Changing the DNA of Test & Evaluation

NDIA Implementation Developmental Test and Evaluation and Systems Engineering

Beth Wilson, Raytheon
Steve Scukanec, Northrop Grumman
NDIA Developmental Test and Evaluation Committee

Motivation For Change


INTRODUCTION

FY 2011
Annual Report

DOT&E Initiatives

1. Field new capability rapidly;
2. Engage early to improve requirements;
3. Integrate developmental, live fire, and operational testing
4. Substantially improve suitability before initial operational test and evaluation (IOT&E).

J. Michael Gilmore Director Operational Test and Evaluation FY 2011 Annual Report

Developmental Test and Evaluation
Office of the Director, Defense Research and Engineering

DT&E Initiatives

1. Increased use of Modeling and Simulation
2. Scientific Test and Evaluation Design (STED)
3. Incorporating T&E into DoD Acquisition Contracts
4. Requirement for Technical Degree
5. Certified DAU T&E Curriculum
6. TEMP at Milestone A (pending)

Edward Greer Director, Developmental Test & Evaluation - International Test and Evaluation Association September 2011

"For each project under oversight, review the Test and Evaluation Strategy (TES) and Test and Evaluation Master Plan (TEMP) to assure they include testing in realistic operational environments initiated during development and continuing through operational testing. "

Operational Test and Evaluation FY 2011 Annual Report

We will solicit early involvement from the developmental test and evaluation (DT&E) community so that the experimental design can encompass all phases of testing, thereby providing rigorous and efficient integrated testing

Operational Test and Evaluation FY 2011 Annual Report

Pentagon Eyes Prototyping Strategy as Budgets Tighten

Defense News January 17th 2012

DNA Change Drivers

T&E Involvement

Incorporating T&E into DoD Acquisition Contracts
Requirement for Technical Degree
Certified DAU T&E Curriculum

Prototyping

Increase Modeling and Simulation
Focus on Needed Technology Development
Establish Operational Environment Early

Operational Realism

Establish WIPT Early
Early Test Planning
TEMP Alignment
Systems Of Systems

Integrated Testing

Data Plans
Scientific Test and Evaluation Design (STED)
Proper Contract Language
Early Identification of Data Needs
Evaluate in Proper Environment
Metrics

Rapid Fielding

Field new capability rapidly
Slow the Requirements Growth
Test Operationally
Collaborative Test Planning

RAM

Substantially improve suitability before initial operational test and evaluation
Early Manufacturing Inputs
Early RAM Simulations

Alignment of DT&E Committee Efforts

DoD Drivers	DT&E Committee Efforts	
	Topic	Activity
T&E Involvement	DoD T&E Policy Study	2006 – 2008: Workshops and Study Report Improving T&E in the DoD Acquisition Process
	RFP Language for T&E	2010 – 2011: Comments for Update to OSD Guide Incorporating T&E into DoD Acquisition Contracts
	Metrics	**2012: Leading Indicators for T&E**
	Software	2009: SW T&E Summit Recommendations
Prototyping	**Modeling and Simulation**	2011: Effective Use of M&S for T&E Use of M&S **2012: Distributed Model-Based Testing**
Operational Realism	**System of Systems**	2010 – 2011: T&E for SoS Workshop and Initiatives **2012: Final Report on Best Practices Model** **2012: Expand to SoS Capability-Based Testing**
Integrated testing	Integrated Testing	2008 – 2010: Integrated Test Study NDIA presentations and tutorial ITEA journal article
Rapid Fielding	**Design of Experiments**	**2012: DOE for T&E Workshop**
RAM	**Metrics**	**2012: Leading Indicators for T&E**

Summary of DT&E Committee Efforts

	Topic	Activity
DT&E Committee	**DoD T&E Policy Study**	2006 – 2008: Workshops and Study Report Improving T&E in the DoD Acquisition Process
	Integrated Testing	2008 – 2010: Integrated Test Study NDIA presentations and tutorial ITEA journal article
	RFP Language for T&E	2010 – 2011: Comments for Update to OSD Guide Incorporating T&E into DoD Acquisition Contracts
	Design of Experiments	**2012: DOE for T&E Workshop**
SE Collaboration	**Software**	2009: SW T&E Summit Recommendations
	System of Systems	2010 – 2011: T&E for SoS Workshop and Initiatives **2012: Final Report on Best Practices Model** **2012: Expand to SoS Capability-Based Testing**
	Modeling and Simulation	2011: Effective Use of M&S for T&E Use of M&S **2012: Distributed Model-Based Testing**
	Metrics	**2012: Leading Indicators for T&E**

