



**T&E AND ITS ROLE IN 5000.02: HOW T&E
CAN BECOME A PROGRAM LIFECYCLE
SKILL**

NDIA 26th Annual National Test &
Evaluation Conference
March 1st – 4th 2010
San Diego, CA.

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Our Challenge



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 & Evaluation (IOT&E)


MEMORANDUM FOR DOT&E STAFF 24-Nov 2009 - J. Michael Gilmore Director DOT&E

Programs Must Change the Way They Do Business

T&E is Chartered

JULY 2007

Department of Defense
Report to Congress on
Policies and Practices for
Test and Evaluation




Under Secretary of Defense
(Acquisition, Technology, & Logistics)

July 2007

"In early testing, as a part of good systems engineering, the objective should not be a binary outcome but rather an exploration of system capabilities."

May 09



111-23

Weapon System Acquisition Reform Act Of 2009


Public Law 111-23
111th Congress

An Act

To improve the organization and procedures of the Department of Defense for the acquisition of major weapon systems, and for other purposes

(Sec. 102)
Establishes: (1) a Director of Developmental Test and Evaluation to advise the Secretary and the Under Secretary on DOD developmental test and evaluation

December 08



Department of Defense
INSTRUCTION

NUMBER 5000.02
December 2, 2008
USD(AT&L)

SUBJECT: Operation of the Defense Acquisition System
References: See Enclosure 1

1. PURPOSE. This instruction:

- Revises Reference (a) to implement DoD Directive 5000.01 (Reference (b)), the guidelines of Office of Management and Budget (OMB) Circular A-11 (Reference (c)), and the various laws, policy, and regulations listed in Enclosure 1 of this instruction.
- Establishes a simplified and flexible management framework for translating capability needs and technology opportunities, based on approved capability needs, into stable, affordable, and well-managed acquisition programs that include weapon systems, services, and automated information systems (AISs).
- Consistent with statutory requirements and Reference (b), authorizes Milestone Decision Authorities (MDAs) to tailor the regulatory information requirements and acquisition process procedures in this Instruction to achieve cost, schedule, and performance goals.

2. APPLICABILITY AND SCOPE. This instruction applies to:

- OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").
- All defense technology projects and acquisition programs, including acquisitions of services. Some requirements, where stated, apply only to Major Defense Acquisition Programs (MDAPs) or Major Automated Information System (MAIS) programs.
- Highly sensitive classified, cryptologic, and intelligence projects and programs shall follow this Instruction and Reference (b) to the extent practicable.


"T&E expertise must be brought to bear at the beginning of the system life cycle to provide earlier learning about the strengths and weaknesses of the system under development. Highly integrated T&E Apply a rigorous System Engineering Discipline"

May 09

DEPARTMENT OF DEFENSE - UNITED STATES OF AMERICA

Incorporating Test and Evaluation into Department of Defense Acquisition Contracts

MAY 2009



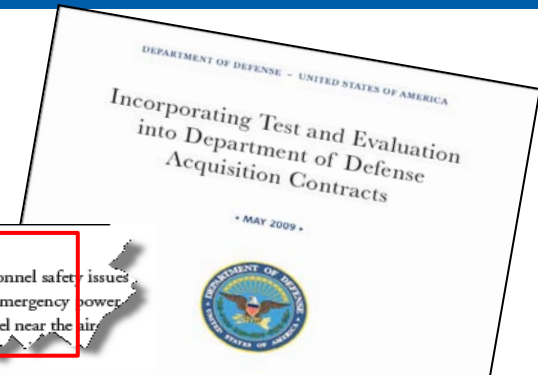
Office of the Deputy Under Secretary of Defense for Acquisition and Technology
Systems and Software Engineering

"During the program life cycle it is critical that the PM, systems engineer, and T&E personnel recognize that early and consistent incorporation of T&E considerations and requirements begins at the onset of program planning during the Materiel Solutions Analysis and TD phases"

Policies and Laws Acknowledge Early T&E Adds Value

T&E EMD Major Activities (Traditional)

Purpose: Develop a system or increment of capability, develop an affordable manufacturing process, *minimize logistics footprint*



4.1.2 T&E Team Participants and Roles

The participants in the T&E team include anyone and everyone necessary to successfully execute the test program, or anyone with a stake in the outcome of the test program (e.g., Joint Forces Command). Different organizations may have different teams working on T&E issues, but the basic issues are the same: test program development and execution.

