Air Force Materiel Command

Systems Engineering

Dr Brian W Kowal
AFMC Engineering Directorate
27 October 2011

AFMC Mission Areas

Technology

Basic research and technology development to enable both evolutionary and revolutionary air, space and cyberspace capabilities

Acquisition

Professional acquisition management to deliver war-fighting capabilities affordably and on time

Testing

Unique facilities and expertise to validate / improve these capabilities in controlled and real-world environments

Sustainment

Sustainment of these capabilities over the weapon system life-cycle

Our Resources

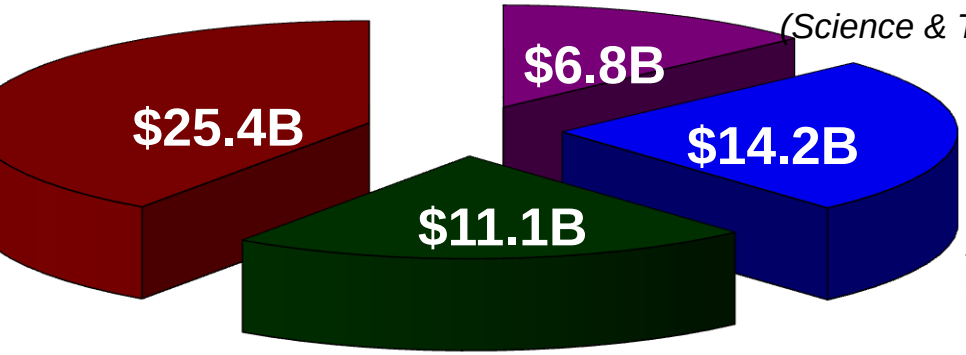
	FY11 ($B)
DoD Total*	548.9
AF Total*	150.0
AFMC Managed*	57.5

Acquisition Programs

(Budgeted by other Major Commands)

AFMC Directly Programmed Funds

(Science & Tech, Internal Acquisitions, Operations)



Centralized Asset Mgmt

(DPEM, DLRs, CLS, tech data, sustained engineering, fuels, consumables)

Supply, Depot Maintenance, Foreign Military Sales

(Budgeted by other organizations)

*Based on FY11 PB (Excludes OCO)

AFMC manages and executes ~ 38% of the Air Force budget

AFMC Systems Engineering

Required Operational System State

(Operational Safety, Suitability & Effectiveness)

-Defined System Baselines
-Baseline Documentation
- Defined metrics for key characteristics
- Capabilities documents

Systems Engineering

Processes & Practices

-Processes to obtain and maintain desired state
- Systematic technical processes
- Interdisciplinary execution

Integrity Programs

- Process to preserve desired state
- Continuous evaluation
- Monitor key OSS&E characteristics

Briefing Purpose

To provide a status of systems engineering initiatives at the Air Force Materiel Command (AFMC)

Acquisition Policy for Defense Business Systems (DBS)

OSD Systems Engineering Standard Initiative

New OSD Systems Engineering Plan Outline

MIL-HDBK 514 (OSS&E) Cancellation

AFMC Business Enterprise System

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Acquisition Policy for Defense Business Systems (DBS)

- **Weapons Systems**
  - **OSS&E Baseline Document (OBD)**
    - Developed during EMD phase
    - Maintained throughout system life
- **New … Business Capability Lifecycle Model (BCL)**
  - **DTM 11-009 issued June 2011**
  - **Takes precedence over DoDI 5000.02**
  - **Unique DBS Acquisition Business Model terminology**
  - **Mature technology (typically no TRAs)**
  - **Lower safety concerns**
  - **DBS OSS&E Baseline Document**
  - **Incremental approach … shorter periods of performance**

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Current State Summary

- Nonstandard Terminology
- Nonstandard Processes
- Nonstandard Tools
- Inter AFMC/AF/Service Differences
- Training Impacts

