General Guidelines
for the
MBx Interoperability Forum

Release 2.0

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Document History

Version	Date	Change
2.0	2023-06-23	Re-Write from Version 1.x for MBx-IF Organization and Infrastructure

1 MBx-IF Introduction

STEP is an established ISO standard (ISO 10303) for the exchange of product data between different CAx and PDM/PLM systems. To promote the international use of the standard, AFNeT, PDES, Inc. and prostep ivip have created the Model-Based "x" Interoperability Forum (MBx-IF) as a new umbrella organization for the established CAx-IF, PDM-IF and EWIS-IF projects. The goal of the new joint project is to accelerate the development of STEP interfaces and ensure that user requirements are met.
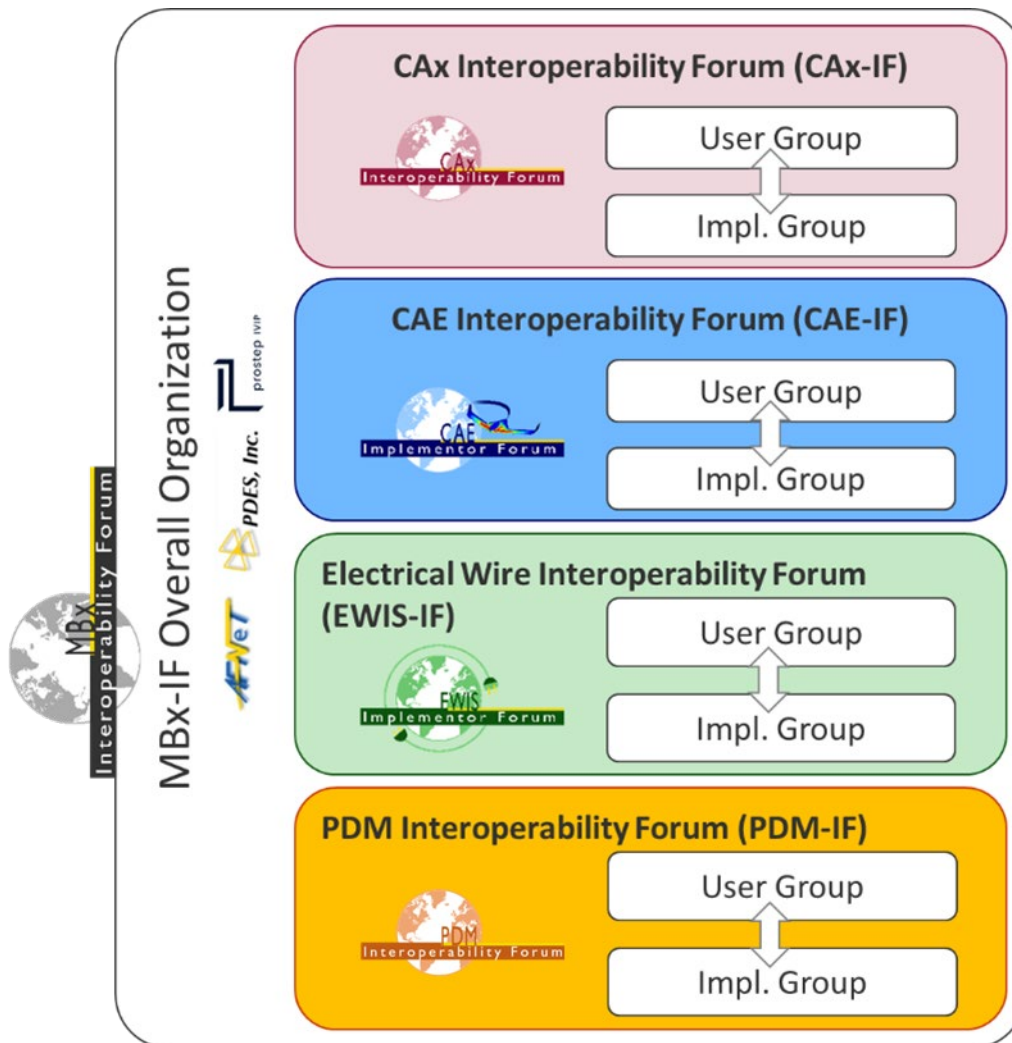
Figure 1: MBx-IF Overview

The MBx umbrella organization is intended to intensify the further development of the STEP standard through cross-domain integration. It provides a trusted environment for user companies and software vendors to openly discuss requirements and technical challenges, develop a common understanding of the various topics, and derive robust approaches to implementation. Thus, each domain is comprised of a dedicated User Group and an Implementor Group:

- The **User Group** (UG) consists of industry representatives who define and prioritize industry requirements, test cases and acceptance criteria for CAx capabilities in scope of AP242.

