The Open Group Guide

FACE™ Overview, Version 2.0

You have a choice: you can either create your own future, or you can become the victim of a future that someone else creates for you. By seizing the transformation opportunities, you are seizing the opportunity to create your own future.

Vice Admiral (ret.) Arthur K. Cebrowski

Prepared by The Open Group FACE™ Consortium Enterprise Architecture Standing Committee.

The Open Group Guide

FACE™ Overview, Version 2.0

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Preface

The Open Group

The Open Group is a global consortium that enables the achievement of business objectives through technology standards. Our diverse membership of more than 750 organizations includes customers, systems and solutions suppliers, tools vendors, integrators, academics, and consultants across multiple industries.

The mission of The Open Group is to drive the creation of Boundaryless Information Flow™ achieved by:

- Working with customers to capture, understand, and address current and emerging requirements, establish policies, and share best practices

- Working with suppliers, consortia, and standards bodies to develop consensus and facilitate interoperability, to evolve and integrate specifications and open source technologies

- Offering a comprehensive set of services to enhance the operational efficiency of consortia

- Developing and operating the industry's premier certification service and encouraging procurement of certified products

Further information on The Open Group is available at www.opengroup.org.

The Open Group publishes a wide range of technical documentation, most of which is focused on development of Standards and Guides, but which also includes white papers, technical studies, certification and testing documentation, and business titles. Full details and a catalog are available at www.opengroup.org/library.

This Document

This document provides an overview of the processes, documents, and tools produced by the Future Airborne Capability Environment™ (FACE) Consortium and the activities and relationships necessary to support the FACE Enterprise. It was developed and is maintained by The Open Group FACE Consortium.

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- Judy Cerenzia – The Open Group

Referenced Documents

The following referenced documents are included for the application of this Guide. For dated references, only the edition cited applies.

(Please note that the links below are good at the time of writing but cannot be guaranteed for the future.)

- AV-2: FACE™ Glossary of Terms and Definitions, Edition 3.0.1, The Open Group Guide (G194), published by The Open Group, August 2019; refer to: www.opengroup.org/library/g194

- FACE™ Software Supplier Getting Started Guide, Version 1.0, The Open Group Guide (G173), published by The Open Group, August 2017; refer to: www.opengroup.org/library/g173

- FACE™ Technical Standard, Edition 3.1, The Open Group Standard (C207), published by The Open Group, July 2020; refer to: www.opengroup.org/library/c207

- ISO/IEC/IEEE 24765:2017: Systems and Software Engineering — Vocabulary; refer to: https://www.iso.org/standard/71952.html

- ISO/IEC/IEEE 42010:2011: Systems and Software Engineering – Architecture Description; refer to: https://www.iso.org/standard/50508.html

- Open Universal Domain Description Language (Open UDDL), Edition 1.0, The Open Group Standard (C198), published by The Open Group, July 2019; refer to: www.opengroup.org/library/c198

- The TOGAF® Standard, Version 9.2, The Open Group Standard (C182), published by The Open Group, April 2018; refer to: www.opengroup.org/library/c182

1   Introduction

1.1   Purpose

This document provides an overview of the Future Airborne Capability Environment (FACE) Enterprise. It provides the reader with an introduction to the structure and processes of the FACE Consortium as well as an introduction to the products of the FACE Consortium.

There are two primary audiences for this document. The first is new members of the FACE Consortium who desire to learn more about the business and technical aspects of the FACE Consortium so that they understand how to engage and contribute within the FACE Consortium. The second is those who want to use the products of the FACE Consortium and provide feedback to the Consortium on those products. (Please note that the links provided in this document are good at the time of publication, but cannot be guaranteed for the future.)

1.2   What is the FACE Enterprise?

The FACE Enterprise is comprised of stakeholders representing the United States (U.S.) Army, Navy, and Air Force, Industry, and Academia, all working towards the common goal of proposing, developing, and implementing FACE conformant software onto Department of Defense (DoD) aircraft and other environments. The goal of the FACE Conformance Program is to provide a trusted, accessible, and fair process for achieving FACE Conformance Certification.

In June 2010, the FACE Consortium was formed as a Voluntary Consensus Standards Body under The Open Group with representative organizations from this enterprise joining as members. The FACE Consortium is a dynamic organization whose members are creating a comprehensive business and technical framework for the FACE open architecture initiative.

The basis of the FACE Enterprise revolves around the FACE Technical Standard and the FACE Conformance Process which ensures that the software developed conforms to the Technical Standard. The FACE Enterprise provides the processes, guidance, and infrastructure to support acquisition, development, and integration of FACE conformant products.
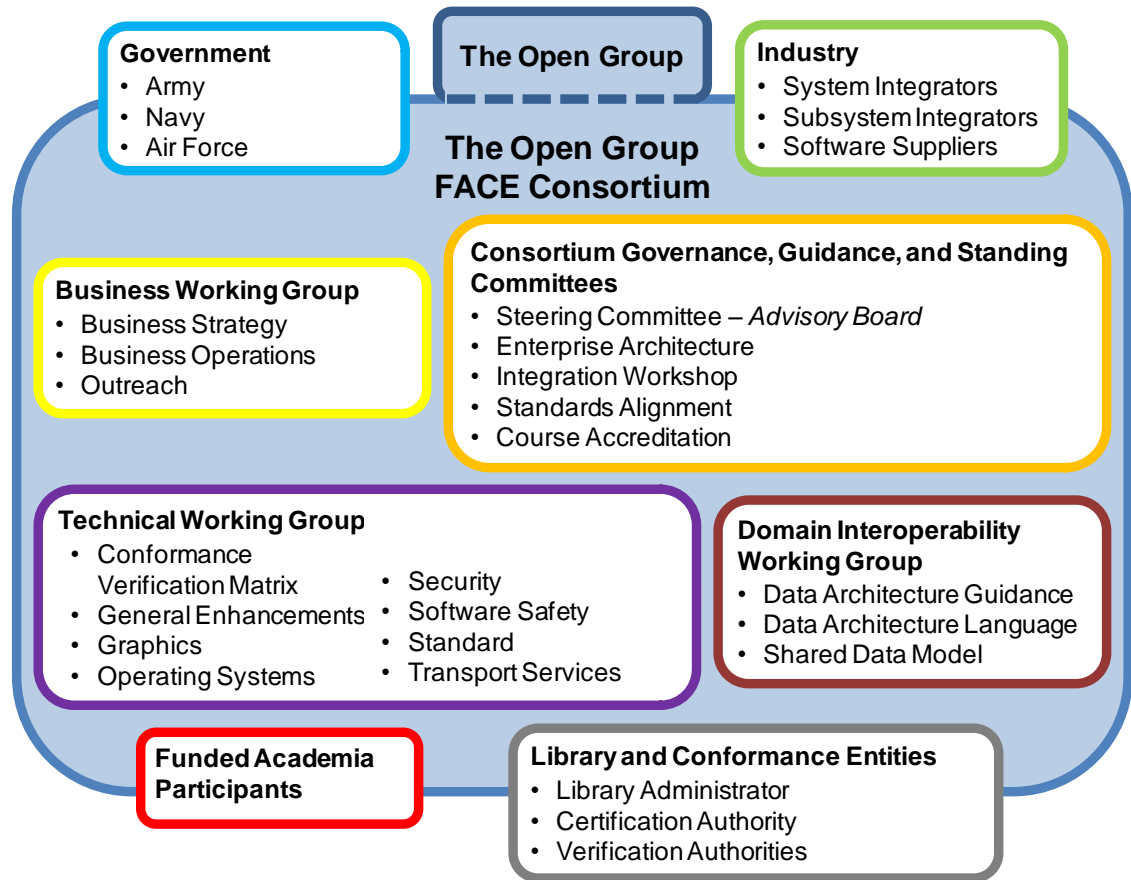
Figure 1: Stakeholders of the FACE Enterprise

1.3 Stakeholders of the FACE Enterprise

There are several different types of stakeholder of the FACE Enterprise, as shown in Figure 1. These include participant members of the FACE Consortium, entity stakeholders that represent the organizational entities within the FACE Consortium, and those who are not members of the FACE Consortium that are consumers of the products produced by the FACE Consortium. Each type of stakeholder is described below.

1.3.1 Participant Stakeholders

The Open Group

The Open Group is a global consortium that enables the achievement of business objectives through technology standards. With more than 750 organizations, The Open Group membership includes customers, systems and solutions suppliers, tools vendors, integrators, academics, and consultants across multiple industries.

The mission of The Open Group is to drive the creation of Boundaryless Information Flow™ achieved by:

- Working with customers to capture, understand, and address current and emerging requirements, establish policies, and share best practices

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The Open Group FACE Consortium (FACE Consortium) was formed as a Voluntary Consensus Standards Body[1] within the legal entity of The Open Group. The Open Group operates the FACE Consortium in a vendor-neutral, technology-neutral, third-party manner and provides the necessary oversight to ensure that the FACE Consortium meets the operational and legal requirements of a Voluntary Consensus Standards Body.

The Open Group FACE Consortium

The FACE Consortium is a Voluntary Consensus Standards Body comprised of U.S. Government, Industry, and Academia representatives. The FACE Consortium vision is an enduring FACE Enterprise that promotes and utilizes evolutionary technologies and business practices to provide portable, reusable, and interoperable software across the aviation community, resulting in faster delivery of capabilities and lower implementation and lifecycle costs.

The primary goal supporting the FACE Consortium vision is to create and maintain an open software standard and supporting business strategy.

The FACE Consortium has effectively leveraged the technical, business, and process expertise from all participating members to create consensus-based technical and business solutions required to implement the vision and goals.

The output of the FACE Consortium is a set of processes, procedures, guidance documents, and technical standards enabling DoD Program Managers (PMs) and Industry stakeholders to procure or produce FACE conformant products.

For more information about how to participate in the FACE Consortium, visit the FACE Consortium website at: www.opengroup.org/face. The link www.opengroup.org/content/future-airborne-capability-environment-face/contact-join provides information on who to contact to receive information about the Consortium as well as how to join the Consortium.