The T&E WIPT is generally the team that addresses the strategy and overall management of the T&E program, while a CIF or IIT, or something similar, will handle the execution of the test program. The T&E WIPT will include all stakeholders for the test program.

At a minimum, T&E WIPT participants will include the program manager, program representatives, oversight organizations, contractor and major subcontractor representatives, and an OTA representative.

WIPT

4.5.2 Test Safety Issues

The actual testing of equipment in the field often poses personnel safety issues, and concerns. For example, testing a toxic chemical, for its emergency power unit. When the emergency power unit was tested on the ground, ground personnel near the air

SAFETY

4.5.5 Detailed Test Planning

This area refers to detailed test plans or the test plans that are actually constructed and used to execute test cases. Detailed test plans are high-level test plans such as T&E strategies, test level plans, and test management plans. If they are not sufficiently detailed to actually execute a test, then more detailed test plans are required. Detailed test plans drive the testers' actions. Therefore, the roles and responsibilities for the development of detailed test plans must be defined. This area includes the development of detailed test plans that are used to execute test cases.

PLANNING

4.5.3 Risk Acceptance Authority

The conduct of safety analyses will assist in identifying and clarifying the risks involved in a test program. Detailed test planning and test procedures to address most of the significant risks, and the test cases that will remain, and the question becomes one of who has the authority to accept the residual risk and allow the test to proceed. The test cases that are approved to proceed are those that are approved upon the basis of established risk acceptance criteria.

RISK

4.5.6 Test Execution

The roles and responsibilities for the conduct of a test must be defined—essential for the test program. The test program manager, or both. This area includes items as deleting or adding test points, expectations for a particular priority when it comes to the test program. The test program manager is responsible for the execution of the test program.

TEST EXECUTION

4.5.7 Test Data Access, Authentication, and Sharing

The access to, process for authentication, and sharing of test data must be clearly established. Enclosure 6, paragraph 7.1.1 of DOT&E 100-02 states: "The DOT&E and the Director, Systems and Software Engineering shall have full and timely access to all available test data."

DATA COLLECTION

Reporting

This area requires a very high level of attention and precision. It includes the type, format, schedule, and approval of reports. Reporting is required for all T&E reports. The contractor is obligated to submit only the reports listed in the contract as CDRI.

