Systems Engineering Workforce Development Update

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To increase the success rate of our acquisition programs, we need to:

- Better equip / support / enable the workforce to perform successfully and meet all demands
- Mitigate loss of skilled / experienced workforce
- Successfully compete for, hire and retain talent
- Transfer knowledge / expertise to new generation
- Return “inherently governmental” and other appropriate work from contractors to the government workforce
- Integrate acquisition workforce planning with DoD Total Force Human Capital Planning
- Strategically plan and resource human capital initiatives – develop and execute a workforce development roadmap
Technical Management Workforce Population

Technical Management Workforce
42% of the Total Acquisition Workforce population

The Defense Acquisition Community
125,047* Government and Military Certified Professionals
Over 50,000 DoD Professionals in SE, T&E and PQM
500,000+ Defense Industry Personnel

* DAU Data Mart a/o 30 Jun 09
Systems Engineering Workforce Layers

- Systems Engineering (SE) Work performed by Defense Prime / Sub Contractors in development and execution of Acquisition Programs

  - SE Work performed by Contractor (SETA) Systems Engineers
  - SE Work performed by FFRDC Systems Engineers
  - SE Work performed by Government (Civilian, IPA and Military) Systems Engineers

DoD
Notional DoD Systems Engineering Workforce Strategy

Workforce Age

Workforce Size

- Develop / Train and Retain
  - Recruit: Journeymen
  - Retired Military
  - SE FFRDCs

- Develop / Train: Mentors
  - Recruit: Highly Qualified Experts

- Recruit: Interns
SE Acquisition Workforce Age Demographic* and Notional Strategy

Numbers of Personnel

Age Range

19-24 25-34 35-44 45-54 55-64 65-74 75-86

1,225 7,947 7,179 13,152 5,022 811 83

*As of July 2009
US Army RDECOM Career Program 16*
Age Distribution Ages 21-71 only – 2009

Average CP16
Age = 44.25

Minimum CSRS retirement age = 55

* CP 16 includes all Army research and development engineers
US Army RDECOM Career Program 16
Age Distribution Ages 21-71 only – Trend

Percent of population who are military retirees
2001- 1.0%
2005- 1.5%
2009- 2.2%
Projected FY10-15 New Acquisition Government Workforce Distribution

- **20,000 new government billets:**
  - Contractor Conversions to Government = 11,000*
  - New Hires = 9,000

- **Projected Career Field Distribution:**
  - Contracting = 9,500
  - PM, SPRDE/SE&PSE, PQM, LCL, BCEFM, etc. = 10,500

- **Future Workforce Total:** 126K + 20K = 146K

- **Future Contractor Support** = 40K (vice 51K currently)

*Projected at 14 Apr 08 DAU Workforce Conference*
Current Systems Engineering (SE) Workforce Picture

- Recent Congressional and GAO reports cite evidence of lack of disciplined systems engineering – indicates gaps in competencies
- Systemic Root Cause Analysis efforts to date indicate lack of systems engineering skills and numbers in the SE workforce
- No clear picture of what competencies are available in the current SE workforce
- SE workforce members may work on a single component for entire career or may work in only one area across several programs
- SE experience standards for certification levels are only specified as number of years spent in coded acquisition positions in specific career fields – not an indication of real experience
- Number of years of experience for current certification levels is too low when compared to industry
Current DoD SE Certification Picture

- Separate functional career fields/paths with little integration of competencies – SE, PSE, T&E, PQM
- Stove-piped approach to certification => less agile workforce
- SE & PSE paths allow for other career field experience; T&E and PQM do not
- Job rotational assignments are not often utilized / emphasized
- Certification is often seen as a check-off list; no real meat behind what a certification means
- SE/PSE and T&E require degrees

What do we want certification to mean?
SE Workforce Challenges / Opportunities

• What competencies are needed now and in the future and what gaps exist or will exist?
  – What kinds of Systems Engineers do we need?
  – What is the difference between Systems Engineers and other domain engineers?

• What workforce capacity do we need now and in the future?
  – What is the right SE workforce size?
  – How many SEs are needed on any particular program?

• What is the near-term and long-term workforce capability risk?
  – How can we manage and mitigate this risk?

• What key information will help us make sound Systems Engineering human capital strategy / initiative decisions?

• How do we leverage NDAA 852 funding?
  – What should we do in terms of Recruiting?
  – What should we do in terms of Training / Development?
  – What should we do in terms of Retention?
Workforce Development Initiatives

• These initiatives constitute our workforce development roadmap
• Initiatives can be grouped under government, industry and academia categories
• All initiatives are interdependent – each initiative complements, leverages and affects many other initiatives
• Each initiative supports one or more efforts under recruit, train/develop, and retain
Workforce Development Initiatives: Government

• Competency Assessments for Systems Planning, Research, Development and Engineering (SPRDE-SE) and Production, Quality, and Manufacturing (PQM) Career Fields
• New Four Level Certification Standards for SPRDE-SE
• Science, Technology, Engineering, and Mathematics (STEM) Strategic Plan Working Group
• SE Executive Technical Leadership Course (SERC Research Topic)
• Mentoring Workshop/Tutorial at NDIA SE Conference October 26, 2009
• Systems Engineering (SE) Defense Acquisition Workforce Development Fund (DAWDF) Initiative
• Government-to-Government Workshops with Singapore on SE Competency Models
• Occupational Career Code for Systems Engineering (with DAU)
Workforce Development Initiatives: Industry