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[1] Voluntary Consensus Bodies operate under the National Cooperative Research and Production Act of 1993 ("NCRPA" or "Act"), 15 U.S.C. §§ 4301-06, which is designed to promote innovation, facilitate trade, and strengthen the competitiveness of the United States in world markets. Additional guidance on Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities is found in OMB Circular No. A-119 and in DoD 4120.24-M, Defense Standardization Program Policies and Procedures.

The www.opengroup.org/face#new-user section of the FACE Consortium website provides an introduction to the website, and getting started information for Software Suppliers, Integrators, Acquisition, Data Modelers, and Business participants. It also provides access to webinars, third-party tools, products, and training.

The work products of the FACE Consortium are open, publicly available documents. Membership in the FACE Consortium or The Open Group is not required to access these documents. The work products of the FACE Consortium may be accessed using the www.opengroup.org/face/docsandtools link on the FACE Consortium website. A complete list of links to the FACE Consortium resources discussed in this document is in Table 2.

Industry

Industry members of the FACE Consortium hold key leadership positions and contribute technical and business expertise in the development of the FACE Technical Standard and business practices. They will develop needed capabilities that conform to these standards and consume other FACE conformant software products in the creation of innovative airborne capabilities.

Industry members may also serve as FACE Conformance Verification Authorities for FACE conformant software. Industry has made significant contributions in advancing the FACE Enterprise business strategy. Preservation of this healthy partnership will be crucial in achieving future FACE objectives.

Government

U.S. Government participants in the FACE Consortium (Army, Navy, and Air Force) hold key leadership roles within the organization, including the direction and funding of Academia activities, coordinating/leveraging existing DoD Open Architecture efforts, and aligning activities to ensure the continued interest and participation of the industrial base. Government agencies may also serve as FACE Conformance Verification Authorities.

The FACE Technical Standard is an enabler for DoD acquisition improvement, with the goals of increasing readiness, reducing cost, and increasing speed of capabilities to the Fleet.

The Army has selected the FACE Reference Architecture as the preferred solution for Aviation Real-Time, Safety-Critical, Embedded (RTSCE) computing environments within their Common Operating Environment (COE). The Army and Navy are also aligning their unmanned system projects with the DoD-wide Society of Automotive Engineers (SAE) AS-4 Unmanned Aircraft System Control Segment (UCS) standard. This coordination will ensure synergies are realized across platforms and services, as the FACE Technical Standard is complementary to ongoing open architecture efforts in all branches of the military.

Funded Academia Participants

The goal of Academia, as part of the U.S. Government Team supporting the FACE Enterprise, is to provide prototyping, research, and validation support to the FACE Consortium. The funded Academia Team provided an independent source for validating and exercising the FACE Technical Standard and its supporting ecosystem by developing software prototypes that demonstrate the FACE computing environment. The Academia Team developed conformance test suites and software development tools for each edition of the FACE Technical Standard.

The software prototypes and tool sets developed by Academia were provided to the Government with full Government Purpose Rights (GPR), as defined in the Defense Federal Acquisition Regulations (FAR) supplement. Open access to these Academia artifacts will serve to lower industry barriers to entry and increase competition in future DoD acquisitions.

In addition to the funded participants, other Academia organizations and research institutes are active in the FACE Consortium.

1.3.2 Consortium Entity Stakeholders

Consortium Governance – FACE Steering Committee

The FACE Consortium Steering Committee directs all activities of the FACE Consortium, including:

- Approval to submit all Consortium work products to The Open Group for review, final approval, and publication

- Creating new working groups and approving their charters

- Defining and approving roles and responsibilities of the FACE Advisory Board

- Oversight of the FACE Consortium's alignment with other standards organizations

Consortium Guidance – FACE Advisory Board

The FACE Advisory Board provides guidance and advice to the FACE Consortium from the perspective of high-ranking Government and Industry officials. A FACE Advisory Board member's role is to bridge the FACE Consortium's strategic vision with customer needs and supplier capabilities by identifying market activities related to and affected by the FACE standards development effort and identifying key technical priorities of the marketplace.

The Advisory Board serves as an advocate for FACE adoption and helps ensure FACE Consortium plans identify key points of strategic alignment and cooperation with other standards bodies, consortia, or advisory bodies.

Verification Authorities, Certification Authority, and Library Administrator

The Verification Authorities (VAs), Certification Authority (CA), and the Library Administrator (LA) are selected and approved by the FACE Consortium Steering Committee to operate independently of the FACE Consortium. The VAs are responsible for verifying products submitted are conformant to the requirements of the FACE Technical Standard. Once the product has achieved conformance, the CA provides the FACE Conformance Certificate for the product, which allows the LA to place the product description (metadata) in the FACE Registry of conformant products. These roles are described in detail in later sections of this document.

Business Working Group, Technical Working Group, Domain Interoperability Working Group, and Standing Committees

These stakeholders and the charters of the working groups and their associated subcommittees are described in more detail in Chapter 2 and Chapter 3.

1.3.3 Non-Consortium Stakeholders

There are two types of non-consortium stakeholders, as described below.

Members of other Forums under The Open Group

Members of other forums under The Open Group are not able to directly influence the FACE Consortium products through participation in the FACE Consortium working groups. As members of The Open Group, participants in other forums are participants in The Open Group Company Review of the work products. This allows the reviewers to submit comments on the document which must be adjudicated prior to document publication. After document publication, any user of the FACE work products may also report problems with the document using the link https://ticketing.facesoftware.org/. See Section 4.11 for more information on submitting PRs.

Other Standards Bodies with no Affiliation to The Open Group

The FACE Consortium collaborates with other standards bodies to align standards development between the organizations. The Steering Committee directs and provides oversight of standard alignment activities. Members of other standards organizations may be granted limited participation in the FACE Consortium to facilitate the standards alignment.

Users of FACE Work Products with no Affiliation to The Open Group

Unaffiliated users of FACE work products are not able to directly influence the FACE Consortium products through participation in the FACE Consortium working groups. However, after document publication, any user of the FACE work products may submit Problem Reports (PRs) on the document using the link https://ticketing.facesoftware.org/. Submitters are required to create an account. This allows the submitter to follow the progress of the ticket as it moves through the ticketing system and provides a means to contact the submitter for clarification, if needed.

Access to FACE Work Products

The work products of the FACE Consortium are open, publicly available documents posted on The Open Group website. Membership in the FACE Consortium or The Open Group is not required to access these documents.

The FACE name and logo design are trademarks of The Open Group in the United States and other countries. Their usage is subject to the FACE Trademark and Usage Guidelines and Copyright Permissions, which are available on The Open Group website at: www.opengroup.org/content/future-airborne-capability-environment-face/legal.

2 FACE Working Groups, Subcommittees, and their Charters

2.1 Business Working Group

The charter of the FACE Business Working Group (BWG) is to develop, implement, and communicate Industry-Government business practices and procedures. These business practices and procedures guide the implementation of FACE contracting, conformance approval practices, and registry and repository processes that incorporate the FACE vision and mission. The FACE Business strategy is described by the business policies and procedures for establishing and maintaining a marketplace of FACE conformant software components that can be integrated into multiple platforms. The BWG defines these business practices to communicate FACE Consortium goals to DoD and Industry leaders and promote the use of the FACE approach in avionics developments, procurements, and upgrades.

The BWG is currently organized into the following subcommittees.

Business Strategy Subcommittee

The charter of the Business Strategy Subcommittee (BSS) is to evaluate, develop, and disseminate business practices that will support the successful development, delivery, maintenance, and conformance of components and systems to the FACE Technical Standard. The scope of the BSS effort includes the examination of requirements for, and subsequent modeling of, government-to-government, government-to-contractor, and contractor-to-contractor interactions in the execution of contractual obligations utilizing the FACE environment.

Business Operations Subcommittee

The charter of the Business Operations Subcommittee is to:

- Define and sustain the FACE Conformance Program to include a set of plans, policies, and procedures, defining roles and responsibilities of participants, for certifying software products submitted for FACE Conformance Certification

- Provide outreach, education, and guidance regarding the FACE Conformance Program to participants and other interested parties

- Manage the operational, functional, and physical requirements for access to FACE conformant products and to enable the FACE Library Administrator to implement these requirements

Outreach Subcommittee

The charter of the Outreach Subcommittee is to promote the adoption and support of the FACE Technical Standard and business approach. These efforts include developing and coordinating messaging, education, events, and outreach efforts for a global aerospace and defense audience.

2.2 Technical Working Group

The FACE Technical Working Group (TWG) is the body responsible for all FACE Consortium technical aspects. The charter of the TWG is to identify open standards where such exist, define standards that do not yet exist, and provide guidance for using these standards to achieve portability of software-based capabilities across multiple avionics platforms. The TWG defines the Technical Standard for the FACE Reference Architecture, provides guidance supporting the standard, develops additional support documentation, provides implementation guidance, and supports development of procedures for FACE conformance. The TWG also develops technical products associated with the FACE Enterprise such as the FACE Shared Data Model (SDM), Reference Implementation Guide (RIG), Conformance Verification Matrix (CVM), and User's Guide.

The TWG is currently organized into following subcommittees.

Conformance Verification Matrix Subcommittee

The charter of the Conformance Verification Matrix Subcommittee is to:

- Analyze the requirements of each edition of the FACE Technical Standard and develop a CVM specific to that edition; including segment allocation, verification methods, potential artifacts needed for inspection, and identification of conditional applicability

- Publish and maintain the Matrix User's Guide (MUG)

- Provide recommendations for Conformance Test Suite (CTS) requirements and perform technical evaluations upon upgrades to adopted versions of the CTS

- Serve as FACE VA Community of Practice (CoP) representation in the FACE Consortium, and provide TWG oversight to ensure published VA CoP guidance is in alignment with each edition of the FACE Technical Standard

General Enhancements Subcommittee

The charter of the General Enhancements Subcommittee is to be responsible for modification of the FACE Technical Standard for all changes that will touch more than one segment or subcommittee. The subcommittee coordinates changes between multiple subcommittees and is responsible for enhancements and modifications that are not addressed by the specialized subcommittees.

