Tucson Embedded Systems, Inc. (TES/TES-SAVi)

U.S. Army FACE™ & SOSA™ Technical Interchange Meeting

Huntsville Alabama
September 14, 2021

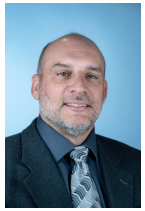
Future Airborne Capability Environment

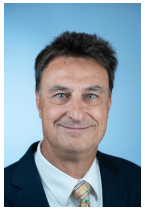
Tucson Embedded Systems

2021 US Army FACE and SOSA TIM Sponsor, and FACE Consortium member since inception, 2010

Leadership roles

- Business Working Group, Chair
- Data Architecture, Chair
- IWS, *past* vice-Chair
- Conformance
- Transport
- Security
- Safety





Sanctioned FACE Verification Authority, 2014

- TES-SAVi - The Consortium's first commerical FACE VA
  - VA'd nine (9 of 22) FACE Conformant products

FACE™
Future Airborne Capability Environment

Tucson Embedded Systems

Began with PEO AVN Common Software Initiative 2003-2007, columinating with a CSI Demo 2006

SETA for PEO Aviation

- Reusable Common Radio Control Software
- Common Software Demonstration CDA-RC, 2006
- Capability Driven Architecture (CDA) – TES' process patent 2009, foundation of TES-SAVi AWESUM® model-based tool suite, complete lifecycle MBSE aligned with MOSA

US Army Radio Communications – Program of Record (PoR)

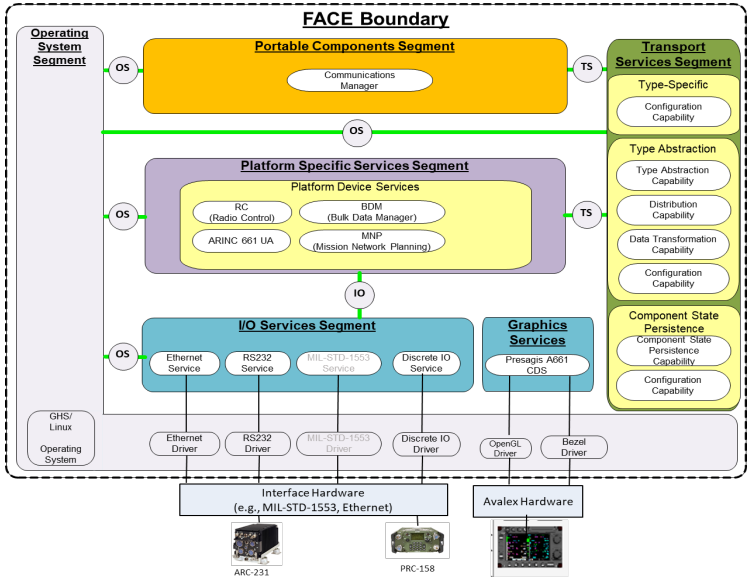
- 2007-WDI, 2010-R2C2 – *the Army's first FACE Verified product*, Aug. 2016, FACE ed. 2.1
- 2014 - ARCM, FACE ed. 3.1, DO-178C DAL-C

Common Reusable Radio Control - *Today*

US Army Radio Communications – Program of Record

Aviation Radio Communications Manager (ARCM)

- Radio Control (RC) is a FACE Platform Specific Services Segment (FACE PSSS) for:
  - ARC-231/PRC-158 RC Platform Device Service (PDS)
- Communications Manager (CM) – FACE Portable Component Segment (PCS) that provides management of all communications through the Radio Control PDS and collects and provides ARCM system status to other components.
- Mission and Network Planning (MNP) – FACE PSSS used to parse preset and mission data files and provide configuration data to other components.
- Bulk Data Manager (BDM) is a FACE PSSS component that provides files such as preset and mission data through a FACE IOS interface to other components.
- ARINC 661 UA – GTRI provided User Application (UA) for interfacing the Cockpit Display System (CDS) Graphics Server to the CM for access to the RC interface.



