



DoD Systems and Software Engineering: *Taking it to the Next Level*

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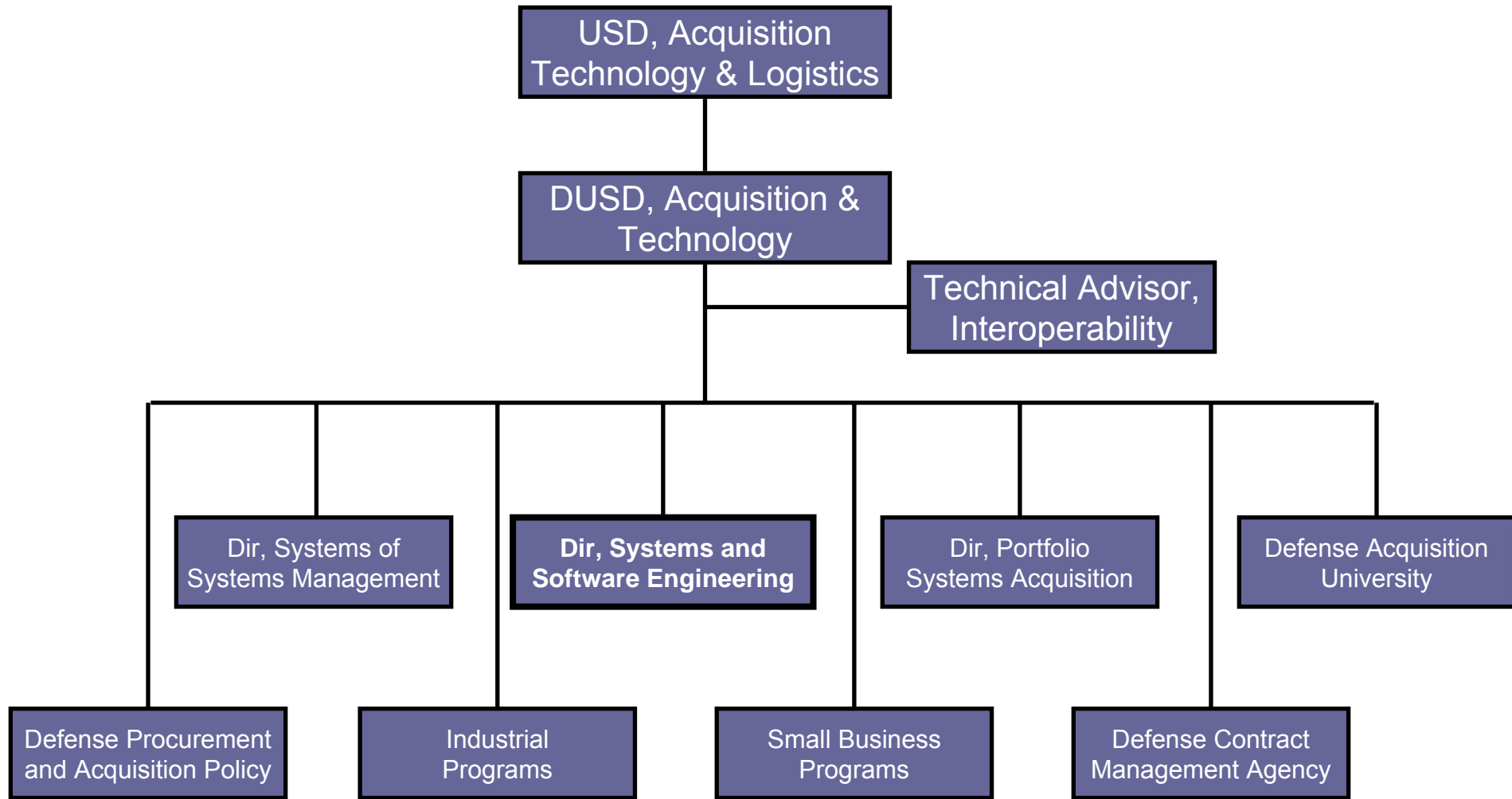
