



DoD Systems Engineering

Kristen Baldwin
Principal Deputy
Deputy Assistant Secretary of Defense
for Systems Engineering

NDIA SE Division Meeting
February 22, 2012



DASD, Systems Engineering Mission



Develop and grow the Systems Engineering capability of the Department of Defense – through engineering policy, continuous engagement with component Systems Engineering organizations and through substantive technical engagement throughout the acquisition life cycle with major and selected acquisition programs.

A Robust Systems Engineering Capability Across the Department Requires Attention to Policy, People and Practice

We apply best engineering practices to:

- Support and advocate for DoD Component initiatives
- Help program managers identify and mitigate risks
- Shape technical planning and management
- Provide technical insight to OSD stakeholders
- Identify systemic issues for resolution above the program level





DASD, Systems Engineering




DASD, Systems Engineering
Stephen Welby
 Principal Deputy
Kristen Baldwin




Systems Analysis
Kristen Baldwin (Acting)

Addressing Emerging Challenges on the Frontiers of Systems Engineering

Analysis of Complex Systems/Systems of Systems

Program Protection/Acquisition Cyber Security

University and Industry Engineering Research

Modeling and Simulation

Systems Engineering FFRDC Oversight



Major Program Support
James Thompson

Supporting USD(AT&L) Decisions with Independent Engineering Expertise

Engineering Assessment / Mentoring of Major Defense Programs

Program Support Reviews

OIPT / DAB / ITAB Support

Systems Engineering Plans

Systemic Root Cause Analysis



Mission Assurance
Nicholas Torelli

Leading Systems Engineering Practice in DoD and Industry

Systems Engineering Policy & Guidance

Development Planning/Early SE

Specialty Engineering (System Safety, Reliability and Maintainability Engineering, Quality, Manufacturing, Producibility, Human Systems Integration (HSI))

Technical Workforce Development

Providing technical support and systems engineering leadership and oversight to USD(AT&L) in support of planned and ongoing acquisition programs



DASD(SE) Top-Level FY12 Goals



Strengthen our *program engagement*, across full product spectrum, using expert technical teams to support informed, affordable decisions

- Increase early engagement in AoA's and RFPs
- Increase use of quantitative data (new SEP format) in program oversight
- Meet commitment to USD(AT&L) to comprehensively support PDR and CDR
- Maintain program support review tempo and quality while using less resources

Implement comprehensive *program protection planning*

- As a part of the trusted defense systems strategy

Implement clear, effective *reliability and manufacturing policy*

- Establish and promulgate guidance and support for these specialty disciplines

Conduct detailed review/update of *SPRDE curriculum*

- Dovetail into DAU statutory requirement to review Acquisition Curriculum

Assess and Strengthen *Workforce Systems Engineering Competencies*

Measure and improve Department-wide *Systems Engineering performance*

- Establish collection of performance metrics, benchmarking

Lead S&T priority to "*Engineered Resilient Systems*"

