Program Support: Perspectives on Technical Planning and Execution

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DEFENSE SYSTEMS
Office of the Under Secretary of Defense for Acquisition, Technology and Logistics

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Top Five Systems Engineering Issues*

- Lack of awareness of the importance, value, timing, accountability, and organizational structure of SE on programs
- Adequate, qualified resources are generally not available within government and industry for allocation on major programs
- Insufficient SE tools and environments to effectively execute SE on programs
- Requirements definition, development, and management is not applied consistently and effectively
- Poor initial program formulation

* Based on an NDIA Study in January 2003
Recap: What We Have Done To Revitalize Systems Engineering

- Issued Systems Engineering (SE) policy
- Issued guidance on SE and Test & Evaluation (T&E)
- Integrating Developmental T&E with SE policy and assessment functions – focused on effective, early engagement of both
- Instituted system-level assessments in support of OSD major acquisition program oversight role
- Established SE Forum – senior-level focus within DoD
- Working with Defense Acquisition University to revise SE, T&E, and enabling career fields curricula
- Leveraging close working relationships with industry and academia

Necessary but not sufficient!
General Approach: Program Outreach

Review Products

- Full reviews conducted 9-12 months before Milestone
  - Detailed findings, risks & actionable recommendations
  - Conducted in “PM support” vice “OSD oversight” mode
- “Quick-Look” reviews conducted 2-3 months before Milestone
  - Same form and formats as full assessment; conducted “for record” review
- Quarterly Defense Acquisition Executive Summary (DAES) assessments inputs
- Test & Evaluation Master Plan (TEMP) and Systems Engineering Plan (SEP) development and approval

PSR Process

In parallel
- PSR
- T&E Planning
- SE Planning
- Acq Strategy

Milestone

Prep IIPT
IIPT
OIPT
SEP & TEMP Approval

PSR Process

Full Assessment
Quick-Look
9-12 Months out
2-3 Months out

Version 1.0; CM# 05-10-002-P
Common failures on acquisition programs include:

- Inadequate understanding of requirements
- Lack of systems engineering discipline, authority, and resources
- Lack of technical planning and oversight
- Stovepipe developments with late integration
- Lack of subject matter expertise at the integration level
- Availability of systems integration facilities
- Incomplete, obsolete, or inflexible architectures
- Low visibility of software risk
- Technology maturity overestimated

**Major contributors to poor program performance**

*Findings from PSRs and DoD-directed Studies/Reviews*
Number of SEPs reviewed: 59

Programs submitting SEPs: 36
  - Number of SEPs approved: 8
  - Number of SEPs pending: 5

Reviews planned for rest of FY06: 103

Component-Managed Acquisitions
- Air Force 23%
- Navy 31%
- Army 26%
- Other 20%

SEP Program Milestones
- Pre MS C 25%
- Pre MS B 56%
- Pre MS A 3%
- Special Interest 16%

Programs by Product Line
- Rotary Wing - 5
- Comms - 4
- Business Systems - 5
- Fixed Wing - 5
- Sea Systems - 3
- Unmanned Systems - 1
- Land Systems - 4
- C2/ISR - 9
Emerging SEP Comments**
(not systemic across all programs)

**BASED ON ANALYSIS OF 27 OUT OF 39 PROGRAMS
Program Support
<table>
<thead>
<tr>
<th>General Review Areas</th>
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**ASSESSMENT METHODOLOGY FOR PRE-MILESTONE A**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<td>1.0</td>
<td>Mission Capabilities/Requirements Assessment Area</td>
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*http://www.acq.osd.mil/ds/se*
Program Support Review Activity
(since March 2004)

- Number of PSRs completed: 25
- Number of AOTRs completed: 4
- Reviews planned for rest of FY06
  - PSRs: at least 24
  - AOTRs: 2

Service-Managed Acquisitions

- Air Force: 52%
- Navy: 20%
- Marine Corps: 8%
- Army: 16%
- Agencies: 4%

Reviews Conducted Prior to Each Milestone

- Pre-MS A: 4%
- Pre-MS B: 40%
- Pre-MS C: 16%
- Pre-FRP: 8%
- Other: 32%

Programs by Product Line

- Fixed-Wing Aircraft: 32%
- Rotary-Wing Aircraft: 16%
- Space Systems: 12%
- Business Systems: 4%
- Sea Systems: 12%
- Land Systems: 8%
- C2/ISR: 12%
- Unmanned Systems: 4%
Samples of Program Support Review “Strengths”

- Experienced and dedicated program office teams
- Strong teaming between prime contractors, sub-contractors, program offices and engineering support
- Use of well defined and disciplined SE processes
- Proactive use of independent review teams
- Successful management of external interfaces
- Corporate commitment to process improvement
- Appropriate focus on performance-based logistics
- Notable manufacturing processes
- Focus on DoD initiatives
- Excellent risk management practices

But not on all Programs…
Emerging Program Support Findings**
(not systemic across all programs)

- Findings across the 6 general review areas…
  (based on assessment methodology areas)

**BASED ON ANALYSIS OF 14 OUT OF 22 REVIEWS
Driving Technical Rigor Back Into Programs
“How PMs are reacting to PSR recommendations?”