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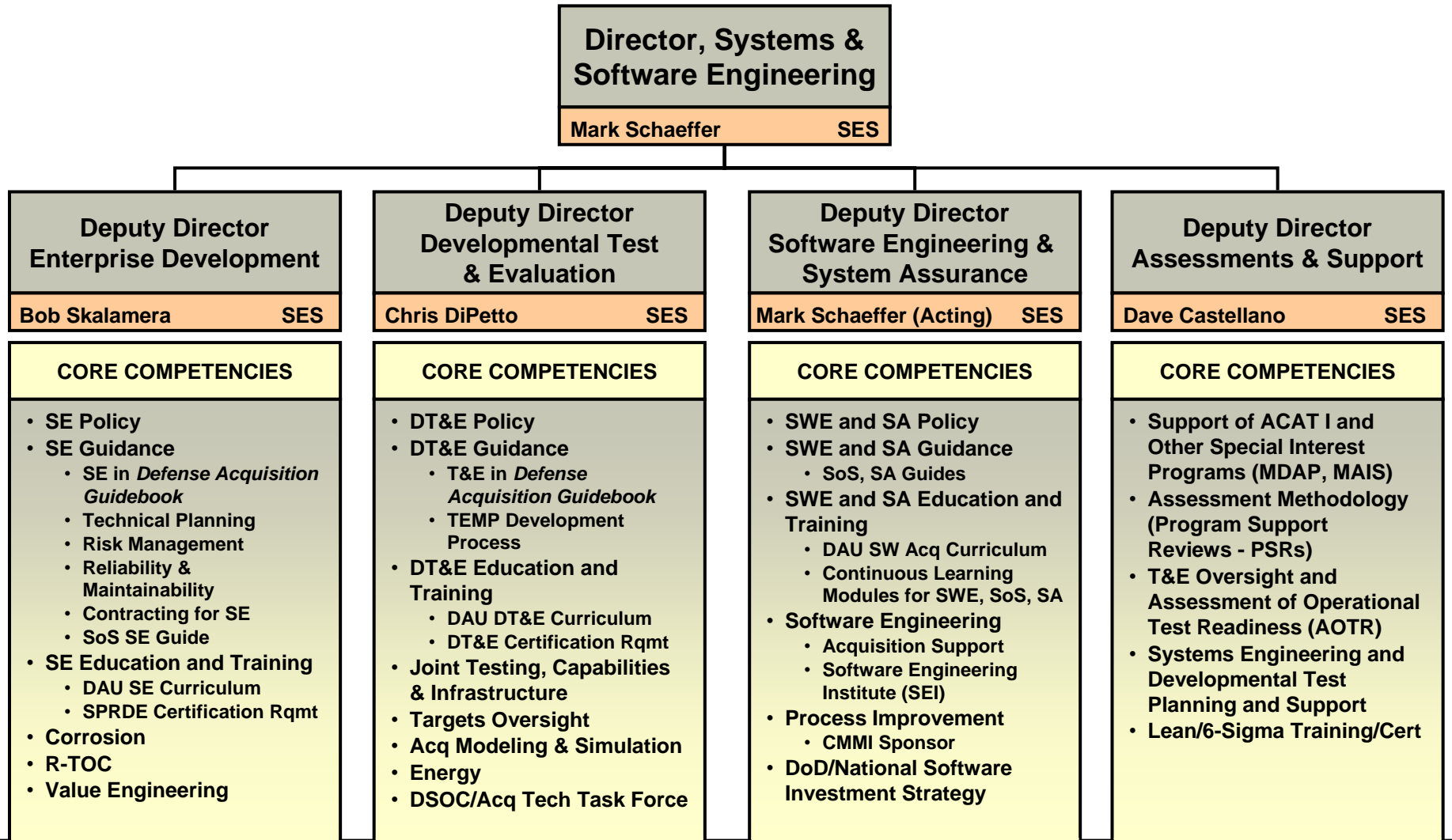
Office of the Under Secretary of Defense Acquisition, Technology and Logistics



