



# **OSD Systems Engineering Status and Goals**

**Stephen Welby**

**Deputy Assistant Secretary of Defense  
for Systems Engineering**

**NDIA Systems Engineering Division Meeting  
February 2013**



# DASD, Systems Engineering Mission



## **Systems Engineering focuses on engineering excellence – the creative application of scientific principles:**

- To design, develop, construct and operate complex systems
- To forecast their behavior under specific operating conditions
- To deliver their intended function while addressing economic efficiency, environmental stewardship and safety of life and property.

***DASD(SE) 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**

- ***US Department of Defense is the World's Largest Engineering Organization***
- ***Over 99,000 Uniformed and Civilian Engineers***
- ***Over 39,000 Acquisition Corps Certified Systems Engineers (SPRDE)***



# 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
- Standardization

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



# FY12 Activities



# Implementing DASD(SE) Duties under DoDI 5134.16 and WSARA



## Implementing statutory authorities provided under WSARA:

- **Performing continuous technical engagement, oversight, and review of Service acquisition programs' SE and Development Planning capabilities**
  - Continuous engagement with Services' acquisition enterprises
  - Sharing best practices across the department
- **Directly advising USD(AT&L) on SE and Development Planning (including Defense Business Systems and National Intelligence Programs)**
  - Active participant in MDAP and MAIS major milestone decision making
- **Reviewing and approving MDAP and MAIS Systems Engineering Plans (SEPs)**
- **Developing SE, Development Planning, Manufacturing, and Reliability and Maintainability policy and guidance**
- **Influencing Pre-MDD and MS A activities (CAPE and JROC)**
- **Participating in AoA policy, guidance, and oversight**
- **Participating in MDAP PDR/CDR's and provide the Post-CDR assessment in support of 2366(b) certification**
- **Delivering Annual Systems Engineering Report to Congress**

WSARA – Weapon Systems Acquisition Reform Act of 2009



# SE Annual Report to Congress



DEPARTMENT OF DEFENSE  
Systems Engineering  
FY 2012 Annual Report



MARCH 2013

Preparation of this report cost the Department of Defense a total of approximately \$----- in FY 2012-2013.  
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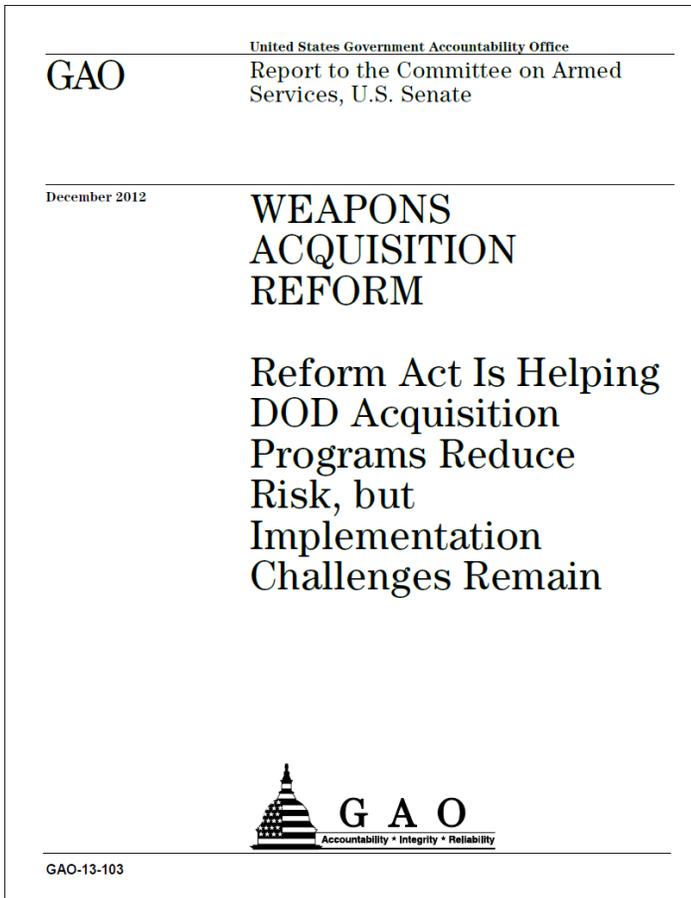
Deputy Assistant Secretary of Defense for Systems Engineering

Washington, D.C.