- Ensure a successful Systems 2020 program start in FY13

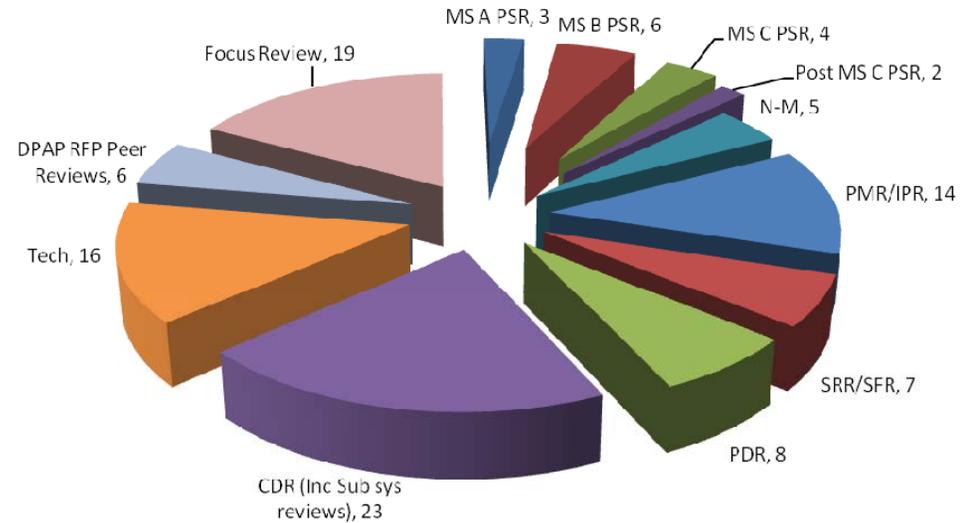


Major Program Support Activity

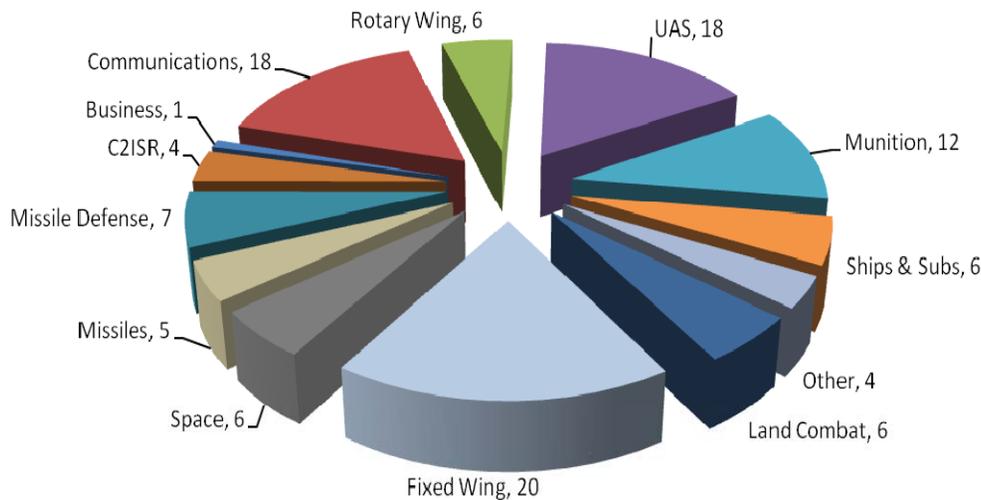
Fiscal Year 2011

- Program Support Reviews: 15
- Nunn-McCurdy Certification: 5
- Focused Reviews: 19
- Tech Reviews/Assessments: 68
- Peer Reviews: 6

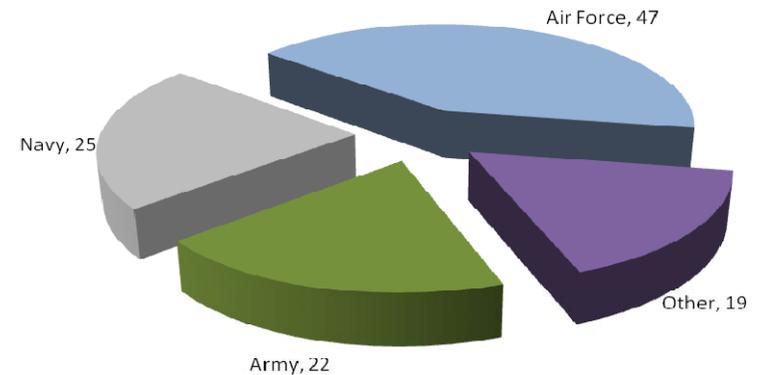
SE Touch Point



Domain



Service





FY11 Development Planning Program Support



MDD

A

ICD

DRAFT

ICDs Reviewed

ICD

APPROVED

MDD DAB Preparation

Analysis of Alternatives (AoA)

Pre-Milestone A Engineering Analysis

ICD Reviews for DP Equities

- 5th Generation Fighter Modernization
- Amphibious Combat Vehicle
- Airborne ISR to SOF
- Army Aircraft Survivability
- Army Operational Energy
- Forensics Support Across the RoMO
- Joint Cyber Situational Awareness
- USMC SCI Communications Enterprise
- USMC Aerial Delivery
- Low Slow Airborne Threat Response (LSATR) Capability
- Tactical Air Control Party Modernization
- Cyber Attack
- USMC Expeditionary Energy, Water and Waste
- Personnel Recovery
- Dock Landing Ship (LSD(X))
- Submarine Communications
- Navy Networking
- Army Unmanned Systems (Air, Ground, Maritime)
- Multimission Unmanned Ground Vehicle (MMUGV)
- Navy Unmanned Carrier Launched Aerial Strike and Surveillance (UCLASS)
- AF Long Range Strike
- IFPC-2
- Maritime ISR Support to SOF (for MRMUAS)

