of the approach including if model to database transfers are best enabled through spreadsheets, and competing expectations in scope of content. More work needs to be done to build consensus in the project objectives.”

Answer:

The current COBie 2.4 standard¹ allows the delivery of COBie MVD² in the following formats: STEP Physical File Format (ISO 10303-21), STEP XML (ISO 10303-28),

¹ https://www.nationalbimstandard.org/files/NBIMS-US_V3_4.2_COBie.pdf

² http://docs.buildingsmartalliance.org/MVD_COBIE/



Spreadsheet Format (NBIMS-US, V3, Chapter 4.2, Annex A³), and NIEM-compliant Transactional XML format (NBIMS-US, V3, Chapter 4.2, Annex B⁴).

As described in the third paragraph of the description of the Industry Foundation Class Model standard (ISO 16739⁵), “Alternative exchange file formats may be used if they conform to the data schemas.” Annex A and Annex B to the current COBie standard, provide detailed mapping of the Spreadsheet and Transactional XML formats to the COBie MVD schema per the requirement of the IFC standard. Demonstration of the round-trip transmission of SPFF to Spreadsheet Physical File Format were demonstrated using the COBie Plugin⁶ for BIMServer⁷.

From the early development and testing of COBie from 2008 until today, the decision of which format is used has been left to each software vendor. The table below identifies lists the four physical file formats allowed for the delivery of COBie data and the number of software companies participating in public COBie testing events who demonstrated compliance with each format⁸.

Physical File Format	# Software Implementers
STEP Part 21	6
STEP Part 28	
Spreadsheet Format	18
Transactional XML	1

As can be seen from the table above, software vendors supporting COBie overwhelmingly supported delivery of COBie in spreadsheet format. Again, this was not the decision of the COBie team, this decision was made by the software companies themselves. Five of the six companies supporting STEP Part 21 delivery were design BIM software systems. All but two of the 20 companies supporting COBie MVD data exchange during the construction and construction handover stage decided to implement the authorized COBie data using spreadsheet format.

Perhaps the strongest demonstration of the interest of software companies in the decision of different data formats, is that rather than create a proprietary API between Autodesk Revit and IBM Maximo, data exchange between these applications is accomplished through the use of the COBie Spreadsheet format.

In the process of technology adoption, it is not always the most efficient method that becomes prevalent. A recent case in point is Video Cassette Recorder technology. Of the two competing formats for recording television shows on magnetic tape the format with the highest fidelity (BetaMax) did not become the most prevalent standard (VHS did). Let us be 100% clear the goal of the FM Handover - COBie 2.5 process is not to

³ https://www.nationalbimstandard.org/files/NBIMS-US_V3_4.2_COBie_Annex_A.pdf

⁴ https://www.nationalbimstandard.org/files/NBIMS-US_V3_4.2_COBie_Annex_B.pdf

⁵ <https://www.iso.org/standard/70303.html>

⁶ <https://github.com/opensourceBIM/COBie-plugins/releases>

⁷ <https://github.com/opensourceBIM/BIMserver/wiki/Get-Started-Quick-Guide>

⁸ https://www.nibs.org/page/bsa_cobiemm

define a mandatory physical format for the delivery of building equipment information. It is to define the requirements for such information and provide alternatives.

As it has done since 2007, development of the FM Handover - COBie 2.5 project will support owners and software company's in their decision as to the file formats that they identify as the most relevant to them.

The production of this update to the COBie standard will continue to emphasize this point. The technical documentation of the COBie 2.5 MVD (or Information Delivery Specification) will support all allowed file formats supported by the IFC 4.3 UML processes. This includes formats beyond the "traditional" SPFF such as JSON. Given the interest of COBie implementers, particularly in the construction and facility management sectors where the majority of COBie data is created and used, the COBie 2.5 MVD will also support a spreadsheet mapping.

Comment 3:

"Needs scope clarification including the specific workflow(s) and non-geometrical information covered that are to be enabled by this "ie" (the non-geometric information in a model for Facilities Management goes beyond the focus on maintainable equipment assets and zones/spaces) , and review of relationship or redundancy when compared with bSI efforts for mvdXML, ifcOWL or ifcJSON which are potentially more flexible standards addressing a broader spectrum of use cases. Workflow concerns are particularly important since current implementations seem to require significant post model spreadsheet editing to enable any "ie" data consumption and this will depend on clear identification of the scope of the exchange and range of attributes included. Linking in the bsDD may technically solve some of these problems but will further complicate any COBie file import mechanisms."

Answer:

This comment contains several separate points each of which is answered in below.

Regarding "scope clarification."

