Air Force Modeling & Simulation

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Purpose and Scope

Discuss Air Force Modeling and Simulation in the context of today’s Expeditionary Aerospace Force

- The Expeditionary Challenge
- M&S Vision
- Domains and Objectives
The Problem: A Changing "Sight Picture"

- **Cold War Air Force - Focused on Containment**
  - Garrison State -- robust basing and manning
  - Operating from bases with large infrastructures
- **21st Century Air Force - Focused on Engagement**
  - Reduced force structure and fewer forward locations
  - Austere operating bases with limited infrastructure
  - Still forward based, but Responding Globally
  - Integrated Force Protection & Agile Logistics

Requires an Expeditionary Approach
We Must Evolve in a Way That...

- Meets National Needs
- Ensures Joint Effectiveness
- Leverages AF Strengths
- Uses the Total Force

**Relevant Forces**
- Rapidly responsive
- Trained and ready
- Modern and capable
- Lean and agile
- Appropriately structured

**Expeditionary Aerospace Force**

**Constrained Environment**
- Fiscal limits
- Political realities
- TEMPO demands
- Quality of life needs
- Readiness challenges

Creating a Better 21st Century Air Force
Maintaining Continuity of Purpose
The Analytic Nexus

Vision

Guidance

Effects Based Operations

End-State Costs

AF Program

Desired Effects

Current Modernization

More of the same, but better?

DIFFERENT AND MUCH BETTER?

Detailed Analysis to Guide the Innovation Ahead

Detailed Analysis to Guide the Innovation Ahead
The M&S Vision

... a Joint Synthetic Battlespace

- Analysts
- Testers
- Warfighters
- Developers
- Trainers

- Supporting multiple functional areas
- Through Live, Virtual, and Constructive Simulation
- With Joint, Interoperable, Re-useable models
**DOMAINS OF MS&A**

**ANALYSIS**

Accurate Aerospace Capability Analysis

- Ensure MS&A capabilities capture the capacity of modern Air and Space power as critical components required to meet the challenges of the world environment as US military force structure is molded to support current and emerging national military strategy.

**ACQUISITION**

Optimized Weapon Systems

- Apply MS&A as a means to objectively and consistently compare, evaluate, perform trade-off analysis, and review current and proposed military weapon systems’ capabilities against existing and emerging threats throughout a weapon system’s life-cycle [all phases of acquisition and sustainment.]

**TRAINING**

Combat Ready Forces

- Utilize MS&A capabilities to support US combat and combat support personnel readiness to meet the challenges of military employment in peace time and throughout the conflict spectrum.
Next Generation Joint Models

- Joint
- Re-Useable
- Interoperable
- Credible

JWARS

JSIMS

NASM

JMASS

System Models
Hardware
Simulators
AF MS&A Caucus Structure

MS&A Resources
- AF Council
- AF Board
- AF Group
- Panels

MS&A Policy
- DoD EXCIMS
- MSWG

AF MSAWG Chaired by AF/AXOC

Tiger Teams
- Technical Planning
- M&S Education

MS&A Caucus
- MAJCOMS
- CVA

Departments
- PPBS IPT /SG (XOCP)
- Joint & Cross Equity Studies SG (XOJS)
- Data / Model Mgmt SG (XOCA / XOCP)

Acquisition (XOCS / AQI)
Training (AFAMS / XOCA)
Analysis AFAC SG (AFSAA)
Wargaming (XOCW)
Experimentation (XOCI)
AF Standard Analysis Toolkit

Transition Plan
- Identify Users Groups
- Establish Air Staff funding
- “Lock” model upgrades
- Allow tasking-specific enhancements

Issues
- J-Triad schedules
- Requirements
- Maintain Capability
- Funding

CAMPAIGN (JWARS)
- THUNDER/STORM
- CFAM
- SMAT
- LCOM
- MASS

MISSION (NGMM)
- SUPPRESSOR
- SWEG
- EADSIM

ENGAGEMENT (JMASS)
- BRAWLER
- SHAZAM (2)
- MIL-AASPEM 2
- JSEM
- TRAP
- TEAM
- ESAMS
- MOSAIC
- GTSIMS
- RADGUNS

HUNDREDS OF ENGINEERING MODELS
( NOT IN THE TOOLKIT - BY DESIGN )

Requirements | Acquisition | Test & Evaluation
Populating JMASS

Missile Flyout
Endgame
Pilot Mental Model
etc.