Flatter, Leaner, Empowered!



Systems and Software Engineering Organizational Core Competencies



Acquisition program excellence through sound systems and software engineering



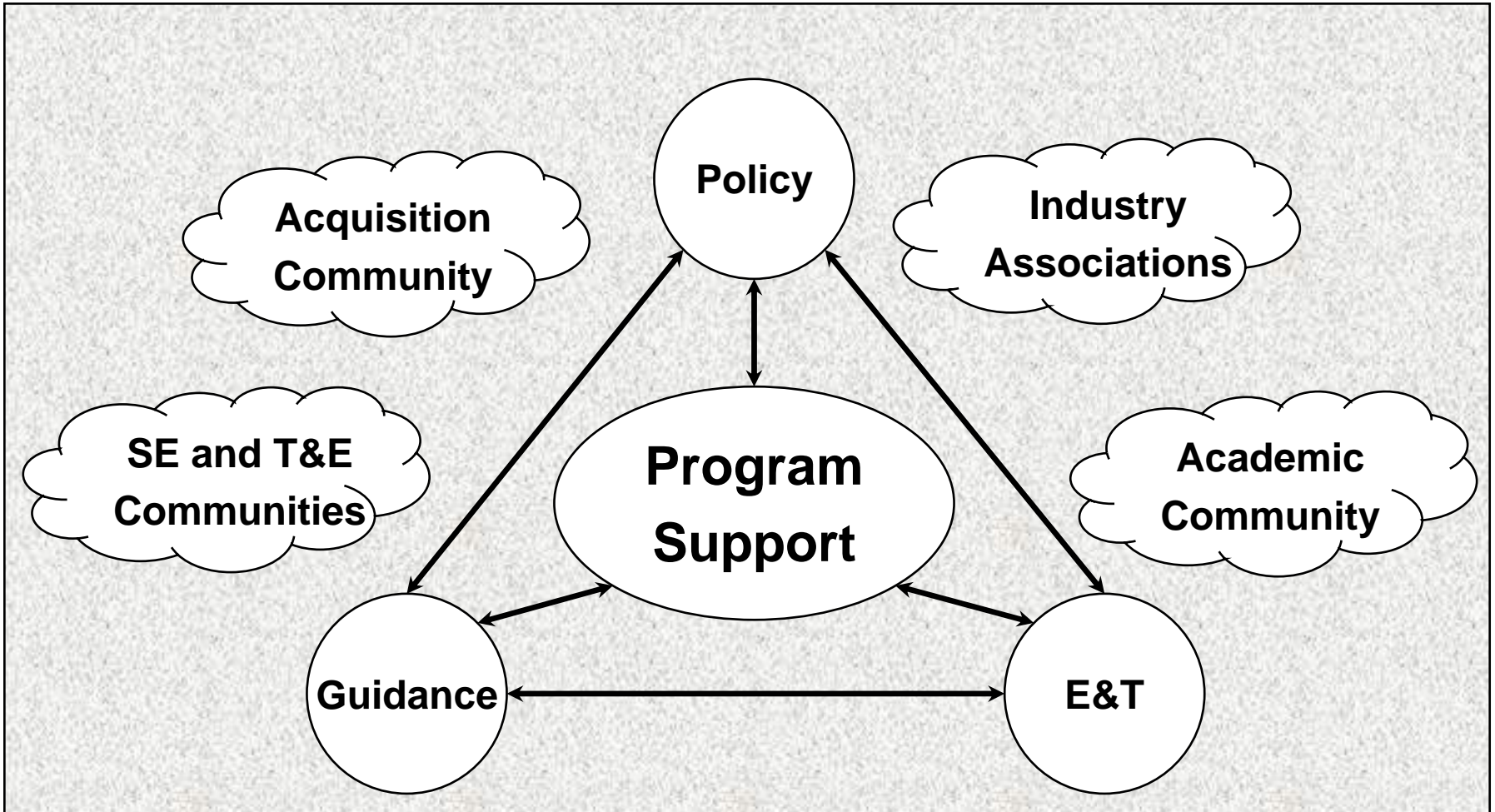
Systems and Software Engineering Mission Statement

- 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, education and training in collaboration with academia, industry, and government communities
- Provide technical insight to program managers and leadership to support decision making

Driving Technical Excellence into Programs!



Systems Engineering Revitalization Framework



Driving Technical Excellence into Programs!