- The **Implementor Group** (IG) is composed of CAx system developers and vendors of STEP translation and validation tools, implementing AP242 interfaces. It develops Recommended Practices based on industry needs and validates them in the CAx test rounds.
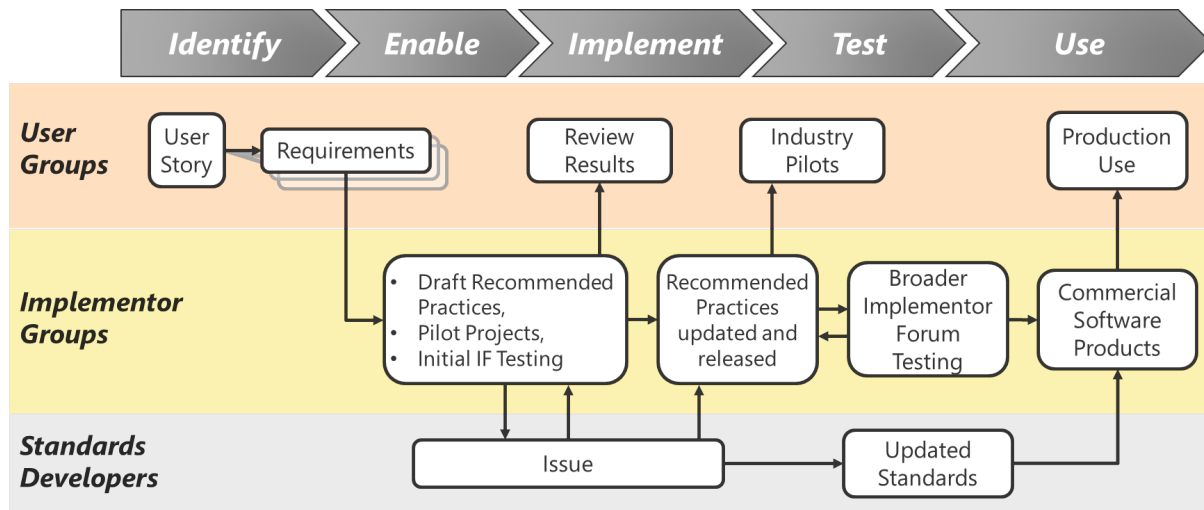
Figure 2: MBx-IF Way of Working between User Groups and Implementor Groups

The goals of the MBx Interoperability Forum's Implementor Groups are to:

- Implement functionality for today's needs

- Identify functionality for tomorrow's needs

- Avoid roadblocks by establishing agreed upon approaches

- Increase user confidence by providing system and AP interoperability testing

- Ensure new functionality does not adversely impact existing implementations

- Significantly improve STEP translator quality and decrease translator time-to-market

This document is aimed at new members of any of the MBx-IF IGs to familiarize themselves with the corresponding infrastructure and procedures.

2 Test Rounds

There are two test rounds per year in each domain, so each campaign is about six months in duration. The test rounds usually begin and end in March and October for the CAx and EWIS domains, and June and December respectively for the PDM and CAE domains. In general, a test campaign is:

- A round of distributed testing
- Followed by a test review meeting. This typically covers:
    - o Detailed discussion of the results
    - o Discussion of technical and standardization issues
    - o Definition of the following round's scope and schedule
    - o Joint meeting with users
    - o Joint meeting with related project teams

Each test round consists of several individual tests designed to meet / prove out requirements identified by the User Groups for STEP interoperability testing. Each campaign encompasses:

- Definition of testing scope
- Development of testing instructions and criteria
- Selection of test cases
- Modeling of the test parts
- Preprocessing
- Transmission of files and related statistics
- Checking files for syntax, structure, and semantics
- Distribution of "checked" files
- Post-processing
- Transmission of results for comparison
- Discussion of issues
- Conclusions and definition of nest steps

