US Department of the Air Force (DAF)  
USAF & USSF  
Standards Overview  

2024-SIW-Presentation-Services Panel  

Dr Jim Gump, Department of the Air Force, USA  
Peggy Gravitz, SAIC, USA
Overview

- Policy
- Governance
- Capabilities
- Issues/Way Ahead
Policy

- Program Guidance Letter (PGL) 19-70, May ’21, Establish Department of the Air Force M&S Executive
  - “5.3.5 - Standards & Architecture Establishment
  - Monitor worldwide state-of-the-art M&S-relevant technology and best business practices. Monitor M&S capabilities, practices, and trends within DoD. Lead implementation of published technical standards for M&S elements, lead establishment of architecture that incentivizes M&S elements that are common, modular, re-useable, affordable, and interoperable. Synchronize and leverage DAF Digital Engineering efforts.”

- AFI AFI16-1005 23 JUNE 2016 (will revise shortly)
  - “7.0 M&S Standards and Architecture.
    - 7.1. Architectures and technical standards are key enabling elements to meet the M&S objective the best use of technology to provide the highest quality test, evaluation, analysis, and training.
    - 7.1.1. Standard Architectures. Open, net-centric, interoperable standards shall be used to achieve an integrated operational architecture that is a scalable and interoperable M&S system of systems that allows for efficient interoperability within the AF and with other DoD components.”
M&S Standards Governance

- **SAF/AQ**
  - Responsible for all standards for the USAF, defers to CMSO for M&S standards

- **Chief M&S Office (CMSO)**
  - Pentagon office responsible for Air and Space Force (DAF Level) M&S

- **DAF M&S Council (Organization “Chartered” by CMSO)**
  - Divided into Functional Areas (Training, Analysis, R&D, etc)
  - w/ Cross-Cutters being worked in Cross Functional Teams (CFTs)
    - Standards CFT addresses M&S standards for the Air and Space Force
DAF M&S Standards Relationships
(Supported by the DAFMSC Standards CFT)

DoD and DAF M&S Standards Collaborative Solutions

* CMSO intends to leverage the CFT to move the DAF M&S standards effort forward

Industry, Government & Academia Coordination

International / SISO / NATO
Non-Government Standards
DAF M&S Capabilities Needed

A tool for our Analysts
From Campaign and Mission Level Analysis …
To Engineering and Physics Level Sims

Tool for our Testers (and engineers)
From Systems of Systems …
Down to Component Testing

Powers our Wargames
Move off MAPEX to … to Future Games

Tools for Training (and Human Factors Research)
From our battlestaff training (AOC) …

To Airmen and Guardian Training

https://warontherocks.com/2019/08/wargaming-has-a-place-but-is-inept-to-stint-for-professional-military-education/
https://media.defense.gov/2018/Dec/04/2002068998/-1/-1/0/160426-F-ZS999-001.jpg
https://media.defense.gov/2014/Aug/25/200092615/-1/-1/140718-O-0000U-001.jpg
ALL Simulation Models (Platforms) should start as a SysML representation for the conceptual model.

**Sampling of DAF Tools**

**Analysis**
(Constructive Sims)

- STORM
- Next Gen
- AFSIM
- NGTS
- DIADS

**Test**
(Virtual & Constructive)

- Hundreds
- Hundreds
- Hundreds
- DIADS

**Training**
(Virtual & Constructive)

- Battlestaff Tng.
- C2SET (AFSIM based)
- F-35 FIAB
- EBS
- H/W Unit Test
- DMO (4th Gen)

**Wargaming**
(Virtual & Constructive)

- Joint Training
- WARSIM, etc

**Live Virtual and Constructive**

**Space – NSTTCD**
National Space Test and Training Complex

- Air Joint Simulation Environment (JSE) - OTTI
- Environment that includes wide range
- Synthetic OTTI for Dist C3BM (S-OSDC) WARTECH
- SCARS Stds
- Cockpit Sims
- Cockpit Simulators & Guardian Trainers
- Move to XR (Save Space and $s)

**Levels**

- Campaign
- Mission
- Engagement/Engineering

**Various COTS Tools (not shown)**
Overview of M&S Capabilities
(Standards Apply to each area)

**Live**
(Actual Systems)

- Interface to actual/live C4ISR systems (use standard interfaces used by C4ISR systems, example DODI 8330.01 Interop of IT inc NSS)
- Example: build an ATO in the AOC and task F-16 sims to fly it out.