Many Different Process Area Descriptions

Integrity Program Process Areas (AFI 63-1/AFI 20-1)	Air Force SEAM Process Areas	Defense Acquisition Guidebook Process Areas (August 2010)	ISO 15288	Naval Systems Engineering Guide	NASA Sys Eng Hbk
Design	Design	Architectural Design	Architectural Design	Solution Definition Process	Design Solution
Configuration Management	Configuration Management	Configuration Management	Configuration Management		Configuration Management
Configuration Management	Configuration Management	Technical Data Management			Technical Data Management
Configuration Management	Configuration Management	Interface Management			Interface Management
System Safety					
Manufacturing	Manufacturing	Implementation	Implementation Process	Implementation Process	Product Implementation
Quality Management			Quality Management Process		
Test					
Maintenance			Maintenance Process		
Inspection					
Supply Chain Management			Supply Process	Supply Process	
Flight Operations					
Mishap Investigation					
	Decision Analysis	Decision Analysis	Decision Management		Decision Analysis
	Project Planning	Technical Planning	Project Planning	Planning Process	Technical Planning
	Technical Management & Control	Technical Assessment	Project Assessment and Control	Assessment Process/Control Process	Technical Assessment
	Requirements	Requirements Management			Requirements Management
	Risk Management	Risk Management	Risk Management		Technical Risk Management
	Requirements	Stakeholders Requirements Definition	Stakeholder Requirements Definition	Requirements Definition Process	Requirements Definition
	Requirements	Requirements Analysis	Requirements Analysis	Systems Analysis Process	
		Integration	Integration Process		Product Integration
	Verification and Validation	Verification	Verification Process	Requirements Validation Process/System Verification Process	Product Ver & Val
	Verification and Validation	Validation	Validation Process	End Products Validation Process	
	Sustainment	Transition	Transition Process	Transition to Use Process	Product Transition
	Sustainment				
			Information Management		
			Infrastructure Management		
			Disposal Process		
					Logical Decomposition
			Measurement Process		
			Operation Process		

Nonstandard Terminology

AF SEAM	Defense Acquisition Guide	AFI 63-1201
Requirements	Reqts Analysis, Reqts Mgmt, Stakeholder Reqts Definition	Reqt Dev & Mgmt, & Architecture
Design	Architectural Design, Integration & Interface Mgmt	Design & Interface Mgmt
Verification & Validation	Verification & Validation	Test & Evaluation, Verification & Validation
Manufacturing	Implementation	Design
Transition, Fielding, & Sustainment	Transition	Design
Project Planning	Technical Planning	Planning
Configuration Management	CM, Data Mgmt, Technical Data Mgmt	Configuration Mgmt, Data Mgmt
Risk Management	Risk Mgmt	Integrated Risk Management
Technical Mgmt & Control (PMC)	Technical Assessment	Technical Reviews & Measurements
Decision Analysis	Decision Analysis	Decision Analysis

AF SEAM Management Guide, Version 2, Page 9

Standards Path Forward

- **Defense Standardization Council (DSC) agreed that enterprise-wide approaches were needed for certain systems engineering disciplines**

- **DSC directed DSPO to form working groups to assess existing systems engineering technical documentation; identify requirements gaps; and make recommendations**

- **Working groups to focus on four specific areas:**
  - **Systems Engineering and Technical Reviews and Audits**
  - **Configuration Management**
  - **Logistics Support Analysis**
  - **Manufacturing and Quality**

November Defense Standardization Council Decision

POSSIBLE COURSES OF ACTION

SE-1 Maintain Status Quo: Use existing guidance to include handbooks, canceled military standards, non-government standards, component-unique standards, and other government agency standards to implement systems engineering on DoD programs, implementing contractual requirements via local guidance or standards, Data Item Descriptions (DIDs) and Statement of Work (SOW) language uniquely tailored for each acquisition.

SE-2 Military Standard: Update and reinstate cancelled MIL-STD-499 (or a contemporary derivative (e.g. SAE-S-0010).

SE-3 Non-Government Standard: Generate a DoD-unique addendum or a stand-alone non-government standard managed and controlled by the non-government standards developing organization but providing SE requirements specific for DoD.

SE-4 Component Standard: Create and publish component-unique SE standards, based on existing policy and guidance.

