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T&E Collaboration and Contributions During Early Program Acquisition

NDIA Systems Engineering Conference
San Diego California October 26th – 29th 2009

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Background

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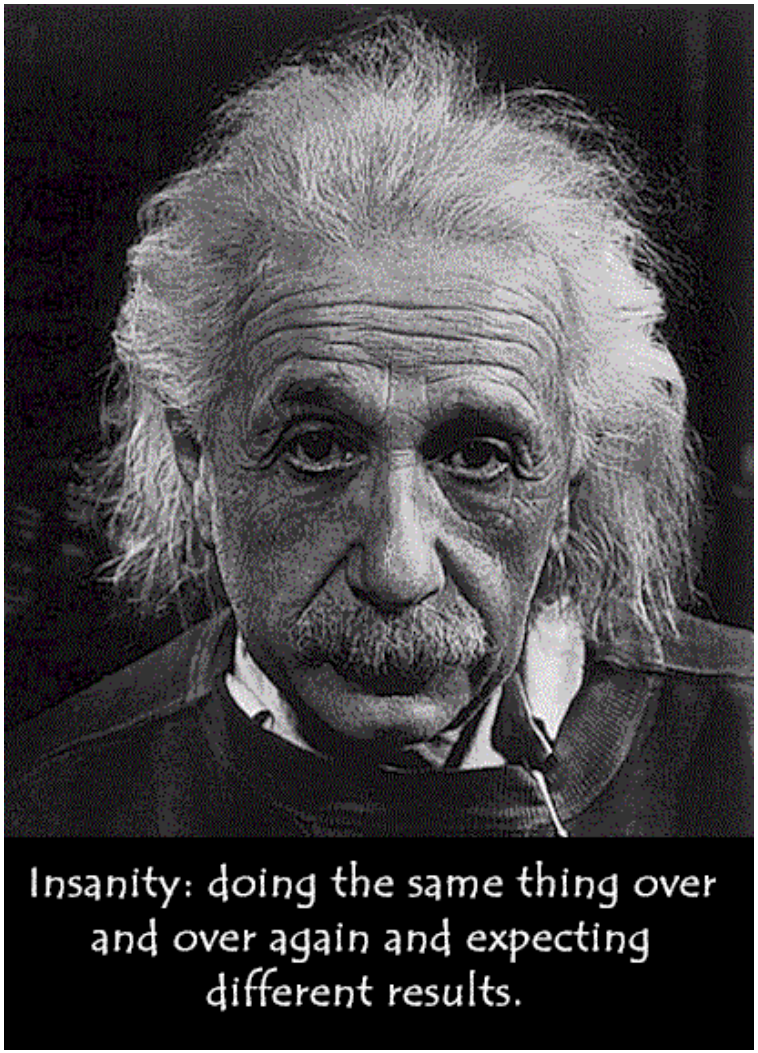
Why Programs Fail

- My observations since last year...[1]
- Programs usually fail because we don't start them right:
  - Requirements instability/creep –not well defined, not understood
  - Inadequate early technical planning
  - Inadequate funding or phasing of funding to properly execute the program
  - Lack of schedule realism –success oriented, concurrent, poor estimation/planning
  - Lack of technical maturity or a credible back-up plan –"we're always optimistic"
  - Limited focus on life cycle issues
- What we need from you...[1]
  - Tell your leadership that Dr. McQueary and Dr. Finley are focused on starting programs right!
  - We are working daily to improve communication, both in DoD and with Industry
  - We are looking to improve competition and time to field capabilities

1 - The Honorable- James I. Finley- Deputy Under Secretary of Defense (Acquisition & Technology) - October 23, 2007 NDIA Systems Engineering Conference – Keynote Address