REPORTING

ANOMALY RESOLUTION

T&E EMD Role Remains Basically The Same – Increased Emphasis On Data Sharing

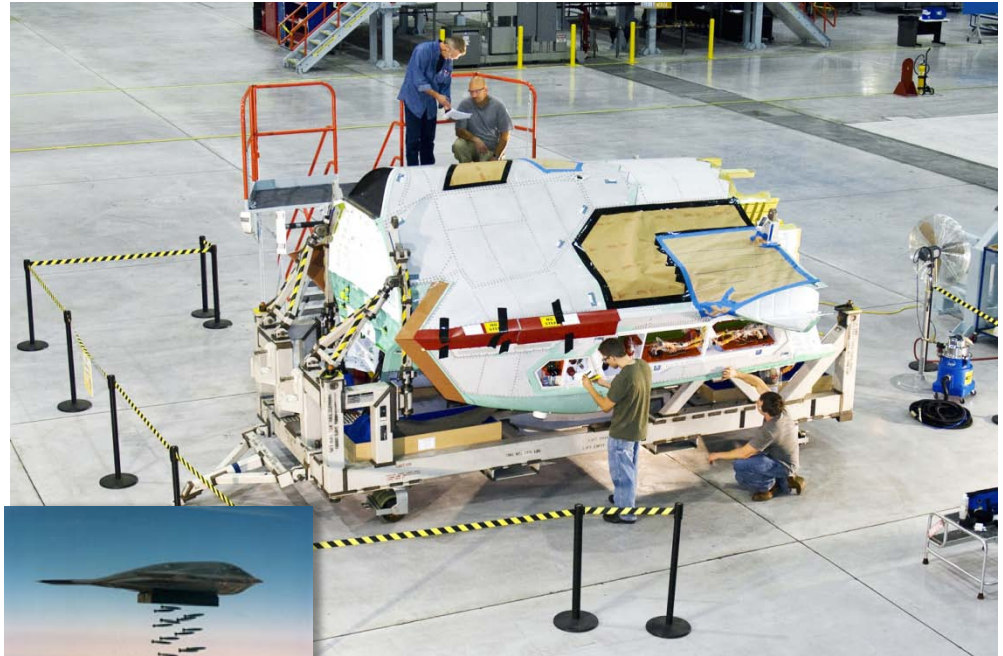
Major T&E Production Support Activities (Traditional)



Purpose: Achieve an operational Capability that satisfies mission needs



- Provide T&E EMD Testing Experiences to the Product Acceptance Test Planning and Development
- Anomaly Investigation
- Align Test Plan with Production Plans
- OT&E Support



T&E Production and Deployment Role Remains Basically The Same

T&E Pre M/S B – Setting The Stage For An Executable Test Program



3. Ensure the integrated T&E strategy and approach address the total life cycle of the program

“What is important to the user is strengths and weaknesses, capabilities and limitations, not specification compliance.”

Department of Defense INSTRUCTION

Department of Defense Report to Congress on Policies and Practices for Test and Evaluation

Department of Defense Instruction

Department of Defense Instruction

- **Conduct Early Test Planning**
 - Develop Flow Down of TES and TEMP to Contractor Test Plan and Technology Development Phase T&E Activities
 - Establish Major Range Coordination
 - Ensure Integrated T&E Strategy and Approach Addresses the Total Program Lifecycle
 - Develop A Logically Sequenced Event Driven T&E Approach that is not Schedule Driven
 - Develop a Test Data Sharing Plan
- **Establish The Programs Integrated Test Team (Contractor/ DT and OT)**
 - Develop, Determine and Implement Operationally Realistic Environments and Measurements in the Verification Plan and Integrated Test Plans and Program
- **Align T&E activities with the Risk Program**

“I see tremendous value in involving the operational test and evaluation community in both developmental testing and requirements generation”^[1]

[1] UNITED STATES SENATE COMMITTEE ON ARMED SERVICES Nomination Hearing - Advanced Policy Questions – J Michael Gilmore - Thursday, June 11, 2009



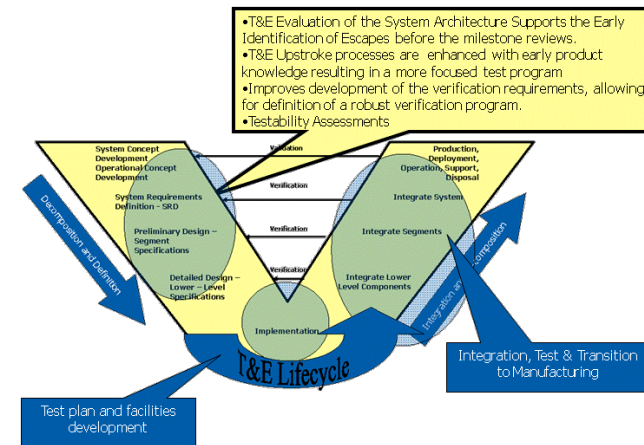
Integrated Test Planning Streamlines the Overall Test Program and Ensures for Operationally Realistic Testing Throughout The Lifecycle

