



# **Program Support: Capabilities and Value Added Oversight**

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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

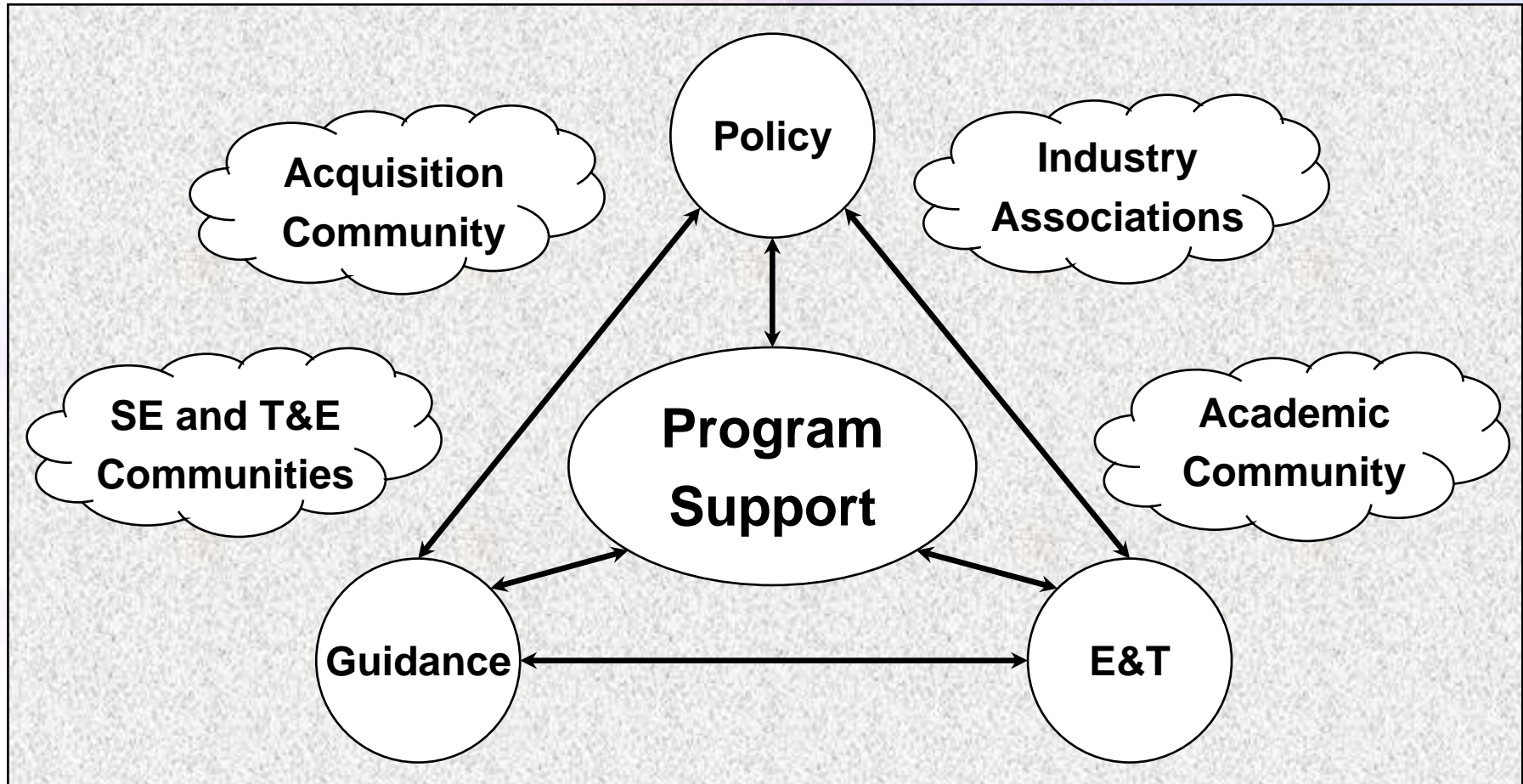


# Recap: What We Have Done To Revitalize Systems Engineering

- 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!***

# Systems Engineering Revitalization Framework



***Driving Technical Excellence into Programs!***



# Driving Technical Rigor Back into Programs “Portfolio Challenge”

- Systems and Software Engineering was tasked to:
  - Review program’s SE Plan (SEP) and T&E Master Plan (TEMP)
  - Conduct program support reviews
- Portfolio of major acquisition (ACAT ID and IAM) programs, supporting 10 Domain Areas:
  - Business Systems
  - Communication Systems
  - C2ISR Systems
  - Fixed Wing Aircraft
  - Unmanned Systems