Bob Skalamera
Deputy Director, Enterprise Development



Systems Engineering Revitalization Effort

- Issued Department-wide Systems Engineering (SE) policy
- Issued guidance on SE, T&E, and SE Plans (SEPs)
- Instituted system-level assessments in support of DAB, OIPT, DAES, and in support of programs
- Established SE Forum to ensure senior-level focus within DoD
- Integrating DT&E with SE policy and assessment functions--focused on effective, early engagement of both
- Instituting a renewed emphasis on modeling and simulation in acquisition
- Working with Defense Acquisition University to revise curricula (SPRDE, T&E, PQM, LOG, PM, ACQ, FM, CONT)
- Leveraging close working relationships with industry and academia



Driving Technical Rigor Back into Programs

“Importance and Criticality of the SEP”

- Program’s SEP provides insight into every aspect of a program’s technical plan, focusing on:
 - What are the program requirements?
 - Who has responsibility and authority for managing technical issues—what is the technical staffing and organization?
 - How will the technical baseline be managed and controlled?
 - What is the technical review process?
 - How is the technical effort linked to overall management of the program?
- Living document with use, application, and updates clearly evident

The SEP is fundamental to technical and programmatic execution on a program



Systems Engineering Plan Trends

➤ What is working:

- Programs beginning to establish SE WIPTs early in the life cycle to develop and document their technical planning
- Increased Program Executive Office level Lead/Chief Systems Engineers involvement in SEP development
- Movement to event-driven versus schedule-driven programs
 - More focus on entry and exit criteria for technical reviews

➤ What needs work:

- Firming up technical planning prior to RFP release
- Proposed processes for a program not always tailored to fit program
 - Often appear to be copied from a manual or guide
- SEP author is someone who is not familiar with the program technical strategy
- SEPs need to be consistent with key program documents

Chris DiPetto

Deputy Director, Developmental Test and Evaluation



Driving Technical Rigor Back into Programs "Importance of TEMP"

- TEMP provides insight into adequacy of T&E planning:
 - Are the scope and content of planned tests adequate?
 - Is the T&E program structured to support decisions at major milestones? Measure technical progress and maturity?
 - Are the schedule and resource requirements adequate?
 - Is DT&E program structured to achieve successful OT&E?
- Living document that must reflect all major changes to a program

The TEMP is fundamental to validating program maturity



Defense Safety Oversight Council

- Defense Safety Oversight Council (DSOC)
 - Established by the Secretary of Defense to reduce DoD mishap and accident rates
 - Eight DSOC Task Forces, including Acquisition and Technology Programs (ATP) Task Force
- How the ATP Task Force has responded
 - Issued DoD-wide policy on “Defense Acquisition System Safety” (USD(AT&L) Memo, Sep 23, 2004)
 - Developed evaluation criteria for System Safety
 - Incorporated ESOH into *Defense Acquisition Guidebook*
 - Developed DAU continuous learning course, "System Safety in Systems Engineering" (CLE009)
 - Formed NDIA Systems Engineering Division System Safety Committee in December 2004

“I challenge all of you to reduce the number of mishaps and accident rates by at least 50% in the next two years.”

**Hon. Donald Rumsfeld
Secretary of Defense**



Safety and the Joint Warfighting Environment

The Issue

- For USSOCOM to field joint systems involving weapons, ammunition, and/or explosives, safety certifications and/or releases must be obtained from multiple system safety boards. Differing processes, procedures, and certification criteria among these various boards can produce:
 - Unacceptable certification delays
 - Duplicative testing
 - Conflicting determinations and interpretations of testing results, which in turn are reflected in disagreements among the respective boards regarding the corrective actions needed to receive certification and/or release
 - Certification impasses because no duly authorized adjudication authority exists to resolve the disagreements

Existing Safety review process is not supportive of Joint warfighting requirements



Safety and the Joint Warfighting Environment

The Solution

- Working with the Service Safety Boards, SOCOM and OSD developed a “Joint Weapons Safety Review” process to address SOCOM issue
- “Joint Weapons Safety Review Guide for USSOCOM” was developed and is in use
- SOCOM regulation expected NLT Jan 07 to formalize the process
- OSD looking to expand process across DoD benefiting all Joint programs

did
The process ~~must~~ change without forfeiting the integrity of safety



Energy Leadership

The Problem:
It costs the Army about 16 times
as much to deliver fuel as to
purchase it....”