DoD T&E Policy Study

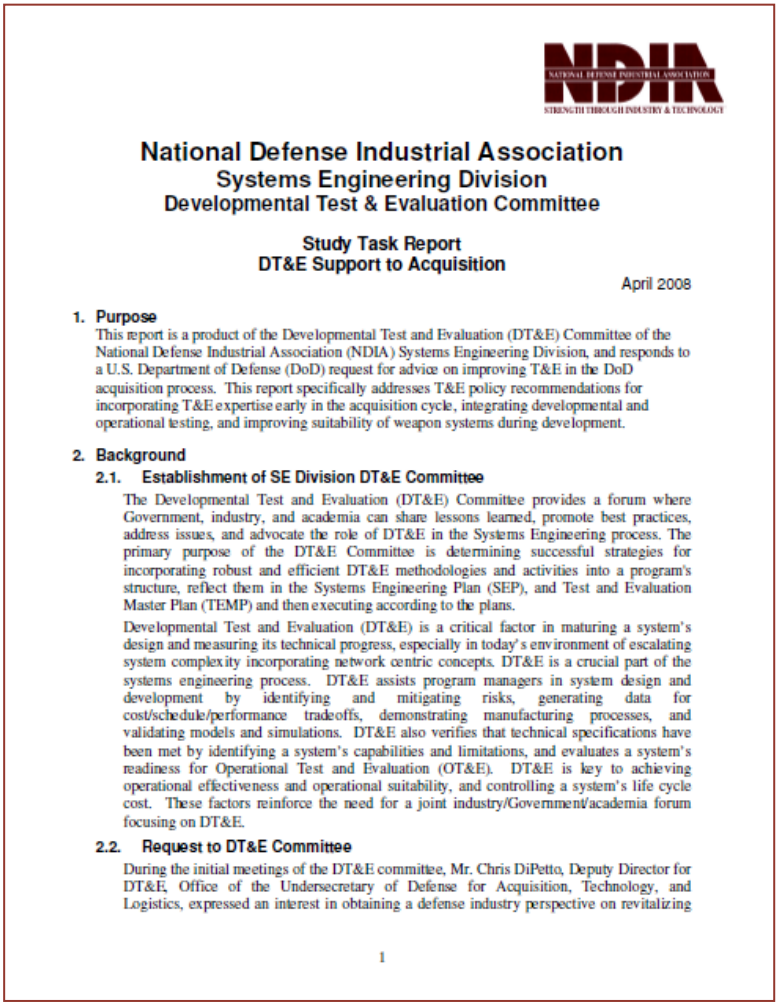
August 2006: DT&E Committee Kickoff

Policy Study:
"Improving T&E in the DoD Acquisition Process"
Industry T&E policy recommendations

Workshops:
August 2007
January 2008

Focus Areas:
1. Earlier contractor and tester involvement
2. Integrated DT/OT and DT operational relevance
3. Suitability

April 2008: Report Summarized Results:
10 Findings
15 Recommendations



National Defense Industrial Association
Systems Engineering Division
Developmental Test & Evaluation Committee

Study Task Report
DT&E Support to Acquisition

April 2008

1. Purpose

This report is a product of the Developmental Test and Evaluation (DT&E) Committee of the National Defense Industrial Association (NDIA) Systems Engineering Division, and responds to a U.S. Department of Defense (DoD) request for advice on improving T&E in the DoD acquisition process. This report specifically addresses T&E policy recommendations for incorporating T&E expertise early in the acquisition cycle, integrating developmental and operational testing, and improving suitability of weapon systems during development.