DP Support to MDD DAB

- F-22A Mod
- HFDS
- LRSO
- MRMUAS
- AIM-9X
- IFPC2-I
- T-AO(X)
- OASuW
- JMS
- LSD(X)
- UCLASS
- NIK
- MMUGV
- DCGS-N Inc 2
- CVM
- ACV
- B-61 TKA
- EPS
- JPALS Inc 2
- DWSS
- AMPV

DP Support to AoA

- OASuW
- T-AO(X)
- APT
- LRSO
- MRMUAS
- IFPC2-I
- UCLASS
- DCGS-N Inc 2
- JC2C
- GCV IFV Dynamic AoA Update

TDS/AS Reviews

- B-61 TKA
- MGUE
- GCV IFV
- B-2 DMS
- T-AO(X)

SEP Reviews

- B-61 TKA
- MGUE
- GCV IFV
- B-2 DMS
- T-AO(X)
- CIRCM

Fiscal Year 2011

- **ICDs Reviewed: 23**
- **MDDs Supported: 21**
- **AoAs Supported: 10**
- **MS A TDS/AS Reviewed: 5**
- **MS A SEPs Reviewed: 6**



Executing “Expected Business Practice”



Systems Engineering Plan
Annotated Outline

**TDS/AS, SEP,
PPP, and LCSP**

Program Protection Plan
Annotated Outline

**Technology Development Strategy
[or] Acquisition Strategy**
Annotated Outline



April 20, 2011

Life-Cycle Sustainment Plan
Annotated Outline



September 14, 2011

<http://www.acq.osd.mil/se/pg/index.html>



Systems Engineering Technical Reviews

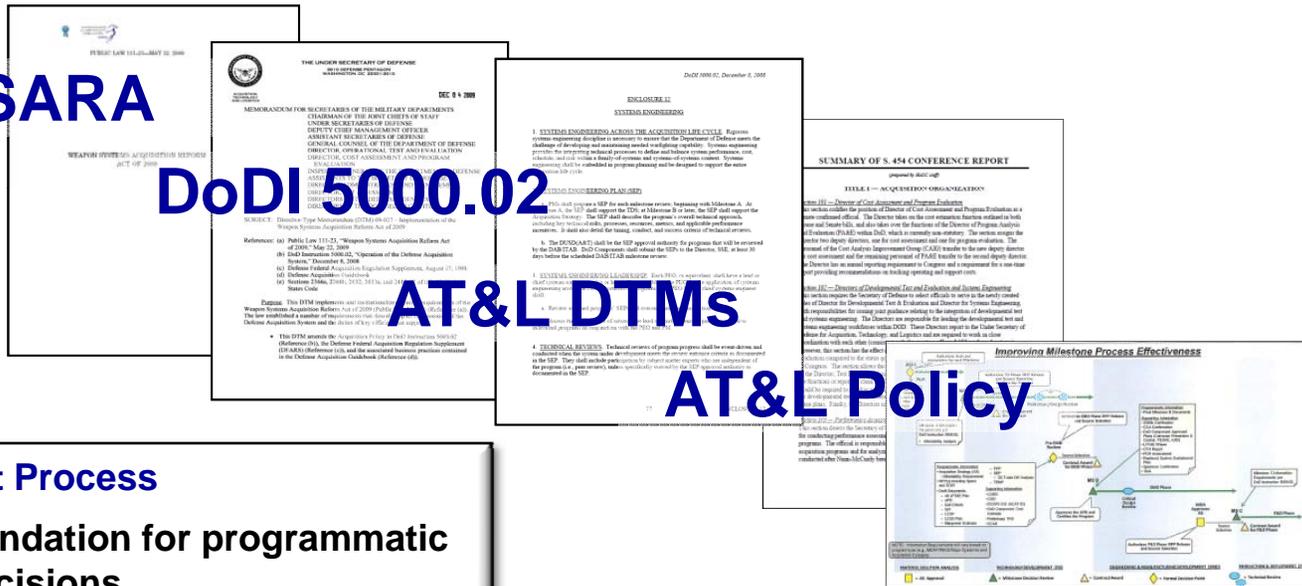
Recognition of significance and value of rigorous Technical Reviews