Graphics Subcommittee

The charter of the Graphics Subcommittee is to provide a definition of graphical services and guidance on their implementation, utilizing guidance from existing standards and methodologies.

Operating Systems Subcommittee

The charter of the Operating Systems Subcommittee is to consider modifications to the Operating System Segment (OSS) sections of the FACE Technical Standard and other TWG work products. The OSS encompasses a variety of foundational capabilities, many of which are based on existing standards and methodologies, including operating systems, programming languages, frameworks, configuration, and health management.

Security Subcommittee

The charter of Security Subcommittee is to focus on security-specific considerations associated with avionics systems and software. The subcommittee is tasked with providing security-specific input for the FACE Technical Standard and RIG as well as reviewing other sections of these documents for consistency and content relative to security. The FACE Technical Standard and RIG will remain public distribution documents; the Security Subcommittee will capture any restricted information in separate appendices.

Software Safety Subcommittee

The charter of the Software Safety Subcommittee is to produce the guidance documentation associated with software development processes used to produce airworthy certification evidence using the FACE Technical Standard. Of note, this subcommittee is not responsible for producing documentation that defines the airworthiness requirements for software products, nor should the reader infer that following the FACE Technical Standard will qualify the software as airworthy. The purpose of the subcommittee is to ensure that FACE conformant software and artifacts do not preclude the ability to meet airworthiness requirements.

Standard Subcommittee

The Standard Subcommittee is comprised of the TWG Chair and Vice-Chair, as well as all subcommittee leads and co-leads. Their role is to coordinate subcommittee activities to ensure the charters of the TWG and subcommittees are met.

Transport Services Subcommittee

The charter of the Transport Services Subcommittee is to consider modifications to the Transport Services Segment (TSS) sections of the FACE Technical Standard and other TWG work products. The subcommittee will harmonize with the Operating Systems and Shared Data Model Subcommittees to eliminate inconsistencies inhibiting implementation.

2.3 Domain Interoperability Working Group

The FACE Domain Interoperability Working Group (DIOG) is the body responsible for all Data Architecture and Data Model aspects of the FACE Technical Standard and The Open Group Universal Domain Description Language (Open UDDL) Standard. The charter of the DIOG is to determine the elements of a Data Architecture, define those elements, identify applicable open standards where they exist, define standards where none exist, and provide guidance for using these standards to achieve interoperability at the data level. The DIOG defines the Open UDDL Standard and the relevant sections of the FACE Technical Standard (working with the TWG), provides guidance supporting the standards, develops additional support documentation, provides implementation guidance, and supports development of procedures for FACE conformance. The DIOG may also develop technical products associated with the FACE Enterprise such as content for inclusion in the FACE SDM.

The DIOG is currently organized into the following subcommittees.

Data Architecture Guidance Subcommittee

The charter of the Data Architecture Guidance Subcommittee is to develop guidance documents, document best practices, and provide Software Suppliers with the information necessary to adopt the FACE Data Architecture. The Data Architecture Guidance Subcommittee is also responsible for alignment activities and evaluation of other data modeling approaches.

Data Architecture Language Subcommittee

The charter of the Data Architecture Language Subcommittee is to define the data syntax and semantics for data models within the Open UDDL and FACE Technical Standards, guided by existing standards and methodologies. The focus is on enabling capture of domain descriptions in support of data exchanged by software components, systems, or organizations. This subcommittee is responsible for all artifacts that are included in a FACE standard.

Shared Data Model Subcommittee

The charter of the Shared Data Model Subcommittee is to review SDM Change Requests (CRs) with submitters, provide recommendations to the Shared Data Model Configuration Control Board (SDM CCB), to develop pertinent SDM content, and to provide direction to Software Suppliers submitting SDM CRs.

3 Standing Committees and their Charters

3.1 Enterprise Architecture

The charter of the Enterprise Architecture (EA) Standing Committee is to define and develop formal architecture products (artifacts) to create a clear, top-level picture of the FACE Enterprise for a wide variety of FACE Consortium and outside audiences, address the FACE role in the context of related initiatives and programs, and ensure internal consistency across the FACE Business and Technical architecture.

The EA Standing Committee has one subcommittee.

EA Air Worthiness Subcommittee

The charter of the EA Air Worthiness Subcommittee is to address air worthiness considerations across the FACE Technical Standard. The purpose of the subcommittee is to ensure that FACE conformant software, associated artifacts, and the process to produce them:

- Contribute towards evidence of air worthiness where possible, explicitly citing common requirements, processing, and guidance

- Address both commonality and variance at a high level

- Do not preclude the ability to meet airworthiness requirements

3.2 Integration Workshop

The charter of the Integration Workshop (IWS) Standing Committee is to collaborate with the BWG/TWG to establish and enforce technical entrance criteria for public FACE Consortium sanctioned Technical Interchange Meetings (TIM) and similar events as well as to discover, evaluate, and produce FACE reference implementation examples and facilitate adoption and publication of those reference examples.

3.3 Standards Alignment

The Standards Alignment Standing Committee identifies potential areas of synergy between the FACE Consortium and other open architecture initiatives or standards bodies and guides the formation and operation of joint Alignment Advisory Groups to prevent development of duplicative or contradictory enterprise standards.

A Memorandum of Agreement (MOA) will be created for each Alignment Advisory Group to define the collaboration in support of each standard's respective mission to maintain a shared understanding of the current and future requirements, scope, and business and technical products of both standards. Each Advisory Group shall select areas of potential alignment ("Alignment Activity") of the respective standards and business guidelines. For each potential Alignment

Activity, the Advisory Group shall describe and document the goal of the Alignment Activity, the scope of the Alignment Activity, the targeted Standards and Business Guidelines sections, the targeted Standards and Business Guidelines versions, and the governance of the Alignment Activity. Approval of alignment tasks and change control of artifacts between the other Standards Bodies and the FACE Consortium is managed following the normal governance plans and procedures of the individual standards bodies.

Alignment Activities include:

- SAE AS-4 Unmanned Aircraft System (UAS) Control Segment (UCS) Committee/FACE Consortium Alignment Advisory Group (UFCAAG) alignment between the FACE Shared Data Model and the UAS Domain-Specific Data Model

- Sensor Open Systems Architecture (SOSA) alignment of aspects of the SOSA Software Architecture with the FACE Reference Architecture

- Joint Tactical Networking Center (JTNC) Software Communications Architecture (SCA) alignment between the FACE profiles and SCA profiles

3.4 Course Accreditation

The charter of the Course Accreditation Standing Committee is to advise on the following related to training accreditation:

- What falls under the accreditation process?

- Who are the intended audiences?

- What are the syllabus and learning outcomes?

- What boundaries exist with respect to the training process?

- What accreditation process will we follow?

- What certification does the trainee get? Does the trainee receive continuing credit?

- What is the timeline and criteria for rolling out the process?

4 Work Products and Processes

This chapter describes the work products and processes developed by the FACE Consortium Working Groups and Subcommittees.

All documents that have been created by the FACE Consortium and approved and published by The Open Group may be accessed via the FACE website at: www.opengroup.org/face/docsandtools. Users must register to gain access to these documents, but do not have to be FACE Consortium members.

4.1 FACE Technical Standard

The FACE Technical Standard is the "keystone" document of the FACE Consortium. The vast majority of the other FACE Consortium documents have evolved in the support and implementation of the FACE Technical Standard. Each edition of the Technical Standard has a corresponding RIG (starting with Edition 2.0), SDM (starting with Edition 2.0), Shared Data Model Governance Plan, CVM, and CTS. Links to the FACE Technical Standard editions and corresponding documents are available on the FACE website at: www.opengroup.org/face/docsandtools.

The FACE Technical Standard describes a standardized software COE that is hardware-agnostic. It embodies a set of requirements and descriptions referred to as the FACE Technical Standard. The FACE Technical Standard uses industry standards for distributed communications, programming languages, graphics, operating systems, and other areas as appropriate. It describes requirements for architectural segments with their associated modular software components, and defines key interfaces that link the segments together. The FACE Technical Standard establishes a framework to enable the affordable acquisition of software systems that promote rapid integration of portable capabilities across a global portfolio of defense programs.

The FACE Technical Standard specifies how to develop an open, modular, software environment for security, safety, or general-purpose software COEs. There are five logical segments in the FACE Reference Architecture connected by three FACE Interfaces (*aka* as "KEY" Interfaces per a Modular Open Systems Approach (MOSA)).

The five FACE architectural segments are:

- **Operating System Segment**: the OSS is where foundational system services used by all of the other segments and vendor-supplied code reside

  The OSS provides and controls access to the computing platform for the other FACE segments. The OSS manages the execution of software associated with the other FACE segments and hosts various operating system and low-level health monitoring interfaces. The OSS can also optionally host external networking capabilities, programming language run-times, and component framework interfaces.

- **Input/Output Services Segment**: the Input/Output (I/O) Services Segment (IOSS) is where normalization of interface hardware device drivers resides

  This normalization is achieved using a set of adapter design patterns that individually communicate to a vendor-supplied driver and then convert that data to a standardized FACE interface. The I/O services within this segment provide a bridge for subsystem data between the interface hardware to the Platform-Specific Services Segment (PSSS).

- **Platform-Specific Services Segment**: the PSSS is comprised of the following sub-segments:

  — Platform-Specific Device Services (PSDS) is where management of data and translation between platform-unique device specific messages defined by an Interface Control Documents (ICDs) and logical messages defined by a FACE Data Model occurs

  — Platform-Specific Common Services (PSCS) is comprised of higher-level services including Logging Services, Device Protocol Mediation (DPM), Streaming Media, and Health Monitoring/Fault Management (HMFM)

  — Platform-Specific Graphics Services (PSGS) is where presentation management occurs; PSGS abstracts the interface specifics of Graphics Processing Units (GPUs) and other graphics devices from software components within the FACE Reference Architecture

- **Transport Services Segment**: the TSS is where communication services reside

  Data Distribution occurs between and within software residing in either the Portable Components Segment (PCS) or the PSSS. Other communication services include Quality of Service (QoS), Data Transformation, Paradigm Translations, and Message Association.

