NDIA Systems Engineering Division Meeting

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Briefing Overview

Last Update ➡️

Today ⬇️

April 2008 Update
- OSD SSE Activities 2Q FY08
- Systems Engineering Research UARC
- Systems of Systems Engineering
- System Assurance
- Defense Industrial Base Information Assurance Systemic Analysis
- Industry Committee on Program Management
- SSE Forum - Strategic Initiatives

June 2008 Update
- Enhanced Systems Engineering – Pre-MS B
- Revitalizing T&E
  - Integrated DT/OT
  - New TEMP Construct
- Manufacturing Readiness Levels
- Integration Readiness Levels
- Human Systems Integration
- OSD FY10-15 SSE Program Objective Memorandum

Enhanced Systems Engineering

Enhanced SE
Working Group (E-SEWG)

Purpose: To foster collaboration within the SE community and key stakeholder organizations to establish unified SE Guidance to implement the changes in DoDI 5000.2

- Participants
  - AOs from each SSE DD, Services and Agencies
  - Key Stakeholders as necessary (DPAP, J8, PA&E, and DDR&E)
- Address the key areas of DoDI 5000.2 we "Own"
  - PDR   – PSR, Transition to all ACATs
  - CDR, Post CDR Report   – AOTR, for all 1Ds
- Influence key areas where SE needs to contribute
  - Materiel Development Decision   – AoA Guidance, Plan
  - Technology Development Strategy – Prototype Planning
  - AoA Conduct and Oversight

E-SEWG Achievements to Date

Completed a bottom up review and update of the Material Solution Analysis (MSA) and Technology Development (TD) Phases

❖ Systems Engineering "Vee" Diagrams
- Materiel Solution Analysis Phase
- Technology Demonstration Phase

❖ Gained working group consensus on the Entry / Exit Criteria on both MSA and TD phases and their associated technical reviews
- Initial Technical Review now placed prior to Materiel Development Decision
- Renamed Alternative Systems Review, to Systems Concept Review (SCR)
- Preliminary Design Review (PDR), & PDR Report

❖ Emerging need: Establish workshop(s) to collaborate with stakeholders outside of the SE community in order to establish comprehensive guidance for the Defense Acquisition Guidebook

PDR Workshop Overview

- ❖ Purpose of the PDR workshop is two-fold
    - Inform the participants (e.g., PA&E, DPAP, JS, ARA…) of the revised role of PDR and the subsequent extensive information available to support ***an informed MS B decision by the MDA***
    - Foster collaboration on guidance to yield the ***informed MS B Decision***
- ❖ Proposed Workshop Agenda:
    - Purpose for the movement of MS B to Post PDR
    - Overview of PDR
    - Characterization of the extensive information subsequent to PDR
    - Overview of the DoD Acquisition Guidance Model representing the PDR
    - Concurrent Break-Out Sessions to address actions/issues
- ❖ CONOPS
    - Partner with Stakeholders to promulgate integrated DAG guidance
    - Initial workshop 9 July @ IDA
    - Planned for one full day with a ½ day follow up
    - 1st of several integrating workshops on key 5000.2 initiatives

DT&E Update

DT&E Revitalization

- SSE has directed a Revitalization of DT&E
  - Strengthen Role in Acquisition Planning and Oversight
  - Foster Recognition of Inherent Government DT&E Role
  - Put the "E" back in T&E-Applauded by Services DT&E Community as well as DOT&E
- Approach
  - Act upon DSB recommendations
  - Reliability Working Group Chartered by Drs McQueary and Finley
    - Tasked to implement Integrated Test Process
  - Established T&E WG – Services, OTAs, DISA, NII, DOT&E, SSE/AS, JTEM
    - Unanimously recognized TEMP content needs to focus on evaluation framework

What's Been Done

- Drafted DoD common Definition of Integrated Test

  "The collaborative planning and collaborative execution of test phases and events to provide shared data in support of independent analysis, evaluation and reporting by all stakeholders particularly the developmental (both contractor and government) and operational test and evaluation communities."