WSARA

DoDI 5000.02

AT&L DTMS

AT&L Policy



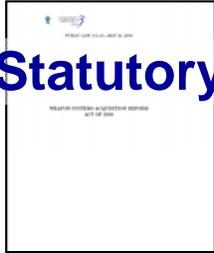
- **Inform Development Process**
 - Establish solid foundation for programmatic and investment decisions
 - Inform the trade space early in development
 - Control cost and schedule
 - Expedite delivery of capability
 - Design understanding expectation management

- **Inform Decisions and Reporting**
 - OIPT, DAB Milestone Reviews
 - IPRs and Pre-EMD reviews
 - 2366b certifications
 - Annual Report to Congress



PDR Governing Language

Statutory



*Public Law 111-23 (WSARA) – Section 205 amended 2366b of Title 10 USC to require the MDA to “conducted a formal post-preliminary design review assessment, and certifies on the basis of such assessment that the program **demonstrates a high likelihood of accomplishing its intended mission**”*

Regulatory



*DoDI 5000.02 - “The MDA shall conduct a formal program assessment & consider the results of the PDR and the PM's assessment in the PDR Report, and ; **determine whether remedial action is necessary to achieve APB objectives.**”*

*DTM 09-027 - “Post-PDR assessments will be conducted in association with MS B preparations and will be **formally considered by the MDA at the MS B certification review.**”*

DTM 09-027 - requires 2366b MS B Certification memo to state: “I... conducted a formal post-preliminary design review assessment, and certify on the basis of such assessment that the program demonstrates a high likelihood of accomplishing its intended mission”

Guidance



Additional Guidance available:

<http://www.acq.osd.mil/se/> or <https://dag.dau.mil/>

“Technical reviews shall be event-driven and conducted when review entrance criteria ,as documented in the SEP, is met. They shall include participation by subject matter experts who are Independent of the program (i.e., peer review).” DoDI 5000.02, Enclosure 12



CDR Governing Language

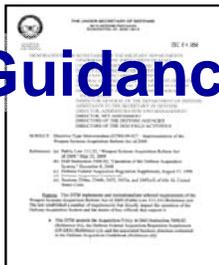
Regulatory



DoDI 5000.02 - "The MDA shall conduct a formal program assessment following system-level CDR"

"Determine whether additional action is necessary to satisfy EMD Phase exit criteria and to achieve the program outcomes specified in the APB"

Guidance



PD USD(AT&L) Memo of Feb 24, 2011 - Eliminates the Program Manager's reporting responsibility for the CDR Report

- DASD(SE) will participate in all MDAP CDRs and prepare a brief assessment of the program's design maturity and technical risks which may require Milestone Decision Authority (MDA) attention
- PMs of Major Defense Acquisition Programs shall be required to invite DASD(SE) engineers to their system-level CDRs and make available CDR artifacts



Additional Guidance available at

- <http://www.acq.osd.mil/se/> or
- <https://dag.dau.mil/>

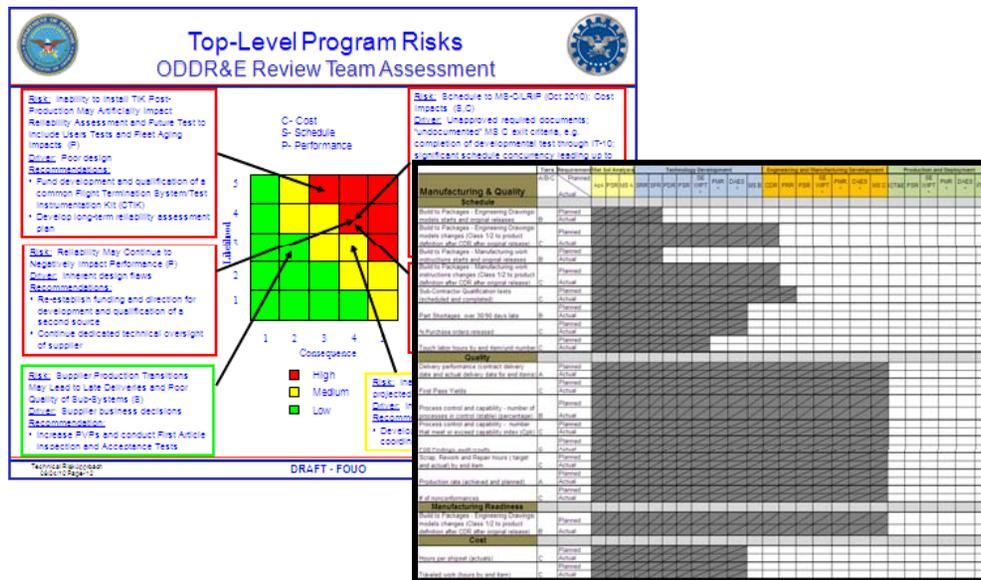
Making sound decisions without overly burdening programs



