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

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).

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)

“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

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## Summary of DT&E Committee Efforts

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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 DiPietro, 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
### 2009 Software Test and Evaluation Summit/Workshop

**Announcing:**

**SOFTWARE TEST SUMMIT/WORKSHOP**

Presented by the DT&E Committee & Software Expert Panel of the NDIA Systems Engineering Division

<table>
<thead>
<tr>
<th><strong>CONFIRMED SPEAKERS</strong></th>
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<tr>
<td>Mr. Hung Nguyen, Loggear</td>
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<td>Mr. Pax Black, RBGS</td>
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<td>Mr. Adam Kolawa, Parasoft</td>
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<td>Dr. Cam Kanew, Florida Institute of Technology</td>
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<tr>
<td>Military Service Software Test Representative Panel</td>
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**September 15-17, 2009**

**September 15:** Plenary Session

**September 16:** Workshops & Panel Discussion

**September 17:** 1/2 day Plenary Session

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**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

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**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
## RFP Language

<table>
<thead>
<tr>
<th>Industry #</th>
<th>Master #</th>
<th>Reviewer</th>
<th>Line #</th>
<th>Comment and Rationale</th>
<th>Recommended Input</th>
<th>A/R/P</th>
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### Industry Comments for Update:

**Incorporating Test and Evaluation Into Department of Defense Acquisition Contracts**

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

Recommendations from SW Summit

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!

<table>
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<th>Activity</th>
<th>Plans for 2012</th>
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| **Design of Experiments**<br>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**<br>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**<br>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**<br>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)*                                            |