Insight



Section 231 Report to Congress Core T&E Principles

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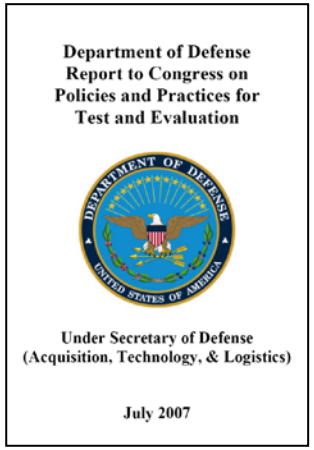
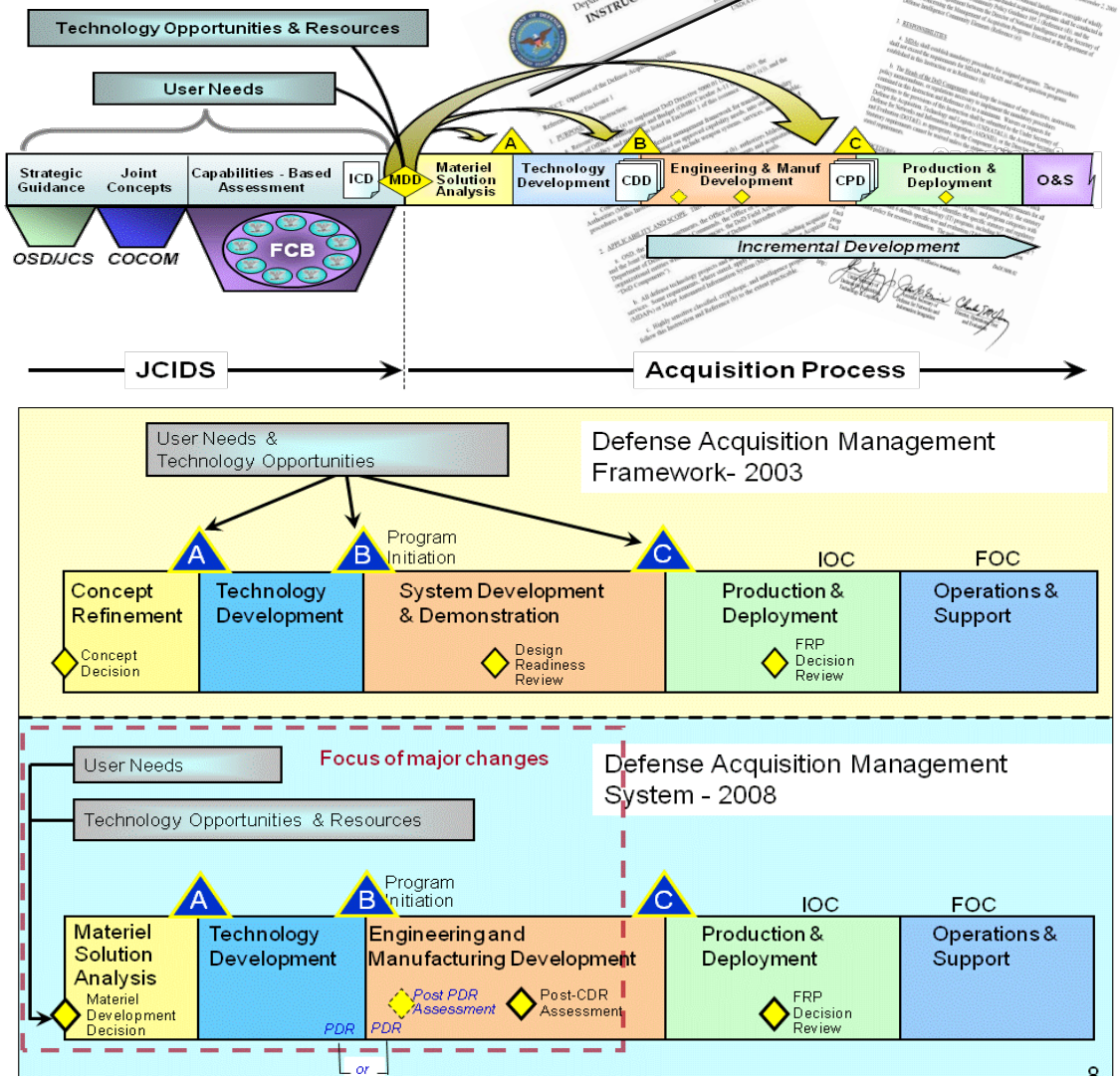


