



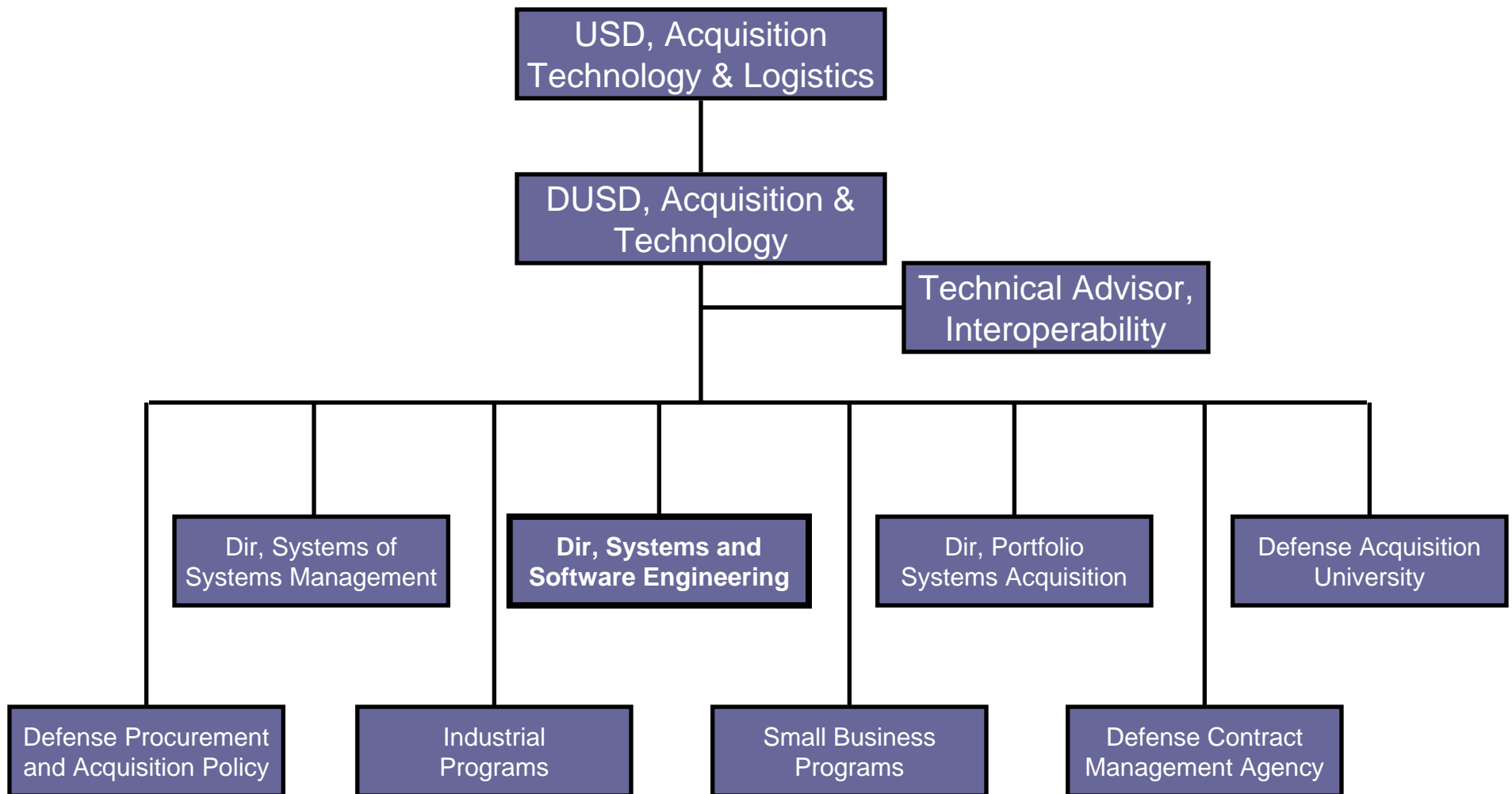
***9<sup>th</sup> Annual NDIA  
Systems Engineering Conference  
2006***

**Mark D. Schaeffer**

Director, Systems and Software Engineering  
Office of the Under Secretary of Defense (A&T)