- TES Exhibit booth #31 also in US Army PEO Aviation's booth #47

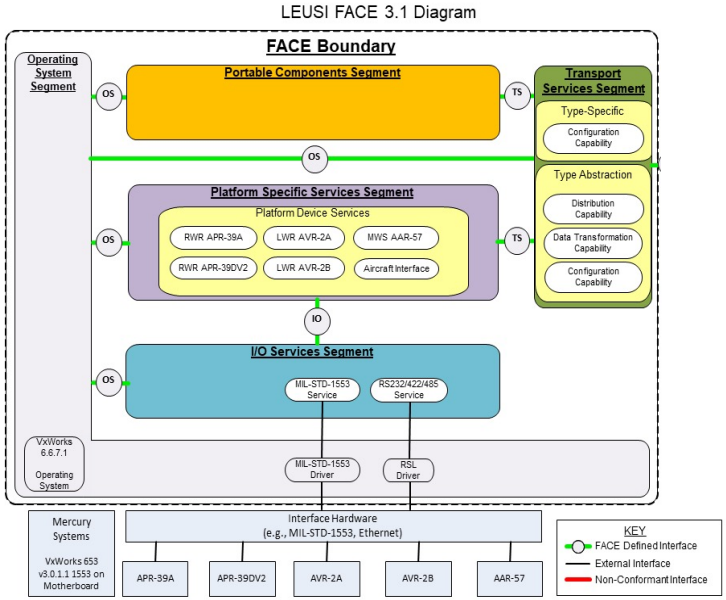
Other TES / TES-SAVi FACE Development Program Efforts

AGx EIS for PM Apache - *Today*

Aircraft Survivability Equipment (ASE) Program of Record

Multiple FACE UoPs developed using TES-SAVi AWESUM® model-based tool suite

Guidance:
FACE Technical Standard, edition 3.1, aligned to the Safety Base Profile
DO-178C DAL-C with data modeling using AWESUM® model-based tool suite.
Unlimited Rights including Model, Software, Tests, and 11.1,..,11.22 DO-178C documentation, *i.e.*, all *funded* products ***Delivered Unlimited Rights Data Rights***



- TES Exhibit booth #31, with LEUSI and Mercury

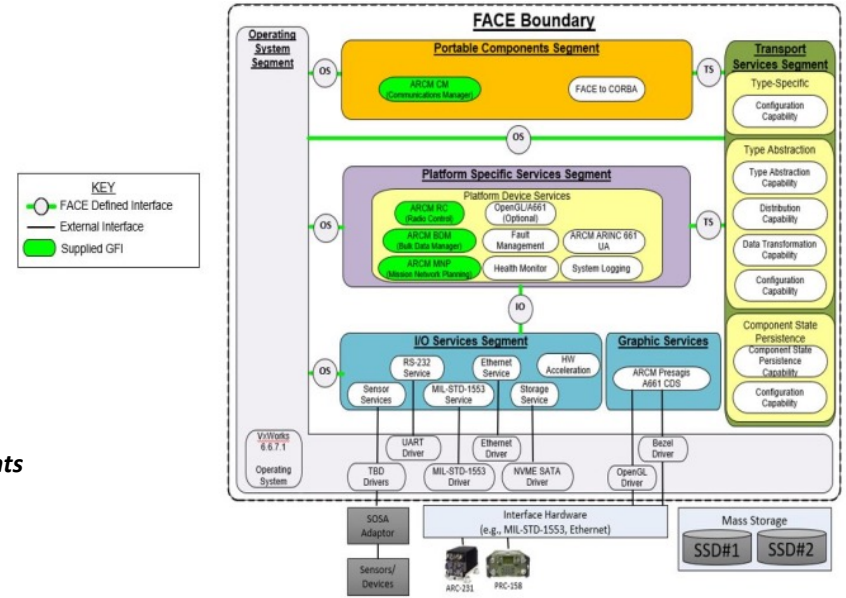
AMCS for AMCA - *Today*

Aviation Mission Common Server (AMCS) – Program of Record

Guidance:
FACE Technical Standard, edition 3.1, aligned to the Safety Base Profile
DO-178C DAL-C, OE DAL-A