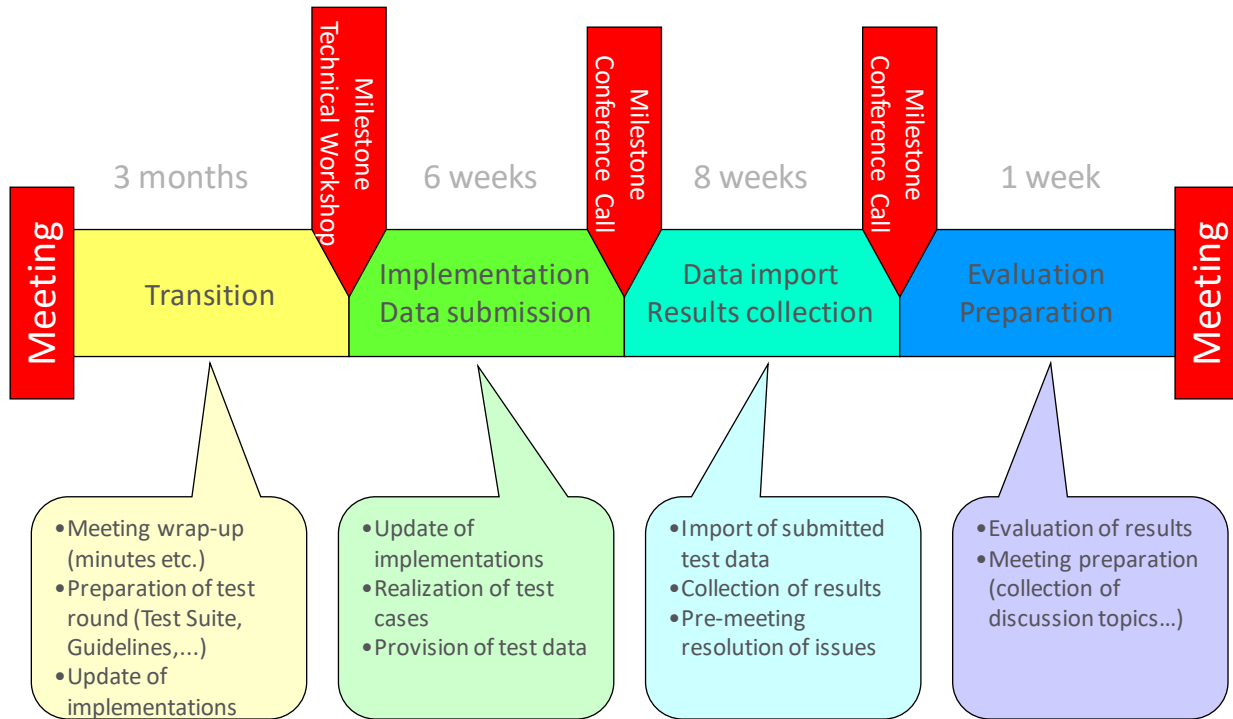An overview of an arbitrary test round is as follows:

Figure 3: Schematic course of an MBx-IF Test Round

2.1 Prerequisites for Participation

Several prerequisites have to be met before an MBx vendor can participate in the Implementor Forum. They are:

- The vendor must have a relatively mature STEP translator for either AP209 Edition 2 or a recent version of AP242, and be able to:
  - o post-process a test suite of representative STEP files successfully
  - o provide STEP files which pass syntax, structure, and semantic checking
- The vendor must sign a non-disclosure agreement with AFNeT, PDES, Inc. or prostep ivip
- The vendor must agree to actively participate in the testing, which includes:
  - o Pre- and post-processing test cases
  - o Participating in conference calls
  - o Identifying and discussing issues
  - o Attending the meetings at the culmination of a round of testing

2.2 File Naming Conventions

2.2.1 For STEP Files

To ensure proper configuration management of the test files, the following naming conventions are to be used for the STEP files from each vendor:

ccc-xx-yyy.stp	ccc = test case identifier per testing instructions
	xx = vendor code of creating system
	yyy = 209 or 242

So, for instance for the submitted STEP file from Autodesk Inventor for the solid assembly test case AS1 conforming to AP242, the proper file name would be:

<div align="center">

as1-in-242.stp

</div>

Either the "*.stp" or "*.step" file extensions are permissible, but "*.stp" is recommended.

2.2.2 For native and target Models

Native and target models (i.e., models in the native format of the target system importing a STEP file) need to be exchanged to enable data transfer quality validation. Since many CAx systems automatically generate the file names from the id of the contained models, no naming convention for the models themselves is given. It is however recommended to rename the files (if possible) so that it becomes clear from the file name which system generated the model on the basis of what STEP file.