- Developing new TEMP Construct
- Surveyed TEMPs And Found Three Candidate Improvement Areas
  - Modeling And Simulation
  - Critical Technical Parameter Process And Definition
  - Operational Relevance In DT&E
- Conducted Review Of Related Activities
  - ICOTE, JTEM, Air Force
  - DSB and NDIA SE/DT&E White Paper
- Strengthening program review process
  - Create new SSE product to provide Impartial Assessment of T&E at OIPTs and DABs

What's Still To Do

- Socialize new TEMP construct
  - Content and new format reduce TEMP from 5 to 3 Parts with about a 50% reduction in number of sections
  - Evaluation Framework
    - Relational Crosswalk Of Requirements: KPP – COI – MOS – MOE – CTP
    - Test Case Using Existing Program
  - Mission Oriented Context
  - Integrated Test Planning
- Finalize Defense Acquisition Guidance
- Educate and Train
  - Briefings to Senior Leaders
    - ICOTE, SAE's, 3-Stars, ICPM
  - Discussions with T&E Community and Leaders
- Implement TEMP Review and Adjudication Process

Readiness Levels:

for Manufacturing

for Integration

Manufacturing Readiness Levels

MRL/EMRL Background:

- ❖ MRLs documented by a "body of knowledge", the *MRA Deskbook and* piloted in selective Air Force acquisition programs
- ❖ EMRLs used as MDAP exit criteria since 2002

Currently ODDR&E and OSD SSE collaborating to:

- ❖ Draft policy to integrate MRLs into S&T and acquisition programs
- ❖ Incorporate criteria and assessment activities into existing acquisition processes (leverage acquisition and systems engineering technical reviews)
- ❖ Update SE guidance documents to fully embrace MRLs and yield appropriate MRA-like assessments

ACTION: OSD SSE has requested the NDIA SED Engineering and Manufacturing Committee to assist in Systems Engineering community review of the MRA Deskbook

Integration Readiness Levels

Background:

- DUSD(A&T) requested SSE study and develop integration readiness levels for use in acquisition
- Systemic analysis has shown integration issues in ~ 45% of PSRs
  - Contributes to cost and schedule issues
- SSE proposes a collaborative effort with the DoD community, academia, and NDIA to develop quantifiable metrics to verify integration maturity of hardware and software systems within established SE processes

Product:

- Draft set of IRLs needed in 120 days
- Tabular format applicable across the lifecycle, and integrated with SE processes to define integration expectations and best practices

ACTION: Request NDIA SED members:

- Identify existing IRL activities/products to support comprehensive study
- Consider a future workshop on this topic

Integration Readiness Levels

- Product development and test relies on successful integration of components and subsystems, using integration tools and facilities to advance the product to successful system-level test and evaluation
  - Systemic findings from program support reviews reflect hardware and software integration issues on most programs

- IRL success criteria can facilitate the success of event-driven schedules by validating readiness of hardware and software integration activities and identifying issues and risk areas that require mitigation plans

- Potential benefits of IRLs:
  - Define integration expectations at SE technical reviews
  - Serve as exit criteria for acquisition phases
  - Inform program execution and decision making
  - Lead to increased risk recognition and management
  - Identify interfaces between components, subsystems, systems and SoS
  - Improve contracting to identify critical integration activities
  - Ensure inclusion on programs' critical path at program start-up

