



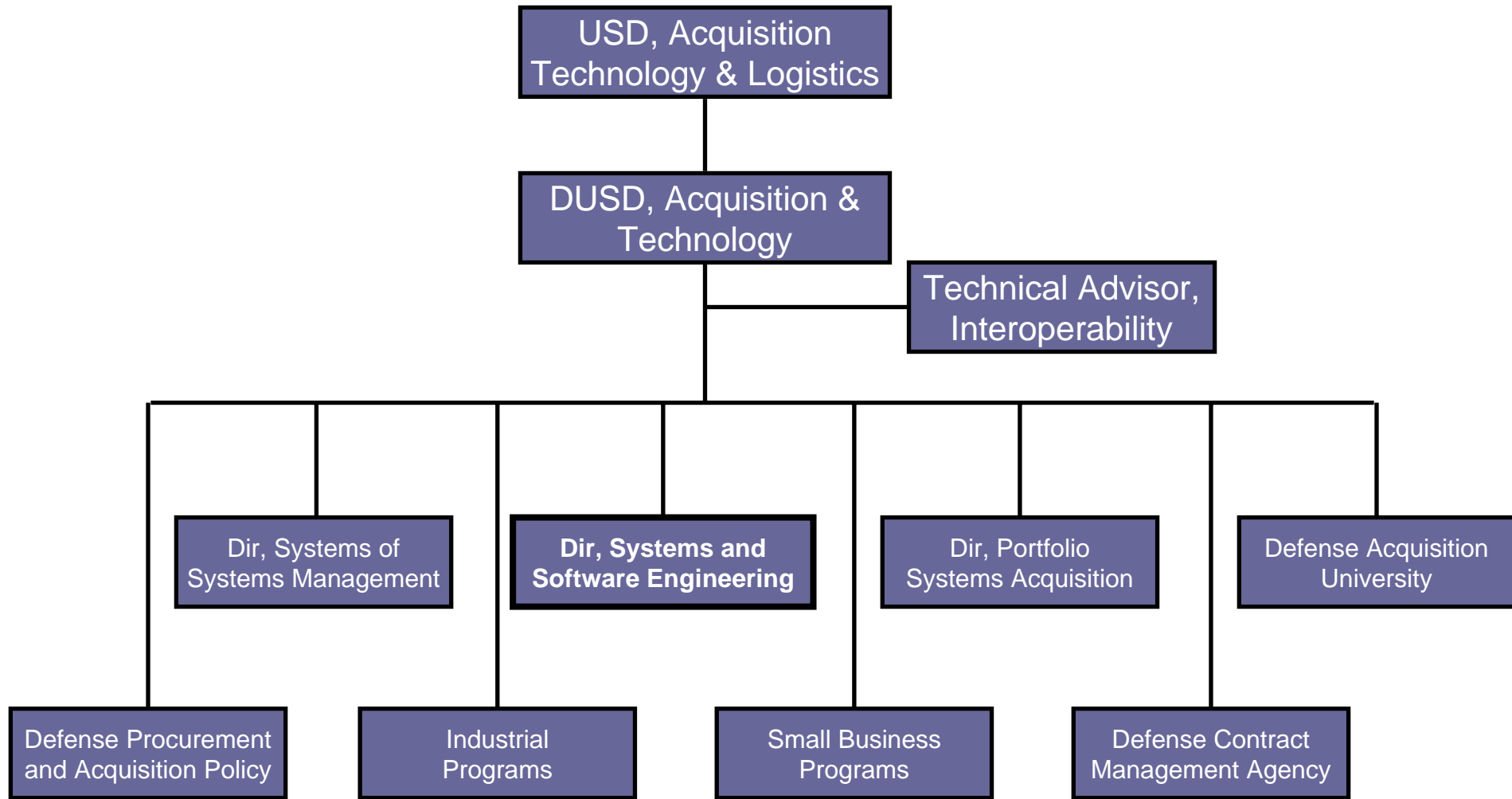
***9th Annual NDIA
Systems Engineering Conference
2006***

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

Director, Systems & Software Engineering

Mark Schaeffer SES

Est. Aug 06

Deputy Director Enterprise Development

Bob Skalamera 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

Deputy Director Developmental Test & Evaluation

Chris DiPetto SES

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

Deputy Director Software Engineering & System Assurance

Mark Schaeffer (Acting) SES

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

Deputy Director Assessments & Support

Dave Castellano SES

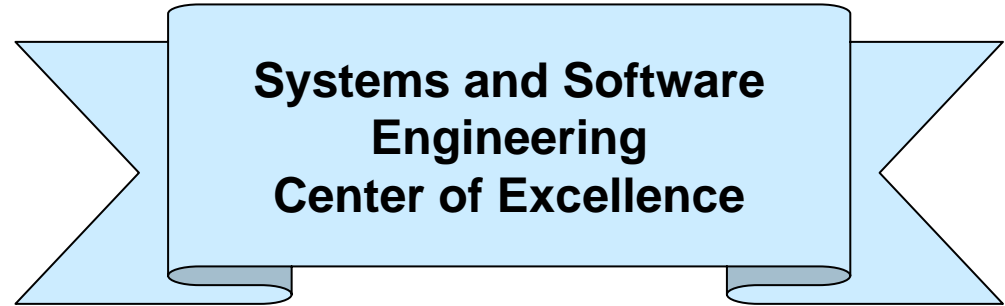
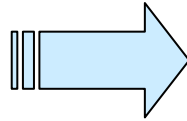
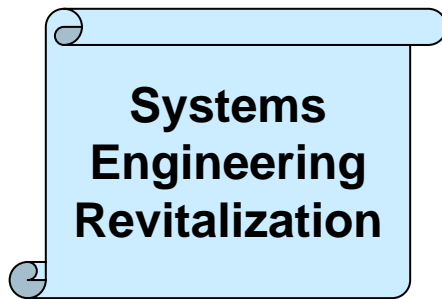
CORE COMPETENCIES