- **Portable Components Segment**: the PCS is where software providing mission-level capabilities or business logic resides

  Capabilities contained within the PCS should remain agnostic from hardware and free of any data transport mechanism or operating system specifics in order to meet the objectives of portability and interoperability.

The three FACE key interfaces are:

- **Operating System Segment Interface**: the OSS Interface provides a standardized means for software to utilize the services within the operating system and other capabilities related to the OSS

  This interface is provided by software in the OSS to software in other segments. This interface includes ARINC 653, POSIX®, and HMFM Application Programming Interfaces (APIs). The OSS also includes programming languages and (in FACE Technical Standard, Edition 3.0 and later) configuration. This interface is optionally allowed to include networking capabilities, programming language run-times, and component frameworks.

- **I/O Services Interface**: the I/O Services Interface provides a standardized means for software to communicate with interface hardware device drivers

  This interface is provided by software in the IOSS to software in the PSSS. This interface supports several common I/O bus architectures.

- **Transport Services Interface**: the Transport Services (TS) Interface provides a standardized means for software to utilize communication services provided by the TSS

  This interface is provided by software in the TSS to software in the PSSS and PCS. This interface utilizes messages formatted using the FACE Data Architecture.

Figure 2, the FACE Reference Architecture, follows:
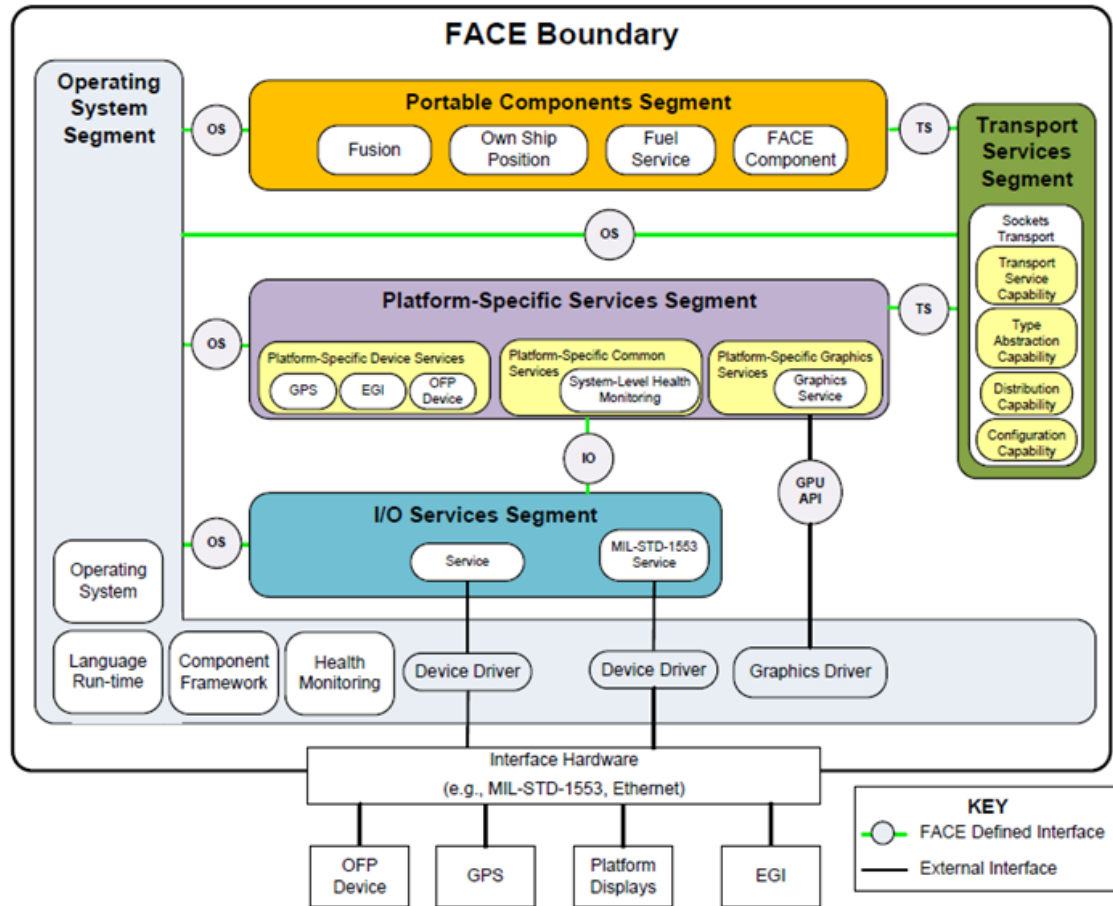
Figure 2: FACE Reference Architecture

Software components in different segments of the FACE Reference Architecture have different potential for portability. Software in the PCS and TSS is expected to be the most portable, whereas software residing in the PSS is more tightly coupled to platform-specific systems and therefore expected to be less portable. Software components in the IOS have the least potential for reuse due to potentially tight coupling with unique I/O hardware.

4.2 FACE Conformance Program

Defining conformance and creating a method for certifying software is vital to establishing an effective standard. Certification provides formal recognition of conformance to an industry standard and can provide the following stakeholder benefits:

- **Government (customer) benefits**: increased confidence in portability and reuse, faster fielding of capabilities, easier integration, and lower costs

- **Industry (supplier) benefits:** lowers barriers to entry, and eases product enhancement

The FACE Consortium has established a comprehensive Conformance Program and has developed the Conformance Policy and Certification Guide to define the processes to verify and certify conformance to the FACE Technical Standard. The FACE Conformance Program consists of Verification, Certification, and Registration, which are shown in Figure 3. A Software Supplier can only claim that a product is FACE conformant or certified as FACE conformant when Verification, Certification, and Registration have been completed. Access to the FACE Conformance Program is via www.opengroup.org/face#conformance. The FACE Conformance Program pages provide general information on the FACE Conformance Program and how to become certified.

FACE Verification is the act of determining the conformance of a FACE Unit of Conformance (UoC) implementation to the applicable FACE Technical Standard requirements. Verification is performed using the CVM and running the CTS. Verification is handled through an entity known as a VA, a technical expert on the FACE Technical Standard.

FACE Certification is the process of applying for FACE Conformance Certification once verification has been completed. Certification is processed through the FACE CA.

FACE Registration is the process of listing a FACE Certified UoC in the FACE Registry. The Registry is the single source for listing all FACE certified products – it is a catalog with information about the FACE UoCs (not the FACE UoC itself) and includes the contact information for sales and licensing. Registration of software products is an important final step of the process to enable awareness of the availability of certified FACE conformant software to other Government and Industry customers. The FACE Registry can be accessed at www.facesoftware.org.
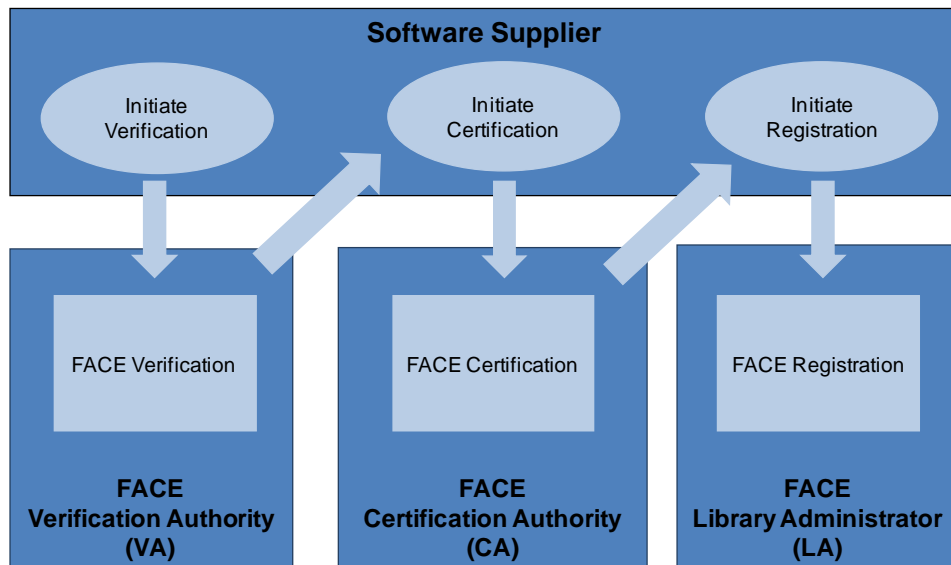
Figure 3: FACE Conformance Process Flow

The Conformance Policy defines the organizational entities that participate in the FACE Conformance Program. The key interfacing entities involved in the FACE Verification, Certification, and Registration are shown in Figure 3 and include:

- Software Supplier

- Verification Authority

- Certification Authority

- Library Administrator

The Software Supplier initiates the process by submitting FACE UoCs and FACE UoC Packages to the FACE Conformance Program.

The VA is an organization(s) officially sanctioned by the FACE Consortium to conduct For-the-Record Verification testing and assess the verification evidence provided by the Software Supplier in support of the FACE Conformance Program. A VA may be an independent third-party organization; a designated internal, independent organization of the Software Supplier; or a Government lab. The VA runs the CTS and assesses the applicable segment requirements contained within the FACE Technical Standard using the CVM. Upon successful completion, the VA generates a verification report which the Software Supplier must submit to the CA for certification approval.

The CA is a single organization selected by the FACE Consortium to manage the day-to-day operations of the FACE Conformance Program. The CA performs under the authority of the FACE Consortium and in accordance with the FACE Conformance Program policies and procedures. The CA is responsible for assessing applications for certification, administering the Certification Agreement, and issuing the FACE Conformance Certificate. The Open Group has been selected by the FACE Consortium to fulfill the CA role.

The LA is selected by the FACE Consortium to operate and maintain the FACE Library in accordance with the FACE Library policies and procedures. At the Software Supplier's direction, the LA places the metadata for each certified FACE conformant software product into

the FACE Registry. The Open Group has been selected by the FACE Consortium to fulfill the LA role.