  - Rotary Wing Aircraft
  - Land Systems
  - Ships
  - Munitions
  - Missiles

***Systems Engineering and T&E Support to Over 150 Major Programs in 10 Domain Areas***

# Driving Technical Excellence into Programs



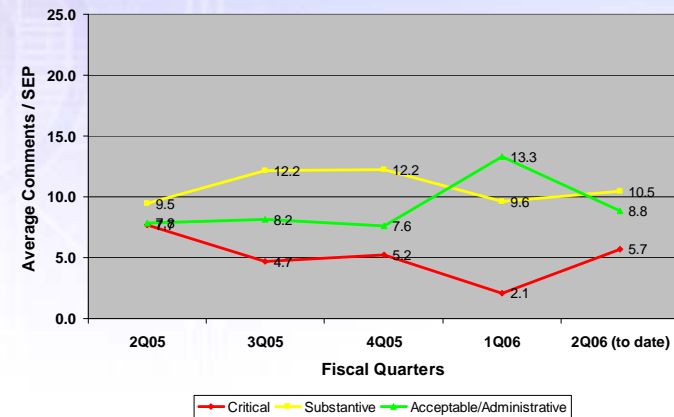
Topic	Systems Engineering	Test & Evaluation	Risk Management	Exit Criteria	Acquisition Strategy
Focus Areas	Requirements	V&V Traceability	Risk ID	Mission Systems	Time-defined
	Organization & Staffing	Test Resources	Risk Analysis	Support	COTS
	Technical Reviews	Test Articles	Risk Mitigation Planning	Manufacturing	Bounded Solutions
	Technical Baseline	Evaluation	Risk Tracking	R & M	Industrial Base
	Linkage w/ Other Program Mgmt & Controls	Linkage w/ Other Program Mgmt & Controls	Evidence of Effectiveness	Net Centric	Risk-based Source Selection
Product	SEP	TEMP	RM Plan	Phase Exit Criteria	RFP, Contract, ASR

