OSD DT&E: Implementing the Technology Maturity Vector

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Outline

• SSE Mission
• Systems Engineering Revitalization
• Emerging Systemic Issues
• DT&E Revitalization Focus
• DT&E Technology Maturity Initiative
• Pending Guidance Changes
Systems and Software Engineering
Mission Statement

• Shape acquisition solutions and promote early technical planning

• Promote the application of sound systems and software engineering, developmental test and evaluation, and related technical disciplines across the Department's acquisition community and programs

• Raise awareness of the importance of effective systems engineering and drive the state-of-the-practice into program planning and execution

• Establish policy, guidance, best practices, education, and training in collaboration with academia, industry, and government communities

• Provide technical insight to program managers and leadership to support decision making

Evolving System Engineering Challenges

DT&E – From Concept to Combat
Systems Engineering Revitalization Cycle

DEVELOPMENTAL TEST & EVALUATION

Input

Output

Policy

Guidance

Program Support

E&T

Academic Community

Industry Associations

Research & Development

SE, T&E, & SW/SA Communities

Acquisition Community

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## Top 10 Emerging Systemic Issues

### DEVELOPMENTAL TEST & EVALUATION

1. **Management**
   - IPT roles, responsibilities, authority, poor communication
   - Inexperienced staff, **lack of technical expertise**

2. **Requirements**
   - Creep/stability
   - Tangible, measurable, **testable**

3. **Systems Engineering**
   - Lack of a rigorous approach, technical expertise
   - Process compliance

4. **Staffing**
   - Inadequate Government program office staff

5. **Reliability**
   - Ambitious growth curves, unrealistic requirements
   - Inadequate “test time” for statistical calculations

6. **Acquisition Strategy**
   - Competing budget priorities, schedule-driven
   - Contracting issues, **poor technical assumptions**

7. **Schedule**
   - **Realism**, compression

8. **Test Planning**
   - **Breadth, depth, resources**

9. **Software**
   - Architecture, design/development discipline
   - Staffing/skill levels, organizational competency (process)

10. **Maintainability/Logistics**
    - Sustainment costs not fully considered (short-sighted)
    - Supportability considerations traded

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**Major contributors to poor program performance**

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DT&E Revitalization Focus

- Support Faster Fielding of Improved Capabilities
- **Reduce Risk of Immature Technology in Systems Development**
- Revitalize T&E Workforce Education
- Promote Joint T&E in Live-Virtual-Constructive Environments
- Provide Effective Acquisition Policy and Practices for DT&E
Technology vs. Technical Maturity

**Technical Maturity:** System-level

- Manufacturing
- Reliability
- Safety
- Software
- Integration
- Resources
- Logistics

*Technology Maturity*

*Technology Maturity is a component- or subsystem-level issue*

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Reduce Risk of Immature Technology in Systems Development

DEVELOPMENTAL TEST & EVALUATION

- Immature technology is a primary source of cost and schedule risk
  - GAO -- DAPA
  - QDR -- SSE Program Support Reviews

- “Programs that started development with immature technologies experienced an average acquisition unit cost increase of nearly 21 percent” (GAO-05-301, March 2005)

- Milestone B – USD(AT&L) certification that “the technology in the program has been demonstrated in a relevant environment” - Technology Readiness Level (TRL) 6 (FY06, PL 109-163, Section 801)

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DT&E Technology Maturity Initiative

**Purpose**

- Add Technology Maturity focus into the Systems Engineering and DT&E processes to:
  - Reduce technical, cost, and schedule risk
  - Increase the rigor of SE
  - Plan for alternatives in the event of TM difficulty
  - Verify TRLs during DT&E

**Scope**

- Leverage existing acquisition review structure
- Use existing DDR&E Technology Readiness Assessment (TRA) methodology
Pending Guidance Changes

**DEVELOPMENTAL TEST & EVALUATION**

- Defense Acquisition Guidebook
  - Chapter 4 (SE)
    - For immature critical technology elements (CTE), identify mature alternative
    - If a CTE is not likely to reach TRL 6 before MS B, substitution of the mature alternative may be required
  - Chapter 9 (T&E)
    - Validate technology maturation during Technology Development phase
      - DT supports decisions to shift to alternative technology
Increased TM emphasis in OSD Oversight

**DEVELOPMENTAL TEST & EVALUATION**

- **Program Support Review (PSR)**
  - ID Critical Technology Elements?
  - Current TRLs known?
  - ID Mature alternative components/sub-systems?
  - TRL monitoring, Alternative decision date?

- **Assessment of Operational Test Readiness (AOTR)**
  - TM verification results
  - DT&E performance results
  - IOT&E predictive analysis/M&S

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