- **FY12 SE Annual Report to Congress currently on track to deliver 31 March**
- **Detailed review of DASD(SE) Accomplishments in FY12**
- **Review of Service progress and plans implementing key pieces of WSARA to improve SE capabilities**
- **Detailed program by program assessments for 40+ MDAPs**



# GAO Report 13-103 Findings DASD(SE) Performance



- **Completed the development of systems engineering and development planning policy, guidance and performance measures**
- **Regularly completing MDAP document review and approval and program monitoring and assessments**
- **Led working group efforts to support Service initiatives to address systemic reliability issues in UAS and rotary wing portfolios**
- **Led workforce development initiatives to attract and retain a qualified SE workforce and support KLP implementation**
- **Positively impacted the requirements development and technical and reliability planning for:**
  - Joint Lightweight Tactical Vehicle
  - Ground Combat Vehicle
  - Joint Strike Fighter
  - Remote Mine-hunting System
  - Gray Eagle and Global Hawk

<http://www.gao.gov/products/GAO-13-103>



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# FY13 Goals



# Better Buying Power 2.0



- 1. Achieve Affordable Programs**
- 2. Control Costs Throughout the Product Lifecycle**
- 3. Incentivize Productivity and Innovation in Industry and Government**
- 4. Eliminate Unproductive Processes and Bureaucracy**
- 5. Promote Effective Competition**
- 6. Improve Tradecraft in Acquisition of Services**
- 7. Improve the Professionalism of the Total Acquisition Workforce**

**Better Buying Power: <http://bbp.dau.mil/>**



# Top Level FY13 DASD(SE) Goals



- **Continue excellence in SE support to programs and acquisition decisions**
- **Improve consistent PPP engagement with programs resulting in successful vulnerability mitigation strategies**
- **Advocate for and ensure SE workforce capacity and capability**
- **Provide depth to acquisition policy and processes with SE guidance, practices, and continuous learning opportunities**
- **Advance the state of engineering to meet challenges and enable DoD goals**
- **Maintain quality of technical insight in resource constrained environment**



# FY13 DASD(SE) Objectives



- **Engineering Program Support**
  - Provide engineering assessment / mentoring of major defense acquisition programs
  - Support acquisition leadership with independent engineering analysis and advice
  - Support, review and approve Systems Engineering Plans
  - Engage with programs in support of PDR/CDR assessments
  - Institutionalize software assessment support capability
  - Develop an update to the DoD Risk Management Guide to implement a risk management approach for PMs
  - Program data analysis and benchmarking
  
- **Engineering Workforce**
  - Publish Human Capital Strategic Plan content for Engineering Non-Construction, SPRDE and PQM career fields
  - Oversee implementation of Lead Systems Engineer Key Leadership Position (KLP)



# FY13 DASD(SE) Objectives



- **Engineering Policy and Guidance**

- Promulgate revised engineering guidance in DoDI 5000 and publish an update to the Defense Acquisition Guidebook Chapter 4 – Systems Engineering
- Oversee Value Engineering activities in support of BBP 2.0
- Publish Open Systems Architecture guidance in support of BBP 2.0
- Finalize DAES reporting guidance for Reliability and Maintainability Engineering
- Publish guidance on risk-based counterfeit prevention, in coordination with L&MR and DPAP, in support of FY12 NDAA Section 818 and FY13 NDAA Section 833

- **Technical Standards**

- Oversee DoD update to 5 technical standards: 1) Systems Engineering, 2) Technical Reviews/Audits, 3) Configuration Management, 4) Logistics Support, and 5) Manufacturing “Standard”
- Oversee GIDEP requirements update and implementation in support of FY12 NDAA Section 818 Counterfeit Prevention activities



# FY13 DASD(SE) Objectives



- **Program Protection**
  - Conduct Anti-Tamper study to support exportability BBP 2.0 initiative
  - Update Software Assurance policy/guidance in compliance with FY13 NDAA Section 933
  - Implement AT&L strategy for DIB Cyber Security/Safeguarding Unclassified information, and Supply Chain Risk Management in support of NDAA Section 941
  - Support DASD(C3&Cyber) publication of AT&L IA Guidebook; aligned with PPP and system security engineering
  - Support acquisition program implementation of trusted microelectronics strategies in accordance with DoDI 5200.44 requirements for trusted ASICs and FPGA strategy
- **Other:**
  - Oversee MITRE NSEC and the SE Research Center UARC
  - Submit Annual WSARA Systems Engineering Report to Congress
  - Continue external engagement with industry, professional and academic organizations on Counterfeit Prevention, Risk Management, System Security Engineering, STEM, Affordability, Modeling and Simulation, Advanced Design and Manufacturing