T&E Pre M/S B – Setting The Stage For An Executable Test Program

- **Starting with the Right Product Definition**

- **Architecture Development**

- **Test the Architecture**
 - Physical
 - Functional
- **Architecture Testing Provides a Robust Starting Point for Requirements Development and Test Planning**
- **Optimized Product Architecture and Requirements Set for Testing Provides a Streamlined Test Program Before Testing Begins**



A Great Starting Point is the Development of a Robust Product Architecture

T&E Pre M/S B – Setting The Stage For An Executable Test Program

- Getting the Requirements Right
 - Requirements
 - Identify and Refine “Not Testable Requirements” Resulting in a Verifiable Requirement Set
 - Provide T&E Skills in the Development of Verification Statements For Each Requirement
 - Provide Design Review (SRR/PDR/CDR) Testability / Verifiability Assessment
 - Develop Unique Test Requirements
 - Become Requirements “Owners” For Unique Testing Requirements Imposed on the Design
 - Completes the Requirements Process, Avoids Late To Need and Costly Requirement Impacts

T&E Skill Mix Is Necessary to Develop Characteristics of Good Requirements

- ✓ Unitary (Cohesive)
- ✓ **Complete**
- ✓ **Consistent**
- Non-Conjugated (Atomic)
- Traceable
- Current
- ✓ **Feasible**
- ✓ **Unambiguous**
- ✓ **Mandatory**
- ✓ **Verifiable**

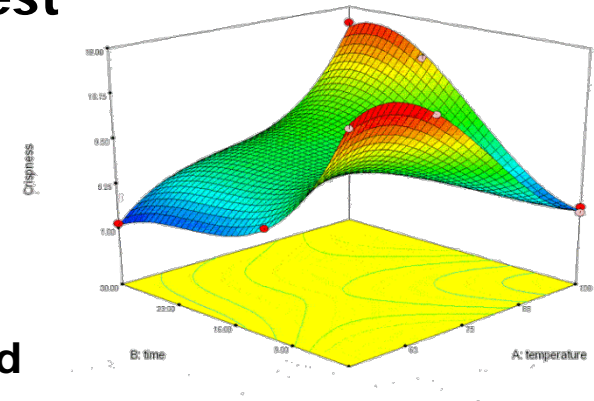
“Getting the requirements right and starting with a good systems engineering plan that is executable are essential for successful development and testing” [1]

[1] UNITED STATES SENATE COMMITTEE ON ARMED SERVICES
Nomination Hearing - Advanced Policy Questions – J Michael Gilmore -
Thursday, June 11, 2009

Development of Realistic, Relevant, and Verifiable Requirements Mandatory
For Program Success

T&E Pre M/S B – Setting The Stage For An Executable Test Program

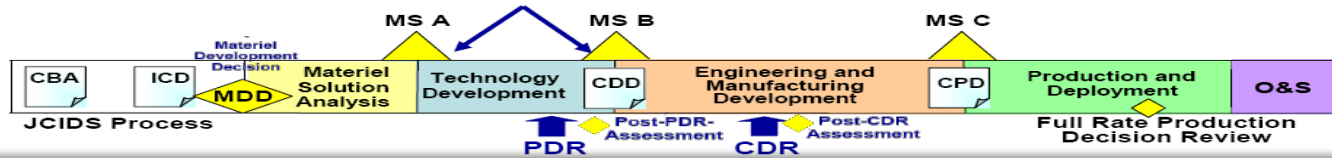
- Apply A Design Of Experiments Approach to Test Planning
 - Maximize the Effectiveness of the Test Planning Activities
 - Optimizes Test Program Efficiencies
 - Solidifies Testing Approach Early
 - Examples
 - Number of Flight Tests Points Needed to Characterize Wing Flutter
 - Number of Test points Needed to Characterize Temperature Gradient Across Material



“DOE provides the scientific and statistical methods needed to rigorously plan and execute tests and evaluate their results ¹”