DoD Report To Congress	Influence on T&E Program
“ What is important to the user is strengths and weaknesses, capabilities and limitations, not specification compliance.”	Avoid “Mindless Specification Verification”. Provide a Realistic Test Environment
“Along with the notion of experimentation is the consequence that testing and evaluation should be a continual process of information gathering for decision-making.”	Early Test and Evaluation Should be Conducted to Support the Early Program Milestones Including the Evaluation of the System Architecture and the Design and Not Just Focus on Verification and Acceptance
“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.”	Evaluate to and beyond the limits of the design. Ensure the Proper Environmental Effect are a Part of your Testing Program. Ensure data is Collected In Evaluation beyond the Pass Fail Borders

Reference :DoD Report to Congress on Policies and Practices for Test and Evaluation Contracts – July 2007

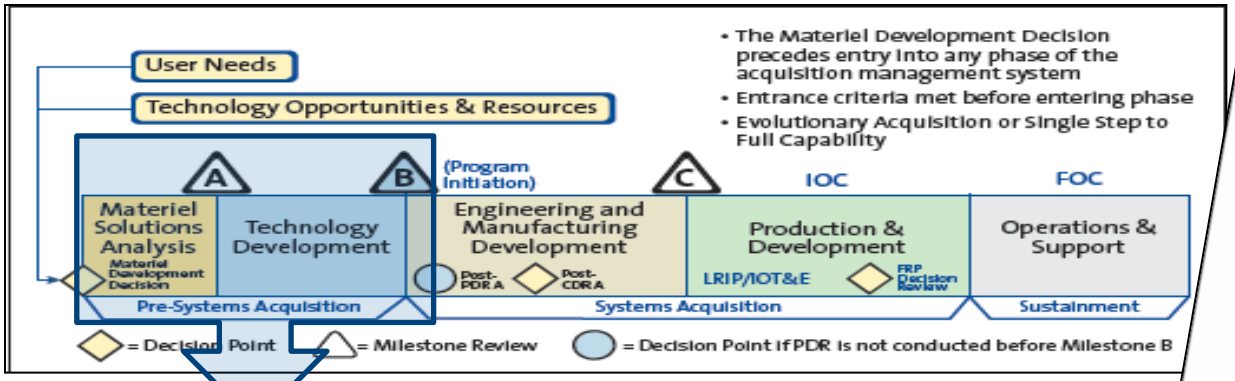
Major Attributes of Revision

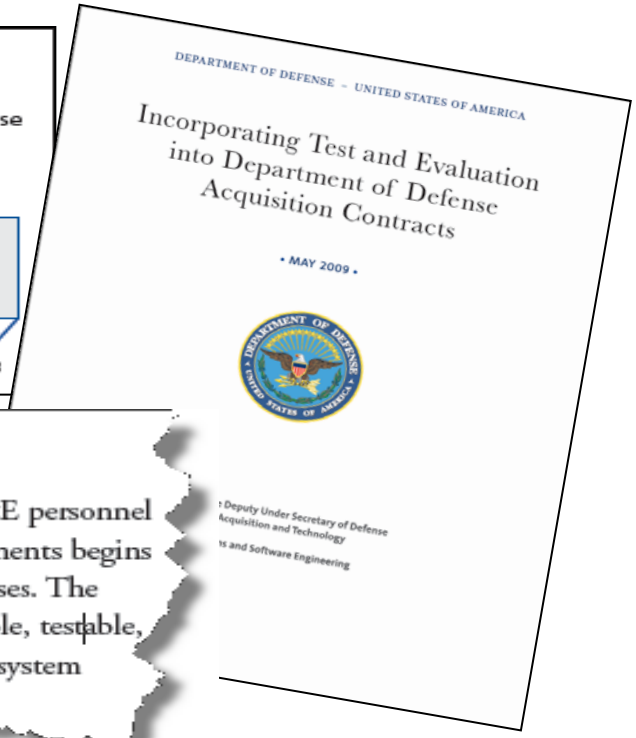
- **Earlier definition of scope, risk and cost**
  - **Mandatory entry point**
- **Risk Reduction**
  - **Competitive prototyping**
  - **Highly integrated T&E**
  - **Apply a rigorous System Engineering Discipline**
  - **Evolutionary acquisition (NOT spiral development)**
- **Enhanced Oversight**
  - **More/more frequent assessments**
  - **Peer reviews**
  - **Configuration Steering Boards**