# FY13 Challenges and Opportunities



- **Engaging Leadership in the Department**
- **High visibility interest areas:**
  - Reliability
  - Counterfeit Prevention
  - Engineering for exportability
  - Technology Prototyping
- **Update SE Policy and Guidance to reflect changes in coming revision to DoDI 5000**



# Reliability and Maintainability (R&M)



## • FY 12 Activities

- Continued to collaborate with Services on the development of a detailed, lower level Reliability and Maintainability (R&M) guidance document. The guidance identifies key R&M activities necessary throughout the lifecycle and emphasizes planning for reliability and maintainability upfront.
- Initiated efforts to incorporate Reliability Growth Tracking into Defense Acquisition Executive Summary (DAES) reviews per DTM 11-003. The activities include defining the requirements and capabilities needed to automate reliability growth reporting across the Services. DASD(SE) is in collaboration with DT&E, DOT&E, Acquisition Resources & Analysis (ARA), and Service R&M leadership on this effort.
- Developed an initial R&M human capital strategy including definition of R&M engineering competencies and association of competencies to learning objectives for courseware. DASD(SE) has conducted an initial review of all DAU courses for R&M content and plans to extend the review to Service and Academia courseware.

## • FY 13 Goals

- Complete development of lower level R&M guidance document while continuing to collaborate with Service R&M leadership.
- In conjunction with the Services, evaluate existing R&M engineering capacity and capability and gaps across the Department and continue to develop a human capital strategy for the current and future R&M workforce.
- Assess existing R&M standards, both active and inactive, and develop an initial strategy to systematically evaluate the R&M engineering standardization needs.
- Working with ARA, finalize the Functional Description Document to incorporate reliability growth tracking into DAES and began initial non-automated collection of reliability growth data.



# Counterfeit Prevention



- **FY 12 Activities**

- Worked with integrated DoD team (R&E/DPAP/L&MR) to lay ground work for comprehensive "Risk Based Counterfeit Mitigation Strategy" in compliance with Section 818 of NDAA 2012 including formulating "GIDEP Reporting Policy".

- **FY 13 Goals**

- Work on ensuring all SE design considerations take into account relevant counterfeit issues.
- Develop GIDEP performance requirements to build a System Requirements Specification for GIDEP Modernization.





