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The Open Group
Future Airborne Capability Environment™

Conformance Verification Matrix User's Guide (MUG)

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Contents

1. Introduction

This document is a guide to interpreting and using the FACE™ Conformance Verification Matrix (CVM). The FACE CVM provides the Product Standard, which clarifies the requirements from the FACE Technical Standard that a product must meet in order to be certified as FACE Conformant, along with the specific techniques to be used to verify each of these requirements. The guidance in this document is targeted for use by parties acting as a Verification Authority (VA) performing conformance verification and by Software Suppliers as they build Units of Conformance (UoCs).

Each edition of the FACE Technical Standard specifies all requirements needed for conformance and is the governing document for those requirements. The FACE CVM is not intended to add or modify requirements from its corresponding edition of the FACE Technical Standard. In cases where the CVM differs from the FACE Technical Standard, the referenced FACE Technical Standard takes precedence. The FACE CVM provides guidance and clarification on illustrating how the requirements are met.

1.1 Unit of Conformance (UoC)

A UoC is a software component or domain-specific data model designed to meet the applicable requirements defined in the FACE Technical Standard. It is referenced as a UoC at any point in its development, and becomes a FACE Certified UoC upon completion of the FACE Conformance process.

1.2 Editions of the Conformance Verification Matrix

Each edition of the CVM is labeled based on the edition of the FACE Technical Standard for which it applies.

If a ticket from the FACE Problem Report (PR)/Change Request (CR) Ticketing System (FACE PR/CR System) requires a change to a published edition of the CVM, a revision of the CVM may be published. Revisions are to correct or clarify issues identified with a published CVM. Since a CVM is a guide to a published edition of the FACE Technical Standard, it should only incorporate language from the published standard. Updated technical standard language from the FACE PR/CR System will be incorporated into a future edition of the FACE Technical Standard, which will have its own CVM.

CVM revisions after the initial revision are identified by a letter appended to the edition. The letter distinguishes it from previously published CVMs. Changes in a CVM will be consistently traceable between revisions. Each revision is accompanied by a change log. Additionally, each cell updated since the initial edition of a CVM is highlighted in yellow. Furthermore, the *Row ID* value should reference the same text from the standard between revisions. If a CVM revision inserts new rows into the matrix, the new rows will have unique *Row ID* values assigned and all previously existing matrix rows will retain their *Row ID*.

2. CVM Description

This chapter describes the structure and content of the CVM.

2.1 CVM Row Description

Each row in the CVM corresponds to text contained within the FACE Technical Standard or text contained within the Open Universal Domain Description Language (Open UDDL) Standard referenced by the FACE Technical Standard. The CVM follows the flow of these technical standards, and includes the section headings for guidance.

2.2 CVM Column Description

Each column provides guidance on whether the text defines a requirement and, if so, how the requirement will be verified. Sections 2.2.2 through 2.2.9 describe each column in the CVM, including purpose and expected values.

2.2.1 Row ID

The *Row ID* column contains an identifier for referencing text from the FACE Technical Standard and the Open UDDL Standard, where applicable. The *Row ID* value is an identifier corresponding to the row within the CVM. This identifier facilitates communication of sections of the CVM outside of the context of the CVM. Where more than one standard is referenced within the CVM, the cover page of the CVM provides a key for distinguishing the specific standard being referenced for that row.

2.2.2 Verification Needed

The *Verification Needed* column will contain one of the following values: Yes (*Y*), No (*N*), Header (*H*), or Figure (*F*) and indicates how the text from the FACE Technical Standard or Open UDDL Standard ("Technical Standard Requirements" or "Technical Standard for FACE Edition *n*" columns) should be interpreted. *Y* in this column indicates the text is a requirement. An *H*, *F*, or *N* denotes the text is not a requirement. An *H* applies to heading text for subsections, which include requirements or lead-in statements to individual requirements that follow. An *F* indicates the row contains a figure from the corresponding standard. An *N* indicates the text does not fit the other categories.