Conclusion:
Investments in End-
Use Efficiency at the
Spear Tip Cascade
Down the Supply
Pyramid

Pete Nolte
Assessment and Support



Driving Technical Rigor Back Into Programs “Portfolio Challenge”

- For major acquisition programs (ACAT ID and IAM), USD (AT&L) tasked SSE to:
 - Review program’s SE Plan (SEP)
 - Review program’s T&E Master Plan (TEMP)
 - Conduct Program Support Reviews (PSRs)
- Across these domains:
 - Business Systems
 - Communication Systems
 - C2ISR Systems
 - Fixed Wing Aircraft
 - Unmanned Systems
 - Rotary Wing Aircraft
 - Land Systems
 - Ships
 - Munitions
 - Missiles

Systems Engineering support to over 130 major programs in ten domains



Driving Technical Rigor Back Into Programs “Program Support Reviews”

- Program Support Reviews provide insight into a program’s technical execution focusing on:
 - SE as envisioned in program’s technical planning
 - T&E as captured in verification and validation strategy
 - Risk management - integrated, effective and resourced
 - Quantifiable milestone exit criteria as captured in Acquisition Decision Memo
 - Acquisition strategy as captured in Acquisition Strategy Report
- Independent, cross-functional view aimed at providing risk-reduction recommendations

The PSR reduces risk in the technical and programmatic execution on a program



Driving Technical Discipline

Topic	Systems Engineering	Test & Evaluation	Programmatic Risk Management	Exit Criteria	Acquisition Strategy
Focus Areas	Requirements	V&V Traceability	Risk ID	Mission Systems	Mission Capability
	Organization & Staffing	Test Resources	Risk Analysis	Support	Resources & Management
	Technical Reviews	Test Articles	Risk Mitigation Planning	Manufacturing	Technical Process
	Technical Baseline	Evaluation	Risk Tracking	R & M	Technical Product
	Linkage w/ Other Program Mgmt & Controls	Linkage w/ Other Program Mgmt & Controls	Evidence of Effectiveness	Net Centric	Enterprise Environment
Product	SEP	TEMP	RM Plan	Phase Exit Criteria	ASR/APB

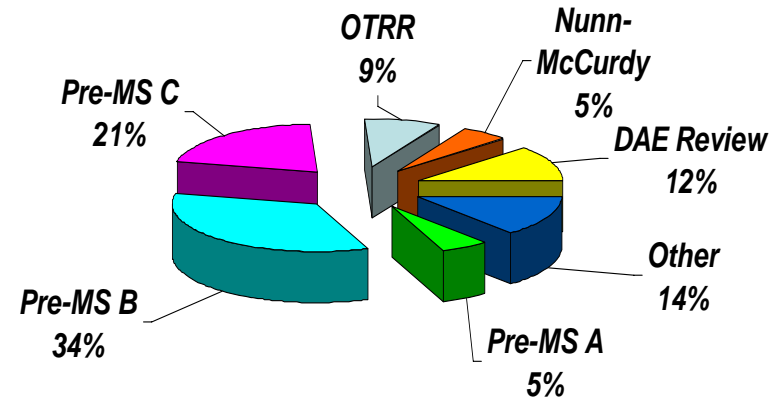
Examples



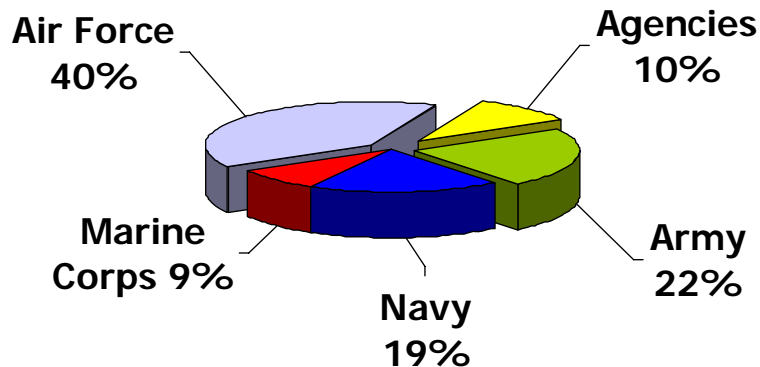
Program Support Review Activity

- PSRs/NARs completed: 37
- AOTRs completed: 7
- Nunn-McCurdy Certification: 3
- Participation on Service-led IRTs: 2
- Technical Reviews: 9
- Reviews planned for FY07:
 - PSRs/NARs: 14
 - AOTRs: 2
 - Nunn-McCurdy: 1