DOD Instruction 5000.02 Operation of the Defense Acquisition System

Incorporating T&E Into Programs





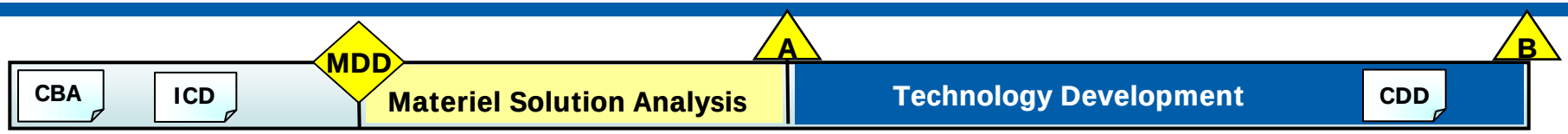
2.1 Planning

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. The program acquisition strategy must be grounded in a technical approach with achievable, testable, and measurable performance requirements and reliability metrics embodied in viable system solutions that are within cost and schedule constraints.

Consistent incorporation of T&E considerations and requirements begins at the onset of program planning during the Materiel Solutions Analysis and TD phases.

This is not Business As Usual

What Can the Program Do To Incorporate These Changes?

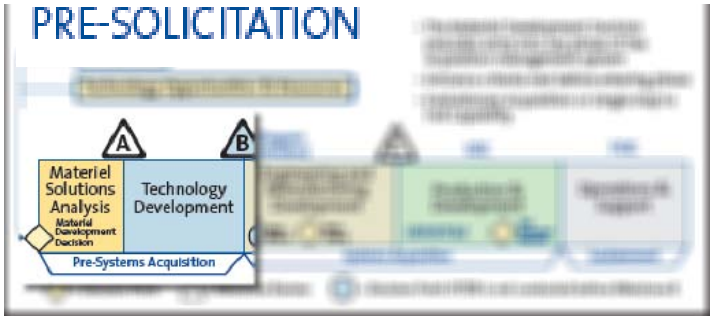


Activity	Systems Engineering	Test and Evaluation
Prototyping & Risk Reduction	Prototyping (Technology and Design)	Early involvement of testers, …as a program conducts pre-system acquisition activities, especially prototype testing. The T&E Strategy should be consistent with and complementary to the Systems Engineering Plan (SEP).
	TRL Maturation	Include TRL Maturation plans in T&E Master Plan and TES
	SE Support for Technology Risk Reduction	The TES describes, in as much detail as possible, the risk-reduction efforts across the range of activities
	Oversight of Competitive Designs	Oversight of Competitive Test Programs, Facilities and Teaming Coordination as required
	Risk Assessment	Participate in Risk Assessment Activities
Input to Acquisition/ Planning, CARD, Budget and Other	SE in Contract Requirements	T&E in contract requirements
	SE Input into the post-PDR Report, report to MDA, Acquisition Strategy, TEMP, CARD, and the ICE	The SEP, SSP, RMP, and the resulting RFP should integrate the T&E policy directives and best practices from government and industry
Evidence of Strong SE Activity	PDR and Post-PDR Report and Assessment	PDR and Post-PDR Report and Assessment
	Tech Reviews up to and including PDR	Support technical reviews, Test Readiness Reviews, acceptance requirements, and schedule.
	SEP	TES and TEMP
	Strong Reliability, Availability and Maintainability (RAM)	Include RAM program in T&E Strategy
Inputs to Requirements	Systems Requirements Definition	Ensure T&E approach can satisfy Requirements verification approach
	RAM and Sustainability	Include RAM program in T&E Strategy

Reference DAG Sections 4.3.1 and 4.3..2

Reference Incorporating Test and Evaluation into Department of Defense Acquisition Contracts • MAY 2009 • Sections 2 and 3