Two separate fees are associated with Verification and Certification:

- **Verification Fee**: the verification element of the FACE Conformance Program is a Level of Effort (LOE) type activity and time to conduct verification may vary based on the FACE architectural segment or complexity of the FACE UoC

  In some cases, the Software Supplier's organization may also be an approved VA and the organization could perform an internal, independent verification. The cost to perform verification will vary based on these considerations.

- **Certification Fee**: the CA has established and documented a fixed Certification Fee for FACE UoCs, available at www.opengroup.org/face/conformance-authorities

4.3 FACE Library

The purpose of the FACE Library is to provide the infrastructure to enable the discovery of certified FACE conformant products, documents, or tools. The FACE Library enables the registration of FACE conformant products using a centrally located and FACE Consortium managed web-based gateway, which is operated and maintained by an LA. The Registry is the single source for listing all FACE certified products and provides a central point for users to access a searchable listing of certified products. Only products that are FACE certified are listed in the Registry. The Registry allows full public access, presenting only information that is approved for public release. The actual software components are not stored in the Registry, only metadata related to the certified products. Links are provided to the original developer of the software if the searcher is interested in acquiring the product from that supplier's Product Repository. The Reference Repository contains all published FACE documents, the SDM snapshot, and the CTS.

Figure 4 shows the following components of the FACE Library:

- Main FACE Landing Page

- FACE Conformance Workflow Tool

- FACE Registry

- FACE Reference Repository

- FACE Product Repositories

- FACE Certification Retention Repository

- FACE Verification Retention Repositories
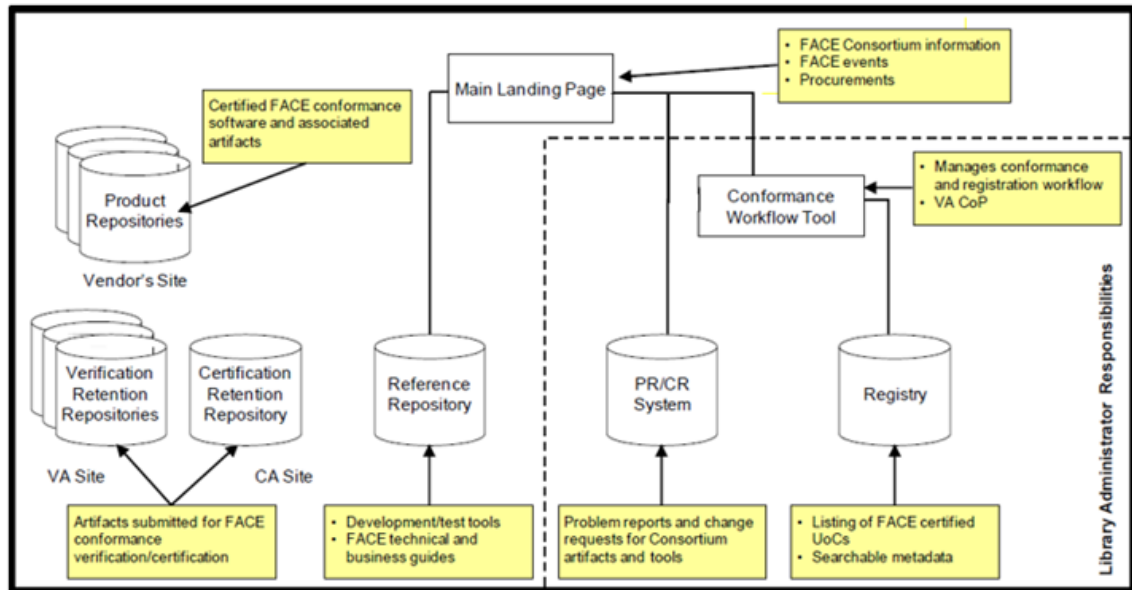
Figure 4: Library Infrastructure

4.4   FACE Conformance Workflow Tool

The Library Conformance Workflow Tool provides a dashboard for users and organizations to facilitate moving data through a series of FACE Consortium defined processes. The Library Conformance Workflow Tool enables:

- User authentication needed to access the FACE Registry and Problem Report and Change Request (PR/CR) system

- Software Suppliers to enter metadata information about a product into the conformance workflow for VA, CA, and LA review prior to publication in the Registry of FACE certified products

- Software Suppliers to initiate a Registry submittal following successful completion of the FACE certification process

- Users to search the Registry to find FACE certified products based on the product's metadata

4.5   TWG Work Products

4.5.1   FACE Technical Standard

The FACE Technical Standard, described above, is the principal work product of the TWG. All further work products from the TWG support the development of software to this standard and proving conformance to it.

4.5.2   Reference Implementation Guide

The FACE RIG is to be used in conjunction with the FACE Technical Standard. There is a RIG edition associated with each edition of the FACE Technical Standard, starting with FACE Technical Standard Edition 2.0. The RIG has been designed to:

- Support a specific edition of the FACE Technical Standard

- Present best practices for development and deployment of FACE UoCs

- Guide the developer through example implementation scenarios where FACE UoCs are bundled together to provide typical airborne capabilities

- Provide further information on FACE Profiles, FACE UoCs, the FACE Data Architecture, Application Frameworks, Language Run-times, and how Safety, Security, HMFM, and Configuration Services may be implemented within a FACE UoC

In the event of conflict between the FACE Technical Standard and the FACE RIG, the FACE Technical Standard takes precedence.

References and descriptions of other published standards (e.g., ARINC 653, ARINC 661, POSIX) are presented at an overview level relative to the FACE Technical Standard and not designed to conflict with the referenced standards.

4.5.3   Conformance Verification Matrix

The CVM provides the product standard which clarifies the conformance 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 is targeted for use by parties acting as VA performing conformance verification and by Software Suppliers as they build FACE UoCs.

4.5.4   Conformance Matrix User's Guide

The MUG is a guide for interpreting and using the CVM. The CVM provides the product standard which clarifies the conformance 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 is targeted for use by parties acting as VA performing conformance verification and by Software Suppliers as they build FACE UoCs.

4.5.5   Conformance Test Suite

The CTS supports the verification process of the FACE Conformance Program. The FACE Consortium TWG and Steering Committee are the key entities that determine the approval and acceptance of the CTS as the single tool that will be used for FACE verification testing. There is an approved CTS for each edition of the FACE Technical Standard.

The CTS is designed to be development tool-agnostic. The suite tests for conformance to the FACE Technical Standard specified APIs for a specific segment. The test suite provides a means to test all requirements identified in the CVM that have the Verification Method marked "Test" and is a mandatory step of FACE verification testing. The test suite ensures only required APIs are defined, implemented, and/or used based on the specific segment where the tested software

resides. This test only verifies conformance to the FACE Technical Standard; functional verification is the responsibility of the vendor or test agency. The CTS is available to users at no cost and can be run during all phases of the software development process to provide feedback to the developer in support of FACE conformance.

A Software Supplier also has the option of utilizing the FACE CTS to run internal checks for FACE conformance. Instructions for accessing specific versions of the CTS are given below. Once you have downloaded the CTS, you will also need access to the target operating system and the Real Time Operating System (RTOS) development tool suite to execute the conformance test.

The CTS corresponding to each edition of the FACE Technical Standard may be downloaded at www.opengroup.org/face/conformance-testsuites.

4.6 DIOG Work Products

The FACE Data Architecture is a set of related models, specifications, and governance policies with the primary purpose of supporting an interoperable means of data exchange among Units of Portability (UoPs) through the Transport Services Interface. The FACE Data Architecture includes the work products described in this section.

4.6.1 Shared Data Model

The Shared Data Model (SDM) is a FACE Consortium managed data model that provides the mechanism to consistently document the semantics of data within the FACE Interface parameters. The SDM is a repository of data elements that may be leveraged or extended by Software Suppliers developing UoPs. SDM content is governed by a CCB. The SDM provides the basic set of elements and common entities from which all UoP Supplied Models (USMs) are built and serves as the primary point of interaction between suppliers and system integrators. Software Suppliers may submit extensions from their USM to the CCB to review for inclusion in the SDM.

4.6.2 FACE Shared Data Model Governance Plan

The FACE Shared Data Model Governance Plan defines the policies for management of the SDM and establishes the authority and operating parameters of the CCB. All proposed changes to the SDM are reviewed and applied based on the rules within the FACE Shared Data Model Governance Plan.

4.6.3 Open Universal Domain Description Language (Open UDDL) Standard

The Open UDDL Standard defines a data architecture and language for formally describing, querying, and communicating information. It formally documents the semantic meaning of data to support machine readability and the use of information in the engineering process. It separates concerns relative to the appropriate level of abstraction. The standard facilitates information exchange within any domain. It allows specification of a model subset for information exchange while maintaining contextual integrity of the projected data. It facilitates interoperability during information exchange by supporting automated data conversions and transformations and the ability to compare and merge data.

The Open Group Open UDDL Standard, Edition 1.0 is available in The Open Group Library at www.opengroup.org/library/c198.

The DIOG is responsible for maintenance of the Open UDDL Standard. The FACE Technical Standard, Edition 3.1 includes a reference to the Open UDDL Standard.

4.7 BWG Work Products

4.7.1 FACE Business Guide

The FACE Business Guide describes the business aspects of implementing the FACE Technical Standard and highlights to Industry and Government acquisition professionals how adopting the FACE Technical Standard may affect software-based aviation electronics (avionics) acquisitions. The Business Guide also describes a range of business practices encouraging suppliers to develop portable FACE conformant software components in order to lower costs, speed delivery, and produce higher-quality aviation capabilities.

4.7.2 FACE Contract Guide

The FACE Contract Guide is a reference for including FACE specific requirements into a solicitation or proposal. The FACE Contract Guide enables a DoD Contracting Officer or PM to include FACE requirements in a solicitation. It also assists providers, including Government Contractors, and Subcontractors, in understanding the FACE requirements in a solicitation and appropriately responding to these requirements in formal proposals.