2.2.3 FACE Segment

The *FACE Segment* column indicates the applicability of each requirement to the appropriate FACE Segment(s). If the *Verification Needed* column has the value *N*, *H*, or *F*, this column will be blank. If the *Verification Needed* column has the value *Y*, then this column will have one or more of the following values:

- OSS – Operating System Segment
- IOSS – I/O Services Segment
- PSSS – Platform-Specific Services Segment
- TSS – Transport Services Segment

- PCS – Portable Components Segment
- Package – Unit of Conformance (UoC) Package
- DSDM – Domain-Specific Data Model

2.2.4 Technical Standard Requirements (or Technical Standard for FACE Edition *n*)

The *Technical Standard Requirements* column contains the exact text from the corresponding technical standard identified by the *Row ID*. Otherwise, for versions of the CVM where the *Row ID* does not identify a technical standard, the text originates from the edition of the FACE Technical Standard identified by the column header (e.g., *Technical Standard for FACE Edition n).* The text is placed into the CVM in the same layout as it appears in the corresponding technical standard, so the items in this column may show up as a complete paragraph, a list, a figure, or a source code fragment.

If a statement in this column does not have requirements language (e.g., must, will, or shall), then the *Verification Needed* column will contain an *N, F,* or *H,* and the *FACE Segment, Verification Method, Conformance Artifacts*, and *Conditional Requirements* columns will be blank.

Statements in the Appendices may have *Y* in the *Verification Needed* column if it is referenced by a requirement in a previous section of the FACE Technical Standard.

If a statement in the *Technical Standard Requirements* column is a requirement, then a UoC must be verified for conformance to that statement. The *Verification Needed* column will contain *Y*, and the *Verification Method* and *Conformance Artifacts* columns will contain the assigned method of verification and the artifacts required.

2.2.5 Verification Method

The *Verification Method* column contains the method intended to verify that the requirement has been satisfied. The following methods are described below:

- Blank when the text does not require verification
- Inspection is defined as the examination of the UoC and its associated documentation to determine conformance to the FACE Technical Standard
- Test is the utilization of the FACE Conformance Test Suite (CTS) to verify UoC conformance with the FACE Technical Standard

Note: For CVM versions prior to 2.1, an "NA" in this column indicates the text is not intended as a requirement but contains "shall" in a non-normative statement.

When the *Verification Method* is Inspection, then the *Conformance Artifacts* column will contain a list of the artifacts or verification categories, which are evaluated to verify the requirement has been met.

When the *Verification Method* is Test, then the *Conformance Artifacts* column will contain the phrase "Test Suite".

When the *Verification Method* contains multiple values, the *Conformance Artifacts* column will contain a list of the artifacts or verification categories derived from the *Verification Method* options specified.

2.2.6 Conformance Artifacts

The *Conformance Artifacts* column indicates suggested artifacts for verifying the requirement has been met.

For FACE Technical Standard requirements which have a *Verification Method* of Test, the column will indicate "Test Suite". This indicates that the applicable FACE CTS is used to verify the requirement. The Software Supplier will provide the artifacts required for test suite execution as described in the documentation provided with the test suite.

When the *Verification Method* is Inspection, the *Conformance Artifacts* column will contain a list of example artifacts or verification categories to guide the Software Supplier on what needs to be documented to verify the requirement has been met. The *Conformance Artifacts* value suggests the anticipated artifacts to verify meeting the requirement, but the Software Supplier may provide other artifacts so long as the artifacts verify the intent associated with the *Conformance Artifacts* value. The VA will use the provided artifacts to determine if the UoC meets the FACE Technical Standard requirement.

When the *Conformance Artifacts* column contains more than one value, the *Verification Notes* column will describe which aspects of the requirement are verified by each *Conformance Artifacts* value.

The objective of Table 1 is to describe the evidence required to verify a given requirement. The "The requirement …" and "Verification requires review of …" columns are to be read as complete sentences with the rows below them. The columns should be interpreted as follows:

- The "Verification Category" column provides a short descriptive name of the evidence needed; it also describes the possible values contained in the *Conformance Artifact* column of the CVM
- The "The requirement …" column describes the verification category of the requirement in the FACE Technical Standard
- The "Verification requires review of …" column provides the scope of the evidence needed for verification for that category – this column describes which artifacts should be listed in the Software Supplier Artifact Cross-Reference column
- The "Example Artifacts" column lists example artifacts that could be provided by the Software Supplier if following a Data Item Description (DID); these artifacts will differ depending on which documentation or process standards are used

Table 1: Verification Categories

Verification Category	The requirement …	Verification requires review of …	Example Artifacts
Fully Tested Requirements	… is directed at the component functionality.	… related functional requirements with verification artifacts.	SRS+STP+STR
UoC Designs	… is directed at the component architecture and would not be reflected in a functional requirement.	… component design or architecture addressing related architectural concerns.	SAD/SDD
Restricted APIs	… is restricting allowed APIs.	… design documents indicating the UoC meets the restrictions.	SAD/SDD