As with every Model View Definition (or Information Delivery Specification) there are included and excluded entities and properties as well as relevant business rules. The FM Handover - COBie 2.5 project the project is very clearly defined as delivering building equipment operations and maintenance information. That does not mean to imply that building equipment is the only information relevant to building operations, maintenance, or asset management. Including the delivery of non-geometric data concerning non-equipment handover requirements was an impediment to implementation of COBie 2.4 and will be more formally addressed in this project.

Regarding "flexible standards."

The initial international publication of COBie, in 2012, was the "Basic Facility Management Handover Model View Definition." This formulation of COBie version 2.26 was created based the rules International Alliance for Interoperability (IAI) standard. Members of the team who prepared the documentation included the founding developers of the IFC model.

The current draft IFC MVD, COBie 2.4, was developed per the Information Delivery Manual, Exchange Requirements, and Model View Definition requirements developed by

the buildingSMART international. The COBie MVD was created by the chair of BSI's MVD committee.

The COBie 2.5 MVD (or Information Delivery Specification) will be provided through the approved IFC 4.3 process that automatically defines SPFF-alternative physical file formats. This work is being directly coordinated with the BSI Technical Director sees this project as a critical bridge to successfully demonstrate the transition of the two prior standardized approaches to define the schema and physical implementations of all MVD's or IDS's.

Regarding "workflow."

The project team fully agrees that supporting efficient workflows are critical to improving COBie implementation.

The development of standards used in practice must pragmatically address real-world use cases which go beyond enforcement mandates. For the foreseeable future there will be small design consultancies and construction subcontractors whose business does not support the transition to and knowledge of IFC-compliant BIM standards. The pragmatic goal of the COBie project has been, from the first, to allow open standard-complaint construction handover data to be captured and delivered by everyone on the project team. The rationale for that goal is that if even one consultant's or subcontractor's data is not provided, then this is an opportunity for (at best) waste and (at worse) incorrect information.

Testing COBie 2.4 was limited to the production and consumption of full sets of COBie data at the conclusion of design and construction. No testing was conducted of tools to "merge" or "test" COBie data supporting needed design and construction workflows. The FM Handover - COBie 2.5 project will directly test such merge and test software to ensure they are correctly processing COBie required data found in overloaded design BIM files and/or in COBie merging required by small and large firms using so-called Common Data Environments.

Regarding "linking in the bsDD".

The technical requirements of the FM Handover - COBie 2.5 project are being directly supported by the BSI Technical Director and by designated technical support staff. The project team and BSI Technical Director would be interested in the commenter to expand on their comment for the benefit of this project and the overall bsDD effort.

It should be noted that the development of translation and extension projects are to be undertaken as supplemental projects to this initial project, based on the availability of the necessary capabilities within the bsDD.

Comment 4:

"The project plan is impressive, but I'm not sure how widely COBie is really used. There should maybe also include point of views if there are some alternative approaches."

Answer:

The difficulty with having an open standard is always that there is no requirement for those using the standard to report that use. What we can authoritatively say, however, is that COBie is used in several countries including US and UK where requirements are

enforced on publicly funded on some or all national-level public construction contracts. We have also seen COBie being required several other countries including Singapore and Switzerland. COBie use has also been tested in over 30 software systems spanning the entire project life-cycle from planning to maintenance management.

One key goal of the project is to evaluate international requirements for the delivery of building equipment information delivery, and translate those requirements, to support the local use of a common international standard. The first step in the project will be to collect international (traditional and information-based) requirements and to compare those requirements with the current COBie MVD.

Comment 5:

“If I have understood right, in this moment COBie is intended just for buildings. I suggest the project should also include some infrastructure part.” (original comment updated to correct typo.)

Answer:

The fundamental IFC entities that define projects and maintenance plans are indeed the same across all project domains. That does not mean, however, that the same MVD can be used by both building and infrastructure domains. This is because the organization and semantics of objects representing buildings and infrastructure are different. Ensuring the correct structure is used for each domain is essential to link together the information needed to describe how the projects are to be maintained.

Differences in the IFC entities that define different project domains is reflected in the “Building Room” and “Infra Room” structures within BSI. It is the recommendation that the FM handover - COBie 2.5 project support the delivery of building equipment information for “Buildings”. Also the third initial in “COBie” is “Buildings”!

We also recommend that a separate infrastructure construction handover project be undertaken by the Infra Room. In fact BSI is already in discussions with several national and provincial governmental bodies to undertake such a project.

Comment 6:

“The proposal is good. But I miss the history of the process up to now - how has the document been handled among chapters, reviewers, implementers etc. That is why I have stated - do not know as answers on previous questions!”