- International Council on SE (INCOSE) Certified SE Professional-Acquisition (CSEP-Acq) and Future Extensions
- National Defense Industrial Association (NDIA) SE Division Education and Training (E&T) Committee Comparison of Acquisition and Developer Competency Models
- Others?
• Body of Knowledge and Curriculum for Advanced SE – BKCASE (SERC Research Topic)
• Defense Acquisition Workforce Certification Equivalency with Naval Postgraduate School, Air Force Institute of Technology and Air Force Academy for DAU SYS Courses
• Air Force Academy Preparation Course for INCOSE Associate SE Professional (ASEP) Certification
• SE Education Symposium April 2010 (Co-sponsored with Air Force Academy)
• SE Education and Training Summit 2010
• Working with DAU on SPRDE-SE and PQM Curriculum Currency
• Collaboration with Civilian Universities
Benefits

• All of these initiatives directly contribute to “raising the bar” for Systems Engineering across the board by:
  – Enabling us to assess the entire DoD Systems Engineering workforce across critical competencies
  – Enabling us to better determine shortfalls in both competencies and workforce size at all levels
  – Enabling us to better manage workforce development requirements and certification standards
  – Enabling us to make better decisions about human capital strategy and initiatives for the Systems Engineering workforce
  – Enabling us to provide acquisition programs with the quantity and quality of Systems Engineers they need for success
Questions?
BACKUP
Human Capital Initiatives
(Defense Acquisition Workforce Development Fund ¹)

Defense Acquisition Workforce Development Fund

- Recruiting & Hiring
  - Intern Programs
  - Recruiting Incentives
  - Outreach Programs
  - Journeyman Hiring
  - Highly Qualified Experts

- Training & Development
  - Training Enhancement & Capacity Expansion
  - Acquisition Workforce Management & Student Information System
  - Competency Management & Assessments
  - Workforce Planning

- Retention & Recognition
  - Retention & Recognition
  - Career Broadening & Academic Programs

¹ Based on NDAA Section 852, Defense Acquisition Workforce Development Act
### Objective

- **Develop**: A future world-class STEM workforce talent pool

### Attract

- **Attract**: A dynamic and innovative work environment in the DoD that attracts and retains world-class STEM talent

### Deliver

- **Deliver**: A coordinated, collaborative and cohesive set of DoD STEM programs

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**Inspire**

- A Nation of students, parents, teachers and the public inspired to engage in STEM discovery and innovation

**Objectives**

- Increase the awareness and importance of STEM to foster discovery and innovation.
- Provide opportunities and resources for learning and personal growth that stress academics, knowledge, skills and attributes required for STEM discovery and innovation.
- Strengthen, expand and enable communities of stakeholders to provide a continuum of formal and informal education programs and opportunities.
- Directly engage populations underrepresented in STEM fields.

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**Develop**

- A future world-class STEM workforce talent pool

**Objectives**

- Identify current and future workforce needs.
- Increase the diversity of participants in STEM programs.
- Build a portfolio of DoD STEM programs to develop the desired competencies of the talent pool.

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**Attract**

- A dynamic and innovative work environment in the DoD that attracts and retains world-class STEM talent

**Objectives**

- Identify programs and best practices that attract and retain world-class STEM talent.
- Ensure a DoD workplace environment that attracts and retains world-class STEM talent.
- Strengthen and promote the awareness of STEM-relevant opportunities within DoD.

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**Deliver**

- A coordinated, collaborative and cohesive set of DoD STEM programs

**Objectives**

- Develop a systematic approach to identify STEM education and outreach programs across the DoD components and agencies.
- STEM Development Office will provide and maintain a publicly-accessible inventory of DoD STEM programs.
- Develop a STEM inventory communication strategy.

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**DoD STEM Development Office**

DoD DDR&E STEM DEVELOPMENT OFFICE – 10/21/09 - Dr. Laura Adolphi – 703-588-1479
Vision: A diverse world-class STEM talent pool with the creativity and agility to meet national defense needs.

Mission: Inspire, develop and attract the STEM talent essential to create innovative solutions for the nation’s current and future challenges.

Goals:
- INSPIRE: A nation of students, parents, teachers and the public inspired to engage in STEM discovery and innovation
- DEVELOP: A future world-class STEM workforce talent pool
- ATTRACT: A dynamic and innovative work environment in the DoD that attracts and retains world-class STEM talent
- DELIVER: A coordinated, collaborative and cohesive set of DoD STEM programs
# Professional Growth to Program Management

- **Level 1 – Entry**: (minimum 1 year of experience)
- **Level 2 – Journeyman**: (minimum 2 years of SE experience)
- **Level 3 – Expert**: (minimum 4 years of SE experience)
- **Level 4**: (minimum 8 years of SE experience)

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- **Test & Evaluation Career Field**
  - Level 3
  - Level 2
  - Level 1

- **Program Management Career Field**
  - Level 3
  - Level 2
  - Level 1

- **PQM Career Field**
  - Level 3
  - Level 2
  - Level 1

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**SPRDE-Systems Engineering Career Field**

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**NDIA SE Conference: SE Workforce Development Update**
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