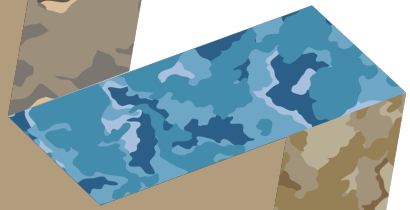
TES' task Integrate
- ARCM
- IDM ISA
- ABE
- SNC's DVE

Unlimited Rights Data Rights



TES Exhibit booth #31 with MMS, and also US Army PEO booth #47

Preliminary HOST Evaluations



HOST Conformance – *Today / Tomorrow*

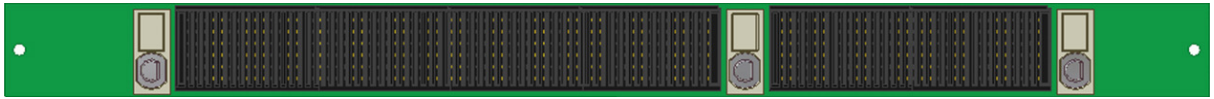
Preliminary HOST Evaluations – performed HOST SBIR Phase I & II

Preliminary evaluation of a HOST OpenVPX module in compliance with the **HOST** (**H**ARDWARE **O**PEN **S**YSTEMS **T**ECHNOLOGIES) OpenVPX v4.0 Standard

VPX — replaces all VME connectors with multi-gig RT2 7-row

3U VPX

6U VPX



- TES Exhibit booth #31, preliminary testing with NAI's SIU 68PPC2
  with AMCS Tiger Lake card to follow…

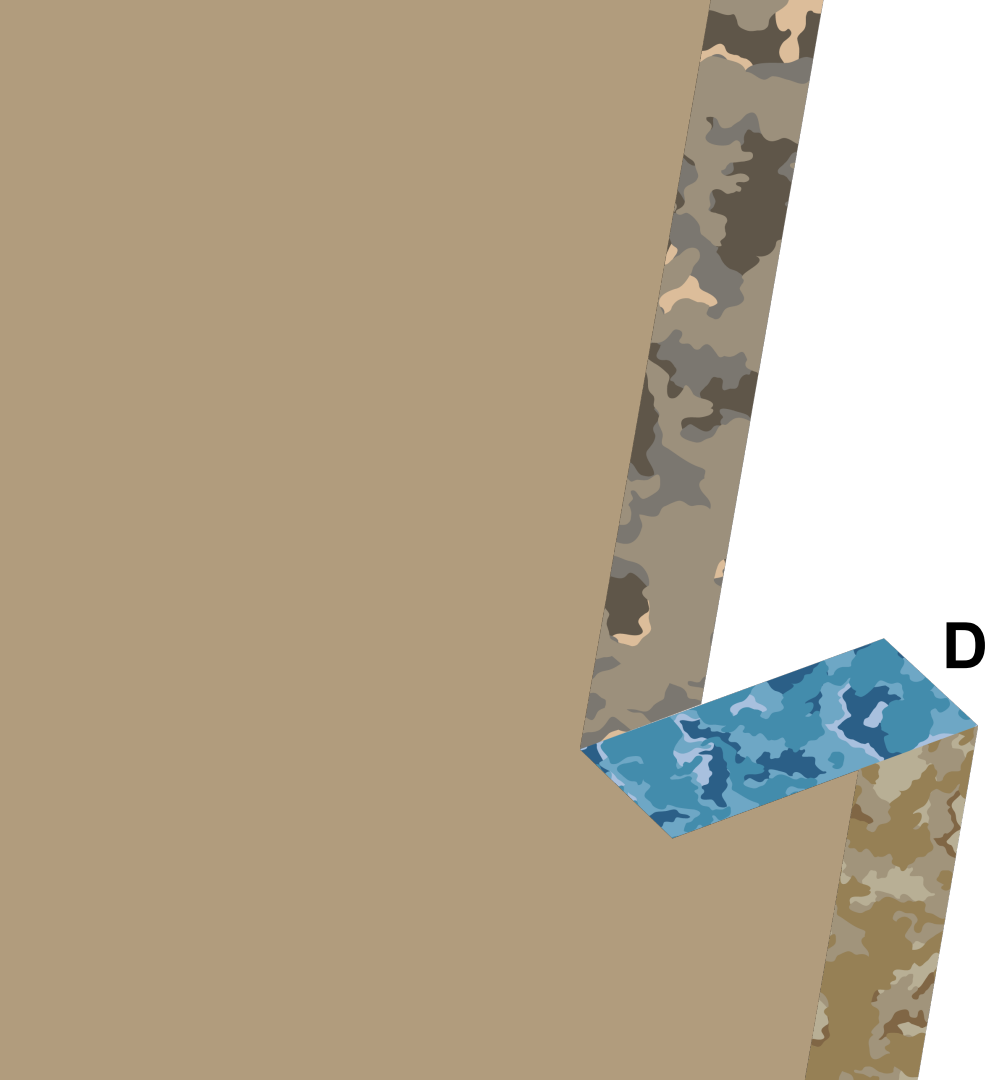
Eco-system Tools aligned with MOSA principles supports FACE, SOSA, HOST Development and Test Efforts

