



DoD Systems Engineering Update

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**Principal Deputy, Office of the Deputy Assistant Secretary of
Defense for Systems Engineering (DASD(SE)), USD(AT&L)**

**AIA Technical Operations Council (TOC) Meeting
May 14, 2014**



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

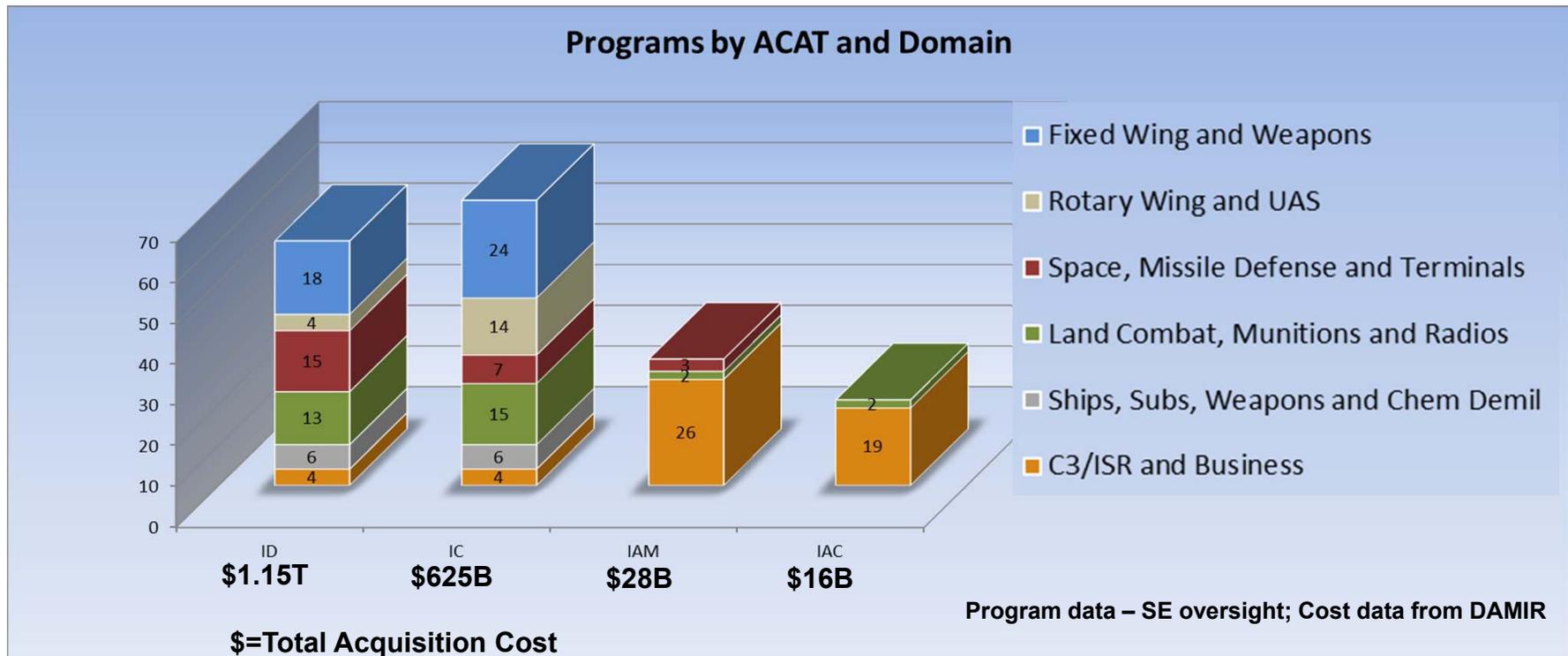
- ***US Department of Defense is the World's Largest Engineering Organization***
- ***Over 99,000 Uniformed and Civilian Engineers***
- ***Over 39,000 in the Engineering (ENG) Acquisition Workforce***



DASD(SE) Portfolio



- Perform system engineering oversight of **182 programs** with acquisition costs of **\$1.8T**





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, FFRDC and Industry Engineering and Research

Modeling and Simulation



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
Vacant

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)

Counterfeit Prevention

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



SE Annual Report to Congress



DEPARTMENT OF DEFENSE
Systems Engineering
FY 2013 Annual Report



MARCH 2014


Stephen P. Welby
Deputy Assistant Secretary of Defense
Systems Engineering

The estimated cost of report or study for the Department of Defense is approximately \$460,000 in Fiscal Years 2013–2014. This includes \$372,000 in expenses and \$89,000 in DoD labor.
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DISTRIBUTION STATEMENT A. Approved for public release.