2. Background

2.1. Establishment of SE Division DT&E Committee

The Developmental Test and Evaluation (DT&E) Committee provides a forum where Government, industry, and academia can share lessons learned, promote best practices, address issues, and advocate the role of DT&E in the Systems Engineering process. The primary purpose of the DT&E Committee is determining successful strategies for incorporating robust and efficient DT&E methodologies and activities into a program's structure, reflect them in the Systems Engineering Plan (SEP), and Test and Evaluation Master Plan (TEMP) and then executing according to the plans.

Developmental Test and Evaluation (DT&E) is a critical factor in maturing a system's design and measuring its technical progress, especially in today's environment of escalating system complexity incorporating network centric concepts. DT&E is a crucial part of the systems engineering process. DT&E assists program managers in system design and development by identifying and mitigating risks, generating data for cost/schedule/performance tradeoffs, demonstrating manufacturing processes, and validating models and simulations. DT&E also verifies that technical specifications have been met by identifying a system's capabilities and limitations, and evaluates a system's readiness for Operational Test and Evaluation (OT&E). DT&E is key to achieving operational effectiveness and operational suitability, and controlling a system's life cycle cost. These factors reinforce the need for a joint industry/Government/academia forum focusing on DT&E.

2.2. Request to DT&E Committee

During the initial meetings of the DT&E committee, Mr. Chris DiPetto, Deputy Director for DT&E, Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, expressed an interest in obtaining a defense industry perspective on revitalizing

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2006-2008

Integrated Testing (CT/DT/OT) Implementation Framework

NDIA Test and Evaluation Conference
Paper #7847

Walking the Line with Title 10: Implementation Strategies for Integrated Testing

NDIA Systems Engineering Conference
Paper #8848

Integrated Testing: We Can Do It

NDIA Test and Evaluation Conference
Paper #9565

Erasing the Line with Title 10: Best Practices in Integrated Testing

Beth Wilson
Industry Co-Chair NDIA System Engineering Division, DT&E Committee
Principal Engineering Fellow, Raytheon Company

Darlene Mosser-Kerner
Government Chair NDIA System Engineering Division, DT&E Committee
OUSD(AT&L)/Developmental Test and Evaluation

Tom Wissink
Industry Co-Chair NDIA System Engineering Division, DT&E Committee
Director of Integration, Test & Evaluation, Lockheed Martin Corporate Engineering & Technology

NDIA T&E Conference Mar 2010

2009 ITEA Journal

Integrating Test and Evaluation (September issue)

ITEA Journal 2009; 30: 375–380

Integrated Testing: A Necessity, Not Just an Option

Beth Wilson, Ph.D.
Raytheon Company, Sudbury, Massachusetts

Department of Defense policy states that developmental and operational test activities need to be integrated whenever possible to improve overall test and evaluation efficiency with increased emphasis on operational relevance. The National Defense Industrial Association Systems Engineering Division Developmental Test and Evaluation Committee has been evaluating existing integrated testing policies, methods, and practices to identify an implementation framework with best practices for sharing data, involving developmental test and operational test stakeholders in integrated test planning, and collaboratively executing an integrated test program. Barriers to integrated testing were identified looking at the cultural constraints placed on planning, people, and data. While the definitions and mandates are recent, the practice of integrated testing is not new. The framework described focuses on existing policy and captures best practices.

Key words: Collaborative planning; collaborative execution; shared data; DT&E; OT&E; Army; Navy; Air Force; contractor support; resource planning

NDIA Systems Engineering Conference
Paper #8818

Integrated Testing: Tutorial

Beth Wilson
Industry Co-Chair NDIA System Engineering Division, DT&E Committee
Principal Engineering Fellow, Raytheon Company

Darlene Mosser-Kerner
Government Chair NDIA System Engineering Division, DT&E Committee
Developmental Test & Evaluation
OUSD(AT&L)/Systems & Software Engineering