- 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



- **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***



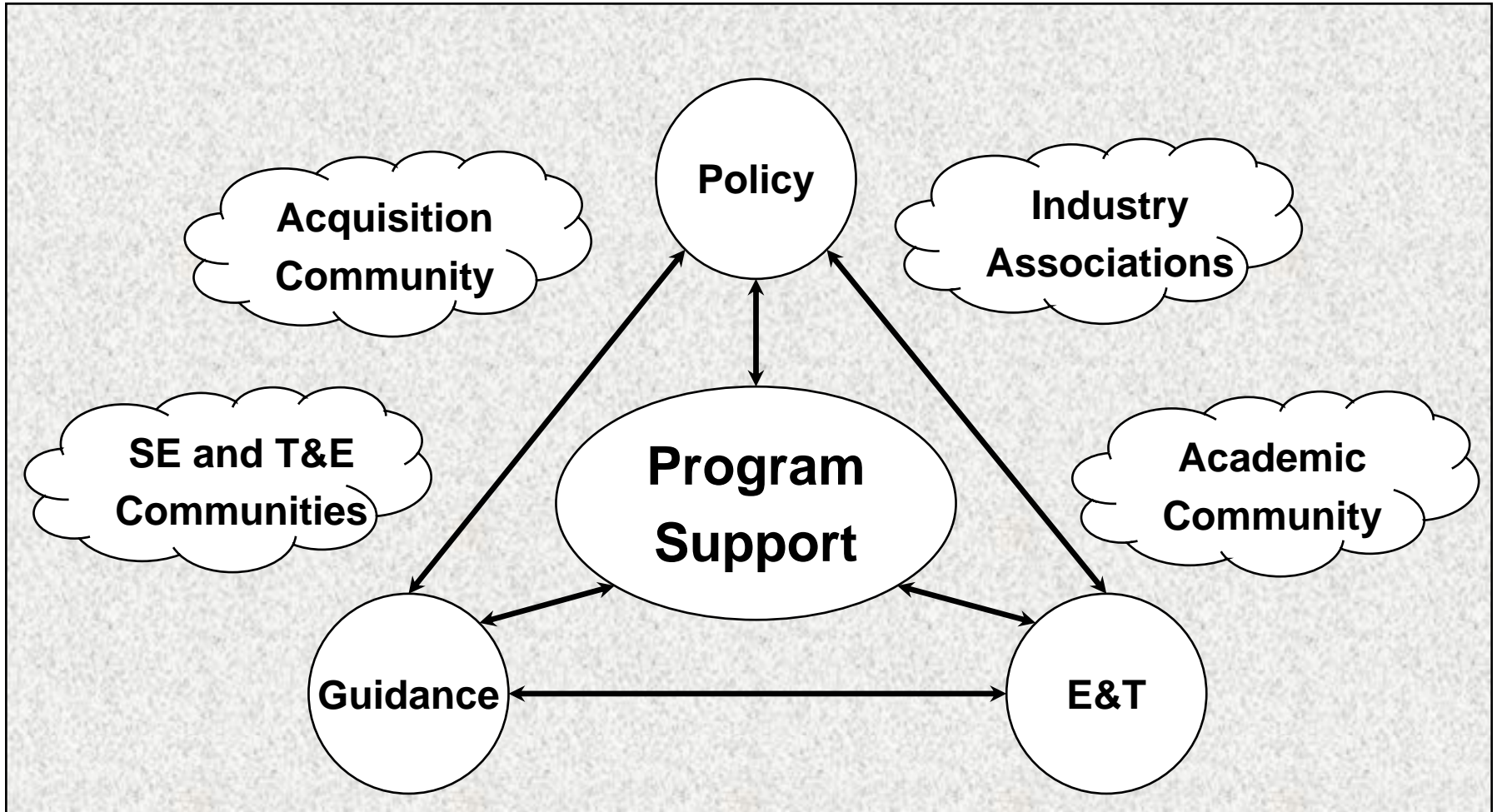
Systems and Software Engineering Mission Statement

- 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



Driving Technical Excellence into Programs!



Systems Engineering Policy

- 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

- 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

- **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”

- 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

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

- 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



Defense Safety Oversight Council

Joint Weapons Safety

➤ 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

➤ 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!



Energy Leadership

- 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



CMMI: New Release and Next Steps

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



System-of-Systems Engineering

- 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



Software Engineering and System Assurance (SSA)

➤ 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!



System Assurance

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



Systems Engineering Revitalization

➤ Policy

- No new policies in 2006

➤ Guidance

- Continues to be refined

➤ Education and Training

- E&T portfolio refreshed and growing

➤ Program Support

- Gaining momentum; yielding systemic insights



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
 - Defense Safety Oversight Council
 - Major leap in Joint Weapons Safety
 - Hammering Unmanned System Safety
 - Energy
 - SEDEF initiative, National implications
 - CMMI
 - Went from no integrity to...
 - System-of-Systems System Engineering
 - Filling VOID with...