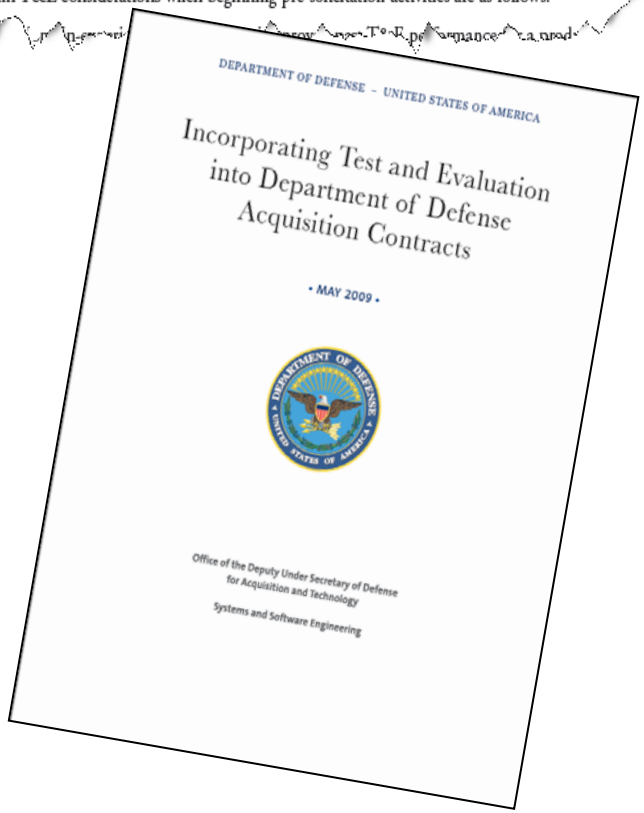
Additional T&E Activities Needed in the Pre-solicitation "Early" Phase



1. **Select a Domain – Experienced Contractor With Proven Performance**
2. **The SEP, SSP, RMP, and the resulting RFP should integrate the T&E policy directives and best practices from government and industry.**
3. **Ensure the integrated T&E strategy and approach address the total life cycle of the program**
4. **Ensure the specific test ranges/facilities and test support equipment are identified for each type of testing.**
5. **Incorporate T&E requirements in budgets and cost estimates**
6. **Consider Joint Interoperability Test Command (JITC) interoperability and Net-Ready Key Performance Parameter (NR-KPP) certification**

6 Important PM and team T&E Considerations When Beginning pre-solicitations activities

The PM and team, and the program, must be prepared to enter the EMD phase with cost, schedule, and expected system performance requirements balanced and synchronized. Six important PM and team T&E considerations when beginning pre-solicitation activities are as follows:


DEPARTMENT OF DEFENSE – UNITED STATES OF AMERICA

Incorporating Test and Evaluation into Department of Defense Acquisition Contracts

• MAY 2009 •

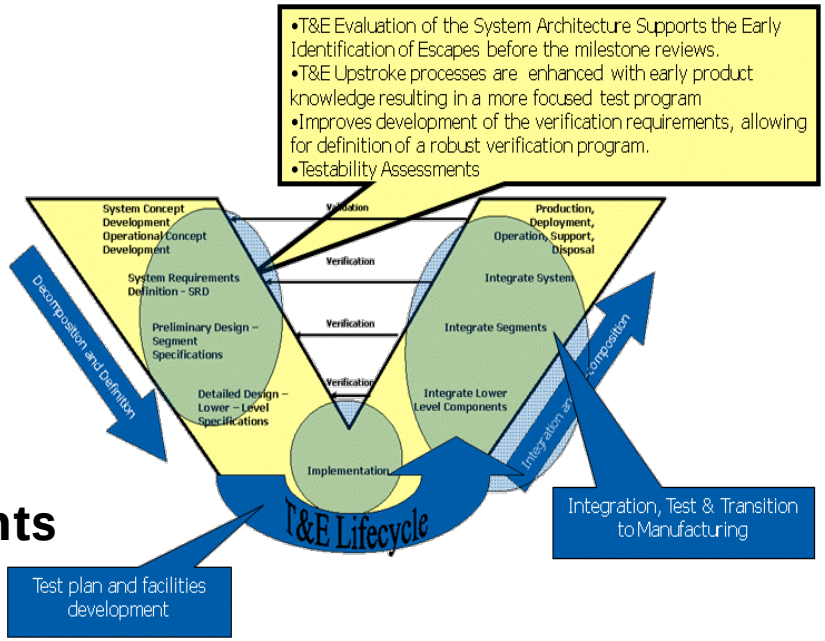
Office of the Deputy Under Secretary of Defense for Acquisition and Technology

Systems and Software Engineering

Incorporating T&E into DoD Acquisition Contracts May - 2009

What Can T&E Do To Help The Process?