4.7.3 FACE Conformance Policy

The FACE Conformance Policy defines the processes and policies that govern the FACE Conformance Program. The goal of the FACE Conformance Program is to provide a trusted, accessible, and fair process for achieving FACE Conformance Certification. These processes and policies define what can be certified, what it means to be certified, and the process for achieving certification. They also define the obligations on Software Suppliers for FACE Conformance Certification. This document is intended primarily for Software Suppliers who would like to certify a FACE UoC or a FACE UoC Package.

4.7.4 FACE Conformance Certification Guide

The purpose of the FACE Conformance Certification Guide is to provide step-by-step instructions for the Software Supplier regarding the FACE Conformance Program and its associated policies and procedures/processes. The guide provides high-level descriptions, instructions, and references, including links, to FACE Conformance Program-related activities and authorities. This guide is intended to supplement and be used in conjunction with the FACE Technical Standard and FACE Conformance Policy.

4.7.5 Conformance Workflow Tool and FACE Registry

These tools support the FACE Conformance Process. The documents which govern the FACE Library which includes the FACE Registry are primarily for internal Consortium use. They include: Library Requirements, Library Implementation Plan, Library Policy, and the FACE Library Administration Plan.

4.7.6 Overview, General Information, and Promotional Materials

These materials consist of the FACE Initiative Data Sheet, FACE Frequently Asked Questions (FAQs), and the FACE Business and Technical Overview presentations. Links are provided in Table 2.

4.8 EA Work Products

4.8.1 AV-2 FACE Glossary of Terms and Definitions

The FACE AV-2 is the authoritative single source for terms and definitions used within the FACE Consortium. The AV-2 is available in The Open Group Library at www.opengroup.org/library/g194.

4.8.2 FACE Overview Document

The FACE Overview provides an overview of the FACE Enterprise. It provides an introduction to the structure and processes of the FACE Consortium as well as an introduction to the products of the FACE Consortium.

4.8.3 FACE Enterprise Architecture Artifacts

The EA Standing Committee has depicted the FACE Enterprise in a series of graphical architecture presentations, which follow the DoD Architecture Framework (DoDAF) 2.0 and The Open Group TOGAF® Standard. These views are useful for capturing and presenting FACE Consortium processes and activities to Consortium members and to an external audience. The EA work products are used in the documents produced by the BWG and TWG.

4.8.4 Problem Report/Change Request Process

The Problem Report/Change Request (PR/CR) process describes the process for submittal, tracking, and closure of PRs and Approved Corrections relating to FACE Consortium products, processes, and/or policies. See Section 4.11 for more information on submitting PRs and CRs.

4.9 Integration Workshop Standing Committee Work Products

4.9.1 Software Supplier Getting Started Guide

The Software Supplier Getting Started Guide is designed to be a navigational quick start guide for Software Suppliers to develop FACE conformant software. It provides the reader access to sample software aligned to the FACE Technical Standard, developed FACE data models, and corresponding verification artifacts. The sample software contains FACE UoCs that pass the FACE CTS. It does not "touch on" all components of the FACE Technical Standard. The intent is to navigate readers through a demonstration example, with information on how to continue advanced FACE development efforts, including accessing and navigating the FACE website, FACE Library, FACE tools, and published FACE business and technical documents.

The FACE Software Supplier Getting Started Guide is available in The Open Group Library at www.opengroup.org/library/g173.

The Software Supplier Getting Started Guide is *not* designed to be an introduction to the overall FACE approach. Readers should have a basic understanding of the FACE approach and of embedded systems software development principles and practices.

4.9.2 Basic Avionics Lightweight Source Archetype

The Basic Avionics Lightweight Source Archetype (BALSA) is a simplified demonstration operating environment that provides a working example of how to use the FACE architecture. Software Suppliers can use BALSA to integrate their software in a basic computing environment aligned to all of the FACE architecture segments (PCS, TSS, PSSS, and IOSS), without the complexities of a full system.

Note: At the time of publication of this document BALSA has not been approved for distribution outside of the FACE Consortium membership.

4.9.3 FACE Two-Part Webinar Series

A two-part webinar series is available titled "FACE Software Supplier Getting Started Guide and BALSA Overview" (Parts 1 and 2).

4.10 Academia Work Products

4.10.1 Software Development Tools

To date, the CTS is the only tool currently approved by the FACE Consortium. The FACE website provides a listing of tools and development environments that have been created by third-party companies and Academia to assist software developers and integrators with meeting FACE requirements. The link to this page is www.opengroup.org/face/third-party-tools. The FACE Consortium provides the tools listing as a convenience to users, with the following disclaimer:

DISCLAIMER: The products listed here are intended to support the development of FACE™ software or support the integration of certified FACE conformant software into a system or subsystem. The support products themselves in this listing are not to be perceived as FACE conformant, and have not been vetted or approved by The Open Group FACE Consortium. Listings are the sole responsibility of the posting company and are provided as a resource "as is" to anyone using the directory. The Open Group does not in any way, explicitly or implicitly, warrant or endorse any of the claims, products, services, or organizations listed. The Open Group does not accept any liability for the accuracy of the postings, or for actions taken by users of the directory based on the information provided by the participating vendors/service providers. Please direct questions about the content of the listings to the vendor/service provider of that listing.

Not all the tools listed on the site are free to download. For information about how to list a product or tool that supports a FACE development or integration application, please contact ogface-admin@opengroup.org.

An **OPTIONAL** set of tools has been developed by Academia under Government contract to support the modeling and development of FACE conformant software and modeling tool interchange between the Academia tools and several Commercial Off-The-Shelf (COTS) tool suites. The tools are available to registered users at no cost and links to access each of the tools

are provided on the FACE Third-Party Tools website at www.opengroup.org/face/third-party-tools. The intent of the tools is to reduce barriers to entry and provide support for software developers. The descriptions of these optional tools are for information only.

4.10.2   Modeling Tools for FACE Software Development

The Modeling Tools for FACE Software Development (MTF) is a suite of tools that applies a model-based approach to provide integrators and developers with the capability to develop FACE conformant software components, known as FACE UoCs.

The MTF allows for the modeling of FACE UoCs, interfaces (including data), properties, and functions. The tool suite consists of a bundled:

- Software Development Kit/Integrator's Toolkit (SDK/ITK)

- Data Model (DM) Editor

- Interface Definition Language (IDL) Compiler targeting FACE conformant software

The SDK/ITK consists of modeling and code generation tools, but it does not provide source code compilers, archivers, or linkers. The MTF was designed to supplement other Integrated Development Environments (IDEs) and it is expected that software developers will continue to use their COTS or proprietary IDEs of choice to develop business logic for their software, compile their software, and link applications.

A complete list of the tools is provided on the FACE website at www.opengroup.org/face/third-party-tools. Software developers will also need access to a RTOS IDE to build the business logic of any components and to compile and link components.

4.10.3   COTS Tool Support/Modeling Tool Interchange

A number of tools and profiles have been identified or developed to support the FACE ecosystem. A complete list of the tools is provided on the FACE website at www.opengroup.org/face/third-party-tools.

4.11   Problem Report/Change Request Process

The Problem Report/Change Request (PR/CR) process provides a venue for formal submission of concerns related to FACE Consortium products, processes, and/or policies. The PR/CR process includes a set of layered, specialized CCBs with a single coordinating body to initially receive reports, and subsequently distribute them for action and resolution, as appropriate.

After document publication, any user of the FACE work products may submit PRs on the document using the link https://ticketing.facesoftware.org/. Submitters are required to create an account. This allows the submitter to follow the progress of the ticket as it moves through the ticketing system and provides a means to contact the submitter for clarification, if needed. The submitter of the ticket is anonymous as the ticket moves through the PR/CR process. Figure 5 shows the stages that a "ticket" goes through from submittal to closure.
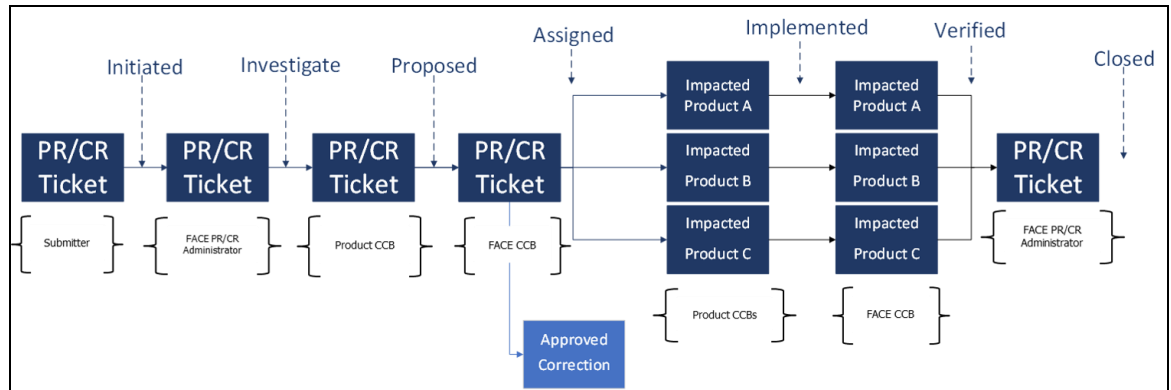
Figure 5: Lifecycle of a PR/CR "Ticket"

The FACE PR/CR Process Overview document, which describes the process in full, is available on The Open Group FACE Consortium website at www.opengroup.org/face/docsandtools.

5 Additional Information

Although not expressly cited, the majority of material presented in this document was extracted directly from FACE publications, charters, and the FACE Consortium website. Since these published documents may evolve, they take precedence over the material presented in this document.

If you need additional information, please contact the administrators of the FACE Consortium at: ogface-admin@opengroup.org.

Table 1: Referenced Documents

(Please refer to www.opengroup.org/face/docsandtools.)