AWESUM® and FAME™
TES-SAVi's model-based tool suites

AWESUM® model-based tool suite is an end-to-end, complete lifecycle tool suite that fuses systems and software modeling and simulation (M&S) capabilities, modular open system architectures (MOSA), putting device and sensor integration techniques into a single package to enable rapid design, development, verification, certification, and deployment of interoperable, platform portable, embedded mission-critical safety-critical avionic systems

FAME™ is a complete end-to-end and round-trip capability for composing FACE-candidate conformant-ready USM and DSDMs conforming to editions 2.1.x and 3.x of the FACE Technical Standard, including 2.1.x to 3.x model migration

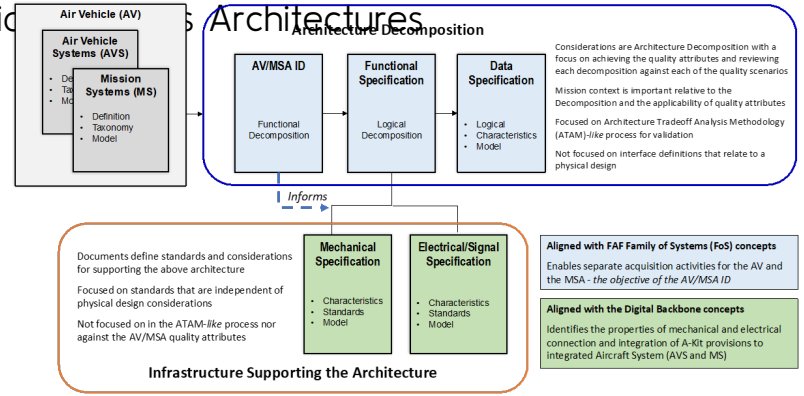
https://tes-savi.com/product/ , see TES' Exhibit Booth #31



Collaborations toward next-generation FVL aircraft aligned to MOSA leveraging FACE, SOSA, HOST Development and Test Efforts

AMTC/VLC's Vehicle/Mission System Architecture (AV/MSA) Interface Definition (ID)

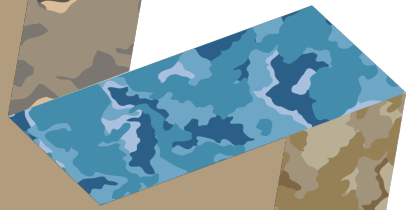
- Fourteen of the top-aviation companies were funded by the US Government to position the Defense Community to be in a better-buying position
- Together they defined an open interface definition following the tenets of a Modular Open Systems Approach (MOSA) and developed a set of specifications for next-generation Air Vehicle and Missio[illegible]s Architectures



The *prototype* FVL FACE Integration Team TIM Demonstration(s)