Verification Category	The requirement …	Verification requires review of …	Example Artifacts
Structures and Enumerations	… refers to structures and enumerations that cannot be tested by the Test Suite.	… documentation detailing the related structures, enumerations, and their use.	SDD
Configuration Information	… refers to configurability of the component.	… documentation addressing component configuration information and its use.	SDD
Device Interface Documentation	… is directed at the interface between the component and a device driver.	… device driver interface documentation for devices used by the component.	ICD
Referenced Standards	… is directed at an external referenced standard requirement.	… documentation detailing adherence to the relevant sections of the referenced standard.	SAD/SDD
Per Referenced Section	… is directed at internal referenced sections containing more detailed requirements.	… documentation detailing adherence to each requirement in the referenced section(s).	As applicable to referenced section
Usage Information	… is directed at the component usage information.	… documentation providing the required information.	Software User's Manual

Each "Verification Category" in Table 1 is described with examples below. These examples are meant to be representative but not limiting.

Fully Tested Requirement – indicates a requirement is directed at component functionality. Expected evidence includes UoC requirement(s) supporting the FACE requirement, test cases for those requirements, and test results showing that those tests passed. One example could be a document of the related requirements and another document containing the test procedures with final test results showing traceability to those requirements. Another example could be independent documents containing the related requirements, test cases, test procedures, test results, and a complete traceability matrix.

UoC Designs – indicates a requirement is directed at component architecture. Expected evidence of component design or architecture may include models, design documents, or diagrams. An example might be a diagram of the architectural boundaries of the software architecture demonstrating alignment to the FACE architecture. At the component level, an example could be documentation of how the component includes the architectural elements described in the FACE requirement.

Restricted APIs – indicates a requirement is restricting the use of APIs. The Test Suite can test API presence but not usage. Expected evidence includes design documentation, coding standards, and source code review showing how the restricted APIs are being used. An example could be detailed designs showing that inter-process communication APIs are only used to communicate within the UoC. An OSS example could be detailed designs showing the implementation of the specified API is in accordance with the restrictions. If the Test Suite report includes a statement that the restricted API is not used, the Test Suite report may be referenced in the "Software Supplier Artifact Cross-Reference" column.

Structures and Enumerations – indicates a requirement is specifying specific structures and enumerations that cannot be tested by the Test Suite. Expected evidence includes a data dictionary or other applicable design documentation showing the required structures and enumerations. An example

could be documentation showing how the component's implementation matches the format and uses the prescribed values when a requirement refers to a format or a specific value detailed in an appendix.

Configuration Information – indicates a requirement is referring to configurability of the component. Expected evidence includes documentation of the component's configurable attributes. An example could be documentation that shows how the UoC is configured when a requirement specifies a method of configuration.

Device Interface Documentation – indicates a requirement is directed at the interface between the component and the device driver. Expected evidence includes device driver documentation. An example could be documentation of device driver APIs used in the UoC's configuration of the FACE CTS when a requirement specifies the use of device driver interfaces.

Referenced Standards – indicates a requirement is directed at external referenced standards. Expected evidence includes documentation supporting adherence to the relevant sections of the referenced standard. An example could be documentation of an analysis conducted to prove adherence to relevant sections of the referenced standard.

Per Referenced Section – indicates required conformance to another section of the FACE Technical Standard or a section in the Open UDDL Standard. No evidence needs to be supplied for this requirement. All evidence from the referenced section must be provided.

Usage Information – indicates a requirement is directed at the component usage information. Expected evidence includes documentation supplied with the component detailing the required information. An example could be providing detailed information (e.g., aspect ratio) for use during integration of the UoC.

The following list contains the abbreviations of commonly used artifacts when a program is using the common DID names and numbers. These are provided as examples; FACE Conformance does not require the use of these DIDs.

- (SAD) Software Architecture Description
- (SDD) Software Design Description: DI – IPSC-81435A
- (IDD) Interface Design Description: DI – IPSC-81436A
- (ICD) Interface Control Document: DI – CMAN-81248A
- (IRS) Interface Requirements Specification: DI – IPSC-81434A
- (SRS) Software Requirements Specification: DI – IPSC-81433A
- (STP) Software Test Plan: DI – IPSC-81438A
- (STR) Software Test Report: DI – IPSC-81440A
- (SPS) Software Product Specification: DI – IPSC-81441A
- (SUM) Software User Manual: DI – IPSC-81443A

A UoC submitted to a VA for FACE Conformance may present evidence in any form, provided that it meets the intent of Table 1 above.