Risk Management

- **Technology Risk**
 - Maturity of critical technologies (HW/SW)
- **Engineering Risk**
 - Technical and management risk of a system throughout the life cycle
- **Integration Risk**
 - Technology, component, platform, SoS integration

- **Risk Assessment**
 - Identification
 - Recommendations
 - Mitigation/ risk burndown
 - Root Cause Analysis
- **Program Support Reviews**
 - Approved methodology
 - Rigorous/phased-based criteria
- **Metrics**
 - Manufacturing
 - Software
 - Reliability
 - Integration
 - Technical Management
- **PDR/CDR Assessments**





Common Risk Pitfalls

- **Programs lack properly documented risk management activities**
 - Lack of formal documented risk mitigation plans
 - Lack of off-ramps for major program risks
 - Lack of mitigation plans for all medium / high risks
 - Mitigation tasks do not have resources assigned nor due dates nor the status of the task
- **Programs lack a mature risk management program**
 - Risk avoidance lessons learned are not addressed within risk management approach
 - Risk management by PMO lacks maturity, discipline, effectiveness
- **Tools and methodology supporting risk management are not sufficient**
 - Lack of evidence of linkage between TPMs/EVM/Risk Management/WBS/IMS to effectively employ them as management tools that enable risk reduction
 - Risk tool does not map risks to applicable WBS element
- **Program management does not have a portfolio view of risk management**
 - Enterprises do not have a portfolio view of risk management to prevent one program from being adversely impacted by other acquisition programs or enterprise-wide challenges

Need to Perform Quantitative Risk Management



Program Protection Plan Outline and Guidance as “Expected Business Practice”




 DEPARTMENT OF DEFENSE
 ACQUISITION, TECHNOLOGY AND LOGISTICS

PRINCIPAL DEPUTY UNDER SECRETARY OF DEFENSE
 3015 DEFENSE PENTAGON
 WASHINGTON, DC 20301-3015

JUL 18 2011

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
 DIRECTORS OF THE DEFENSE AGENCIES

SUBJECT: Document Streamlining – Program Protection Plan (PPP)

The September 14, 2010, Better Buying Power memorandum directed a review of the documentation required by Department of Defense Instruction (DoDI) 5000.02 in support of the acquisition process. This is the second in a series of document streamlining memoranda, following my April 20, 2011, direction on the streamlined Technology Development Strategy/Acquisition Strategy (TDS/AS) and Systems Engineering Plan outlines. I am directing the following actions for the PPP:

Document Streamlining: The PPP will be streamlined consistent with the attached annotated outline. The outline is designed to guide both program protection management and document preparation. It increases emphasis on early-phase planning activity and is specifically focused on information central to the purpose of the document. The new PPP reflects the integration of the Acquisition Information Assurance (IA) Strategy and recognizes Program Protection as the Department’s holistic approach for delivering trusted systems.

PPP Review and Approval: Every acquisition program shall submit a PPP for Milestone Decision Authority review and approval at Milestone A and shall update the PPP at each subsequent milestone and the Full-Rate Production decision. While some programs may not have Critical Program Information, every program, including those with special access content, shall address mission-critical functions and components requiring risk management to protect warfighting capabilities. Per the TDS/AS outline described above, Program Protection information is no longer included in the TDS. The Acquisition IA Strategy shall continue to be reviewed and approved in accordance with DoDI 8500.1 and shall be included as an appendix to the PPP.

These actions constitute expected business practice and are effective immediately. The revised outline will be documented in the Defense Acquisition Guidebook and referenced in the next update to DoDI 5000.02. My point of contact is the Mr. Stephen Welby, Deputy Assistant Secretary of Defense for Systems Engineering, at 703-695-7417.