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



***Flatter, Leaner, Empowered!***



# State of Systems Engineering Director, Systems & Software Engineering

Est. Aug 06

**Director, Systems & Software Engineering**  
Mark Schaeffer SES

**Deputy Director Enterprise Development**  
Bob Skalamera SES

**Deputy Director Developmental Test & Evaluation**  
Chris DiPetto SES

**Deputy Director Software Engineering & System Assurance**  
Mark Schaeffer (Acting) SES

**Deputy Director Assessments & Support**  
Dave Castellano SES

- CORE COMPETENCIES**
- SE Policy
  - SE Guidance
    - SE in *Defense Acquisition Guidebook*
  - Technical Planning
  - Risk Management
  - Reliability & Maintainability
  - Contracting for SE
  - SoS SE Guide
  - SE Education and Training
    - DAU SE Curriculum
    - SPRDE Certification Rqmt
  - Corrosion
  - R-TOC
  - Value Engineering

- CORE COMPETENCIES**
- DT&E Policy
  - DT&E Guidance
    - T&E in *Defense Acquisition Guidebook*
    - TEMP Development Process
  - DT&E Education and Training
    - DAU DT&E Curriculum
    - DT&E Certification Rqmt
  - Joint Testing, Capabilities & Infrastructure
  - Targets Oversight
  - Acq Modeling & Simulation
  - Energy
  - DSOC/Acq Tech Task Force

- CORE COMPETENCIES**
- SWE and SA Policy
  - SWE and SA Guidance
    - SoS, SA Guides
  - SWE and SA Education and Training
    - DAU SW Acq Curriculum
    - Continuous Learning Modules for SWE, SoS, SA
  - Software Engineering
    - Acquisition Support
    - Software Engineering Institute (SEI)
  - Process Improvement
    - CMMI Sponsor
  - DoD/National Software Investment Strategy

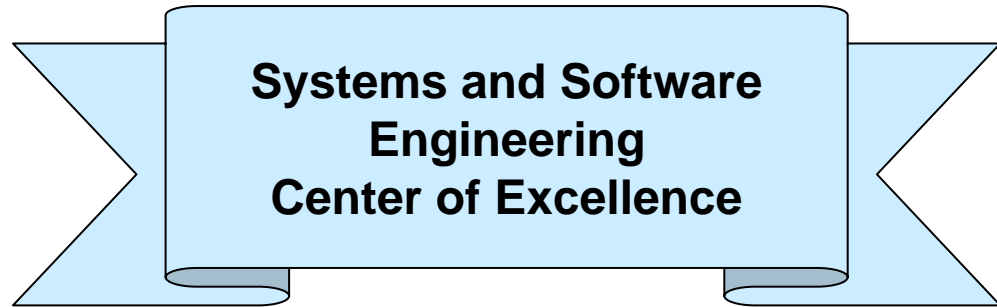
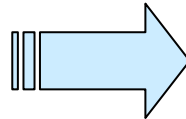
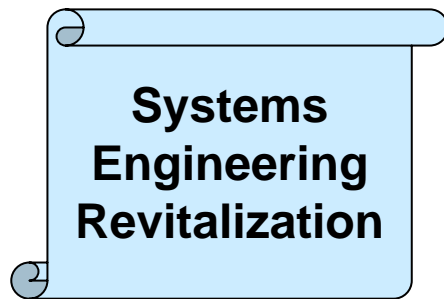
- CORE COMPETENCIES**
- Support of ACAT I and Other Special Interest Programs (MDAP, MAIS)
  - Assessment Methodology (Program Support Reviews - PSRs)
  - T&E Oversight and Assessment of Operational Test Readiness (AOTR)
  - Systems Engineering and Developmental Test Planning and Support
  - Lean/6-Sigma Training/Cert

*Acquisition program excellence through sound systems and software engineering*



# *Vision for Systems Engineering and Software*

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- **Competencies Improved**
- **Delivered Product Suite**
  - Courseware
  - Policy/Guidance
  - Program Support methods
- **Elevated Stature**
- **Raised Awareness**
- **Positive Influence**

- **World class leadership**
- **Broaden to Software Engineering, System Assurance, Complex Systems-of- Systems**
- **Responsive and agile, proactive to changing customer needs**
- **Focused technical assistance, guidance, and workforce education and training**