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OSD SEP Outline Impacts

- **SEP not a process description document**
  - **Program status report to the leadership**
  - **Targeted towards the acquisition community**
- **SEP may be combined with LCMP after FRP**
- **New Sustainment SEP Format**

Sustainment Systems Engineering Plan (SSEP)

- Based on OSD SEP Outline
- Adds Additional Sustainment Topics
- Removes Acquisition Specific Elements
- Program Specific
- Combined with OSS&E Baseline Document
- AFMCI 63-1201 IC #3 and/or Guidance Memo

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MIL-HDBK 514 Cancellation

- **Air Force OSS&E Commitment Unchanged**
- **Cancellation Rationale**
  - **Certification information now hosted on CoP**
  - **OSS&E Baseline Document Format in AFMCI**
  - **Much of Handbook targeted to OSS&E start up**

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AFMC Business Architecture (ABE)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

22 SEP 2011

MEMORANDUM FOR ALHQCTR/CC/CL
ALHQSTAFF

FROM: AFMC/CC
4375 Chidlaw Road
Wright-Patterson AFB OH 45433-5001

SUBJECT: AFMC Business Architecture--AFMC Business Environment (ABE) Usage and Points of Contact (POCs)

1. The AFMC business architecture mission responsibility has transferred from HQ AFMC/EN to HQ AFMC/A2/5. The AFMC Chief Architect's team shall be responsible for the integration of both business systems and business process architectures within AFMC. In addition, the team will lead the development of the AFMC Business Architecture visible in a web-based environment called ABE.

2. Effective immediately, to ensure visibility and integration of AFMC Department of D... Architecture Framework (DoDAF) efforts, ABE version 1.01 is the official AFMC repos... all AFMC DoDAF business system and business process architecture artifacts. All HQ ... Directorates and AFMC Centers will immediately begin to use this common environmen... to the fullest extent possible.

3. Each AFMC Center and headquarters functional organization shall identify one POC ... their business systems and/or process architecture to the AFMC Chief Architect. This PO... serve as a member of the ABE Architecture Review Board, which will assist in the gover... of ABE configuration and content.

4. Please contact Mr. Mark Frazier, HQ AFMC/A2/5, DSN 787-5660, (937) 257-5660, or mark.frazier2@wpafb.af.mil, if you have any further questions concerning this matter.

DONALD J. HOFFMAN
General, USAF
Commander

Attachment:
MOU, 4 March 2011

War-winning capabilities … on time, on cost

2. Effective immediately, to ensure visibility and integration of AFMC Department of Defense Architecture Framework (DoDAF) efforts, ABE version 1.01 is the official AFMC repository for all AFMC DoDAF business system and business process architecture artifacts. All HQ AFMC Directorates and AFMC Centers will immediately begin to use this common environment (ABE) to the fullest extent possible.

3. Each AFMC Center and headquarters functional organization shall identify one POC for their business systems and/or process architecture to the AFMC Chief Architect. This POC will serve as a member of the ABE Architecture Review Board, which will assist in the governance of ABE configuration and content.

DONALD J. HOFFMAN
General, USAF
Commander

ABE Objective

ABE provides users and decision makers a common enterprise environment to understand, relate, integrate and optimize policy and processes from different perspectives

ABE Content

- **One Common Environment**
  - **27 different perspectives**
  - **8 roles/permissions**

- **Current Content**
  - **50 policies**
  - **30 processes**
  - **541 business systems**
  - **361 system interfaces**
  - **600 organizations**

Summary

Air Force Materiel Command (AFMC) 2011 Systems Engineering Initiatives

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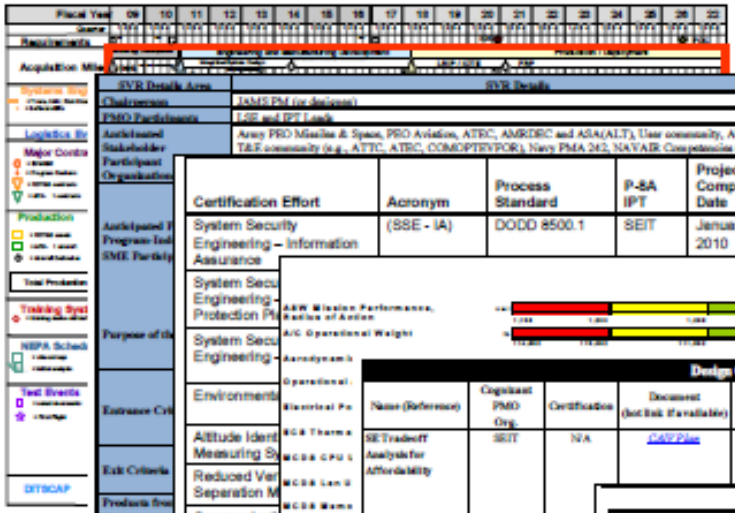
AIR FORCE MATERIEL COMMAND