Human Systems Integration

Human Systems Integration

Hardware

**Total
System
Approach**

Software   **Human**
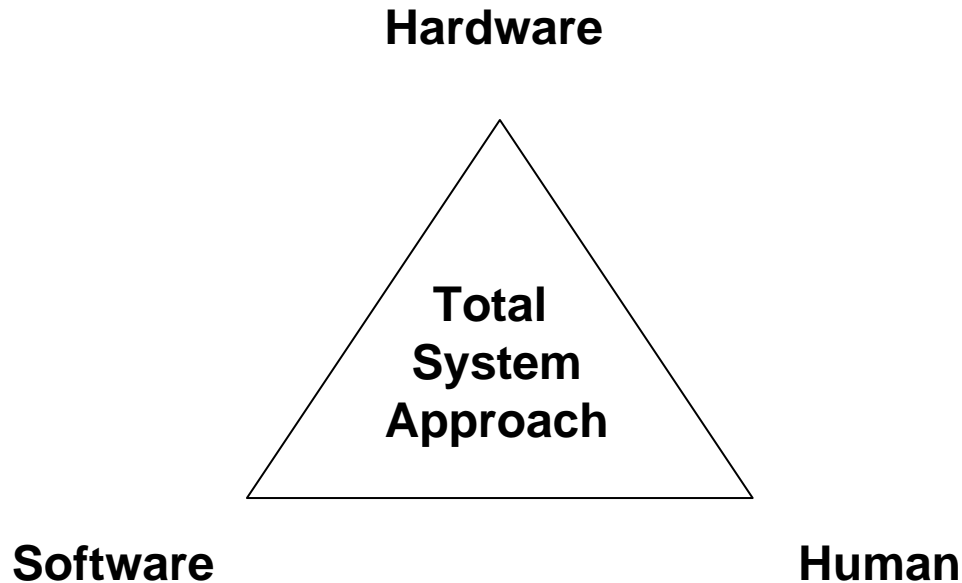
Human Systems Integration (HSI). The interdisciplinary technical and management processes for integrating human considerations within and across all system elements; an essential enabler to systems engineering practice.

Recent HSI Guidance and Direction

- H.R. 1585 National Defense Authorization Act for FY 2008: Section 231
  - Directs the Secretary to: (1) coordinate and manage human systems integration activities throughout DOD acquisition programs; and (2) designate a senior DOD official to be responsible for such effort.

- USD(AT&L) memorandum, dated Apr 3, 2008,
  - Designates DUSD(A&T) as the senior official responsible for coordination and management of HSI activities throughout DoD acquisition programs, with DUSD(S&T), Director, Biological Systems as the co-lead for S&T

- FY09 HASC language
  - directs the USD(AT&L) to develop a comprehensive plan for funding and implementing HSI through all phases of science, research, and acquisition. Report due by March 15, 2009

ACTION: We are soliciting input from DoD and Industry partners to help respond to Congressional Direction. Specifically:
  - **What are key HSI activities, initiatives, capabilities that exist today**
  - **Where gaps or issues exist**

SSE FY10-15
Program Direction

SSE FY10-15 POM Direction (1/2)

- Create enhanced Systems Engineering capability (pre-MS A and between MS A&B)
  - Provide SSE resources (support, tools) for Technology Development phase
  - Integrate SSE with Requirements, Programming and Management
  - Support pre-program and capability analyses (AoAs)
  - Establish AT&L matrix support to CPMs and SoSs
- Develop a Human Capital Strategy for System and Software Engineering (SSE)
- Revitalize Developmental Test and Evaluation to support faster fielding and reliability growth testing
- Advance Systems Engineering state of practice through research by leveraging and transitioning UARC recommendations

- Transition and promulgate SSE tools, practices
  - Institutionalize PSRs, SEPs, Software, Reliability and T&E practice, etc.
  - Services, Agencies, Industry Transition Partners
- Integrate assurance and security practice into SE
  - Transition from FY08/09 cyber and system assurance pilot activities
- Transform lessons learned to predictive measures
  - Transparent data, correlate program findings with external databases (e.g., DAMIR, PoPs, PA&E)
  - Implement corrective actions
- Value Energy in acquisition processes
  - Institutionalize energy in Milestone reviews and portfolio management
  - Ensure fuel demand considerations in AOA and all program analysis