- DoD SE FY 2013 Annual Report delivered 26 March 2014
- Detailed review of DASD(SE) accomplishments in FY13
- Summary of Military Departments' progress and plans toward key SE improvements
- Current ENG workforce numbers by Military Department; best available estimates of SE contracting workforce
- Detailed program-by-program assessments for 40+ MDAPs

<http://www.acq.osd.mil/se/docs/SE-FY13-AnnualReport-25March2014-Final.pdf>



FY13 DASD(SE) Activities: SE Policy and Guidance



- **Published the Defense Acquisition Guidebook (DAG) Chapter 4 on Systems Engineering**
 - Addresses technical activities and expectations associated with pre-Materiel Development Decision (MDD) and Materiel Solution Analysis phase
 - Includes new topics: SE role in contracting, sustainability; anti-counterfeiting; intelligence; operational energy; producibility; and packaging, handling, storage, and transportation
- **Reliability & Maintainability (R&M) Engineering**
 - Implemented a Defense Acquisition Executive Summary (DAES) reliability tracking process
 - Expanded the DAG Chapter 4 R&M section including a description of key R&M engineering activities aligned to each acquisition life-cycle phase
 - Developing a human capital strategy for R&M engineering, R&M competencies, and R&M learning architecture
- **System Security Engineering**
 - Released DoDI 5200.44, “Protection of Mission Critical Functions to Achieve Trusted Systems and Networks (TSN)”
 - Revised DoDI 5200.39, “Critical Program Information (CPI) Identification and Protection Within RDA Programs”
 - Conducted DoD Anti-Tamper program study; supported the AT&L Defense Exportability Features (DEF) program
 - Led study on data vulnerability; resulted in Secretary of Defense memorandum “Safeguarding Unclassified Controlled Technical Information”
- **Additional Engineering Policy and Guidance**
 - **Counterfeit Prevention:** Contributed to DoDI 4140.67, “DoD Counterfeit Prevention Policy”
 - **Value Engineering:** Developed DoDI 4245.14, “DoD Value Engineering Program”
 - **Open Systems Architecture:** Co-chaired the DoD Open Systems Architecture and Data Rights Team; released the DoD Open Systems Architecture Contract Guidebook for Program Managers
 - **Systems Engineering-Related Standards:** With IEEE and SAE International, supporting development of four defense-focused, non-government standards on SE, technical reviews and audits, manufacturing management, and configuration management



FY13 Major Program Support Activity



Annual Report covers critical FY 13 program engagements

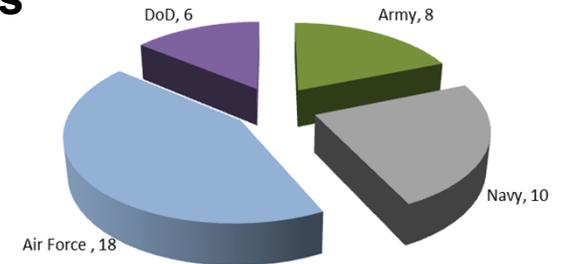
FY 2013 SEP Review and Approval Activity

Major Programs	Program SEPs Reviewed			Program SEPs Approved		
	MDAP	MAIS	Total	MDAP	MAIS	Total
Supporting MS A	5	0	5	2	0	2
Supporting MS B	8	7	15	3	2	5
Supporting MS C	7	3	10	1	2	3
Other (FDD, FRP, ADM Action, etc.)	5	1	6	2	1	3
Total	25	11	36	8	5	13

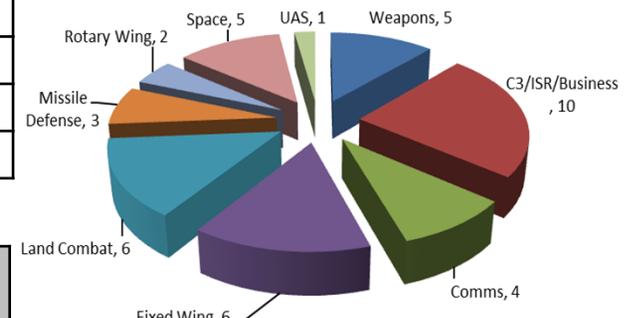
FY 2013 DASD(SE) Program Engagement Summary