New SEP Outline Content and Purpose

Key Sections	Rationale
1. Introduction	• Tracks revision control
2. Program Technical Requirements 2.1. Architectures and Interface Control 2.2. Technical Certifications	• Summarizes the expected architecture products, external interfaces, and links to common architectures • Identifies required system-level certifications
3. Engineering Resources and Management 3.1. Technical Schedule and Schedule Risk Assessment 3.2. Engineering Resources and Cost/Schedule Reporting 3.3. Engineering and Integration and Risk Management 3.4. Technical Organization 3.5. Relationships with External Technical Organizations 3.6. Technical Performance Measures and Metrics	• Documents integrated, event-driven system development schedule including WBS and IMP/IMS • Describes risk management process and organization; identifies system-level technical risks and opportunities • Diagrams technical structure and staffing (e.g., IPTs, Working Groups, etc.) • Identifies management of outside organizational interfaces • Describes program's use of metrics to measure technical progress
4. Technical Activities and Products 4.1. Results of Previous Phase SE Activities 4.2. Planned SE Activities for Next Phase 4.3. Requirements Development and Change Process 4.4. Technical Reviews 4.5. Configuration and Change Management Process 4.6. Design Considerations 4.7. Engineering Tools	• Summarizes completed system-level technical reviews, independent reviews, and trade studies and analogous plans for the next phase • Describes processes for requirements analysis, decomposition, and change management • Summarizes technical review planning details and responsibilities • Lists technical baseline artifacts and describes their management • Identifies relevant design considerations and linkage to contracts • Lists tools and required tool interfaces, if necessary

SEP: Systems Engineering Tables



Technical Schedule

Technical Review Criteria

Certification Effort	Acronym	Process Standard	P-8A IPT	Projected Completion Date	Actual Compliance Date
System Security Engineering – Information Assurance	(SSE - IA)	DODD 8500.1	SEIT	January 13, 2010	-

Certification Requirements

Technical Performance Measures and Metrics

Design Considerations

Name (Reference)	Cognizant PMO Org.	Certification	Document (hot link if available)	Contractual Req'ts (DID/CLIN)	Description/Comments
SE Tradeoff Analysis for Affordability	SEIT	N/A	CAIV Plan	In RFP CDRL	

Engineering Tools

Application	Description
BORIS	Boeing Opportunity, Risk and Issue System database tool is a cooperative effort of Boeing Commercial Airplanes and Boeing Integrated Defense Systems.
ClearCase	Produced by Rational Software, Inc. ClearCase is a software configuration management system that keeps track of which versions of which files were
ClearQuest	
DOORS®	
MET	
Sherlock	
TecView	
Trade Studies Log	
VDATS	

Risks, Issues, and Opportunities

Technical Risks		Mitigation Activities (Closure Dates)
R1. Failure to meet TOC reduction goals may cause budget exceedance		Continue current plan; expedite cuff/yoke redesign (Dec 2015)
R2. Main rotor cuff/yoke redesign not complete in time for test		Certification milestone plan developed and monitored by PM. (Jun 2011)
Technical Issues		
1. Production parts; spares		Continue focus on contractor's SCM and make parts (ongoing)
2. Structural Repair Manual late to need		Expedite approval of DL&T's (ongoing with NAVAIR)
Opportunities		
O1. Capture lessons learned; best practices; store in command library		Low investment; great benefit for program and NAVAIR

New OSD SEP Outline

1. Introduction – Purpose and Update Plan
2. Program Technical Requirements
   - 2.1. Architectures and Interface Control
   - 2.2. Technical Certifications
3. Engineering Resources and Management
   - 3.1. Technical Schedule and Schedule Risk Assessment
   - 3.2. Engineering Resources and Cost/Schedule Reporting
   - 3.3. Engineering and Integration Risk Management
   - 3.4. Technical Organization
   - 3.5. Relationships with External Technical Organizations
   - 3.6. Technical Performance Measures and Metrics
4. Technical Activities and Products
   - 4.1. Results of Previous Phase SE Activities
   - 4.2. Planned SE Activities for the Next Phase
   - 4.3. Requirements Development and Change Process
   - 4.4. Technical Reviews
   - 4.5. Configuration and Change Management Process
   - 4.6. Design Considerations
   - 4.7. Engineering Tools