BACKUP SLIDES

- IT is mandated by policy but not well defined

- DoDI 5000.2 states that T&E is integrated but does not provide a definition

  ➢ DoDI 5000.2 para 3.7.1.1 – "Development and demonstration are aided by the use of simulation-based acquisition and test and evaluation *integrated* into an efficient continuum…"

  ➢ DoDI 5000.2 Enclosure 5 – The PM…"shall coordinate DT&E, OT&E, LFT&E, family-of-systems interoperability testing, information assurance testing, and M&S activities, into an efficient continuum, closely *integrated* with requirements definition…"

- Services requested OSD clarify definition IT

- Defense Science Board Task Force on DT&E

  - ➢ "Implementation of integrated test concepts has been allowed to evolve on an ad-hoc basis. The time has come to pursue more consistency in integrated test planning and execution."

  - ➢ DoDI 5000.2 is "ambiguous and misleading because it is not focused on integrating developmental and operational testing. Instead, it clouds the meaning by adding other factors such as Modeling and Simulation (M&S) and requirements definition into the concept."

- NDIA Systems Engineering Division DT&E Committee White Paper (in draft)

  ➢ "Finding 3: Integrated 'Test' is not consistently implemented in the acquisition process across the different services. This is especially true in the System Development & Demonstration (SDD) Phase. A standard definition and consistent implementation of Integrated Test must be established in DoDI 5000.2."

- Mandates Services incorporate Integrated Test processes into T&E strategies

    ➢ "Developmental and operational test activities shall be integrated and seamless throughout the systems life cycle."

    ➢ "To maximize efficiency of the T&E process and more effectively integrate developmental and operational T&E, evaluations shall take into account all available and relevant data and information from contractor and government sources."
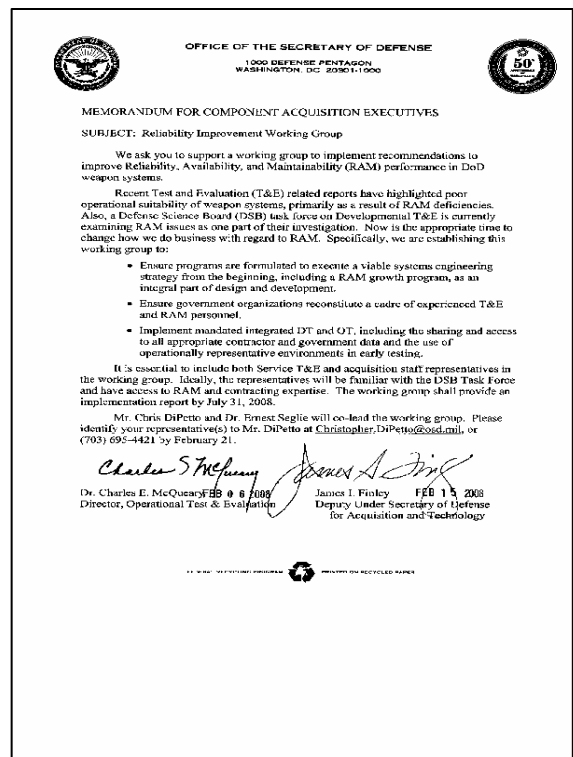
- Directed the establishment of a working group to implement several DSB recommendations including an Integrated Test process

- Specific Task:

  - Implement mandated Integrated DT and OT, including the sharing and access to all appropriate data (contractor and government) and conduct T&E in an operationally representative environment as early as possible

Revised TEMP Concept

Part I
Introduction

Brief mission description paragraph

Brief Threat Assessment

Brief system description paragraph

Reference authoritative source documents

Brief evaluation approach w/COIs

Describe T&E management, (Do not state standard operating roles and practices of organizations)

Part II
T&E Strategy

The philosophy recognizes a T&E continuum

Evaluation Framework
- System maturation (Include CTPs)
- Mission-Oriented Context
- Title 10 Evals (IOT&E, LF)