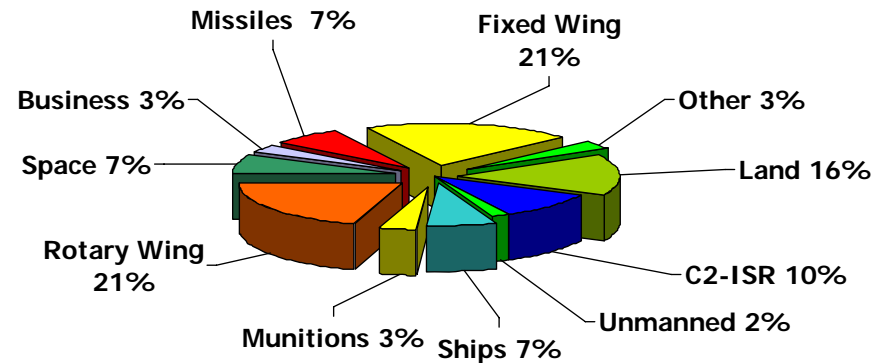
Decision Support Reviews



Service-Managed Acquisitions



Programs by Domain Area





Top 10 Emerging Systemic Issues

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

Major contributors to poor program performance

Mark Schaeffer

Director, Systems and Software Engineering
Acting Deputy Director, Software Engineering
and System Assurance



AT&L Vision for Software Center of Excellence

- USD(AT&L) vision: Establish a world class DoD competency for software
- Initial efforts:
 - Determine the state of software engineering: What organizations and initiatives address software
 - Identify issues for attention
- Ongoing activities
 - Software Industrial Base Study
 - NDIA/DoD Top Software Issues Workshop
 - Outreach visits with Component and Industry software organizations
 - DoD Software Strategy Summit
- Next Steps:
 - Establish a collective vision for DoD software strategy and investment
 - Implement, in partnership with the software community



DoD Software Center of Excellence Organizational Tenets

- **Support Acquisition Success**
 - Ensure effective and efficient software solutions across the acquisition spectrum of systems, SoS and capability portfolios
- **Improve the State-of-the-Practice of Software Engineering**
 - Advocate and lead software initiatives to improve the state-of-the-practices through transition of tools, techniques, etc.
- **Provide Leadership, Outreach and Advocacy**
 - Implement at Department and National levels, a strategic plan for meeting Defense software requirements
- **Foster Software Resources to meet DoD needs**
 - Enable the US and global capability to meet Department software needs, in an assured and responsive manner

***Promote World-Class Leadership for Defense
Software Engineering***



SSE Looking Ahead

- Complete standing up Software Engineering and System Assurance Directorate
- Policy/Guidance/Education & Training
 - Update DoD 5000-series policy and *Defense Acquisition Guidebook* in Systems Engineering, Software, Test and Evaluation, and System Assurance areas
 - Develop/publish: SoS for SE Guide, System Assurance Guide, Contracting for SE Guide
 - Develop/publish revised templates for TES and TEMP
 - Complete/update courses: TST101, 202, 301; SYS203, 302; SAM101, 201, 301
 - Complete CLMs: Trade Studies, Modular Open Sys Approach, Modeling & Sim in T&E
- Continue to provide technical support to programs and decision makers
- Initiatives
 - Energy Security IPT; Executive Secretary to Energy DSB
 - Publish: SOCOM and DoD Joint Safety Review Process Guides, UMS Safety Precepts Guide, Program Review Safety Evaluation Criteria Guide
 - Complete Software Industrial Base Study per PDM II
 - Continue and extend outreach on Software, Systems Assurance, DT&E, and SE Effectiveness through NDIA, SE Forum, and Academia



Challenges Remain

- Component and Industry adoption and effective implementation of sound SE practices as early as possible in the system life cycle
- Retention and development of technical acumen in an aging and shrinking acquisition workforce
- SE support to Acquisition Initiatives stemming from the QDR
- Implementing a DoD vision and strategy for software
- Meeting all requests for technical support to programs



For More Information...

- WebCast: video, slides and questions/answers
<http://www.dau.mil>
- Defense Software Strategy Summit, Washington DC, 18-19 Oct 06
- NDIA Systems Engineering Conference, San Diego, 24-26 Oct 06
- Contact Us
 - Policy, Guidance, Publications, Speeches, Presentations,...
<http://www.acq.osd.mil/se/>
 - Training and Education
<http://www.dau.mil/>
 - DSOC Acquisition and Technology Programs Task Force
<http://www.acq.osd.mil/atptf/>
 - Via e-mail: ATL-ED@osd.mil