# Systems Engineering Plan (SEP) Reviews

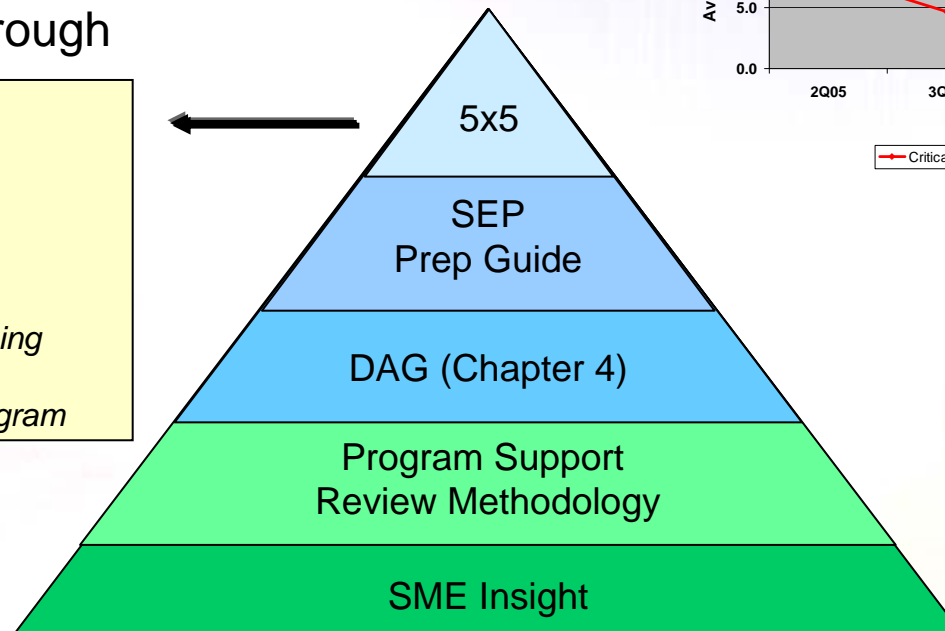


- Structured approach with multiple perspectives
- Iterative review process with Program Office; refining SE planning and documentation with each pass through

Trend Analysis - 5x5 SEP Focus Areas



- SEP Review Areas**
- Program Requirements
  - Technical Staffing and Organization Planning
  - Technical Baseline Management Planning
  - Technical Review Planning
  - Integration w/Overall Management of the Program



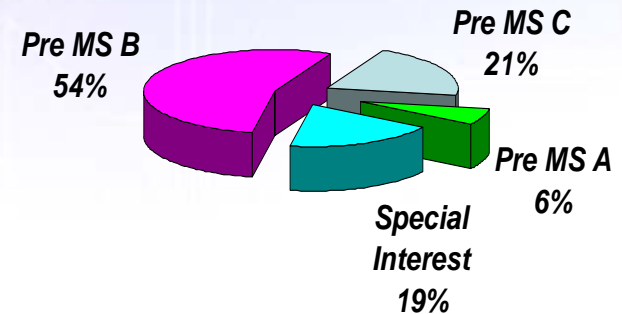
**Thorough SE Planning Ensures Fewer “Gotchas” in Program Execution**

# Systems Engineering Plan Activity (since November 2004)

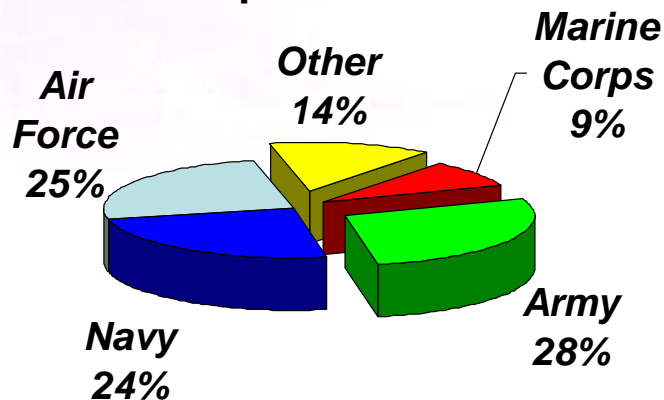


- Programs submitting SEPs: 49
- Number of SEPs reviewed: 88
  - OSD-approved: 13
  - Pending final approval: 3
  - Pending draft review: 6
- Reviews planned for rest of FY06: >50