Name	Owner	Version	Publisher
AV-2: FACE Glossary of Terms and Definitions	EA	Latest edition	The Open Group FACE Consortium
Basic Avionics Lightweight Source Archetype (BALSA)	IWS	All versions (corresponds to a specific edition of the FACE Technical Standard) Access limited to FACE Consortium members	The Open Group FACE Consortium
FACE Business Guide	BWG	Latest version	The Open Group FACE Consortium
FACE Conformance Certification Guide	BWG	Latest version	The Open Group FACE Consortium
FACE Conformance Matrix User's Guide	TWG	Latest version	The Open Group FACE Consortium
FACE Conformance Policy	BWG	Latest version	The Open Group FACE Consortium
FACE Conformance Test Suite	TWG	All versions (corresponds to a specific edition of the FACE Technical Standard)	The Open Group FACE Consortium
FACE Conformance Verification Matrix	TWG	All versions (corresponds to a specific edition of the FACE Technical Standard)	The Open Group FACE Consortium
FACE Contract Guide	BWG	Latest version	The Open Group FACE Consortium

Name	Owner	Version	Publisher
FACE Getting Started Guide	IWS	Latest version	The Open Group FACE Consortium
FACE Library Administration Plan	BWG	Latest version	The Open Group FACE Consortium
FACE Overview	EA	Latest version	The Open Group FACE Consortium
FACE Reference Implementation Guide	TWG	All versions (corresponds to a specific edition of the FACE Technical Standard)	The Open Group FACE Consortium
FACE Shared Data Model	DIOG	All versions (corresponds to a specific edition of the FACE Technical Standard)	The Open Group FACE Consortium
FACE Shared Data Model Governance Plan	DIOG	Latest version	The Open Group FACE Consortium
FACE Technical Standard	TWG	All editions	The Open Group FACE Consortium
Open Universal Domain Description Language (Open UDDL) Standard	DIOG	Latest version	The Open Group
Problem Report (PR) and Change Request (CR) Process	EA	Latest version	The Open Group FACE Consortium

Table 2: Links to FACE Consortium Information

Name	Version
The Open Group Website	www.opengroup.org
FACE Website (FACE Landing Page)	www.opengroup.org/face
Contact/Join the FACE Consortium	www.opengroup.org/content/future-airborne-capability-environment-face/contact-join
New User – Getting Started	www.opengroup.org/face#new-user
Documents and Tools	www.opengroup.org/face/docsandtools
Ticketing (PR/CR Tool)	https://ticketing.facesoftware.org/
FACE Trademark and Usage Guidelines & Copyright Permissions	www.opengroup.org/content/future-airborne-capability-environment-face/legal
FACE Registry of Conformant Products	www.facesoftware.org/registry

Name	Version
AV-2: FACE Glossary of Terms and Definitions	www.opengroup.org/library/g194
FACE Conformance	www.opengroup.org/face#conformance
FACE Conformance Authorities	www.opengroup.org/face/conformance-authorities
FACE Third-Party Tools	www.opengroup.org/face/third-party-tools
The Open Standard for Open UDDL	www.opengroup.org/library/c198
The Open Group Library	www.opengroup.org/library
FACE Software Supplier Getting Started Guide	www.opengroup.org/library/g173
FACE Frequently Asked Questions (FAQs)	www.opengroup.org/content/future-airborne-capability-environment-face/faqs
FACE Initiative Data Sheet	www.opengroup.org/library/q184
FACE Consortium Business & Technical Overview (Webinar)	www.opengroup.org/library/d210
Introduction to The Open Group FACE Contract Guide: Guidance in Writing Solicitations & Proposals with FACE Requirements (Webinar)	www.opengroup.org/library/d161
FACE Consortium Data Model Overview (Webinar)	www.opengroup.org/library/d211
FACE Conformance Program (Webinar)	www.opengroup.org/library/d177
FACE Software Supplier Getting Started Guide and BALSA Overview – Part 1 (Webinar)	www.opengroup.org/library/d206
FACE Software Supplier Getting Started Guide and BALSA Overview – Part 2 (Webinar)	www.opengroup.org/library/d207

6   Glossary and Acronyms

This chapter defines terms or clarifies the meaning of words used within this document. Where an acronym is also used, it is provided in parentheses. Terms and definitions in Table 3 are extracted from the AV-2: FACE Glossary of Terms and Definitions, Edition 3.0.1.

Table 3: Glossary of Terms

Term	Definition
Application Programming Interface (API)	A particular set of rules and specifications a software program can follow to access and make use of the services and resources provided by another particular software component implementing that Application Programming Interface. It serves as an interface between different software components and facilitates their interaction, similar to the way the user interface facilitates interaction between humans and computers.
Architecture	Fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution. (ISO/IEC/IEEE 42010)
Certification Agreement	The agreement between the Software Supplier and the Certification Authority that defines the certification services to be provided.
Certification Authority (CA)	The entity officially sanctioned to manage the day-to-day operations of the FACE Conformance Program in accordance with the policies defined in the FACE Conformance Policy.
Certification Retention Repository	The Certification Authority must retain a copy of the files generated during certification for each product that initiates FACE Conformance Certification, as detailed in the FACE Conformance Policy and FACE Conformance Authorities Plan. A Certification Retention Repository is used to store these files. Access to this Repository is restricted to the Certification Authority and a designated Auditor.
Change Request (CR)	A Change Request identifies either an issue with, or a desired improvement to, one or more FACE Consortium Products.
Component Framework	A set of software deliverables providing a programming language-specific set of Application Programming Interfaces supporting programming in a component paradigm and often providing services which are useful to a wide range of software components.
Computing Platform	The combination of hardware and operating system, network, and device drivers supporting software components. Typically refers to a processing hardware within a Weapons Replaceable Assembly, or Line Replaceable Unit, along with its associated software infrastructure.

Term	Definition
Configuration Control Board (CCB)	See FACE Configuration Control Board.
Conformance Requirements	The applicable requirements contained within the FACE Technical Standard.
Conformance Test Suite (CTS)	See FACE Conformance Test Suite.
Conformance Verification Matrix (CVM)	Spreadsheet assigning verification methods and conformance evidence recommendations for each Conformance Requirement within the FACE Technical Standard.
Conformant	See FACE Conformant.
Corrigendum	A correction to a document that fixes errors discovered after the document has been published. Any corrigendum published against a FACE document will result in versioning of the associated document to the next minor .x edition, not to a new edition. Corrigenda and the associated FACE document will not be referenced for conformance; only the resulting .x edition will be used for conformance.
Coupling	Coupling is a measure of the degree to which each module relies on each one of the other modules.
Data Architecture	A set of related models, specifications, and governance policies with the primary purpose of providing an unambiguous description of exchanged data and an interoperable means of data exchange.
Data Model	An abstraction that describes real-world elements, their properties, and their relationships in order to establish a common understanding for communication between components.
Device Driver	A software component that controls a device and sometimes reformats data for transfer to and from the device.
Domain-Specific Data Model (DSDM)	A Data Model designed to the FACE Data Architecture Requirements. It captures domain-specific semantics.
FACE Architectural Segments	There are five (5) logical segments in the FACE Reference Architecture: (1) Portable Components Segment (PCS); (2) Transport Services Segment (TSS); (3) Platform-Specific Services Segment (PSSS); (4) Operating System Segment (OSS); and (5) Input/Output Services Segment (IOSS). FACE Architectural Segments are connected by three (3) FACE Standardized Interfaces (*aka* as "KEY" Interfaces per a Modular Open Systems Approach (MOSA)).
FACE Certified Unit of Conformance	A Unit of Conformance that has successfully completed the FACE Conformance Program. The Software Supplier has accepted the Certification Agreement, and has received the Conformance Certificate from the Certification Authority.

Term	Definition
FACE Computing Environment	A generic concept and is instantiated for a particular system under development. It includes all elements of the FACE Reference Architecture necessary to deploy FACE conformant components. The FACE Computing Environment is composed of the software infrastructure (Transport Services, Operating System, and I/O Services Segments), the Platform-Specific Services Segment required by the FACE components.
FACE Configuration Control Board	The entity that reviews the work of the Product Configuration Control Boards to ensure the impact of changes recommended and/or implemented takes into account all of the products of the FACE Consortium. The FACE Configuration Control Board assesses proposals for corrections and reviews the corrections after they are implemented.
FACE Conformance Certificate	A document issued to a Software Supplier formally declaring that a Unit of Conformance, any associated conformant variants, and/or Unit of Conformance Package has successfully met the requirements for certification.
FACE Conformance Certification	Provides formal recognition of conformance to the FACE Technical Standard.
FACE Conformance Certification Guide	The document that describes the processes for how a Software Supplier achieves FACE Conformance Certification for a Unit of Conformance. The Guide is used in conjunction with the FACE Conformance Policy. The Guide provides detailed instructions on the steps a Software Supplier must take to get a Unit of Conformance certified and where to obtain relevant information and documents.
FACE Conformance Policy	The document that defines the processes and policies that govern the FACE Conformance Program including the conformance verification and certification processes.
FACE Conformance Test Suite	A test suite that will accept the Unit of Conformance and produce a pass/fail with respect to all Conformance Requirements covered by the test suite plus a detailed report of the test results.
FACE Conformant	Unit(s) of Conformance that have been certified as adhering to the requirements of a specific edition of the FACE Technical Standard, for the applicable FACE Profile(s) and FACE Segment.
FACE Consortium Product	A document, tool, or website maintained or approved by the FACE Consortium.
FACE Contract Guide	The document that serves as a reference guide for including FACE specific content into a solicitation or proposal.
FACE Interfaces	Standardized interfaces providing connections between software components of the FACE Segments.
FACE Library	The infrastructure developed to enable the discovery and acquisition of FACE Certified Units of Conformance.