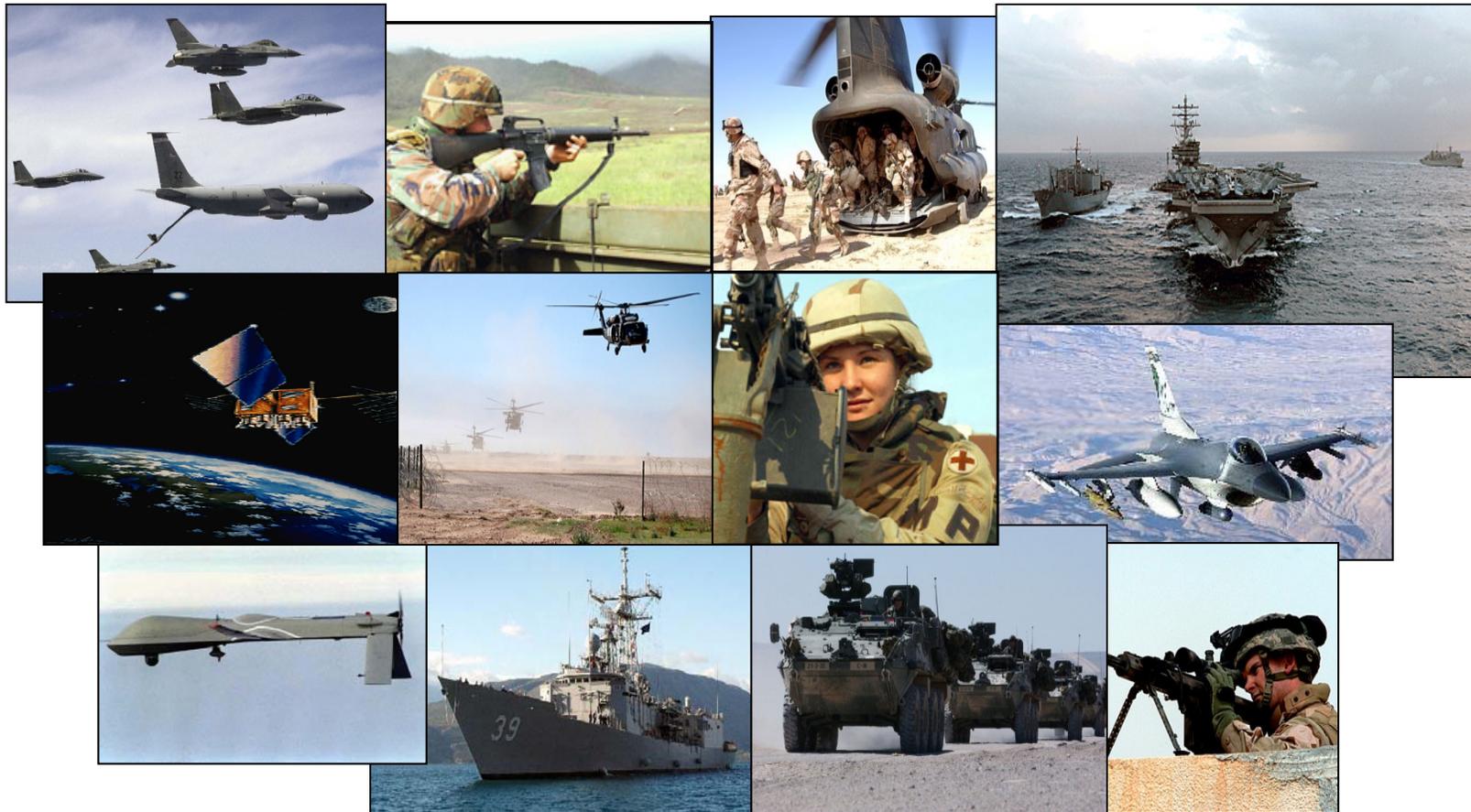
# Summary



- **FY13 continues to be shaped by budget uncertainty**
- **Criticality of our Systems Engineering mission work has grown**
  - Our work will be even more essential in facing budget challenges
- **We are making an impact**
  - Strong support for System Engineering mission across the Department
- **Dedicated, professional and committed SE staff**
- **Focused on working smarter, as a more tightly integrated team across OSD and the Services**
  - Continue to make a difference for the warfighter and the taxpayer



# Systems Engineering: Critical to Acquisition Success



***Innovation, Speed, and Agility***  
***<http://www.acq.osd.mil/se>***



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# Additional References



# FY12 DASD(SE) SEP Reviews and Program Engagements



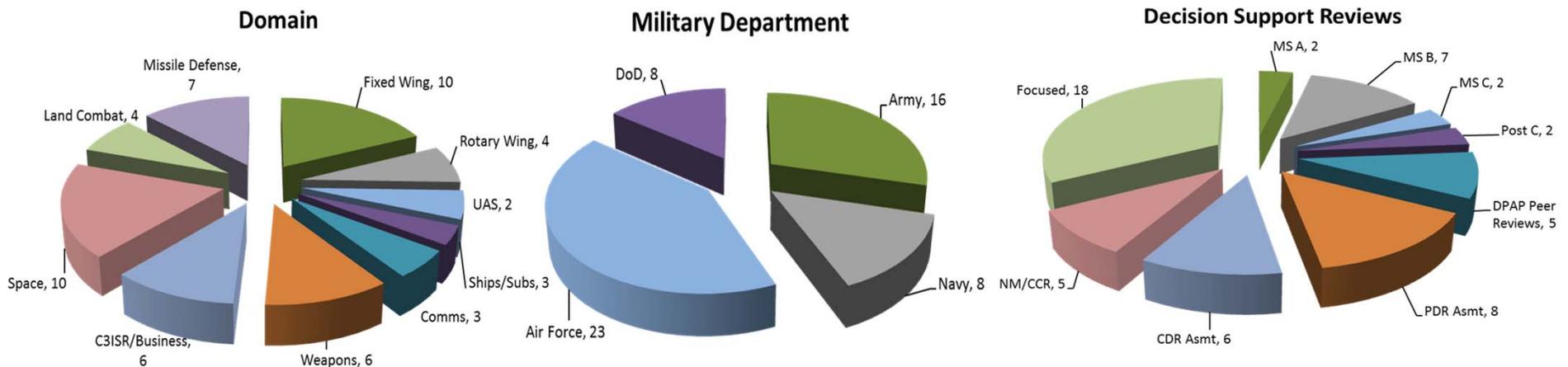
## FY 2012 SEP Review and Approval Activity Summary