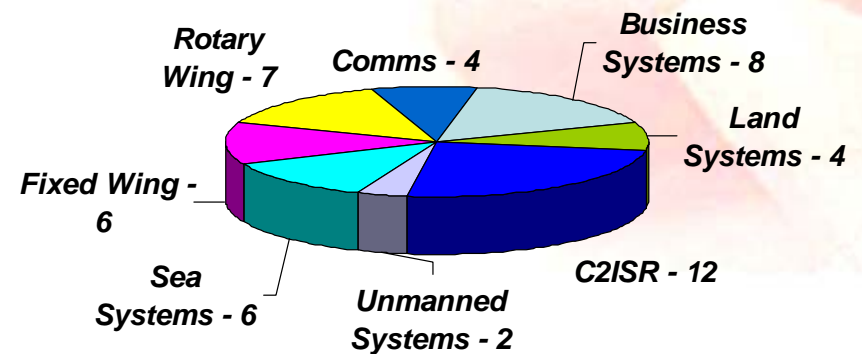
## SEP Program Milestones



## Component-Managed Acquisitions



## Programs by Product Line

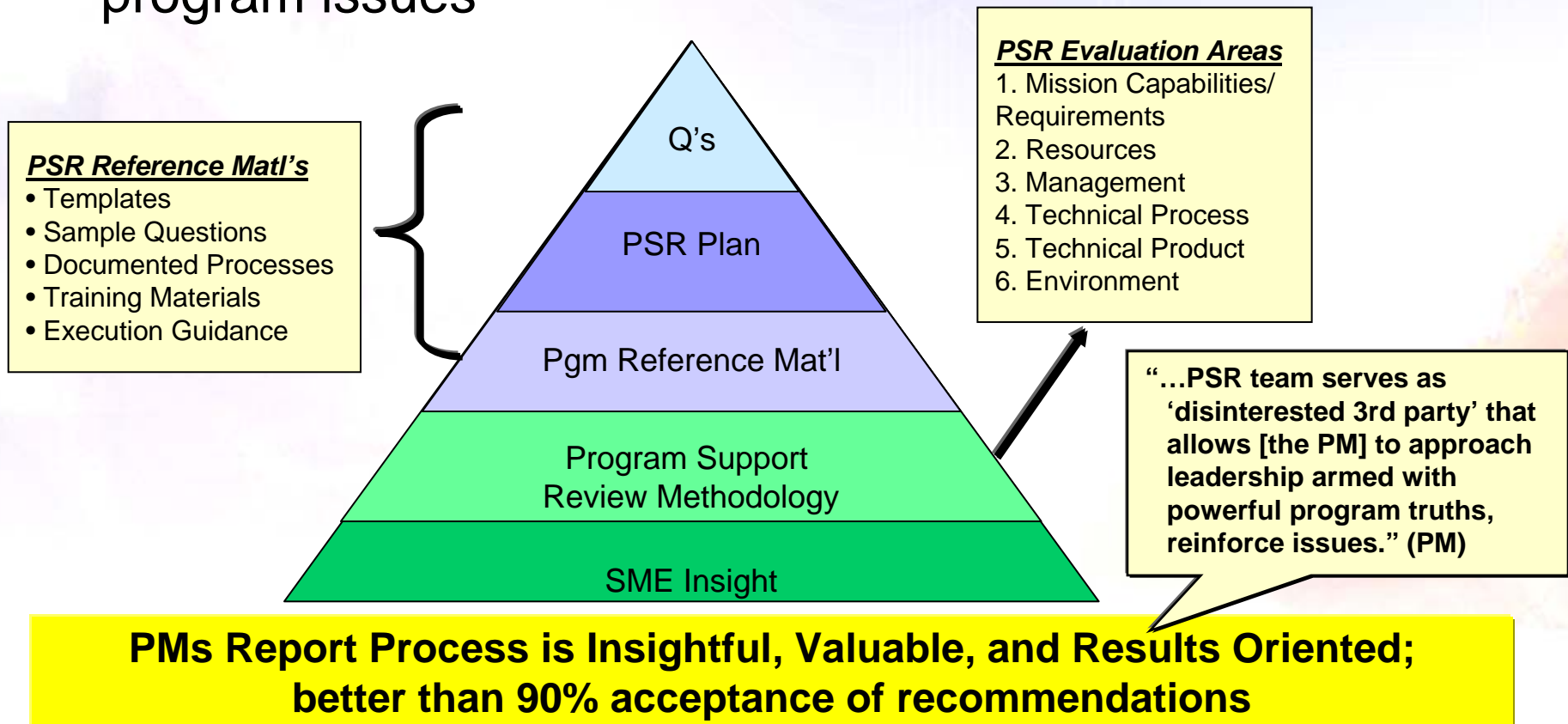






# Program Support Review (PSR)

- Repeatable, tailorable, exportable process
- Trained workforce with in-depth understanding of PMs' program issues