***. . . the Technical Foundation  
that Enables Acquisition Excellence***



# Systems and Software Engineering Mission Statement

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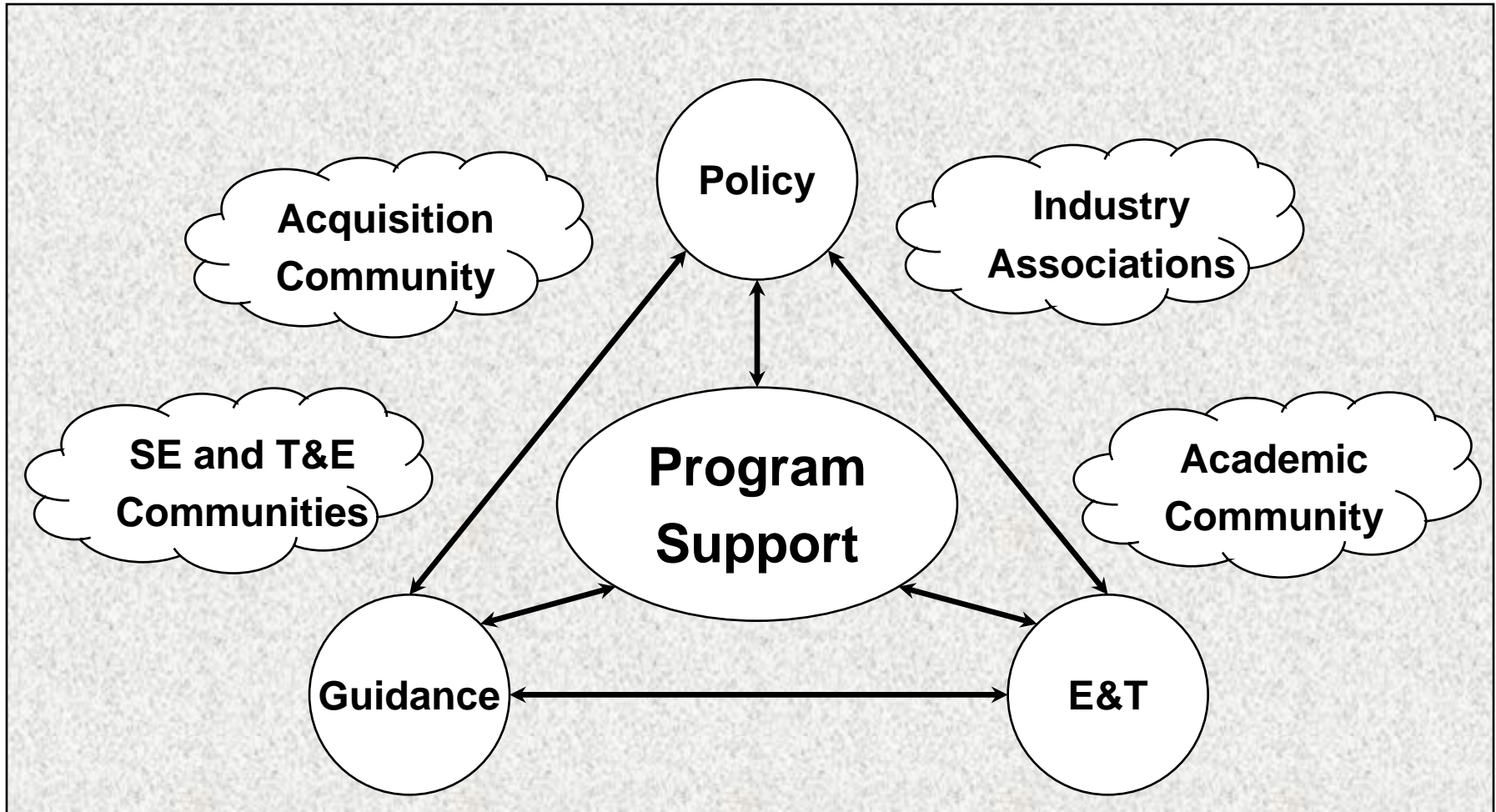
- Shape acquisition solutions and promote early technical planning
- Promote the application of sound systems and software engineering, developmental test and evaluation, and related technical disciplines across the Department's acquisition community and programs
- Raise awareness of the importance of 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

***Evolving System Engineering Challenges***



# Systems Engineering Revitalization Framework

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



# Systems Engineering Policy

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- Policy Memorandum (February 2004) and Policy Addendum (October 2004)
  - Programs shall apply robust SE approach and develop a SE plan
  - Each PEO shall have a lead or chief systems engineer
  - Event-driven technical reviews with entry criteria and independent SMEs unless waived by MDA
  - OSD shall review program SEPs for ACAT ID and IAM programs
  - Defense Systems shall establish a SE Forum
- DoDD 5000.2 Update
  - Reflect “fact-of-life” policy changes

***No new policies in 2006***



# Systems Engineering Guidance

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- Published Defense Acquisition Guidebook
- Published DoD Guide for Achieving Reliability, Availability, and Maintainability
- Published Integrated Master Plan and Integrated Master Schedule Preparation and Use Guide
- Published Systems Engineering Plan Preparation Guide
- Published Risk Management Guide for DoD Acquisition
- Upcoming:
  - Update Defense Acquisition Guidebook
  - Publish Contracting for SE Guide