“Legacy Model Functions”

Intel Centers
Red Threat Models”

Blue
“Digital System Models”

JMASS Program Office
“Support Environment”
(Tools, services, standards and interfaces)
Scoping JMASS:
Blue Digital System Model (DSM) Requirements Survey

Over 800K Air Force End Items
- We don’t NEED DSMs for ALL of them!
- We can’t AFFORD them all!
- Which are the critical ones?

Near Term Requirement Study
- Where are the big money decisions coming?
- What DSMs are needed for them?

The Initial Answer:
- 48 DSMs
- 6 for JMASS
<table>
<thead>
<tr>
<th>DOMAINS OF MS&amp;A</th>
<th>MS&amp;A STRATEGIC OBJECTIVES</th>
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</thead>
<tbody>
<tr>
<td><strong>ANALYSIS</strong></td>
<td>Accurate Aerospace Capability Analysis</td>
</tr>
<tr>
<td><strong>ACQUISITION</strong></td>
<td>Optimized Weapon Systems</td>
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<td><strong>TRAINING</strong></td>
<td>Combat Ready Forces</td>
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C2 Training Environment

“The basis of readiness is a combined and joint exercise program....”
General John H Tilelli, Jr, USA
CINC, Combined Forces Command

Yearly C2 Training Impact:
- Over 3000 AF warfighters
- Over 4000 Sister Service warriors
- Over 14,000 coalition partners

... in readiness exercises
... in multiple scenarios
... immersion through M&S

“M&S has improved air component readiness.”
Lieutenant General Hurd, 7th AF/CC

Modeling and Simulation (M&S) Creates Environment

Prairie Warrior
Fuertes Defensas
Blue Flag
Roving Sands
Union Flash
Ulchi Focus Lens
Yama Sakura
C2 Training Environment

Modeling and Simulation (M&S) Creates Environment

➡️ Role of training environment: stress people, equipment, processes
➡️ During EFX 98, M&S provided
  ➡️ 2,500 USMTF intel messages per day through TBMCS
  ➡️ 2,106 mission updates per day through TBMCS
  ➡️ 12,677 TADIL J, TIBS, TRAP messages via C4ISR every 10 min
  ➡️ With an average of 420 sorties per day
➡️ Typically, UFL and Blue Flag include 2000-3000 sorties/day

Train the way we expect to fight....and win
Today: AF Suite of Models (AFSOM)

- Standard AF suite of C2 training models
- Baselined training tools
- Reduced models from 10 to 4
- Improved C2 training via AWSIM changes
- Added ISR functionality

Various simulations for readiness training used since 1980s
M&S for C2 Training

Tomorrow: Joint Simulation System (JSIMS)

- Increased realism
- Better training
- Improved readiness

M&S Transition Plan

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<thead>
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AFSOM O&M

AFSOM H/W

NASM O&M

AF Funding Requirement Profile
Distributed Mission Training (DMT)

Provide *aircrews* a realistic, fully integrated environment, capable of supporting the entire spectrum of training from individual up to campaign-level mission rehearsal.
DMT Concept of Operations

Team training and mission rehearsal to support operational commanders

**Team training - Wing/Squadron**
- RAP requirements
- Realistic battlespace based on unit’s training needs (local area, expected theaters, challenging adversary)

**Mission rehearsal - AEF/JFACC**
- Based on mission essential tasks derived from real-world mission
- Replicate mission battlespace conditions (terrain, weather, imagery, opposition forces)
Questions?

How Air Force M&S supports the Challenges

- The Expeditionary Challenge
- M&S Vision
- Domains and Objectives