

# IDM BCF Issue Management

Task Group BCF Regional Chapter Stuttgart

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# Abbreviations

MC	Model Checker
CDE	Common Data Environment
CAD	Computer Aided Design
FM	Facility Management



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### Introduction

This paper is the result of 2 years of evaluation of the bcfXML 2.1 specification and its implementation within various software products by the German BCF task group of the regional chapter Stuttgart.

Since there has never been an open dialogue on user-defined requirements for the development of BCF before, the working group brought together as many end-users and software vendors as possible to map and test standard processes and identify the core parameters needed for day-to-day work.

Furthermore, the working group conducted real-life tests on software tools regarding the quality of implementation. While doing so it not only searched for bugs but also got a first-hand impression on how well the intended workflows and parameters suit real-life conditions.

During the whole process the working group gained deep insight into the status and quality of implementation and identified certain challenges which currently prevent industry-wide adoption of BCF workflows.

Herein the working group shares these findings as an impulse and reference for further development and future certification processes.

We are deeply convinced that bcfAPI will play a major role within the digital construction industry in the future and prioritized testing it whenever possible. Thus, all essential points mentioned in this document are equally applicable for file-based data exchange and bcfAPI.

#### Use-Cases

BCF was created for facilitating open communications and improving IFC-based openBIM processes by exchanging model-based issues between BIM software tools.

There are several use cases that benefit from BCF-enabled workflows, where information can be derived from the BIM and connected back to the BIM for object-specific information.



As a starting point we defined common use-case scenarios within a construction project test against:

- 1. Coordination of a clash found in a Model-Checker with 2 CAD-Systems
- 2. Client question in a CDE-System, answered in a CAD-System
- 3. Bilateral Communication between to CAD-Systems
- 4. Issue-Management on construction-site with a CDE-System

While testing these use-cases iteratively it became clear that they could be visualized in a generic process map.

#### Software

The following software tools were tested:

Program	Version	bcfApi/bcfXML
Allplan	2019/01	bcfXML
Bimplus	2019/06	bcfXML
ArchiCAD	22	bcfAPI/ bcfXML
BIMcollab Zoom	2019/01	bcfAPI/ bcfXML
Tekla BIMsight	1.9	bcfXML
California.pro	10.1.09	bcfXML
Nova AVA	2.5	bcfXML
Vectorworks	2020	bcfXML
DDS-CAD	16	bcfXML
Revit	2020.2	bcfAPI/ bcfXML
Solibri Office	9.9.5	bcfAPI/ bcfXML

\* Summaries of the test results can be obtained from the working group.



# Evaluation

Assessment of the actual implementation quality was done by analysis of imported and exported BCF files from widely used software tools. Solibri Office was used as reference implementation to test against. Whenever available bcfAPI was prioritized in testing. The test procedure is shortly explained in the following:

#### A: Creation of BCF test data

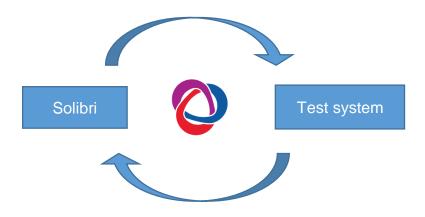
#### Figure 1 Screenshot of standardized IFC-Model

To make a meaningful comparison possible, all BCF files were created from a standardized IFC test model and a set of pre-defined attributes.

#### B: Import/Export test system

The content of each BCF file was then exported from Solibri Office and imported into the CAD program and back again. After this process we reviewed and compared against the bcfXML 2.1 specification, and the requirements identified within the use-case scenarios.