***Continues to be refined***





# Systems Engineering Education, Training, & Outreach

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- **Updating formal training across key career fields:**  
SE, Acquisition Program Management, Contract Management, Finance, Logistics
  - New introductory course SYS101 now online
  - New intermediate course SYS202 online next week, classroom SYS203 available Oct 07
  - New advanced SYS302 course available Jan 07
- **Developing continuous learning, on-line courses:**
  - Available: Reliability and Maintainability, Technical Reviews, System Safety, Modeling and Simulation, Technical Planning
  - In development: Corrosion Prevention and Control, Modular Open Systems Approach, Trade Studies
- **Established new, strengthened certification requirements for systems engineers**
  - New SPRDE career path provides for broader experience and training for selected positions
- **Engaging universities:**  
Stevens Institute of Technology, University of Southern California, Stanford, Southern Methodist, George Mason, Service Academies and Naval Postgraduate School, AFIT/CSE

***Portfolio refreshed and growing***



## Driving Technical Rigor Back Into Programs “Program Support Reviews”

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- 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
  - 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

***Yielding systemic insights***



# Top 10 Emerging Systemic Issues

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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

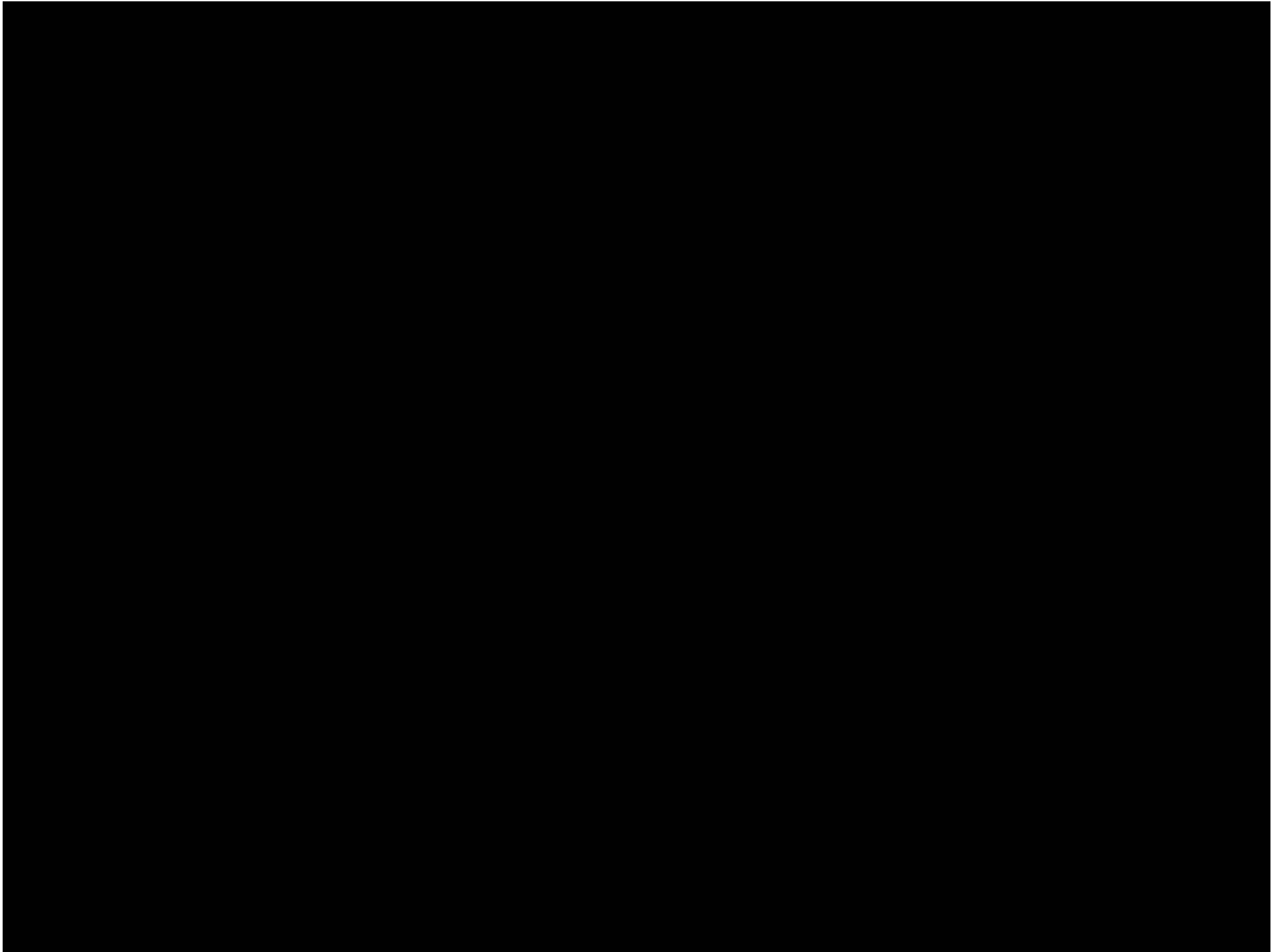
***Major contributors to poor program performance***