Major Program	PSRs	NM/CCR	Focused Reviews	PDR Assessment	CDR Assessment	DPAP RFP Peer Reviews	TOTAL
MDAP/Pre-MDAP	15		6	3	5	4	33
MAIS/MDA		2	4	2		1	9
Total	15	2	10	5	5	5	42

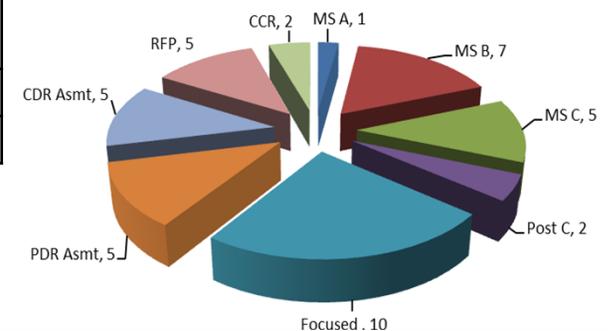
Military Department



Domain



Decision Support Reviews





FY13 Program Protection Engagement and Support Summary



Programs Supported in FY13

- 3DELRR, Pre-EMD/MS B
- AOC-WS, MS B
- AF-IPPS, MS B
- AMDR, MS B
- AMPV, Pre-EMD/MS B
- Army IAMD, MS C
- BAMS, MS C
- B-2 DMS, Pre-EMD/MS B
- B-61 TKA, MS B
- CANES, MS C/FDD
- CH-53K, MS C
- CIRCM, Pre-EMD/MS B
- CRH, MS B
- CVN-78, MS C
- DAI, MS B
- DCGS-A, FDD
- DEAMS, MS B
- E-2D, FRP
- EELV, MS C
- EPS CAPS, MS B
- F-22 Incr 3.2b, MS B
- F-35, MS C
- FAB-T, MS C
- GCSS-A, FDD
- GCSS-MC, FDD
- GCV, Pre-EMD/MS B
- Global Hawk, MS C
- GPS III, FPD
- iEHR
- IFPC Incr 2, MS A
- IPPS-A, MS C
- ISPAN Incr 4, MS B
- ITEP, MS A
- JASSM-ER, FRP
- JHSV, MS C
- JMS Incr 1, MS C
- JMS Incr 2, MS B
- JPALS Incr 1A, MS C
- JPALS Incr 1B MS B
- JPALS Incr 2, MS B
- KC-46A, MS C
- KMI, FDD
- LCS MM, MS B
- LCS Seaframes, MS C
- LMP Incr 2, MS B

- MGUE, MS A/Pre-EMD
- MNVR, MS C
- MQ-1C Gray Eagle, FRP
- MQ-4C Triton, MS C
- NGEN, MS C
- NGJ, MS A
- OASuW, MS A/B
- OCX, MS B
- P-8A Incr 1, FRP
- P-8A, Incr 3, MS A
- PAC-3 MSE, MS C
- PIM, MS C
- PKI, FDD
- SBIRS, FRP
- SDBII, MS C
- Space Fence, MS B
- SM-6, FRP
- TAO(X), MS A
- TMIP-J, FDD
- UCLASS, MS A
- VXX, Pre-EMD/MS B
- WIN-T Incr 2, FRP
- WSF, MS A