Major Program	SEPs Reviewed	SEPs Approved*
Total ACAT I Programs	34	19

\*Note: 10 SEPs reviewed in FY11 were approved in FY12, and 22 SEPs reviewed in FY12 are expected to be approved in FY13.

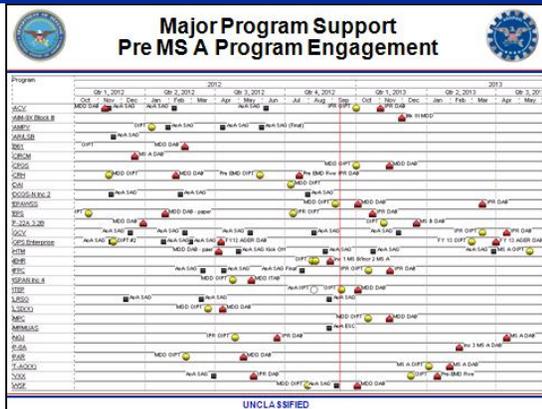
## FY 2012 DASD(SE) Program Engagement Summary

MDAP/MAIS	Category	PSRs	N-M Reviews	Focused Reviews	PDR Assessments	CDR Assessments	DPAP RFP Peer Reviews	Total Reviews	SETRs
MDAP	ACAT ID/IC/Pre-MDAP	12	3	14	8	5	3	45	102
MAIS	ACAT IAM/MDA	1	2	4	0	1	2	10	11
	<b>Total</b>	13	5	18	8	6	5	55	113

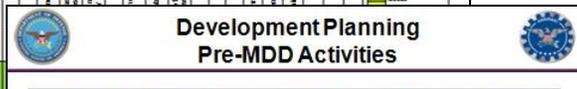




# Development Planning Program Engagement



- **DASD(SE) Pre-MDD activities insights shape MDD decisions and programs' technical strategies**
  - Ensure capability gaps in ICDs are understood and well defined
  - Ensure SE equities addressed in AoA Guidance/Study plan
    - Schedule, risks, RAM, integration, manufacturing, etc.
  - Shape technical planning for MSA phase and beyond
- **FY12 DP program engagements:**
  - Multiple SE WIPTs, IIPT and OIPT meetings
  - 9 Materiel Development Decisions (MDD) in FY12



Program	ROMTS		SE Equities										Technical Planning		Engagements		Meetings		Comments/Issues	
	Dev	OOD	Dev	OOD	Resources	SETR	Performance	SETR	Performance	SETR	Performance	SETR	Performance	SETR	Performance	SETR	Performance	SETR		Performance
ACV	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
GCY	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
AMB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)
ASALB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Comments: on DP, P&A and SEP... (text continues)

- **Post MDD / Pre-MS A engagements ensure:**
  - 55 AoA events on 18 programs in FY12
    - Assessed technical feasibility of alternatives
  - 13 pending MS A decisions in FY12/13
  - Sufficient technical planning and management approaches developed; Documented in Pre-MS A SEP
    - SETRs, CDD and specifications development, prototyping strategy, etc.
    - Resources are adequate (schedule, staffing, funding)
    - SE activities reflected in TD phase RFP
- **Near Term Activities**
  - Increased insights in Capabilities Based Assessments
  - Infusing SE equities into new AoA Guidance template
  - Assisting Joint Staff with their analysis of programs