# Challenges Remain

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- Implementing a DoD vision and strategy for software
- NDIA Top 5 SE Issues/Top 7 Software Issues/SW Summit recommendations
- Component and Industry adoption and effective implementation of sound SE practices as early as possible in the system life cycle
- SE Working Integrated Product Teams (SE WIPTs)
- Retention and development of technical acumen in an aging and shrinking acquisition workforce
- Meeting all requests for technical support to programs
- SE support to Acquisition Initiatives stemming from the QDR
- Continue to evolve “high visibility” initiatives:
  - Energy
  - CMMI
  - DSOC
  - System-of-Systems
  - Modeling & Simulation
  - System Assurance





# Energy Leadership

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- Commodity fuel costs are significant, but only the tip of the iceberg
  - It costs the Army about 16 times as much to deliver fuel as to purchase it....”
- Investments in end-use efficiency at spear tip cascade down supply pyramid
- Energy Security IPT recommendations approved by DAWG
  - Platform Fuel Efficiency – revise policy to incorporate delivered cost of fuel in acquisition decisions
    - 3 pilot programs being considered
  - Assured Fuels (testing, certification, industry incentives)
  - Accelerate Facilities Initiatives



# System-of-Systems Engineering

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- DUSD (A&T) directed OSD-led effort to develop and publish System-of-Systems (SoS) Systems Engineering guide
  - 6-month effort addressing areas of agreement across community
  - Initial focus on SoS with stated requirements and organizations responsible for execution
  - Addresses DAG technical process and considerations for technical management across system life cycle
    - Focused on systems engineering challenges characteristics of SoS and suggested approaches
  - Audience: Program Managers and Lead/Chief Engineers for SoS acquisition programs, legacy systems, and constituent programs

***Draft of initial version of guide is out for review***



# CMMI: New Release and Next Steps

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## Issues:

- Integrity of CMMI appraisals
- Misperception and misuse of the CMMI by acquirers

## Actions:

- Implemented changes to the CMMI v1.2 product suite to ensure:
  - Integrity of appraisals
  - Quality of the product suite
  - Education of acquirers
  - Opportunities for streamlining where appropriate
- Developing a CMMI model for Acquirer process improvement
  - Partnership with General Motors
  - Stakeholders cross DoD, Govt Agencies and Industry
- Writing a CMMI guidebook
  - Help acquirers understand what CMMI is and is not
- Conducting study of actual process implementation post-Level 5





# Defense Safety Oversight Council Joint Weapons Safety

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## ➤ 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 with differing processes, procedures, and certification criteria

## ➤ 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” developed and is in use; SOCOM regulation expected Jan 07
- OSD looking to expand process across DoD

***The process changed without forfeiting the integrity of safety!***



# Defense Safety Oversight Council

## Unmanned System Safety

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### ➤ Issue

- FCS Board of Directors raised issue of whether or not proper procedures & processes in place to ensure weaponized unmanned systems safety in the joint battle space

### ➤ Solution

- Working across OSD, Services, and other agencies: war fighters, technical experts, acquisition staffs
- Developed Unmanned System Safety Guide for DoD Acquisition; available and in use
- Formalizing options for implementation: DAG, training courses, encouraging inclusion in commercial standards

***Safety is no accident!***



# System Assurance

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## Issues:

- Vulnerability of our systems to malicious tampering or access
- Numerous assurance, protection and safety initiatives that are not aligned

## Actions:

- Developing a comprehensive System Assurance strategy
- Promoting nationwide collaboration
- Identifying standards activities to address system vulnerabilities
- Developing a Handbook for Engineering System Assurance
  - Guidance for PMs and Engineers on how Systems Engineering practice can be applied to mitigate system vulnerability to malicious control/tampering



# Software Engineering and System Assurance (SSA)

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- 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.
- Lead the DoD and National Software Investment Strategy
  - Implement at Department and National levels, a strategic plan for meeting Defense software requirements
- Implement Global Outreach and Leadership
  - Enable the US and global industrial base capability to meet Department software needs, in an assured and responsive manner

***Be a World-Class Leader in Software Engineering!***