However, it is recommended to ZIP the model files before submitting them. The naming convention for these ZIP files is:

ccc-nnn-ttt.zip	ccc = test case identifier per testing instructions
	nnn = vendor code of the system that created the models
	ttt = use 'nat' for native models, 'tgt' for target models.

As an example, the target models for the Production Models imported into Dassault Systèmes CATIA V5 would be contained in the archive named:

<div align="center">

pm14-c5-tgt.zip

</div>

Note: For Unix based systems it is allowed to submit *.tgt.gz formatted archives instead of *.zip.

2.2.3 For any other files

Since the introduction of CAESAR (see section 4.1), it is no longer necessary to provide statistics (either native or target), or screenshots, to the facilitators, since these can be uploaded directly to the web database. If any files are submitted for additional information, the following naming convention is suggested:

ccc-nnn-ttt.ext	ccc = test case identifier per testing instructions
	nnn = vendor code of the system that created the native model / STEP file
	ttt = 'nat' for native models, 'tgt' for target models, or target system's code
	ext = extension according to file type

So, for instance for a PNG-formatted screenshot showing the import of a PTC Creo production model into Datakit's CrossCad for SolidWorks, the proper file name would be:

pm20-cr-dw.png

Screenshots uploaded to CAESAR will automatically follow this naming convention.

2.3 Vendor Codes

For the vendor codes used in the file naming conventions and further documentation, the following two letter designations shall be used:

Code	System	Vendor
3de	3D_Evolution	CT CoreTechnologie
c3e	3DExperience	Dassault Systèmes
c5	CATIA V5	Dassault Systèmes
cr	Creo	PTC
ct5	CATIA V5	CT CoreTechnologie
cto	Creo	CT CoreTechnologie
ctx	NX	CT CoreTechnologie
d5	CrossCad (CATIA V5)	Datakit
dc	CrossCad	Datakit
di	CrossCad (Inventor)	Datakit
do	CrossCad (Creo)	Datakit
dw	CrossCad (SolidWorks)	Datakit
dx	CrossCad (NX)	Datakit
e5	3DxSuite (CATIA V5)	Elysium
ec	CadDoctor	Elysium
eo	3DxSuite (Creo)	Elysium
ew	3DxSuite (SolidWorks)	Elysium
ex	3DxSuite (NX)	Elysium
h3	HOOPS 3D Exchange	TechSoft 3D
h5	HOOPS 3D (CATIA V5)	TechSoft 3D
hc	HOOPS 3D (Creo)	TechSoft 3D
hx	HOOPS 3D (NX)	TechSoft 3D
i5	CADfix (CATIA V5)	ITI Global
ic	CADfix (Creo)	ITI Global
id	NX I-DEAS	Siemens PLM Software
if	CADfix	ITI Global

Code	System	Vendor
ii	CADfix (Inventor)	ITI Global
in	Inventor	Autodesk
iw	CADfix (SolidWorks)	ITI Global
ix	CADfix (NX)	ITI Global
k3d	3D Framework	Kubotek Kosmos
k5	CATIA V5	Kubotek Kosmos
nx	NX	Siemens PLM Software
oc	CrossCad (OpenCascade)	Datakit
osv	Open STEP Viewer	Open Design Alliance
pdm	PDM-IF	prostep ivip
s5	COMFOX (CATIA V5)	T-Systems
se	SolidEdge	Siemens PLM Software
stp	STEP	ISO 10303
sw	SolidWorks	Dassault Systèmes

Please note that for historic reasons,

- Siemens NX is occasionally listed as "UG" or "Unigraphics"
- PTC Creo is occasionally still referred to as "Pro/E" or "Pro/Engineer"

Deprecated Codes

The following vendor codes are no longer used, but appear in earlier CAx-IF statistics:

Code	System	Vendor
a3	Acrobat 3D	Adobe
a5	Acrobat 3D (CATIA V5)	Adobe
ac	AutoCAD	Autodesk
al	AliasStudio	Autodesk
ap	Acrobat 3D (Pro/E)	Adobe
au	Acrobat 3D (NX)	Adobe
c4	CATIA V4	Dassault Systèmes
cm	CoCreate Modeling	PTC
dp	CrossCad (Pro/Engineer)	Dataki
eb	*(for AP209 testing)*	Electric Boat
fs	FiberSim	Vistagy