Formed by Six (6) FACE Consortium members

- Bell
- TES / TES-SAVi
- North Atlantic Industries
- RTI
- DDC-I
- Rapita Systems, *with*
- US Army DEVCOM



The prototype FVL Team's Objective

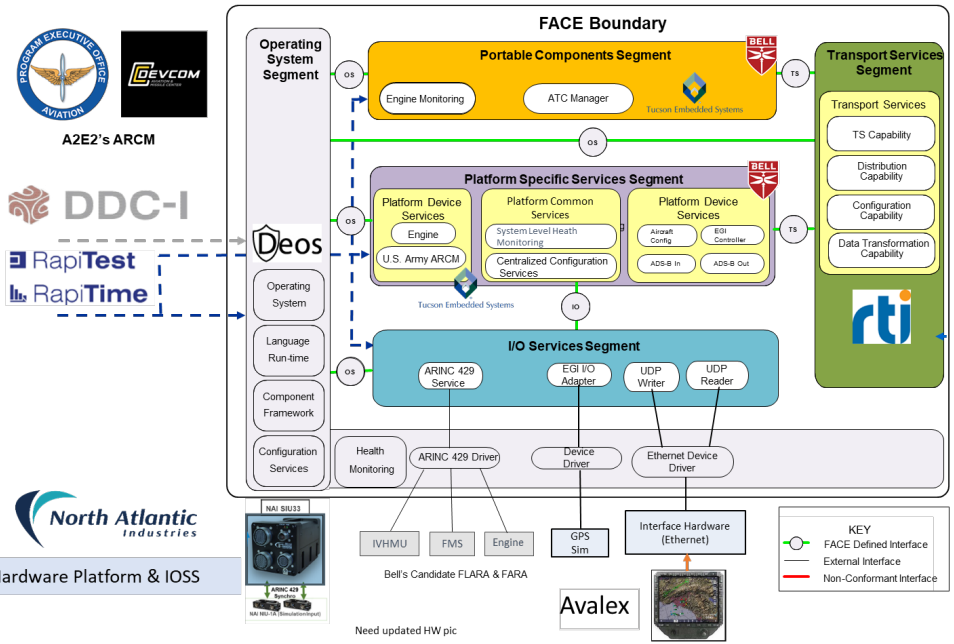
Prototype FLRAA and FARA Development efforts aligned to MOSA, *i.e.*, FACE, SOSA, and HOST

- **Bell** – A/C Platforms for FLRAA and FARA, ITEP
- **TES-SAVi** – US Army ARCM and ITEP to FACE 3.1, using TES' FACE 3.1 COE link libraries
- **North Atlantic Industries** – MOSA aligned Hardware
- **RTI** – FACE Conformant Transport Services
- **DDC-I** – FACE Conformant Operating System
- **Rapita Systems** – Tools for CAST-32A compliance
- **US Army DEVCOM** – Rapid Integration Framework

Stop by Booths/Demos: 31 – TES-SAVi, 30 – RTI, 32 – DDC-I, 33 – Bell & NAI, 29 – Rapita Systems, and 47 – Army PEO AVN

The prototype FVL Team's Accomplishment

FACE Supports FVL – U.S. Army FACE TIM September 2021



A2E2's ARCM

DDC-I

RapiTest

RapiTime

North Atlantic Industries

Hardware Platform & IOSS

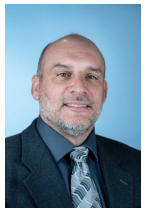
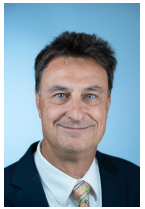
FACE COE Libraries for the U.S. Army

Tucson Embedded Systems

Stop by Booths/Demos: 31 – TES-SAVi, 30 – RTI, 32 – DDC-I, 33 – Bell & NAI, 29 – Rapita Systems, and 47 – Army PEO AVN

TES-SAVi (TIM Sponsor)
alongside of 46 other TIM Exhibitors would like to say..

Enjoy the TIM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