Answer:

As the COBie standard has been under development since its first publication in a US government publication in 2007⁹, there has been a long history of working with IAI then BSI to continue to improve and promote the use of the standard. The most recent consensus ballot of several thousand members National BIM Standard - United States, Version 3 of the of the COBie standard (version 2.4) was published in 2015¹⁰. A critical accounting of the US BIM Standardization process was also published and should be

⁹ <https://apps.dtic.mil/dtic/tr/fulltext/u2/a491899.pdf>

¹⁰ <https://www.nibs.org/news/242663/buildingSMART-alliance-Releases-NBIMS-US-Version-3.htm>

required reading for all BSI members¹¹. A partial COBie reading list is also available from BSI¹².

As part of the FM Handover - COBie 2.5 project, outreach is a key activity. The project has already identified a “Chief Outreach Officer” and begun the process of contacting each of the BSI Chapters to explain the purpose and benefits of BSI’s update to the COBie standard.

Comment 7:

“Even though this activity proposal is very well described, it is missing many essential aspects that would be essential in order to make COBie a true bSI standard. For example, the current scope is limited only to buildings.”

Answer:

It is true that there are operations, maintenance, and asset management requirements for every aspect of our engineered environment. It is also true that some basic information about the jobs and resources required to manage the assets in these engineered environments. What is not the same is the way the assets for different types of environments are defined in a data schema. Thus, while a list of jobs to do would be modeled the say way in IFC, the assets to which the jobs are linked are not the same. Thus the deliver of construction handover data must consider both the information that is the same and the information that is different. The only question is how to organize such a project.

It is the opinion of the project team that given the commercial adoption and use of COBie in some English-speaking countries, critical updates to COBie for “Buildings” (as indicated in the third letter of the acronym) should be taken on as a first step under the BSI Building Room.

As the BSI Infrastructure Room has the responsibility for the development of construction handover standards for linear projects, “COBie” for infrastructure would need to be undertaken as a separate project. That project would begin with the need for a name that does not have the word “Building” in its title.

Comment 8:

“The project group is very small and therefore it will (be) difficult to achieve a wide international consensus for the outcome. The project should try to reach out for more Chapters and software vendors for participation.”

Answer:

The “activity proposal” team is comprised of those people who have currently expressed interest in participating. Once approval is given for the development of a “project proposal” outreach activities to all BSI chapters may, or may not, identify additional interested participants. It is the goal of the project to include experts whose professional activities include production and management of the delivery of building equipment information from every BSI chapter.

¹¹ http://itc.scix.net/cgi-bin/works/Show?_id=w78-2016-paper-007

¹² <https://cobie.buildingsmart.org/reading-list/>

It is the team's understanding that the only one-third of the member countries represented in the BSI Standards Committee even responded to the activity proposal. Ultimately, interest by BSI members and their willingness to join and support the effort as it moves from the "activity" proposal stage to the "project" proposal stage will determine the answer to the question.

As far as software vendors are concerned there have been over 30 software products tested for their ability to produce and/or consume COBie data. Please see the detailed description in Comment #2.

Comment 9:

"The project should create a roadmap for future versions and consider extending the scope to the infrastructure domain. This proposal also lacks an overall budget and a plan, how the budget will be covered. At the same time, bSI needs to revise the guidance for activity proposals and other SC balloting documents."

This comment contains several separate points each of which is answered in below.

Regarding "roadmap."

There is indeed a roadmap that includes, as is first project the rapid, pragmatically driven activity proposal to update the current COBie standard.

Regarding "infrastructure."

Please see the detailed description in Comment #7.

The BSI "activity proposal" may not include budgetary information. Should the project be approved, and direction be given to proceed to the "project proposal" stage, then budgetary information is provided.

Comment 10:

"To bSI: the SC voting needs to be re-organized so that the Mirror Committees within the local Chapters have enough time to study the documents. I see two options: either the ballot period needs to be longer (10-12 weeks) or the ballots are scheduled four times a year. Also, the document management for the votes should be re-worked so that all balloting documents and their status can be found in one location (for example, in the Box)."

Answer:

This "process" question is in the hands of the BSI Building Room organization.

It should be noted that one of the difficulties with making real progress in the AECOO community is the mismatch between the rapid technological innovation shown in private industry and the duration needed for international consensus projects. This leaves most professionals in many countries seeking solutions in vertical integration instead of partially implemented, partially operational least-common-denominator standards. In the opinion of many innovators within the BSI community, it is precisely this delay that has historically kept BSI from making a significant impact AECO community innovation. Those innovations that have come from "outside" the BSI standards process such as BCF and COBie have actually been some of the most successful activities to date.

Comment 11:

“We will investigate the possibility to work on extension for cultural heritage and also work on the (*a non-English language*) translation.”

Answer:

This comment contains several separate points each of which is answered in below.

Regarding “translation.”