 Frank Kendall

cc:
 All CAEs
 DCMA
 DCAA
 DCMO
 DASD(PSA)
 ARA
 DRAP

Program Protection Plan
 Outline & Guidance

• VERSION 1.0 •
 • July 2011 •



Deputy Assistant Secretary of Defense
 Systems Engineering

<http://www.acq.osd.mil/se/pg/index.html#PPP>



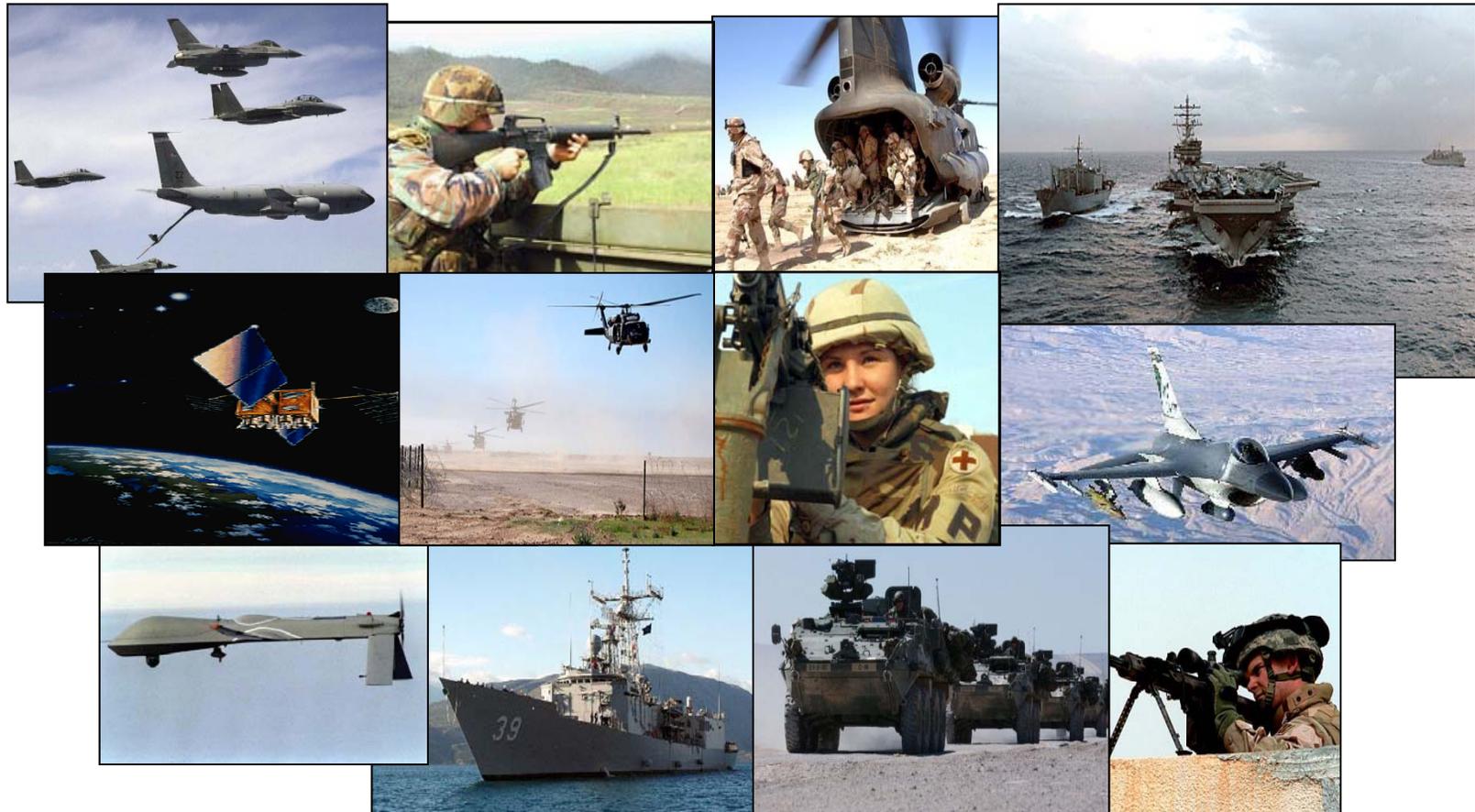
Industry Engagement in Program Protection



- **Identifying risks and setting requirements for protection is one key element of system security engineering**
- **Risk models, design methods, and engineering processes to mitigate system risk remain largely undocumented**
- **Industry plays a key role in ensuring systems are designed with an adequate level of security**
- **NDIA System Assurance Committee is developing a strategy:**
 - Workshop to discuss vulnerabilities, current and/or potential mitigations
 - Senior Engineering Roundtable to discuss a strategic way ahead



Systems Engineering: Critical to Program Success



Innovation, Speed, and Agility

<http://www.acq.osd.mil/se>