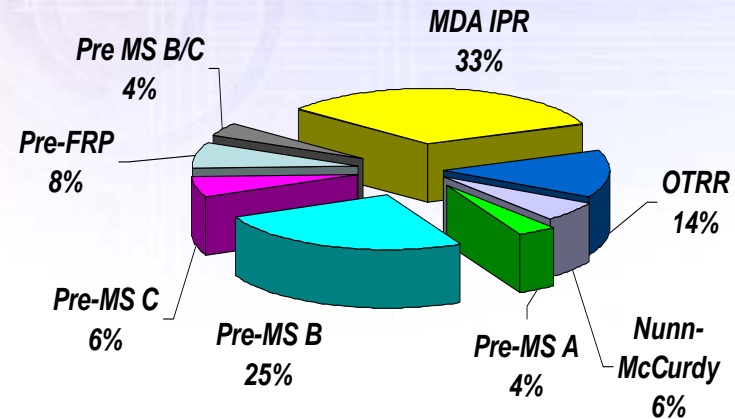




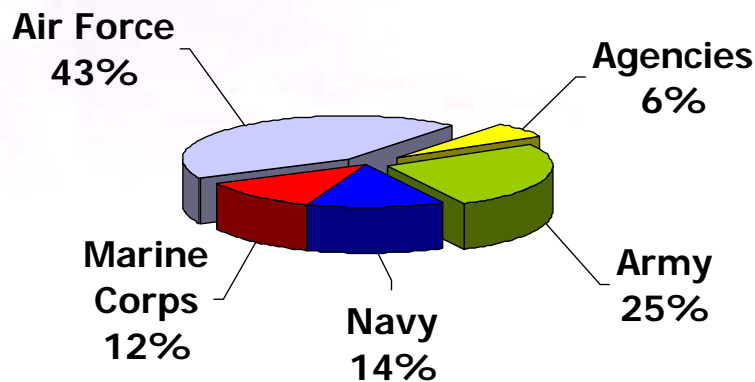
# Program Support Review Activity (since March 2004)

- PSRs/NARs completed: 34
- AOTRs completed: 7
- Nunn-McCurdy Certification: 3
- Participation on Service-led IRTs: 4
- Technical Reviews: 3
- Reviews planned for rest of FY06
  - PSRs/NARs: 10
  - AOTRs: 4
  - NARs: 2