1 - MEMORANDUM FOR DOT&E STAFF 24-Nov 2009 - J. Michael Gilmore Director

T&E Program Lifecycle Values



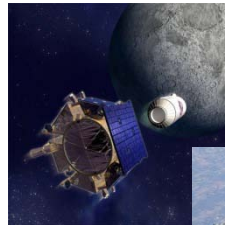
Phase	Task	Value	Product
MDD – M/S A	<ul style="list-style-type: none"> •Execute Architecture Analysis •Establish Long Lead Test Program requirements •Establish Integrated Test Team •Develop Test Strategy 	<ul style="list-style-type: none"> •Testable Architecture •Initial Test Plans and Facilities Definitions Established. •Initial Requirements Based on Tested Architecture •Architecture Streamlined Testable, Essential Requirements Identified Aiding in Rapid Deployment •Event Based Test Schedule Developed 	<ul style="list-style-type: none"> •Integrated Architecture •Schedule •Major Test Assets Identified
TDP	<ul style="list-style-type: none"> •Conduct Requirements Verifiability Assessment • Conduct Verification Requirement Development •Develop Test Unique Design Requirements •Conduct Required Prototyping / Risk Assessments •Establish Reliability Program 	<ul style="list-style-type: none"> •Verifiable Requirements & Verification Statements Development Avoids Requirements rework. •Test Unique Design Requirements Completes the Requirement Set. •Embedded Operational Realism in Test Program Helps Prove Product can meet its intended use •Support Technology Assessment / Maturation / Risk Reduction – Supply Valuable Decision Data •Support Operational Sustainment Assessment 	<ul style="list-style-type: none"> •Solid Requirements Set •Integrated Test Program Identified and Planned •Prototyping data Available • Initial RMA Program Established
EMD	<ul style="list-style-type: none"> •Requirements Refined and Allocated •Integrated Test Planning •Facilities Planning and Development •Integrated Developmental Test Conduct 	<ul style="list-style-type: none"> •Refined Verification Requirements •Conduct Consistent Test Program Through Development Cycle •On Time Establishment of Test Facilities •Coordinated Contractor /DT and OT Test Plans •Integrated and Verified Product •Initial Operational Assessments Supported 	<ul style="list-style-type: none"> •Traditional Test Program Executed •Product Verification •Integrated DT / OT Data Available
Production	<ul style="list-style-type: none"> •Support Transition Support to Manufacturing 	<ul style="list-style-type: none"> •Integrated and Tested Product 	<ul style="list-style-type: none"> •Solid Manufacturing Process based on EMD Lessons Learned

These Principles Implement The DOT&E Objectives

Program Applications / Accomplishments

- In Order to Achieve These Benefits
 - SOW / RFP Must Account for These Activities
 - Program Managers Must Understand the Value of These T&E Contributions
 - T&E Must Break From Traditional Thinking
 - Government and Industry Must Realize These Objectives Jointly
- Programs Which Have Successfully Incorporated Many of These Ideas :

- LCROSS
- F-35
- UCAS
- Restricted Programs



These Principles and Benefits Apply to Land, Sea, Air and Space



S.454 - Weapon Systems Acquisition Reform Act of 2009



Latest Action **May 22, 2009** Became Public Law No: 111-23.

- Policy and Law now **Mandate** Integrated T&E Participation Within Acquisition Programs
- T&E Can Enhance and help Validate Early System Engineering Products
 - T&E Unique Skill Mix Can Aid In the Development of The Product Architecture and Requirements
- Programs Can No Longer Minimize the Needs For T&E in All Program Phases
- T&E Brings Value to All Phases of the Program Lifecycle
 - Rework Avoidance
 - Cost Effective / Optimized Solutions
 - Schedule Efficiencies – Event Based
 - Integrated Approach Across the Test Program (Contractor / DT and OT)
- T&E Personnel Must Break From Tradition and Reach Out To Programs to Offer Their Help

Programs Must Ensure T&E Is Integrated – Budgeted – Tasked Across the Lifecycle

Contact Information



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