**Virtual**
(Person-in-the-loop)

- Interface to live Aircraft (or spacecraft) & components connected to each other and simulation components
- Cockpit simulator or other virtual (person-in-the-loop system) this is a virtual/simulated env.
- Example: F-16 in a range w/instrumentation (or actual data links)
- Example: F-16 cockpit simulator

**Constructive**
(Software Based)

- Simulation representing platforms at sufficient resolution to support intended use (not a Digital System Model)
- Example: F-16 in AFSIM or STORM simulations Or wargaming tools (often lower fidelity)
- Example: F-16 digital model using the OFP from the F-16 a/c

**Simulation Interoperability** (DIS, HLA, DDS, TENA, etc) as required – many can run “stand-alone” no i/f needed

**Foundational Activities**
Standards, VV&A, Data, Certification, Knowledge Management, Workforce Development, IT, etc
Overview of Standards Today

Standards exist for how to interface with Real-world C4ISR Systems (APIs) the program offices create the interfaces used by the real systems and the Simulation Community can adopt these standards (tactical messages, Air Tasking Order formats, etc)

Standards for IT systems can be applied to M&S for data exchange etc

Standards exist for how to interface with Aircraft on a Range

Live (Actual Systems)

Interface to actual/live C4ISR systems (Use standard interfaces used by C4ISR systems example: DD25183.01 Interop of IT Inc MSS)

Examples: ATO in the AOC and task F-16 sim to fly it next.

Standards exist for how to interface with Aircraft on a Range

Virtual (Person-in-the-loop)

Cockpit simulator or other virtual (person-in-the-loop system) this is a virtual/simulated env.

Examples: F-16 in a range w/instrumentation (or actual data links)

Standards exist for how to integrate cockpit sims (DMO, SCARS, etc)

Constructive (Software Based)

Simulation representing platforms at sufficient resolution to support intended use (not a Digital System Model)

Examples: F-16 in AFISM or STORM simulations Or wargaming tools (often lower fidelity)

Standards exist for how to interface with Aircraft on a Range

[Image: Interface to actual/live C4ISR systems example: DD25183.01 Interop of IT Inc MSS]

Standards need for interfacing with Extended Reality COTS products

Digital System Model (DSM) or Digital Twins, etc. "6.5" rep. often contains the Operational Flight Program (OFP) for highest fidelity.

Example: F-16 digital model using the OFP from the F-16 a/c

Standards exist for what Constructive Simulations we should use in the DAF – Standard Toolkits (use this model not that one)

Standards needed for interfacing DSMs with the Joint Simulation Environment

Most critical for simulation interoperability are the Simulation Interface Standards (DIS, HLA, etc)

Simulation Interoperability (DIS, HLA, DDS, TNA, etc) as required – many can run "stand-alone" no if needed

Input Data for the Environment (Maps, Weather, etc) – Standards Exist for this Environmental Data

Standards exist for how to do the systems engineering for M&S (addresses uniqueness)

Standards exist for how to conduct Verification, Validation and Accreditation (VV&A)

Standards exist for how to acquire systems Using M&S (all of the above)

Fundational Activities

Standards, VV&A, Data, Certification, Knowledge Management, Workforce Development, IT, etc

2024 Simulation Innovation Workshop (SIW)
DAF M&S Standards Issues & Way Ahead

- **CMSO M&S Ecosystem** – navigating existing environments (LIFT, HPCs, etc) and future needs and sponsorship – will leverage appropriate standards
- **Policy** – need to include recent thinking and direction on standards to CMSO for incorporation
- **M&S Interoperability Standards** - We have DIS, HLA, etc what is next?
- **Data Standards (for M&S)** – vice “buried in our simulations” – SysML is a start only
- **SysML** - Embrace SysML as a standard for conceptual modeling – engage with OMG to drive the evolution of this critical standard (and bridge to the DE world) as well as converge on a standard approach for SysML to Simulation interop – style guides are stds
- **Government Reference Architectures (GRAs)** – how these become standards for our programs to adopt and drive the architecture from an MBSE perspective thru to M&S
DAF M&S Standards Issues & Way Ahead - Continued

- **RMF/Cyber** - How can we “template” and build a “standards” based process to speed accreditation?
- **Workforce Development** – effort to work this needs to include a “module” on standards as well as a “Handbook” (draft complete) that can be provided to our users, acquisition workforce needs M&S resources
- **KM Solution** – not yet deployed, will include a M&S standards “library” when deployed
- **Participate in Standards Activities** - SISO, NATO, etc
- **Coordinate with the Other Services** - (USN/USMC, USA) and others (e.g., DHS / USCG)
- **Support to our M&S Programs (JSE, etc)** – adhoc support as required – example GSI interface standard promulgation
DAF M&S Summit ‘24
Come visit us at the DAF M&S Summit: https://www.dafmss.org/

2024 Department of the Air Force
Modeling and Simulation Summit

Training in a Digital World

HOSTED BY:
Department of the Air Force,
Chief Modeling and Simulation Officer (CMSO)
and Air Education and Training Command (AETC)

7 – 9 May 2024 | San Antonio, TX | DAFMSS.org