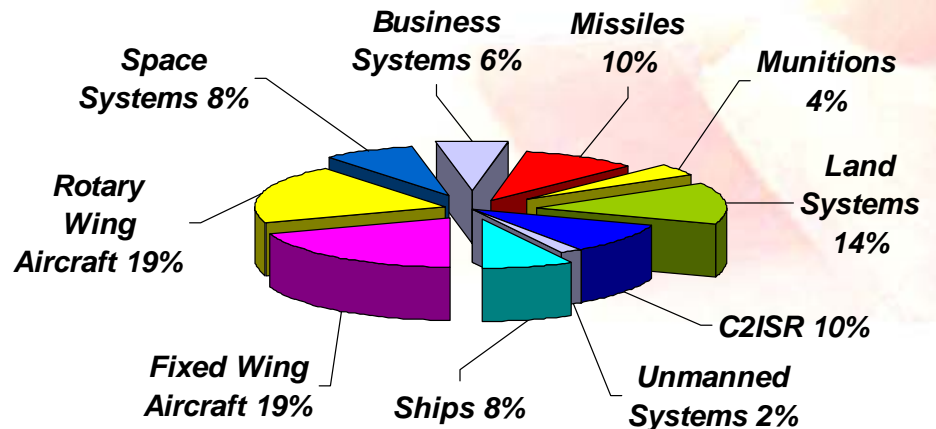
## Decision Support Reviews



## Service-Managed Acquisitions



## Programs by Domain Area

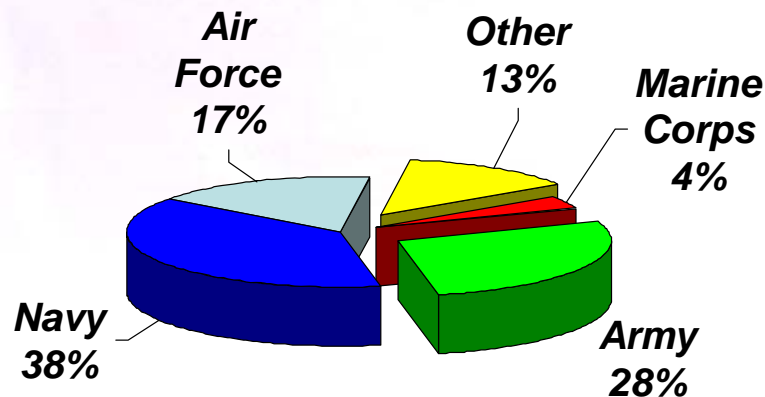




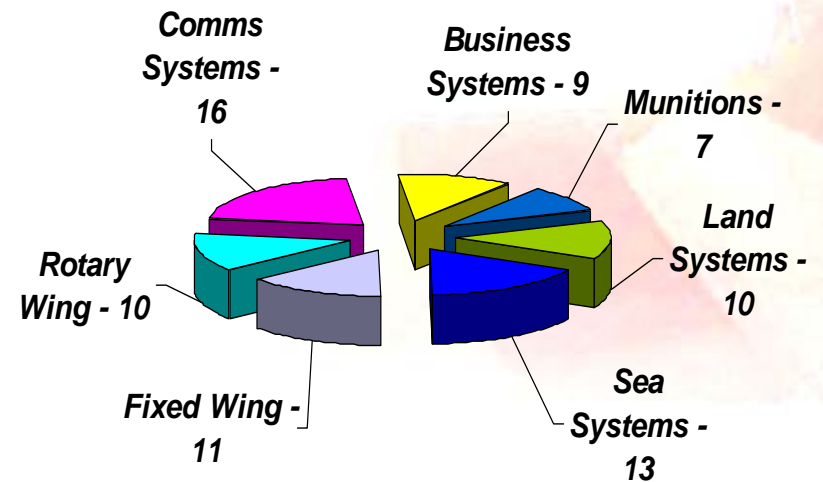
# Test and Evaluation Master Plan Activity (since November 2004)

- Programs submitting TEMP: 66
- Number of TEMP reviewed: 76  
(includes TEMP updates/change pages)
  - Approved: 69
  - Pending approval: 7
- Reviews planned for rest of FY06: >30

### Component-Managed Acquisitions



### Programs by Product Line



# Systemic Analysis Vision and Expected Outcomes



**Vision:** Illuminate systemic program performance strengths and weaknesses in an informative and consistent manner in support of stakeholder decision making and more effective acquisition policy, education and training.