#### Figure 2 test schema

#### C: Evaluation

Name	System A		XML	System 8		Changes	XML	Selibri
Version-Number	BCF Viewpoint 1	BCF Viewpoint 2	BCF Viewpoint 1	BCF Viewpoint 1	BCF Viewpoint 2	BCF Viewpoint 1	BCF Viewpoint 1	
Input	25521368-7163-4Hz-b788-4aa0853cc330	Bec07f17-1887-498e-506e-679913500afa	foldername					105
Project Name	25521566-7165-478-6766-488065500550 65-807- Test	b5-807-Test	missing	not shown missing		not applicable		missing
Topic Tife	bS-Testitel1	b5-Testtitel2	markup.bcf	b5-Testtitel1		bS-Testtitel1_Geendert		ok
Topic Type	Error	Info	markup.bcf	Error		Question		ok
Topic Status	Offen	Gelöst	markup.bcf	Offen		Solved		ok
Prosty	n.a.	na.	-	Middle as standard selection when field is empty.		Low		missing
Label	0.8.	na.	-	missing		TestLabel		ok
Creation Date	2019-08-17 12:18:57	2019-06-17 13 21:11 hite	markup.bcf	Only date, time is not shown but exists in BCF. Uploader shown as euthor.		not applicable		ak
Creation Author ModifiedCate	nks 17.06.2019	54 06 2019	markup.bcf markup.bcf	Uploader shown as author. 17.06.2019		not applicable		ak missing
Modifieduates	hka	his	markup.bcf	hia		0.8		missing
Due Date	2019-09-24	2019-06-25	markup.bcf	2019-09-24		2019-10-15		ok
Assigned To	ARC	test@test.de	markup.bcf	Only when meil adress is known by BIMPLUS.		test@test.de		ak
Description	b5-Testdiscription1	bS-Discription2	markup.bcf	b5-Testdiscription1		b5-Testdiscription1 Zusatz geändert		ok
Stage (phase)	6S-LPHS	ES-LPHS	markup.bcf	missing		n.e.		missing
Link (intern/extern)	bS-Testlink (PDF	b5-Testlink2 https://buildingsmartgermany.sharefile.eu/d-s89e7e84e93046c09	missing	missing		DOCK Anhang angefügt.		missing
Content Date	17.06.2019	24.06.2019	markup.bcf	17.06.2019		14.10.2019		missing
Comment Author Comment	hka bS-Testcomment1	hka b5-Testcomment2	markup.bcf markup.bcf	his b5-Testcomment1		T. Neuer Kommenter em 14.10.		missing missing
Ticket Number	n.s.	n.a.	merkup.ocr	missing		neber kommenter em 14.20.		missing
Story	n.a.	n.a.		missing		n.s.		missing
Camera Position	24	1x	viewpoint.bcfv	supports only one cemere position.		changed		ak
Mark-Ups	red cloud	none	viewpoint.bcfv	missing		n.a.		missing
Clipping Plane(s)	24	0	viewpoint.bcfv	online only, not available in Allplan.		n.a.		missing
Screenshot(s)	24	ix	viewpoint.bcfv	Only one screenshot shown .		Always Enked with camera position.		ok
Invisible Objects	3vaKVZNpT5Q542MSyS0xdC	none	missing	missing		missing		missing
Involved Objects	3Psdl57krDMfh0eeSqkp37 3/rW0Y8vLAVxeYk3tkXvp2							
Colores Colores	3veKVZNpT5QH42MSyS0xdC	none	missing	missing		changed		
RuloSet name	0.0	0.0		and the second sec		n.e.		missing
List off involved IFCs + Date	automatically	sutomatically	markup.bcf	Selected objects are shown in 3D		changed		missing
Source and the second second								
Special								
Position	bS-Testposition1	b5-Testposition2	missing	missing		n.a.		lak .
Verfolgunge-ID	A/2	A)2	missing	masing		n.s.		ok

#### Figure 3 protocol sheet

The evaluation of the exported data from the test system was performed by means of a reimport into the reference implementation (Solibri Office) and an examination of the raw BCF data with an XML editor. All results have then been documented in a standardized sheet.



## Conclusions

All in all, the results show a wide spread and no tool was able to export a fully compliant bcfXML 2.1 file. Furthermore, we found that no vendor has implemented BIMsnippets so far. Many also don't support attaching documents or links to BCF tickets, respectively.

These shortcomings can in most part be traced back to the lack of a proper certification process. The working group therefore highly recommends the establishment of a dedicated global testing and certification framework for BCF to improve and ensure consistent implementation quality in the future.

Additionally, the working group identified a set of crucial parameters that are missing in the current core schema. (see Appendix A) An expansion with respect to industry requirements on task management would increase acceptance and further propagate the use of BCF.

It also became apparent, that features such as rights management and full set of obligatory parameters are missing. As well as clear assignment to a person and identifiables such as a ticket number, labeling; categories and priorities should be expanded as well.

Editor's note: BCF 3 already addressed the issue of a missing human-readable ticket number.



#### BPMN

The use case describes four scenarios where two designers coordinate their issues with the help of a model checker.

The working group started out with 4 different process maps but soon realized, that these use cases can be visualized in one generic process.

A	В	С	D	E
	BUTWEED BUT	BO MARCH ME		an vigene



#### A: Create ticket

The issue containing all the important details is created with status "Open". The author assigns the issue to the responsible person and sends it via file transfer or bcfAPI.