Code	System	Vendor
i4	CADfix (CATIA V4)	ITI Global
ip	CADfix (Pro/Engineer)	ITI Global
jn	NASTRAN	Jotne EPM
jo	openSimDM	Jotne EPM
kc	KeyCreator	Kubotek
kr	REALyze	Kubotek
lk	IDA-STEP	LKSoft
mm	MiCAT Planner	Mitutoyo
mp	PATRAN	MSC
nas	NASTRAN	MSC
pc	CADDS	PTC
pe	Pro/Engineer	PTC
s4	COM/STEP (CATIA V4)	T-Systems
t4	Cadverter (CATIA V4)	Theorem Solutions
tc	Cadverter (CADDS)	Theorem Solutions
tp	Cadverter (Pro/Engineer)	Theorem Solutions
tx	Cadverter (NX)	Theorem Solutions

2.4 Checking of STEP Files for Syntax and Structure

2.4.1 MIM Part 21 Files

STEP files from the various vendors will be checked for syntax and structure by the MBx-IF facilitators in close cooperation with NIST.

Validation of the files relative to the respective Recommended Practices will be done by the facilitators as required, using the NIST STEP File Analyzer and Viewer (SFA) as well as by performing extended manual checks. SFA is publicly available at:

https://www.nist.gov/services-resources/software/step-file-analyzer-and-viewer

It is recommended that all participants run their files through SFA before submitting them for testing. Files with significant syntax errors reported by SFA will not be accepted for testing.

2.4.2 Domain Model XML Files

For Domain Model XML files, basic conformance checking can be done with generally available XML tools, e.g., Altova XML Spy, to ensure the files conform with the underlying XSD Schema.

In addition, Schematron is used to perform extended checks similar to SFA for Part 21 files, with additional rules that check for patterns defined in the Recommended Practices. At the moment, these checks are run by the MBx-IF facilitators and detailed feedback is provided. It is planned to make the Schematron application available to all vendors so they can check their files themselves.

2.5   File Transmission

2.5.1   Distribution and Confidentiality of Test Models

! Many aspects of the MBx Interoperability Forum are closed to the outside world. This means that all information including test models (native and STEP), results, and issues, remain within the group and shall not be used for any other purpose than MBx-IF testing. Adhering to this rule on the one hand allows the members of the group to openly discuss their findings in order to help to advance their development activities, and on the other hand enables user companies to provide test models which may contain intellectual property in a way that ensures that access to this data is strictly limited. All detailed information will be handled within member-only parts of the MBx-IF Infrastructure (see section 4).

Exceptions to this rule are screenshots, management summary presentations as are provided during the MBx-IF User/Vendor Roundtable, recommended practices, and synthetic STEP files the group agrees on publishing in the public area of the CAx-IF web site.

Also, there are joint activities with other project on certain topics, e.g., LOTAR pilots, or cooperation on joint AP242 XML use cases with the JT Implementor Forum. In these cases, detailed information will be shared with these projects. This will be clearly stated in advance.

2.5.2   STEP Files

Any STEP files to be tested in a CAx-IF Test Round need to be sent to the testing administrators of the respective Implementor Group.

CAx-IF:

- Jochen Boy (jochen.bpy@prostep.com)
- Phil Rosché (phil.rosche@accr-llc.com)

PDM-IF:

- Guillaume Hirel (guillaume.hirel@t-systems.com)
- Kevin Le Tutour (kevin.letutour@afnet-services.fr)

EWIS-IF:

- Lothar Klein (lothar.klein@lksoft.com)

The files will be run through the syntax and structure checks by the facilitators to confirm the correctness of the file (see 2.4). In case there are issues with the files, the testing administrators will get in touch with the originating vendor.

Once all files for a test round are submitted and checked, they will be distributed for testing.

2.5.3   Native and target Statistics

For each test case, a set of statistics to validate the success of the exchange will be defined in the corresponding test suite document. There are two types of statistics:

- **native statistics** are calculated in the native system. They are submitted along with the STEP files and state what a consumer of the files can expect to find.
- **target statistics** are calculated by the target system. They are submitted after importing the files and state what was actually found when reading the files.

All statistics are handled by the CAx-IF Evaluation, Statistics And Results (CAESAR) system; an online web data base which collects the statistics and renders immediate results for the submitted test cases.

The statistics may be entered manually using a web form, or by uploading a .csv file (text file with comma-separated values) in the format specified in the test suite document. For registration and use of CAESAR, see section 4.1.