- **Mission Capabilities - Requirements**
  - User requirements not fully defined and/or in flux
  - Established requirements management plan with all stakeholders, including proactive plan for Net-Ready KPP

- **Resources - Personnel**
  - Experienced, dedicated PM office staff, but stretched too thin
  - Expanded, empowered WIPT to bring in technical authority SMEs, users, and DCMA

- **Management - Schedule Adequacy**
  - Technical review planning demonstrated schedule was high risk
  - Lengthen schedule to include full suite of SE technical reviews, supported by adjusted program funding

- **Technical Process - Test & Evaluation**
  - Insufficient reliability growth program to meet user requirements by IOT&E
  - Increased the number of test articles and added sub-system level test events

- **Technical Product - Supportability/Maintainability**
  - Logistics demonstration plan just prior to IOT&E
  - Demonstration re-scheduled prior to MS C

**Better than 90% acceptance of recommendations**
“How do we find solutions to the systemic problems?”

PSR Findings → Program Unique Causes → Program Unique Recommendations

Systemic Analysis

Systemic Issues → Root Causes → Systemic Solutions

DoD Acquisition Community

- Policy/Guidance
- Education & Training
- Best Practices
- Other Processes (JCIDS, etc)
- Oversight (DABS/ITAB)
- Execution (staffing)
Number and Type of Findings by Program

Numbers represent sections of the PSR Methodology

Data from 14 Program Support Reviews
Systemic Analysis Perspective

“What are the systemic problem areas?”

Number of Programs Where Issue Was Prevalent

- Systems Engineering
- Test & Evaluation
- Maintainability
- Software
- Integration/Interoperability
- Requirements
- Schedule

Legend:
- Pre-MS B
- Pre-MS C
- Pre-FRP
Representative Issues
(1 of 3)

• **Representative Issues for Schedule**
  – Schedules too aggressive
  – Detailed schedules missing key components
  – Schedule concurrency (e.g. T&E activities)

• **Representative Issues for Requirements**
  – Requirements don’t support planned modifications, increasing capacity
  – Requirements changed without consideration or coordination with PM/PO and dependent programs
  – “Shortsighted” requirements, i.e. safety critical, bandwidth to support future capabilities

• **Representative Issues for Integration/Interoperability**
  – Integration plans lacking key components
  – Multi-platform, scalable design benefits not realized due to low hw/sw commonality
  – Interoperability with Joint Forces not adequately addressed
Representative Issues

(2 of 3)

• **Representative Issues for **Software
  – Software processes not institutionalized
  – Software development planning doesn’t adequately capture lessons learned to incorporate into successive builds
  – Systems and spiral software requirements undefined
  – Software architecture immature
  – Software reuse strategies are inconsistent across programs
  – Software support plan missing

• **Representative Issues for **Maintainability
  – Maintainability requirements incomplete or missing
  – Diagnostic effectiveness measures are either too ambiguous or missing
  – Tailoring out of criticality calculations translates to inability to monitor the maintainability status of reliability critical items
Representative Issues

(3 of 3)

- **Representative Issues for **Test and Evaluation**
  - No reliability details (hours, profile, exit criteria, confidence level, OC curve)
  - Lack metrics
  - Basis for some threat-based requirements not fully explained or rationalized

- **Representative Issues for Systems Engineering**
  - Lack of disciplined SE process, metrics, etc
  - PO not conducting PRR prior to LRIP
  - Missing Joint CONOPs
  - Missing System Functional Review (SFR) and PDR during SDD
Summary

• We are working to meet the Under Secretary's imperatives in support of transformation by:
  – Providing a context for decisions
  – Putting credibility into the acquisition process
  – Driving systems engineering back into programs

• Our ultimate goal in conducting PSRs is to help all programs achieve mission success through:
  – Early and persistent application of SE
  – Event-driven technical reviews and test programs
Questions...perhaps Answers