Translation is a critical aspect of the FM Handover - COBie 2.5 project. This translation will occur to support both the technical understanding of the COBie standard and the clear translation of workflow and contracting terminology into languages other than English.

Regarding “extension.”

As part of this translation activity, we expect (and have already identified) several property set extensions that are of interest to specific sets of constituents. The project will serve as a model to identify how to practically use the Information Delivery Specification mechanism built into the BSI Technology Roadmap.

Comment 12:

Exact copy of Comment 3.

Comment 13:

Exact copy of Comment 4.

Comment 14:

“COBie is a standard in US and UK, while there are other standards on other countries. e.g. in Germany there is CAFM connect. This has to be considered and harmonized.”

Answer:

The evaluation of international requirements for the delivery of building equipment information is of critical interest to the FM Handover - COBie 2.5 project. Prior to the development of a formal project proposal a “request for information” will be distributed by the project team to BSI members. The resulting input will assist in scoping the content of the project proposal.

With specific respect to the German CAFM Connect, it is the team’s basic understanding of that CAFM Connect reflects a set phased information exchanges defined using an IFC 4 scheme and the ifcXML physical file format. From this point of view, COBie and CAFM Connect are likely to be complementary efforts. Additional information on CAFM Connect will be requested from appropriate SC members once the project begins.

Comment 15:

“See my comment for the need of further harmonization.”

Answer:

See answer to Comment 14.

Comment 16:

“This activity is mainly for the American market. I am not sure that European market will give us a positive feedback.”

Answer:

One thing that has been proven time and time again about the COBie project thus far is that every project, no matter the country or language, has a requirement for the delivery of a list of equipment installed in the building. Sometimes these requirements take the form of formal specification. Other times these requirements take the form of custom and convention. From this point of view, the fundamental requirements that led to the start of the first COBie version released in 2007 are the same today now as they have been since the first delivery of the first project hundreds, if not thousands of years ago.

Additionally, see answer to Comment 14.

Comment 17:

“We do hope that the COBie update will be completed successfully on time.”

Answer:

You are not alone in this hope. From the point of view of the COBie team, we have been amazed that it has taken this long to try to establish a standard for something as seemingly simple and common as a list of installed building equipment. It is our optimistic point of view that by directly engaging through a BSI project, we can accelerate this effort.

The organization of this FM Handover - COBie 2.5 project is meant as a pragmatic first step. The project has an aggressive (but realistic) schedule based on a deep understanding of the management of this type of project.

Beyond the specific project, the BSI Building Room also has a draft roadmap identifying a series of follow-on projects to expand upon this initial success This including future implementation support for transactional building information exchanges and IFC5. Ensuring that these projects are timed to coincide with the availability of commercial technology innovations and owners' ability to implement and utilize the new information, these roadmap projects support a higher rate of innovation than possible compared to generic interoperability project.

Comment 18:

“Wondering whether the new COBie 2.5 will be based on IFC 4.3, taking account of the needs of infrastructure projects?”

Answer:

Yes, the FM Handover - COBie 2.5 project will publish an IFC 4.3 Model View Definition (or Information Delivery Specification).

Standards Committee may not be aware that technical documentation of the COBie project have mirrored advances in the IFC schema and technical document

requirements since 2009¹³. The initial international COBie 2.26 MVD was based on IFC 2x3 (referred to as FM Handover MVD). The COBie 2.4 MVD was based on IFC 4. The COBie update identified in the current activity proposal will reflect current best practices as well by creating a schema based on IFC 4.3.

The technical specification of each major COBie release also reflected the updated technical direction given first by the IAI Model Support Group (COBie 2.26) and then by the buildingSMART MVD Committee (COBie 2.4). The COBie update identified in the current activity will use the UML-based IFC 4.3 model to define.

Innovations developed during the COBie process, including business process models that can directly estimate the cost of expected workflow changes¹⁴ and requirements for regular expressing checking are expected to provide input to future BSI technical documentation requirements.

While pressing forward with the advancing IFC schema and authorized physical file formats, the project must also recognize pragmatic aspects of using a buildingSMART standard. At the time of the publication of COBie 2.4 (2015) and still today, most software has not transitioned to COBie 4. As a result, this project will also publish mapping tables to allow for the translation of COBie required entities provide in different IFC versions. An example of this documentation has already discussed, and positively reviewed, by the BSI Technical Directory.

Regarding “infrastructure.”

Please see the detailed description in Comment #7.

Comment 19:

“See my comment for the need of further harmonization.”

Answer:

See answer to Comment 14.

{end of comments}

¹³ <https://cobie.buildingsmart.org/history/>

¹⁴ https://www.nibs.org/page/bsa_cobiecalc