PPPs Approved in FY13

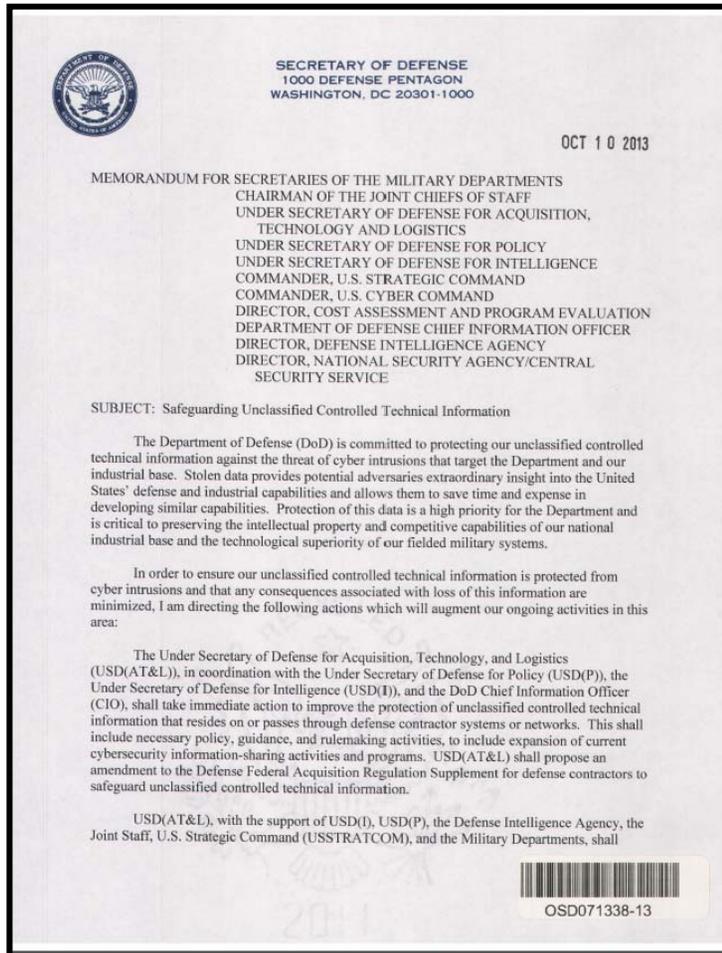
- AMDR, MS B
- B-61, LEP TKA, MS B (not counted)
- CANES, MS C
- DCGS-A, FDD
- E-2D, FRP
- EELV, MS C
- F-22, MS B
- GCSS-A, FDD
- Gray Eagle, FRP
- JMS Inc 2, MS B
- JTRS MIDS, FRP
- KMI, FRP
- MQ-9 Reaper, MS C
- NGEN, MS C
- NGJ, MS A
- PIM, MS C
- SBIRS, FRP
- Space Fence, MS B
- WIN-T Incr 2, FRP

Count = 68

Count = 18



Safeguarding Unclassified Controlled Technical Information Memo



- **Secretary of Defense Memorandum, October 10, 2013**
 - Emphasizes DoD commitment to preserving the intellectual property (IP) and competitive capabilities of the Defense Industrial Base (DIB) and the technological superiority of our fielded military systems.
- **Key Goals**
 - Protect DoD unclassified controlled technical information from cyber intrusions
 - Minimize the consequences associated with loss of this information
- **Augments current activities**
 - Including the DIB Cyber Security/Information Assurance (CS/IA) Program



DFARS Clause 252.204-7012: Safeguarding Unclassified Controlled Technical Information



- **Rule Published November 18, 2013**
 - Clause affects all new contracts that contain, or will contain unclassified controlled technical information
- **Purpose: Establish minimum requirements for DoD unclassified controlled technical information on contractor information systems**
 - Requires contractors implement minimum set of information security controls
 - Requires contractors report cyber incident and compromises
 - Requires contractor actions to support DoD damage assessment
- **Minimum Security Controls**
 - Set of 51 information security controls from NIST SP 800-53, Revision 4
 - Combination of Technical, Process, Awareness & Training measures
- **Incident Reporting**
 - Reporting includes:
 - DoD contracts and subcontractor information affected by a cyber incident or compromise
 - DoD programs, platforms, or systems involved
 - Description of DoD technical information compromised
 - Reported information does not include attack signatures or other threat actor indicators
- **Clause includes flow down in all subcontracts**

http://www.acq.osd.mil/dpap/dars/dfars/html/current/204_73.htm



FY13 Acquisition Engineering Workforce Activities



- **DAWIA Career Paths and Career Fields**
 - Retired Program Systems Engineer (PSE) acquisition career path; renamed Systems Planning, Research, Development and Engineering (SPRDE) to Engineering (ENG)
 - Updated ENG Competency Model
 - Updated ENG Certification Requirements
 - Updating DAU ENG Curriculum
- **Engineering Workforce Initiatives**
 - Implementing Key Leadership Position (KLP) Qualification Boards
 - Developing specialty engineering guides, tools, competency models and training in R&M Engineering, Program Protection Planning and Manufacturing