Term	Definition
FACE Registry	The single online reference point for listing and managing all FACE Certified Units of Conformance. As the gateway to discovering certified products, it will include descriptions and locations of available FACE conformant products and the publishable standard licensing terms for each product.
FACE Reference Architecture	A reference architecture that guides and constrains the development of FACE UoCs based on the Architectural Segments, key interfaces between the Architectural Segments, Programming Language Mappings, and the Operating System Profiles as specified in the FACE Technical Standard.
FACE Repository	A storage component of the FACE Library for software, models, interfaces, documents, source code, and other artifacts associated with portable software that are certified to be FACE conformant. The types of repositories include: FACE Reference Repository, FACE Product Repositories, FACE Certification Retention Repository and Verification Retention Repositories, and a FACE Shared Data Model Reference Repository.
FACE Technical Standard	An open, royalty-free standard that addresses the software technical requirements of the FACE infrastructure, interfaces, and software.
Framework	A software abstraction which provides common technical functionality to support the business-specific software. A software framework is a reusable software execution environment that facilitates development of software components, products, and solutions. Software frameworks may include support programs, compilers, code libraries, tool sets, and Application Programming Interfaces to ease development of a project or solution.
I/O Service	A collection of software components that provides a unified view of an IO Interface to all Platform-Specific Services Segment software components using that interface.
I/O Services Segment (IOSS)	Segment where normalization of vendor-supplied interface hardware device drivers occurs.
Library Administrator (LA)	Entity or organization that is responsible for the day-to-day operations of the FACE Library
Mission-Level Capabilities	Software adding high-level discernible value to the user's mission. An example is "situational awareness" which adds value to some missions. However, a bubble-sort is a supporting algorithm and while it may be a component of a mission capability, it is not the mission capability itself.
Models	A description or specification of a system and its environment for some certain purpose, often presented as a combination of drawings and text using a modeling language or a natural language.
Open Source	Pertaining to or denoting software whose source code is available free-of-charge to the public to use, copy, modify, sublicense, or distribute.

Term	Definition
Open Standards	Widely accepted and supported standards set by recognized standards organizations. These standards support interoperability, portability, and scalability and are equally available to the public at no cost or with a moderate license fee, and are maintained by standards bodies that meet the requirements of OMB-A119.
Operating System Segment (OSS)	Segment where foundational system services used by all other Segments and vendor-supplied code reside.
Platform	Refers to one of three related things with respect to the FACE Technical Standard: Device (comprised of sensors, Weapon Replaceable Assembly, and Line Replaceable Unit), Aircraft (to include one or more computing platforms), and Computing (comprised of electronic circuitry and software).
Platform-Specific Common Services	Sub-segment comprised of higher-level services including Logging Services, Centralized Configuration Services, DPM services, Streaming Media, and System-Level HMFM.
Platform-Specific Device Services	Sub-segment where management of data and translation between platform-unique ICDs and the FACE Data Model occurs.
Platform Specific Graphics Services	Sub-segment that abstracts the interface specifics of a graphics device driver from software components within the FACE Reference Architecture.
Platform-Specific Services Segment (PSSS)	Segment comprised of sub-segments including Platform-Specific Common Services, Platform-Specific Device Services, and Platform-Specific Graphics Services.
Portable	The ability to move existing software elements from one environment (physical or computing) to another. More specifically, the ease with which Unit of Conformance source code can be transferred and reused from one instance of a Software Computing Environment to another.
Portable Components Segment (PCS)	Segment where software components providing capabilities and/or business logic reside.
Problem Report (PR)	Identifies an issue with FACE Consortium Products that prevents a Unit of Conformance developed to the intent of a particular Edition of the FACE Technical Standard from obtaining a Conformance Certificate.
Programming Language Run-time	A set of software deliverables constituting a software layer that provides a software programming language Application Programming Interface and the capability to execute programs written to that Application Programming Interface.
Quality of Service (QoS)	A set of quality requirements for the collective behavior of one or more data exchange objects. Quality of Service comprises requirements for the attributes of a data exchange connection.

Term	Definition
Reference Architecture	An authoritative source of information about a specific subject area that guides and constrains the instantiations of multiple architectures and solutions. See https://dodcio.defense.gov/Portals/0/Documents/DIEA/Ref_Archi_Description_Final_v1_18Jun10.pdf.
Reference Implementation Guide (RIG) for FACE Technical Standard	The FACE Reference Implementation Guide is to be used in conjunction with the FACE Technical Standard. The RIG guides the developer through the thought process in determining how FACE conformant products may be instantiated in a manner that is conformant to the FACE Technical Standard.
Reuse	The ability for source code, components, or modules to be used again to add new functionalities with slight or no modification.
Safety	Safety is the freedom from conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.
Segment	A logical grouping of components and/or services within a boundary whereby elements within are allowed to vary based on system needs and the interface to elements outside the Segment boundary adheres to the FACE Reference Architecture.
Service	A software utility providing capability to software components or other services.
Shared Data Model (SDM)	An instance of a Data Model whose purpose is to define commonly used items and to serve as a basis for all other data models. Alignment with the required elements in the Shared Data Model is necessary for conformance of any other Data Model. The Shared Data Model is governed by a Configuration Control Board.
Shared Data Model Configuration Control Board (SDM CCB)	The entity responsible for managing and approving changes to the Shared Data Model.
Software Capability	A set of software deliverables that provides one or more mission-level facilities to the existing functionality of the current software suite.
Software Component	A functionally or logically distinct part of a system, distinguished for the purpose of convenience in designing and specifying a complex system as an assembly of subordinate elements (ISO/IEC/IEEE 24765).
Software Computing Environment	From a deployment perspective, a layer above the computing and networking hardware that encompasses a collection of configured instances of Operating System Segment Units of Conformance, Transport Services Segment Units of Conformance, I/O Services Segment Units of Conformance, and Platform-Specific Services Segment Common Service Units of Conformance required to support a specific collection of configured instances of Portable Components Segment Units of Conformance and Platform-Specific Services Segment Units of Conformance in the layer above it.

Term	Definition
Software Supplier	A vendor who is interested in, is applying for certification in, or has certified a Unit of Conformance in the FACE Conformance Program.
Steering Committee	The governing body of the FACE Consortium. The FACE Consortium Steering Committee directs all activities of the FACE Consortium, including approval to submit all Consortium work products to The Open Group for official publication, creating new working groups and approving their charters, and defining and approving roles and responsibilities of the FACE Advisory Board.
Third Party	An entity (business, person, or component) that is beyond the two primary interacting parties.
Transport Services Segment (TSS)	Segment which abstracts transport mechanisms and data access from software components facilitating integration into disparate architectures and platforms using different transports.
Unit of Conformance (UoC)	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 FACE UoC at any point in its development, and becomes a FACE Certified UoC upon completion of the FACE Conformance Process.
Unit of Conformance Package	A collection of Units of Conformance combined to create a singular software logical entity which may be placed in the Registry. The Units of Conformance that make up a Unit of Conformance Package may be from different FACE Segments.
Unit of Portability (UoP)	A FACE UoC that resides within the PCS or PSSS.
UoP Supplied Model (USM)	A Data Model provided by a Software Supplier that documents the data exchanged by a Unit of Conformance via the Transport Services Interface.
Verification Authority (VA)	An entity officially sanctioned by the Steering Committee to conduct or witness For-the-Record Verification testing using an approved version of the Conformance Test Suite and assess the Verification Evidence provided by the Software Supplier in support of the FACE Conformance Program. The Verification Authority may be an independent third-party entity or a designated internal, independent entity of the Software Supplier.

Table 4: Acronyms

Acronym	Definition
API	Application Programming Interface
ARINC	Aeronautical Radio Inc.
BALSA	Basic Avionics Lightweight Source Archetype
BSS	Business Strategy Subcommittee
BWG	Business Working Group

Acronym	Definition
CA	Certification Authority
CCB	Configuration Control Board
COE	Common Operating Environment
CoP	Community of Practice
COTS	Commercial Off-The-Shelf
CR	Change Request
CTS	Conformance Test Suite
CVM	Conformance Verification Matrix
DIOG	Domain Interoperability Working Group
DM	Data Model
DoD	Department of Defense
DoDAF	Department of Defense Architecture Framework
DPM	Device Protocol Mediation
DSDM	Domain-Specific Data Model
EA	Enterprise Architecture
FACE	Future Airborne Capability Environment
FAQ	Frequently Asked Questions
FAR	Federal Acquisition Regulations
GPR	Government Purpose Rights
GPU	Graphics Processing Unit
HMFM	Health Monitoring/Fault Management
I/O	Input/Output
ICD	Interface Control Document
IDE	Integrated Development Environment
IDL	Interface Definition Language
IOSS	Input/Output Services Segment

Acronym	Definition
IT	Information Technology
ITK	Integrator's Tool Kit
IWS	Integration Workshop Standing Committee
JTNC SCA	Joint Tactical Networking Center Software Communications Architecture
LA	Library Administrator
LOE	Level of Effort
MOA	Memorandum of Agreement
MOSA	Modular Open Systems Approach
MTF	Modeling Tools for FACE Software Development
MUG	Matrix User's Guide
NCRPA	National Cooperative Research and Production Act
OMB	Office of Management and Budget
OS	Operating System
OSS	Operating System Segment
PCS	Portable Components Segment
PM	Program Manager
POSIX	Portable Operating System Interface
PR	Problem Report
PSCS	Platform-Specific Common Services
PSDS	Platform-Specific Device Services
PSGS	Platform-Specific Graphics Services
PSSS	Platform-Specific Services Segment
QoS	Quality of Service
RIG	Reference Implementation Guide
RTOS	Real Time Operating System
RTSCE	Real-Time, Safety-Critical, Embedded

Acronym	Definition
SAE	Society of Automotive Engineers
SDK	Software Development Kit
SDM	Shared Data Model
SOSA	Sensor Open System Architecture
TIM	Technical Interchange Meeting
TS	Transport Services
TSS	Transport Services Segment
TWG	Technical Working Group
UAS	Unmanned Aircraft System
UCS	Unmanned Aircraft System Control Segment
UDDL	Universal Domain Description Language
UFCAAG	Unmanned Aircraft System Control Segment Committee/FACE Consortium Alignment Advisory Group
UoC	Unit of Conformance
UoP	Unit of Portability
U.S.	United States
USM	Unit of Portability Supplied Model
VA	Verification Authority

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