2.5.4 Native and Target Models

The native and target models required for data transfer quality validation will be exchanged using the Nextcloud platform as described in section 4.2.

3 Communication

The MBx-IF provides various of means of communication, in order to keep its members and associated working groups up to date on current testing activities and agreements.

3.1 Web Sites

The MBx Interoperability Forum maintains an internet homepage, which is mirrored at three URLs:

- https://www.mbx-if.de/

- https://www.mbx-if.eu/

- https://www.mbx-if.org/

The contents at all locations are identical. Only in the context of updates it may happen that the sites are out of sync temporarily, depending on the availability of the respective web master. These pages cover general information about the MBx-IF, as well as all public information on the CAx, CAE and EWIS domains. This includes Recommended Practices, Test Suite documents, and information on implementation support.

The PDM has a separate homepage, as it joined the MBx-IF at a later point in time. It can be found at:

- http://www.pdm-if.org/

In the near future, it is planned to merge all of these web pages into one.

3.2 Mailing Lists

This section provides an overview on the currently maintained mailing lists.

Note that there currently are no mailing lists for the CAE and EWIS domains.

3.2.1 CAx-IF

- cax-contact@lists.purdue.edu – The AFNeT, PDES, Inc. and prostep ivip facilitators of the CAx-IF

- cax-current-round@lists.purdue.edu – Closed mailing list for the active participants of the current round of CAx testing.

- team-users-cax-if@lists.afnet.fr – Closed mailing list for the CAx-IF User Group

3.2.2 PDM-IF

- implementors@lists.pdm-if.org – Closed mailing list for the PDM-IF Implementor Group

- users@lists.pdm-if.org – Closed mailing list for the PDM-IF User Group

3.3 Meetings

The various teams within the MBx-IF conduct multiple meetings per year. All of these meetings are set up as hybrid meetings, i.e., presence in person on site is always preferred, but if not possible, remote attendance will be possible.

3.3.1 CAx-IF & EWIS-IF

There are usually four milestone meetings per year, generally following this pattern:

- **March:** Face-to-face meeting in Europe
  - CAx-IF and EWIS-IF Test Round Review
  - MBx-IF User / Vendor Roundtable
  - In conjunction with LOTAR 1st Qtr. WS

- **June:** Online meeting
  - CAx-IF and EWIS-IF Test Round Kick-Off
  - In conjunction with LOTAR 2nd Qtr. WS

- **September:** Face-to-face meeting in the USA
  - CAx-IF and EWIS-IF Test Round Review
  - MBx-IF User / Vendor Roundtable
  - In conjunction with LOTAR 3rd Qtr. WS

- **December:** Online meeting
  - CAx-IF and EWIS-IF Test Round Kick-Off
  - In conjunction with LOTAR 4th Qtr. WS

3.3.2 PDM-IF

The PDM-IF usually meets face-to-face twice per year, in June and December. These meetings alternate between France and Germany. They are mainly comprised of Test Round Review and a joint meeting between the Implementor Group and User Group.

3.4 Conference Calls

Regular conference calls are set up throughout the year to keep track of each group's progress. The meeting notices will be sent out by the respective facilitators.

These calls use established conferencing platforms, such as Microsoft Teams, Google Meet, or WebEx.

4 MBx-IF Infrastructure

In addition to the public web pages (see section 3.1), the MBx-IF provides additional infrastructure for internal communication, tracking, and testing. Each of these tools requires a personal login.

4.1 CAESAR

CAESAR is the central information hub for all Implementor Groups within the MBx-IF. It servers two main purposes:

- **Test Evaluation** – by capturing statistics for each test case, calculating the corresponding results, and supporting resolution of issues
- **Issue Tracking** – for documenting and following up on technical issues.

CAESAR can be accessed at the following location:

https://www.mbx-if.de/caesar/

4.1.1 Registration

CAESAR requires an individual login for each user. To get a login, please get in touch with the CAx-IF facilitators:

- Jochen Boy (jochen.bpy@prostep.com)
- Phil Rosché (phil.rosche@accr-llc.com)

Once your account has been created, you can use the "Reset Password" link on the login page to set up your credentials and activate your account.