#### B: Receiver checks issue for responsibility

The receiver checks if he is responsible at all and comments accordingly if he is not.

After that the ticket is sent back to the sender or status is set to "In Progress".

• B.1: The original sender corrects the ticket according to the hints in the comment and resends it.

#### C: Receiver checks tickets due date

After reviewing responsibility and accepting the task a sanity check of the due date has to be performed. If the given time frame is not sufficient the issue has to be given back to the sender with suggestion of a new due date.

• C.2: The receiver suggests a new due date and sends back the ticket



#### D: Implement changes

The receiver implements the required changes and answers the ticket. Status is set to "Resolved" and the ticket is being sent back to the author.

#### E: Close ticket

The author performs a final check with regards to the points mentioned in the issue. Depending on the result of the check status is set to "Closed" or the ticket is reopened with Status "ReOpened" and sent to the receiver in another attempt to solve the problem.

#### Parameter

All parameters from the bcfXML 2.1 Standard have been thoroughly checked with regards to necessity and completeness.

Changes have been committed where legal aspects matter. Comments should be unchangeable, to ensure documentation. We also recommend logging timestamps and names of the involved IFC files.

Furthermore, we defined obligatory parameters, to ensure completeness of the issues.



# Appendix A - Required parameters

#### Added / Changed Parameters are in red

valid entries	available in V2.1 obligatory where to find	changeable by
---------------	--	---------------

Header					
GUID	UUID	Х	Х	Markup.bcf:Topic:Guid (folder name)	automatically
ProjectName	String	Х	Х	Project.bcfp:Topic:Name	automatically
InvolvedIfcFile(s) + Timestamp(s) ***	String Array	-			automatically

TicketNumber	String	-	Х	Human readable number for the ticket; alphanumeric	automatically
RuleSetName *	String	-			automatically
TopicTitle	String	Х	Х	Markup.bcf:Topic:Title	author
ТорісТуре	Comment Issue Request Solution Task Clash	х	×	Markup.bcf:Topic:TopicType	author
TopicStatus	Open In Progress Resolved Closed ReOpened	х	x	Markup.bcf:Topic:TopicStatus	everybody except for Closed (author only)
Priority	high normal Iow	x	х	Markup.bcf:Topic:Priority	author
TopicLabel	Architecture Structure Mechanical Electrical Specifications Technology	x		Markup.bcf:Topic:Labels	everybody
CreationDate	Date	Х	Х	Markup.bcf:Topic:CreationDate	automatically
CreationAuthor	String	Х	Х	Markup.bcf:Topic:CreationAuthor	automatically
ModifiedDate	Date	Х	Х	Markup.bcf:Topic:ModifiedDate	automatically
ModifiedAuthor	String	Х	Х	Markup.bcf:Topic:ModifiedAuthor	automatically
DueDate	Date	Х	Х	Markup.bcf:Topic:DueDate	author
AssignedTo	String	Х	Х	Markup.bcf:Topic:AssignedTo	author
Description	String	Х		Markup.bcf:Topic:Description	author
Continued on next page					



Stage (phase)	Preliminary Planning		Markup.bcf:Topic:Stage	everybody
	End	Х		
	Construction Start			
	Construction End			

DocumentReference				
DocumentReference (internal/external)	String	Х	Markup.bcf:DocumentReference:ReferencedDocument	immutable, adding only

RelatedTopic				
RelatedTopic	UUID	Х		everybody

Comment							
Comment	String	Х		Markup.bcf:Comment:Comment	immutable, adding only		
CommentAuthor *	String	Х	Х	Markup.bcf:Comment:Author	automatically		
CommentDate *	Date	Х	Х	Markup.bcf:Comment:Date	automatically		

Viewpoints								
Camera Position	Vector	Х	Х	Viewpoint_GUID.bcfv:Camera	everybody			
Story *	String	-			automatically			
Screenshot(s)	.png image file	Х		Snapshot_GUID.png	immutable, adding only			
Mark-Ups	Vector	Х		Viewpoint_GUID.bcfv:Lines	everybody			
Clipping Plane(s)	Vector	Х		Viewpoint_GUID.bcfv:ClippingPlanes	everybody			
InvisibleObjects	UUID	Х		Viewpoint_GUID.bcfv:Components	automatically			
InvolvedObjects	UUID	Х		Viewpoint_GUID.bcfv:Components_Selection	automatically			

\* only if available/applicable \*\* CreationDate of IFC files