Integrated Test Planning (CT, DT, OT, LFT, M&S)

Overarching schedule that includes sequencing of T&E activities, phases, synchronized w/ Acq Strat

Technical / Operational Issue Xwalk in TEMP annex

Future Testing

Part III
Resources

Include in para form or table:
• Test articles needed/event
• Special equip/ instr costs
• Target / expendable costs
• Threat representation costs
• Manpower needs
• M&S costs

Some numbers will be Estimates, but real $$ should match test phases, and evaluation requirements

Direct linkage of requirements, test phases, and resources, within the guidance of an evaluation strategy

What, Why, Who — *How, When* — **Resources** required

Include Joint requirements throughout

As of May 29

Current vs Draft Outline

Current

Draft

PART I: SYSTEM INTRODUCTION
- Mission Description
- System Description
- System Threat Assessment
- Measures of Effectiveness and Suitability
- Critical Technical Parameters

PART II: INTEGRATED TEST PROGRAM SUMMARY
- Integrated Test Program Schedule
- Management

PART I: INTRODUCTION

1.1. Mission Description
- Sys Threat Assessment

1.2. System Description
- Program Background
- Key Capabilities (KPPs/KSAs)
- Key Interfaces (OV-1)
- Unique Characteristics

1.3. Evaluation Approach

1.4. T&E Management

Current vs Draft Outline

Current

PART III: DEVELOPMENT TEST AND EVALUATION OUTLINE

➢ Development Test and Evaluation Overview
➢ Future Developmental Test and Evaluation Limitations

PART IV OPERATIONAL TEST AND EVALUATION OUTLINE

➢ Operational Test and Evaluation Overview
➢ Critical Operational Issues
➢ Future Operational Test and Evaluation Limitations
➢ Live Fire Test and Evaluation

Draft

PART II: T&E STRATEGY

2.1. Introduction
2.2 Evaluation Framework
- System maturation
  - Capabilities & Limitations
  - CTPs & Certifications
- Mission-Oriented Evaluation Context
  - Op Effectiveness (COI / MOE)
  - Op Suitability (COI / MOS)
- Statutory Evals (Initial Op, Live Fire)
- Mission capability comparison

2.3 Integrated Test Planning
- CT, DT Objectives
- LFT Objectives
- OT Objectives

2.4 Integrated Test Program Schedule
2.5 M&S
2.6 Future Testing
- Evaluation Crosswalk Matrix (Annex)

Current vs Draft Outline

Current

PART V TEST AND EVALUATION RESOURCE SUMMARY

- Test Articles
- Test Sites and Instrumentation
- Test Support Equipment
- Threat Representation
- Test Targets and Expendables
- Operational Force Test Support
- Simulations, Models, and Test Beds
- Special Requirements
- Test and Evaluation Funding Requirements
- Manpower/Personnel Training

Draft

PART III: RESOURCE SUMMARY

3.1 Test Articles
3.2 Test Sites and Instrumentation
3.3 Test Support Equipment
3.4 Threat Representation
3.5 Test Targets and Expendables
3.6 Operational Force Test Support
3.7 Simulations, Models, and Test Beds
3.8 Special Requirements
3.9 Test and Evaluation Funding Requirements
3.10 Manpower/Personnel Training

Industry Committee on Program Management (ICPM)

- DUSD (A&T) established ICPM:
  - OSD Dir, Portfolio Systems Acquisition
  - Industry Program Management VPs
  - Service Acquisition MILDEPs
  - OSD Dir, SSE, NDIA (SED) Chair
- Active Working Groups
  - Leading Indicators
  - Program Start-up Workshops and Pre-MS B Assistance
- Current Topics of Interest to ICPM
  - Earned Value Management
  - Integrated DT/OT
  - DoD 5000 Update
  - Service Acquisition Initiatives

Increased communication and understanding between Systems Engineering and Program Management to define common problems and develop common solutions