4.1.2 Using CEASAR

Once you're logged in to CAESAR, there is a comprehensive User Guide as well as a Frequently Asked Questions section available in the "Documentation" section of the Main Menu:
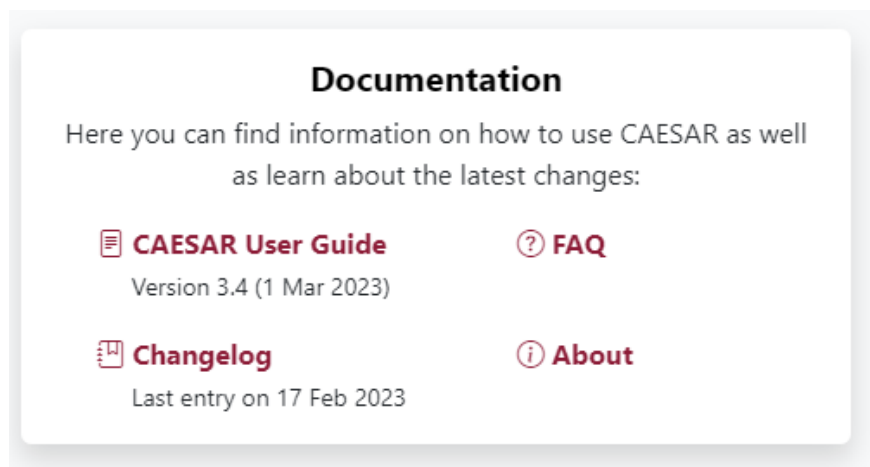

Figure 4: CAESAR Documentation

4.2 Nextcloud

Nextcloud is the file sharing platform shared by all teams under the MBx-IF umbrella. It can be found at the following location:

> https://nextcloud.boost-lab.net/nextcloud/

4.2.1 Registration

Nextcloud requires an individual login for each user. To get a login, please get in touch with any of the MBx-IF facilitators:

CAx-IF IG:

- Jochen Boy (jochen.bpy@prostep.com)
- Phil Rosché (phil.rosche@accr-llc.com)

CAx-IF UG:

- Pierre Duchier (pierre.p.duchier@airbus.com)

EWIS-IF IG & UG:

- Lothar Klein (lothar.klein@lksoft.com)
- Dan Ganser (dan.ganser@gulfstream.com)

PDM-IF IG & UG:

- Guillaume Hirel (guillaume.hirel@t-systems.com)
- Kevin Le Tutour (kevin.letutour@afnet-services.fr)

They will create an account for you if needed. You will the receive an email with a link to set your initial password, thus activating your account.

The facilitators will also assign you to the correct user groups within Nextcloud, which will enable you to access that group's folders.

4.2.2 Using Nextcloud

Though Nextcloud does support direct integration and synchronization with Windows Explorer via WebDAV, it is recommended to use the browser interface to avoid interference with other installations.

Comprehensive documentation on how to use Nextcloud is available from the "Help" section in the personal menu, which you open by clicking on your avatar in the top right-hand corner of the Nextcloud web interface.

It is possible to link your Nextcloud account with your CAESAR account. Follow the instructions given on the "App Integration" tab of your CAESAR user profile to do so. This will enable you to browse and download content on Nextcloud from directly within CAESAR without having to switch between applications.

4.3 Redmine

Redmine is used by the User Groups within the MBx-IF to track their requirements following the SAFe (Scaled Agile Framework) methodology. The tool can be found at the following URL:

https://rd.pdes-ch.org/

Implementors can join on Redmine as well. They will be granted a read-only access, so that they can follow along with current discussions.

4.3.1 Registration

If you do not have a Redmine account yet, you can create one yourself by clicking on the "Register" link in the top right-hand corner of the Redmine homepage. Afterwards, please get in touch with the respective facilitators for the User Group of your domain to be added to that group:

CAx-IF UG:

- Pierre Duchier (pierre.p.duchier@airbus.com)

- Ian Parent (ian.parent@pwc.ca)

PDM-IF UG:

- Frédéric Darré (frederic.f.darre@airbus.com)

- Guillaume Hirel (guillaume.hirel@t-systems.com)

- Kevin Le Tutour (kevin.letutour@afnet-services.fr)

4.3.2 Using Redmine

A user Guide is available by clicking on "Help" on the left side at the very top of the Redmine web interface.

It is possible to link your Redmine account with your CAESAR account. Follow the instructions given on the "App Integration" tab of your CAESAR user profile to do so. This will allow you to see information about user stories linked to test cases or technical issues directly within CAESAR without the need to switch between applications.