- **Architecture Process**
  - **Test Architecture**
    - **Physical**
    - **Functional**
- **Requirements Process**
  - **Identify "Not Testable Requirements"**
  - **Develop Unique Test Requirements**
    - **Become Requirements "Owners" For Unique Testing Requirements Imposed on the Design**
  - **Provide T&E Skills in the Development of Verification Statements**



Get Involved Early

Early T&E Activity Benefits

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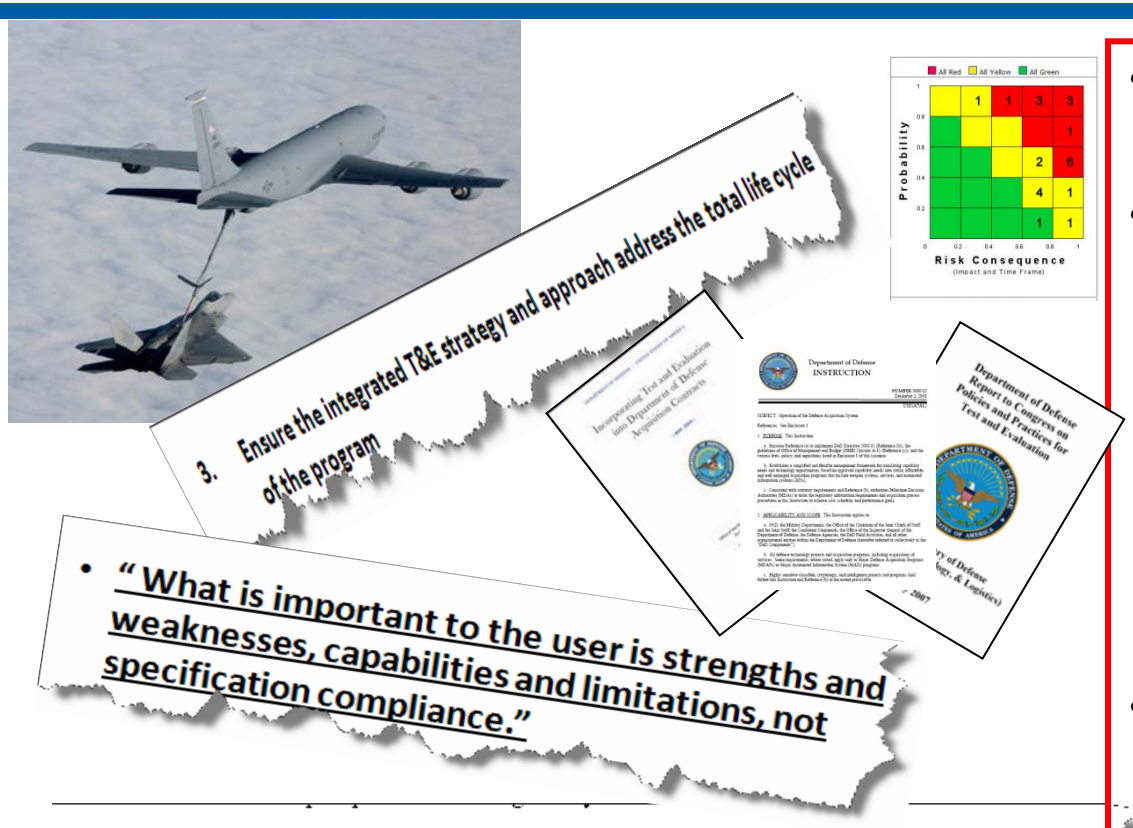
Architecture Development	
Activity	**Benefit**
Architecture Tested for •Errors / Holes •Limits •Testability	Evaluated System Architecture Prior to Requirements Development. Know that the System Architecture has already been "Tested"