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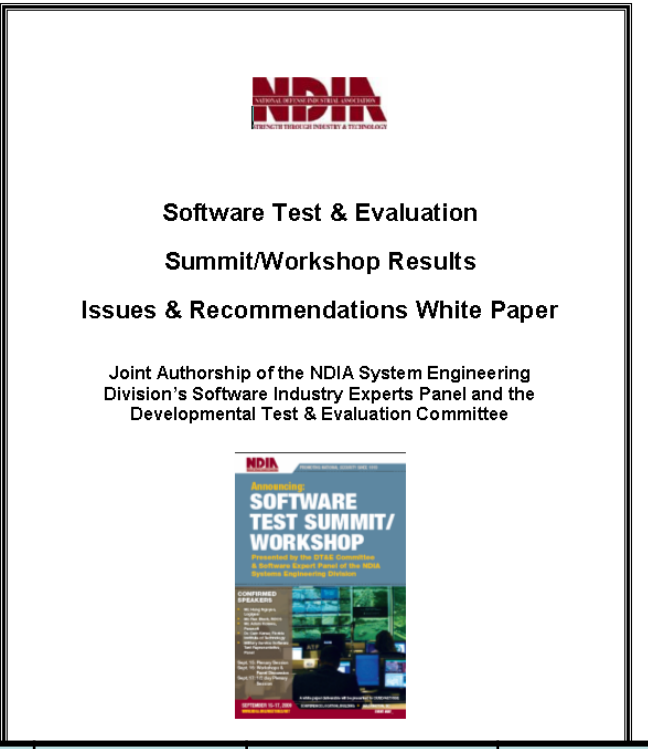
NDIA SE Conference Oct 2009

2008-2010

Software Test and Evaluation Software Summit



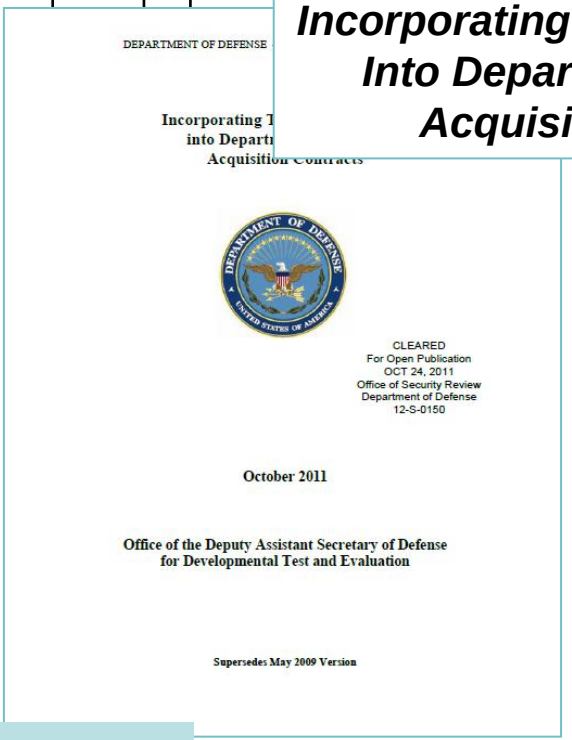
RFP Language	How Much Testing is Enough?	Lifecycle and End-to-End Software T&E	Changing Paradigms
Training & Competency Model			
Policy, Guidance, and Standards			
Tools, Automation, Methodologies, Process			

2009

RFP Language

Industry #	Master #	Reviewer	Line #	Comment and Rationale	Recommended Input	A/R/P

Industry Comments for Update:
Incorporating Test and Evaluation Into Department of Defense Acquisition Contracts


DEPARTMENT OF DEFENSE

Incorporating T
into Departm
Acquisition Contracts

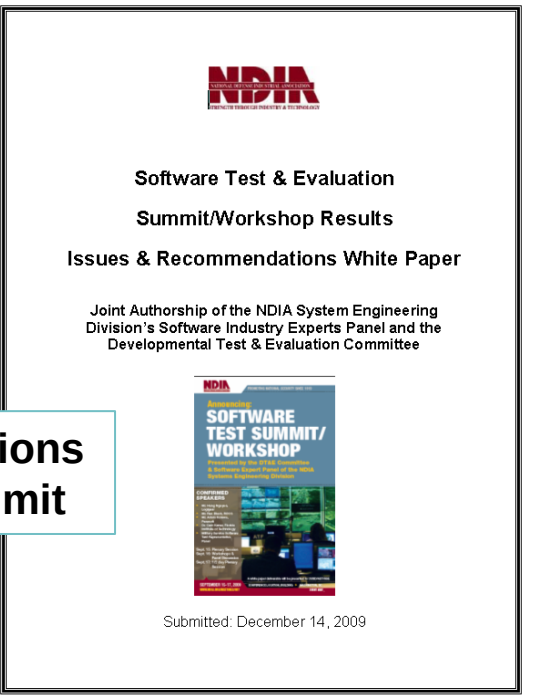
CLEARED
For Open Publication
OCT 24, 2011
Office of Security Review
Department of Defense
12-S-0150