# FY12 Program Protection Engagement and Support Summary



## Programs Supported in FY 12

- AMDR, MS B
- LCS MM, MS B
- B-61, LEP TKA, MS B
- LCS Seaframes, MS C
- JTRS MIDS, FRP
- Gray Eagle, FRP
- WIN-T Incr 2, FRP
- TAO(X), MS A
- MQ-9 Reaper, MS C
- Global Hawk, MS C
- KMI, Incr 1/Incr 2, FDD
- SBIRS, FRP
- GCSS-A, FDD
- CIRCM, MS A
- ECSS, MS C
- NGEN Pre-EMD/MS C
- JPALS Incr 1A, MS C
- JPALS Incr 2, MS B
- MP-RTIP, MS B/C

- AIM-9X BLK II, MS C
- JAGM, MS B
- EPS CAPS, Pre-EMD
- 3DELRR, MS B
- F-22, MS B
- Space Fence, Pre-EMD
- NGJ, MS A
- B-2 DMS, MS B
- AF-IPPS, ITAB B
- Combat Recue Helicopter, Pre-EMD
- JMS, Pre-EMD ITAB
- PKI, FDD
- E-2D, FRPs
- Teleports Gen 3, MS C
- CANES, MS C
- P-8A, Incr 3, MS A
- DCGS-A, FDD
- BAMS, MS C
- Army IAMD, MS C
- PIM, MS C

## PPPs Approved in FY12

- SSC, MS B
- JLTV, MS B
- AB3, FRP
- JTRS HMS RR, FRP
- E-Procurement, FDD





# Workforce Development



- **FY 12 Activities**

- Completed SE research project to understand the methods through which systems engineering learning and career interest may be increased among undergraduate and graduate engineering students. The project was successful in accelerating the development of SE talent to meet future DoD workforce needs.
- Continued holistic and integrated strategic planning inclusive of Human Capital Initiative and Personnel and Readiness goals, priorities and timelines for both the Acquisition and Engineering (non-construction) workforce.
- Defined SPRDE and PQM Key Leadership Position competencies to include both career field-specific and cross-functional expectations
- With respect to the certification standards, at the request of the Components, engineering support technicians (Occupational Career Codes 0802 – Engineering Technician and 0856 Electronics Technician) may now be coded to acquisition positions in SPRDE-SE and will be able to obtain Level I SPRDE-SE certification.

- **FY 13 Goals**

- Continue holistic and integrated strategic planning inclusive of Human Capital Initiative and Personnel and Readiness goals, priorities and timelines for both the Acquisition and Engineering (non-construction) workforce.
- Sunset SPRDE-PSE career field - Intent is to have all SPRDE-SE or PSE workforce members held to the same education, training and experience standards.
- Re-invigorate the PQM career field - includes occupational career field review; competency update, and education/training review
- Update and align certification requirements and DAU course material in an effort to increase technical rigor.
- Design, develop and implement qualification standards for the SPRDE and PQM acquisition workforce.



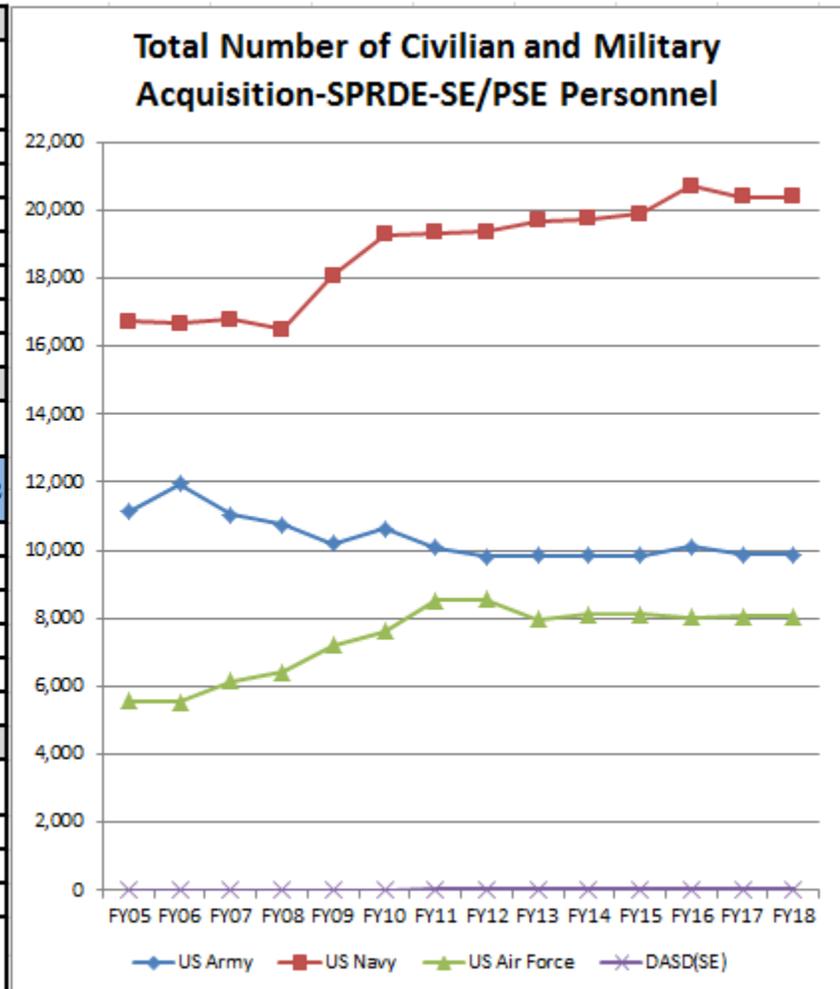
# SE Workforce Positions in the DoD as Reported by Service SEs and DASD(SE) in the FY12 Annual Report as of 4Q FY12