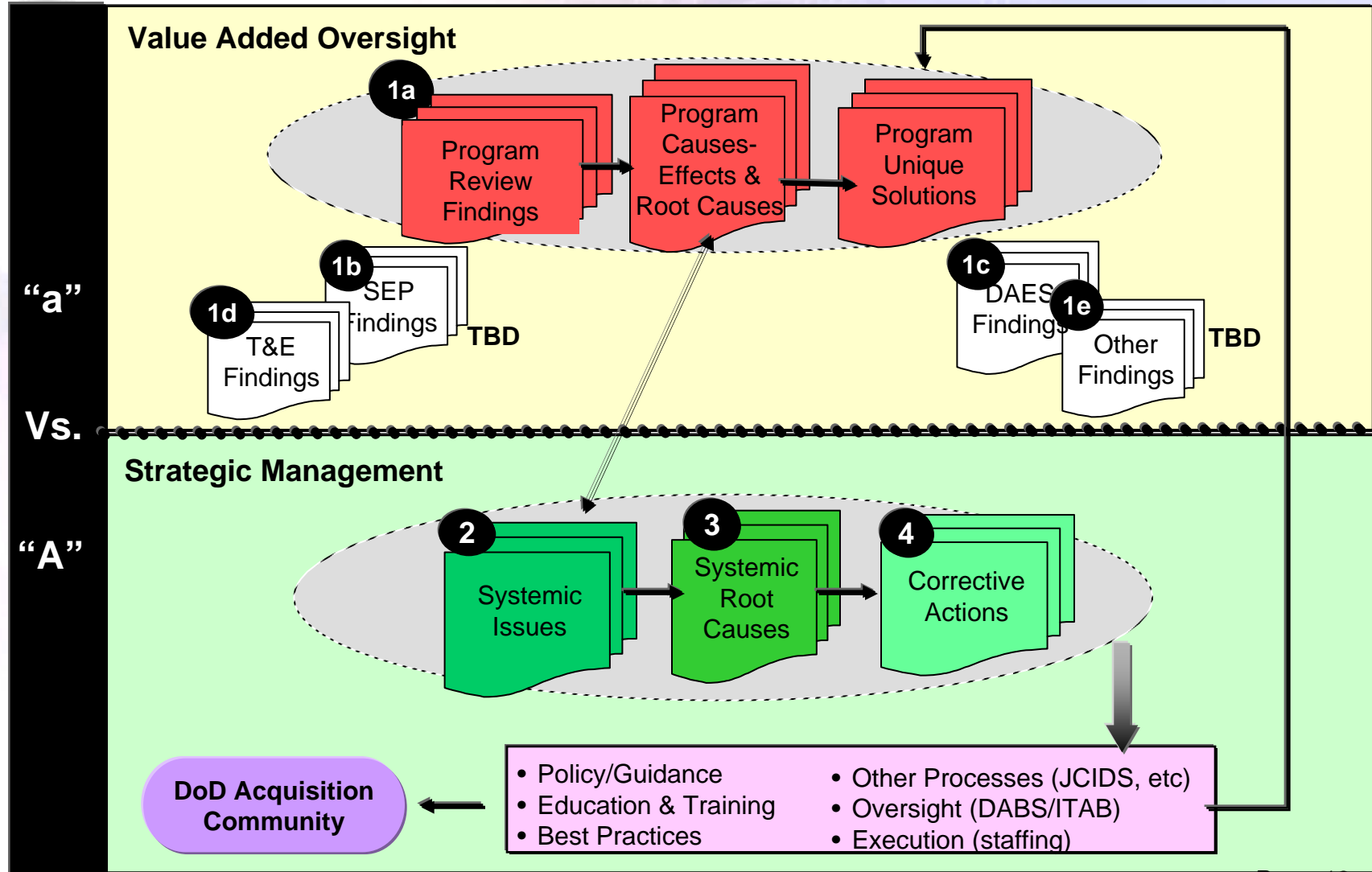
## **Desired Outcomes:**

- |           |   |  |
|-----------|---|--|
| Near Term | { | <b>Improved state of the practice</b> <ul style="list-style-type: none"><li>• Provide foundational information to support policy, education, training and identification of best practices</li><li>• Inform target audiences of issues and their root causes, risks and recommended solutions based on lessons learned</li><li>• Improve PSR process (e.g. methodology, training for teams, templates etc.)</li></ul>                  |
| Mid Term  | { | <b>Informed decisions</b> <ul style="list-style-type: none"><li>• Data to inform leadership decisions, and support leadership questions</li><li>• Ability to correlate program symptoms (seen in OIPTs, DAES, etc) to systemic indicators</li></ul>  |
| Long Term | { | <b>Parametric Modeling</b> <ul style="list-style-type: none"><li>• Trend data, analyzed over time<ul style="list-style-type: none"><li>– Track individual cost, schedule, performance over time</li><li>– Track improved performance vs. corrective actions made; successful practices incorporated</li></ul></li><li>• Identify relationships across multiple data sources (SEP/TEMP, DAES, NARs, etc.) and CAIG cost model</li></ul> |