October 2011

Office of the Deputy Assistant Secretary of Defense
for Developmental Test and Evaluation

Supersedes May 2009 Version

Recommendations from SW Summit


Software Test & Evaluation

Summit/Workshop Results

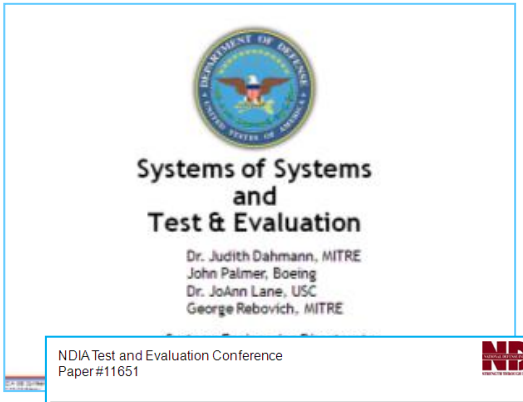
Issues & Recommendations White Paper

Joint Authorship of the NDIA System Engineering Division's Software Industry Experts Panel and the Developmental Test & Evaluation Committee

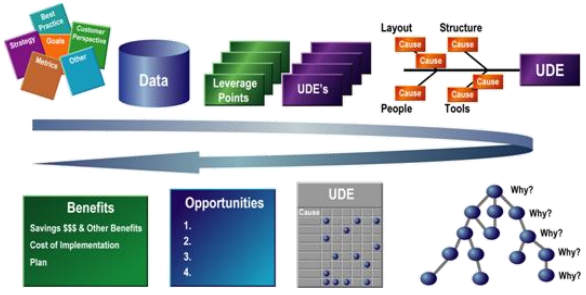
Submitted: December 14, 2009

Test and Evaluation for Systems of Systems

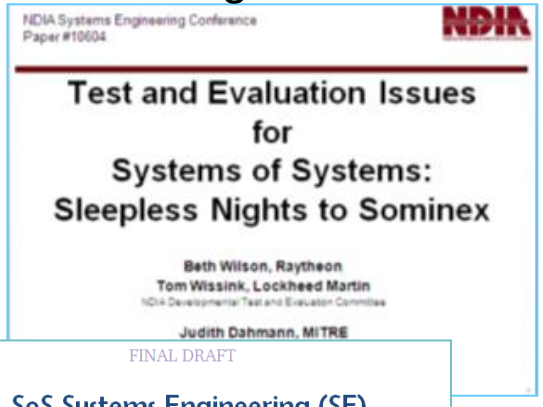
2009: "Sleepless Nights" List of Issues

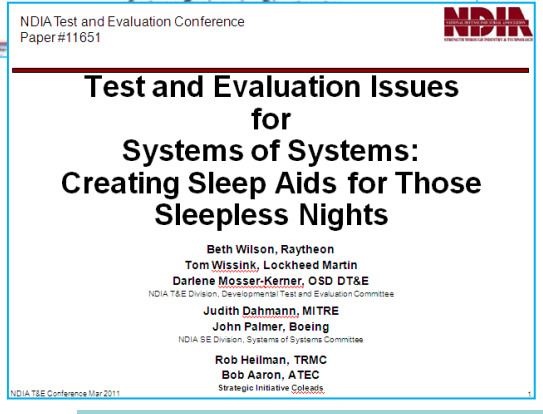


2010: Workshop

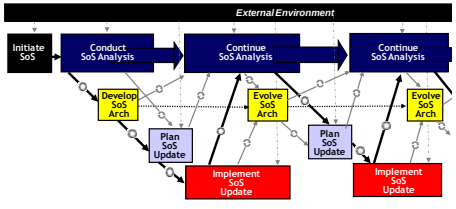


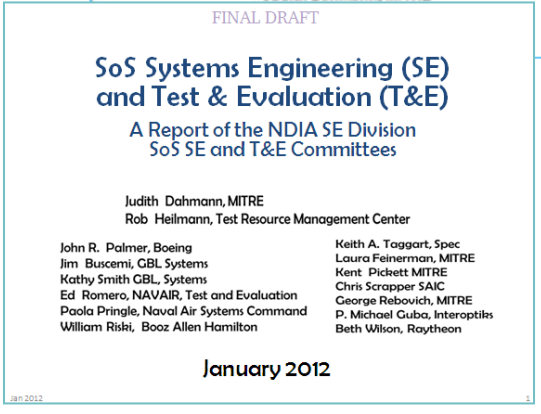
2010: "Sominex" Resulting Initiatives





2011: Best Practices Wave Model

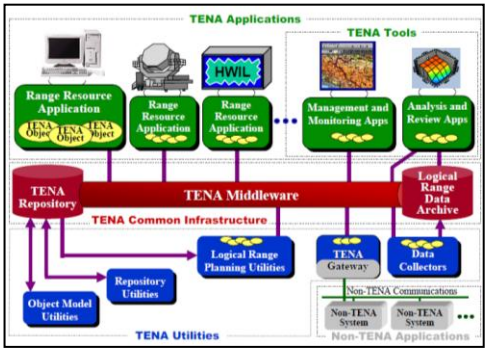


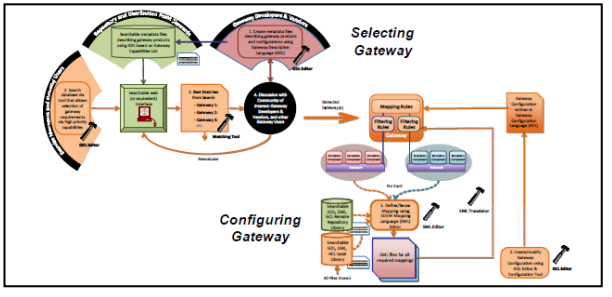


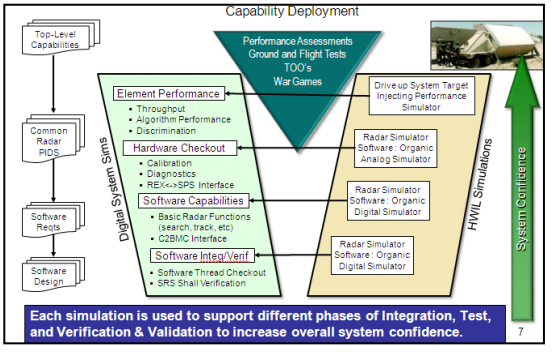
Plan Follow-on Effort in 2012

Framework for SoS Capability-Based Testing

Effective Use of Modeling and Simulation for Test and Evaluation







Joint Meeting in August 2011

- Distributed Testing, the Joint Mission Environment Test Capability (JMETC) and the Test and Training Enabling Architecture (TENA)
- DoD M&S Community of Interest Data Management Working Group
- LVC Architecture Roadmap Implementation (LVCAR-I) Gateways Effort Applicability to T&E
- OSD T&E Working Group
- Raytheon Presentation on M&S for T&E
- Potential Topics for November AMSWG Meeting

Plan Joint Meeting in 2012
Distributed Model-Based Testing

DT&E Committee Plans for 2012
Not Too Late to Join Us!

Activity	Plans for 2012
Design of Experiments **DOE for T&E Workshop**	Gather examples of effective use of Design of Experiments and other statistical approaches for test optimization to develop an implementation framework *Plan to conduct a small workshop in the DC area*
System of Systems **SoS Capability-Based Testing**	Build on best practices model initiative results to define a framework for SoS capability based testing *Collaboration with the SoS Committee*
Modeling and Simulation **Distributed Model-Based Testing**	Focus on distributed testing in support of integrated testing using government models *Collaboration with M&S Committee* *(Joint meeting in April, June, or August)*
Metrics **Leading Indicators for T&E**	Expand the 2011 focus to include testability and requirements verification information needed to define additional leading indicators *Collaboration with System Performance Measurement Working Group (follow-on workshop)*