Requirements Development	
Activity	**Benefit**
Develop Unique Test Design Requirements	Ensure Complete Requirements Set is developed – No Late to need requirements developed for test program imposed late on the design
Provide skill mix for development of Verification Requirements	Complete and Concurred with Requirements Verification Criteria
Assess Requirements Verifiability	Complete Requirements Validation Check, Provide Independent Assessment of Requirements Verifiability at Program Reviews

T&E and SE Working Together to Achieve Early Program Milestones Benefits The Entire Program Lifecycle

Additional Early T&E Activity Established By Policy



b. The PM, in concert with the user and the T&E community, shall coordinate DT&E, OT&E, LFT&E, family-of-systems interoperability testing, information assurance testing, and modeling and simulation (M&S) activities, into an efficient continuum, closely integrated with requirements definition and systems design and development.

- **Align Early Test Planning with Program Risk Planning**
- **Conduct early Test Planning**
  - **Develop Flow Down of TES and TEMP to Test Program**
  - **Establish Major Test Range Coordination**
  - **Ensure the integrated T&E strategy and approach address the total life cycle of the program and include an event-based T&E approach that is not schedule-driven but consists of logically sequenced test events**
- **Develop Operational Based Test Parameters to be Applied to Verification Plan and Integrated Test Plan**
- **Coordinate the DT and OT Test Communities Early**

Starting Early on Lifecycle Planning and Coordination Supports Policy and Law

How Did We Do?

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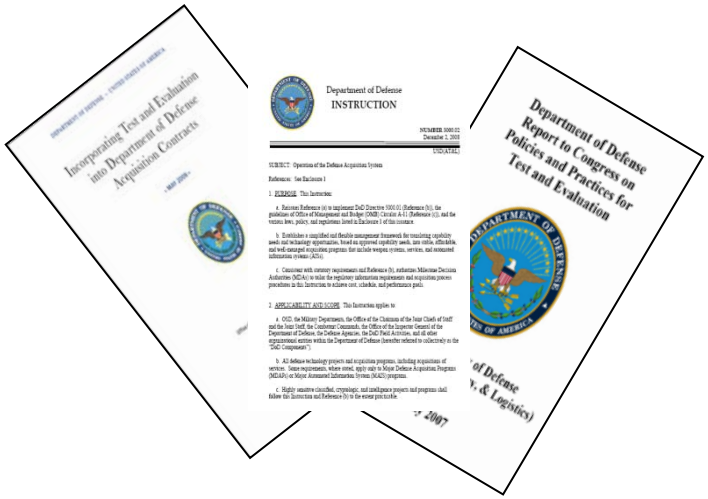
Problem	T&E Contribution to Solution
Requirements instability/creep –not well defined, not understood	T&E Skill Mix Can Support Architectural Evaluations and Requirements Development and Verification Criteria
Inadequate early technical planning	Integrated DT&OT – TES and TEMP integrated with Contractor Experience
Inadequate funding or phasing of funding to properly execute the program	Program Managers Must Account for Early T&E Skill Mix – T&E Skill must Contribute to Early Program Milestones
Lack of schedule realism –success oriented, concurrent, poor estimation/planning	Include an event-based T&E approach that is not schedule-driven
Lack of technical maturity or a credible back-up plan –"we're always optimistic"	T&E Supports the Technology Development Phase and Risk Reduction Programs
Limited focus on life cycle issues	T&E Strategy, Planning, and Execution Must Address the Entire Program Lifecycle

T&E Skill Mix Contributions Early Help Ensure Program Success

Conclusions



- Policy and Law now Mandate Early and Integrated T&E Participation Within Acquisition Programs
- T&E Can Enhance and help Validate Early System Engineering Products
  - T&E Unique Skill Mix Can Aide In the Development of The Product Architecture and Requirements
- The Programs Lifecycle Must be Included Within the Requirements and Test Program
- Programs Can No Longer Minimize the Needs For T&E in Early Program Phases

Programs Must Ensure That T&E Is Integrated Early – Budgeted Early – Tasked Early