Systems Engineering Workforce in the DoD Reported by Military Department Systems Engineers and DASD(SE)



Total Number of Civilian and Military Acquisition-ENG Personnel									
Fiscal Year	Year Ending	US Army		US Navy		US Air Force ¹		DASD(SE)	
FY05	30-Sep-05	11,138		16,886		6,505		13	
FY06	30-Sep-06	11,964		16,688		6,237		14	
FY07	30-Sep-07	11,050		16,804		6,162		13	
FY08	30-Sep-08	10,769		16,576		6,429		14	
FY09	30-Sep-09	10,208		18,085		7,197		13	
FY10	30-Sep-10	10,647		19,270		7,625		14	
FY11	30-Sep-11	10,071		19,325		8,514		23	
FY12	30-Sep-12	9,812		19,498		8,649		23	
FY13	30-Sep-13	9,374		19,589 ²		8,474		21	
		Planned Growth	Projected End Strength	Planned Growth	Projected End Strength ³	Planned Growth	Projected End Strength	Planned Growth	Projected End Strength
FY14	30-Sep-14	22	9,396		20,290	-74	8,400	0	20
FY15	30-Sep-15	21	9,417	106	20,396	-22	8,378	0	20
FY16	30-Sep-16	0	9,417	6	20,402	-23	8,355	0	20
FY17	30-Sep-17	0	9,417	-9	20,393	-13	8,342	0	20
FY18	30-Sep-18	0	9,417	-136	20,257	-10	8,332	0	20

Status as of
Sept 30, 2013;
Does not
reflect
subsequent
budget actions

¹Source: USD AT&L DataMart Q4 FY12.

²DON FY 2013 personnel on-board as of 9/30/2013. Source: DACM MIS.

³DON Projected E/S based on SE Workforce Requirements (per PB-14, PB-13, Exhibit)



Engineering Workforce Development



**Vision for 21st Century Engineering Workforce:
Develop capability, capacity and competence needed to address
current and future technical and programmatic challenges.**

- **All DASD(SE) Workforce Development initiatives align with OSD(AT&L) priorities**
- **Initiatives address growing challenges to the DoD and the Defense Industrial Base for attracting, developing and retaining the most qualified engineering leaders:**
 - Key Leadership Position and qualification criteria for Chief Engineer/Lead Systems Engineer and Program Lead, Production, Quality and Manufacturing
 - Systems Engineering Research Center Workforce Tasks:
 - Experience Accelerator and Technical Leadership Curriculum (with DAU)
 - SE Capstone Program (with STEM Development Office)
 - Project Helix (with Services and Defense Industrial Community)
 - Body of Knowledge and Curriculum to Advance Systems Engineering (BKCASE)
 - ASD(R&E) Science, Technology, Engineering, and Mathematics (STEM) Strategic and Implementation Plans and Executive Board



Systems Engineering Research Center



- | | | |
|---|---|---|
| 1 Stevens Institute of Technology | 9 Missouri University of Science and Technology | 16 Texas Tech University |
| 2 University of Southern California | 10 Naval Postgraduate School | 17 University of Alabama in Huntsville |
| 3 Air Force Institute of Technology | 11 North Carolina Agricultural & Technical State University | 18 University of California - San Diego |
| 4 Auburn University | 12 Pennsylvania State University | 19 University of Maryland |
| 5 Carnegie Mellon University | 13 Purdue University | 20 University of Massachusetts Amherst |
| 6 Georgetown University | 14 Southern Methodist University | 21 University of Virginia |
| 7 Georgia Institute of Technology | 15 Texas A&M University | 22 Wayne State University |
| 8 Massachusetts Institute of Technology | | |

SERC leverages expertise of over 400 researchers across the nation



Questions for Industry



- **What are your workforce challenges and what mitigating techniques/strategies do you utilize?**
- **How do you ensure technical capability is maintained within your workforce?**
- **How do you identify and grow your technical leaders?**



Systems Engineering: Critical to Defense Acquisition



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