Total Number of Civilian and Military Acquisition-SPRDE-SE/PSE Personnel													
Fiscal Year	Year Ending	US Army			US Navy			US Air Force			DASD(SE)		
FY05	30-Sep-05	11,138			16,745			5,561			13		
FY06	30-Sep-06	11,964			16,670			5,536			14		
FY07	30-Sep-07	11,050			16,785			6,162			13		
FY08	30-Sep-08	10,769			16,495			6,430			14		
FY09	30-Sep-09	10,208			18,086			7,201			13		
FY10	30-Sep-10	10,647			19,279			7,625			14		
FY11	30-Sep-11	10,071			19,327			8,516			23		
FY12	30-Sep-12	9,812			19,359			8,553			22		
Planned Growth in Civilian and Military Acquisition-Coded SPRDE SE & PSE													
Fiscal Year	Year Ending	US Army			US Navy			US Air Force <sup>1</sup>			DASD(SE)		
As Reported In:		FY 10	FY 11	FY 12	FY 10	FY 11	FY 12	FY 10	FY 11	FY 12	FY 10	FY 11	FY 12
FY13	30-Sep-13	208	11	28	225	160	329	86	-86	-596	0	0	-1
FY14	30-Sep-14	220	11	5	88	94	60	170	160	166	0	0	0
FY15	30-Sep-15	125	0	0	164	79	158	-4	-6	-12	0	0	0
FY16	30-Sep-16		0	0		35	98		-9	-32		0	0
FY17	30-Sep-17			0			66			-9			0
FY18	30-Sep-18			0			8			0			0
Planned End-State Total Number of Civilian and Military Acquisition-Coded SPRDE SE & PSE													
Fiscal Year	Year Ending	US Army			US Navy			US Air Force <sup>2</sup>			DASD(SE)		
FY16	30-Sep-16	10,103			20,703			8,032			21		
FY17	30-Sep-17	9,861			20,393			8,048			21		
FY18	30-Sep-18	9,861			20,402			8,048			21		

<sup>1</sup> Overhires play a significant role in the delta between FY 2012 personnel and FY 2013 positions. As of

<sup>2</sup> Data based on FY 2014 PB 23 as of September 30, 2012.



\*The numbers in this table and figure will be updated in in 2Q FY13 for inclusion in the FY12 SE Annual Report to Congress



# Defense Acquisition Guidebook

## Chapter 4 Rewrite



- Use a product-centered approach, where the product is the weapon system or capability under development
- Thread policy, activities/processes, and product together  
Policy (Direction / Requirement) → Process (How) → Product (What)
- Do not restate policy, rather clarify intent of policy and identify expectations
- Do not invent guidance to fill a gap in policy and remove preferences
- Map to Services' practices
- Minimal links
- Reduce the overall page count
- Include the emerging acquisition models

**Provide the thinnest layer of guidance to get the job done**