2.2.7 Software Supplier Artifact Cross-Reference

The *Software Supplier Artifact Cross-Reference* column may be used by the Software Supplier to specify specific references into the supplied artifacts for applicable requirements. When this column is used, the name of the document and a link to a specific location in the document must be provided.

The VA has the discretion to allow the *Software Supplier Artifact Cross-Reference* to be supplied in an alternate format (e.g., DOORS database; MBSE model). This should streamline the verification process by reducing the effort required to locate supporting evidence. If an alternate format is provided, it must also specify the name and exact location in a manner the VA can use.

2.2.8 Verification Notes

The *Verification Notes* column contains any commentary from the FACE Technical Working Group that will aid in understanding the impact the text from the FACE Technical Standard or a referenced PR/CR has on conformance. In some cases, the commentary will provide guidance on the meaning of and how to verify the requirement.

2.2.9 Conditional Requirements

The *Conditional Requirements* column is used to indicate that the requirement is conditional. This column uses specific phrases such as “Security Profile”, “Partition-dependent”, or “Graphics” or generic phrases such as “if required”, “as required”, or “when required” to denote the FACE requirement is conditional based upon the intended use of the UoC. These requirements do not apply to all UoCs in the Segments specified in the *FACE Segment* column.

Typically, these are requirements driven by design decision. For example, if a Software Supplier chooses to use the Operating System Safety Profile APIs, then the software must conform to these requirements. There are other design choices based on transport mechanisms or graphics services that apply as well. In some instances the requirement only exists if the designer chooses to implement a particular functionality. If the system or design does not require this function then there would be no need for conformance verification to this requirement.

Conditional Requirements for the Segment in which the UoC resides must be listed on the Conformance Statement along with a description of the applicability to the UoC. Evidence must be provided only for the requirements that are applicable to the UoC.

2.3 CVM Functionality

The CVM offers the user the option of filtering results by column. Software Suppliers and VAs should use the filtering/sorting capability with caution. While various spreadsheet applications may appear compatible, Microsoft® Excel applies filtering in succession, while Apache™ OpenOffice™ and Numbers® for Mac® may operate differently. Users should clear any previously selected filters before applying a new one.

2.3.1 Filtering on the Verification Needed Column

Table 2: Verification Needed Values

Value	Meaning
Y	Yes, this line is a requirement
N	No, this line is not a requirement
H	Heading
F	Figure

The *Verification Needed* column can be used to filter the matrix and identify those rows identified as being a requirement. To accomplish this, filter this column by "Y". Other text and figures may provide additional context, but the requirements for which a Software Supplier is expected to provide evidence are marked with a Y in this column.

2.3.2 Filtering on the FACE Segment Column

Table 3: FACE Segment Values

IOSS	OSS	PCS	PSSS	TSS	Package	DSDM

In the *FACE Segment* column, select the segment in which your UoC will reside. Be aware that there are requirements that apply to more than one segment, so it is not enough to just select the segment of interest, but you must select all of the rows that contain the segment of interest. Alternatively, you may choose to use a "Text Filter" on this column to look for all cells that "contain" the FACE Segment of your UoC.

2.3.3 Filtering on the Conditional Requirements Column

To identify the list of conditional requirements, deselect "(Blanks)" on the column filter. When combined with the previously described filters, this will identify the list of conditional requirements in the FACE Segment pertaining to your UoC. This entire list of rows will need to be addressed on the Software Supplier Statement of Conformance when attempting FACE verification. The Software Supplier should go through each of these and determine if each conditional requirement applies to the UoC or not. As a way to document your initial assessment, mark the *Software Supplier Artifact Cross-Reference* column with a "yes" or "no" to capture your initial assessment. This list of requirements and your responses will be listed on the Software Supplier Statement of Conformance.

To identify the list of requirements for a FACE Segment that are not conditional, deselect all of the values in the column filter and select only "(Blanks)". This is the list of requirements for which the Software Supplier is responsible in the given FACE Segment. If you are annotating the matrix to track which requirements will need to be verified, then mark each of these with "yes" in the *Software Supplier Artifact Cross-Reference* column. After marking these requirements, the complete list of requirements for this UoC will have been identified.