# Systemic Analysis Model

Steps 1A, 2-4 Underway





# Representative Issues\*

- **Requirements**
  - Change without consideration, lack support for planned modifications, lack SoS definition
- **Management**
  - Overworked PM offices, poor SoS integration, lack measures driven approach to risk management, lack quantifiable exit criteria
- **Schedule**
  - Aggressive, concurrent, missing key components
- **Software**
  - Processes not institutionalized, lessons learned not incorporated into successive builds, immature architecture, support plans missing
- **Test and Evaluation**
  - Lack metrics, reliability details, poor planning to evaluate joint interoperability, inability to pass IOT&E
- **Systems Engineering**
  - Lack of disciplined SE process, metrics, missing technical reviews, technology risks not mitigated

\* Based on systemic analysis of 23 PSRs to date



# Representative Systemic Issues (1 of 4)

## 1.0 Mission Capabilities/Requirements

- Reliability requirements lack mission context
- Lack of growth margins
- Upgrade programs lack measurable baseline requirements
- Systems of Systems not well defined; Stovepiped ORDs/CDDs
- Requirement creep leads to systems engineering churn
- Difficulty in balancing requirements (e.g., transportability, lethality and survivability requirements)

## 2.0 Resources

- Small, overworked program offices
- Plans to evaluate joint interoperability not well defined



# Representative Systemic Issues (2 of 4)

## 3.0 Management

- Reluctance to demonstrate key functionality in SDD phase
  - » Integration of Mission Equipment Packages onto platforms
- Success oriented schedules trivialize integration risks
  - » COTS poses integration and support challenges
- Concurrent development and testing schedules
- Lack of planning for follow-on increments and technical refresh
- Avoidance of quantifiable Milestone exit criteria
- PMs not leveraging lessons learned from other programs
- Lack of overall SoS integrator with authority and resources
  - » Poor funding commitment for SoS programs
  - » Lack of issue resolution process across program and Service lines
- Poor communication across IPTs
- Lack of measures-driven approach to risk management





# Representative Systemic Issues (3 of 4)

## 4.0 Technical Process

- Dependence on critical technologies
  - » Late Technology Readiness Assessments preclude ITAs
- Technology Development phase not used properly to mitigate risks
- Lack of disciplined SE processes and SE reviews, on all programs
  - » No “time” to conduct full suite of SE technical reviews
  - » Insufficient time between SE technical reviews
- Limited capability demonstrated by MS C
- Systems Engineering
  - » Lack of disciplined SE process, metrics, missing technical reviews, technology risks not mitigated
- T&E Planning
  - » Success oriented T&E schedules; No time for corrective actions
  - » Lack of attention to reliability growth
  - » Poor plans to mature suitability during SDD phase
  - » Hesitancy to establish exit criteria for test phases
  - » Plans to evaluate joint interoperability not well defined



# Representative Systemic Issues (4 of 4)

## 5.0 Technical Product

- Production Planning
  - » Production Readiness Reviews (PRRs) not always conducted
    - PRRs at key suppliers not always planned
  - » Lack of supplier management plans
  - » Movement to improving processes; eliminating waste
- Software
  - » Software processes not institutionalized
  - » No plans to apply lessons learned into successive builds
  - » Systems and spiral software requirements undefined
  - » Software reuse strategies are inconsistent across programs
  - » Software support plan missing



# Questions/Discussion



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