Systems Engineering and Acquisition Excellence

Stephen Welby
Director, Systems Engineering
Office of the Under Secretary of Defense (AT&L)
Department of Defense

We are a nation at war

- Over 1.4 million active duty men and women
- Over 737,000 civilians
- Over 1.1 million Guard & Reserves

Our Mission:

- Protect our National Security
- Provide the military forces needed to deter war and prevail in conflict
Systems Engineering in OSD
Weapon Systems Acquisition Reform Act
May 2009

Establishes the Director, Systems Engineering as principal systems engineering advisor to the SECDEF and the USD(AT&L)
OSD Systems Engineering

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

- Engineering Assessment / Mentoring of Major Defense Programs
- Technical Reviews
- AT&L Decision Forums
- Systems Engineering Plans
- Systemic Root Cause Analysis
- Support Acquisition Leadership with Independent Engineering Analysis and Advice

Our Focus: Supporting Knowledge-Based Decision Making
Policy and Practice

Supporting the Current Practice
- Department-wide Systems Engineering Policy and Guidance
- Specialty Engineering
  - System Safety, Reliability/Availability / Maintainability, Quality, Manufacturing, Producibility, Human Systems Integration

Addressing Emerging Challenges
- Complex Systems/Systems of Systems
- Program Protection/Acquisition Cyber-Security
- University and Industry Engineering Research
- Modeling and Simulation Support to Acquisition

Our Focus: Policy, People and Practice
Acquisition Excellence through Systems Engineering

Our Focus: Growing Engineering Capacity Across the Department
Best Jobs in America

Systems Engineer
Information Technology (86,000)
$87,100 | $130,000

Physician Assistant
Healthcare (82,000)
$99,000 | $124,000

College Professor
Education (278,000)
$70,400 | $115,000

Nurse Practitioner
Healthcare (22,000)
$85,200 | $113,000

Certified Public Accountant
Financial (190,000)
$74,200 | $136,000

Physical Therapist
Healthcare (181,000)
$74,300 | $96,100

Computer/Network Security Consultant
Government (33,000)
$99,700 | $152,000

IT Project Manager
IT (174,000)
$98,700 | $140,000

Certified Public Accountant
Financial (190,000)
$74,200 | $136,000

Software Developer
IT (275,000)
$79,400 | $116,000

Pharmacist
Healthcare (198,000)
$109,000 | $134,000

Occupational Therapist
Healthcare (170,000)
$69,700 | $100,000

Anesthesiologist
Healthcare (23,000)
$292,000 | $408,000

Physician/General Practice
Healthcare (96,000)
$150,000 | $228,000

Human Resources Manager
Other (236,000)
$71,800 | $111,100

Senior Financial Analyst
Financial (127,000)
$79,900 | $109,000

Physician/Oncologist
Healthcare (14,000)
$222,000 | $338,000

Business Analyst, IT
IT (125,000)
$82,600 | $119,000

Attorney/Lawyer
Legal (94,000)
$115,000 | $262,000

Physician/General Practice
Healthcare (96,000)
$150,000 | $228,000

Telecommunications Network Engineer
IT (213,000)
$86,200 | $130,000

Securities Trader
Financial (120,000)
$113,000 | $491,000

Education/Training Consultant
Financial (120,000)
$77,800 | $157,000

Emergency Room Physician
Healthcare (22,000)
$249,000 | $386,000

Product Management Director
Sales and Marketing (17,000)
$145,000 | $201,000

Source: http://www.focus.com/fyi/human-resources/best-jobs/
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Key
- Highest paid Salary
- Highest median Salary
- Most flexibility
- Most satisfaction
- Benefit to society
- Highest job growth
- Highest turnover
- Most security
- Fewest growth

Top 50
Sector (Total Jobs)
Median salary | Top pay
Systems Engineering Workforce

Breadth
- Awareness of and appreciation for other functional areas
- Understanding of system lifecycle and processes
- Knowledge of other engineering disciplines and how they integrate into a system solution
- Knowledge of product domains

Depth
- Extensive expertise and experience in one or more engineering disciplines and in one or more product domains

Leadership
- Ability to motivate and inspire individuals and teams
- Comfort in dealing with complexity
- Focus on underpinning decisions with data
- Capability to make tough technical decisions
Acquisition Efficiency Initiatives
Acquisition Efficiency Guidance Roadmap

**Target Affordability and Control Cost Growth**
- Mandate affordability as a requirement
- Implement “should cost” based management
- Eliminate redundancy within warfighter portfolios
- Achieve Stable and economical production rates
- Manage program timelines

**Incentivize Productivity & Innovation in Industry**
- Reward contractors for successful supply chain and indirect expense management
- Increase Use of FPIF contract type
- Capitalize on progress payment structures
- Institute a preferred supplier program
- Reinvigorate industry’s independent research and development

**Promote Real Competition**
- Emphasize competitive strategy at each program milestone
- Remove obstacles to competition
  - Allow reasonable time to bid
  - Require non-certified cost and pricing data on single offers
  - Enforce open system architectures and set rules for acquisition of technical data rights
- Increase small business role and opportunities

**Improve Tradecraft in Acquisition of Services**
- Assign senior managers for acquisition of services
- Adopt uniform services market segmentation (taxonomy)
- Address causes of poor tradecraft
  - Define requirements and prevent creep
  - Conduct market research
- Increase small business participation

**Reduce Non-Productive Processes and Bureaucracy**
- Reduce frequency of OSD level reviews
- Work with Congress to eliminate low value added statutory requirements
- Reduce the volume and cost of Congressional Reports
- Reduce non-value added requirements imposed on industry
- Align DCMA and DCAA processes to ensure work is complementary
- Increase use of Forward Pricing Rate Recommendations (FPRRs) to reduce administrative costs
Acquisition Efficiency Guidance
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Systems Engineering and Acquisition Excellence
**Systems Engineering Challenges**

- Create the tools to enable Rapid Capability Delivery
  - Shorten the time to deliver life-saving and war-winning technologies – without compromising product integrity

- Expand the aperture of DoD Engineering practice to address 21st century technical challenges
  - Security, software-intensive, etc...

- Embrace complexity
  - Systems of Systems / Complex Adaptive Systems / Emergent behaviors

- Expand the human capital resource base
  - Reflect new insights in curricula to grow the next “crop” of technical leaders
The DoDI 5000.02 Process
The Challenge of Rapid Fielding

Problem Identification

Solution Matching

Implementation Tools

Transition

Role of Systems Engineering in Rapid Fielding?

JUONS
COCOM Requests
Anticipated Needs

OSD
Services
US Govt

Academia

Industry

IC
DARPA
Coalition

Rapid Equipping Force
JIEDDO
Rapid Fielding Office
Rapid Capabilities Office
Others

Program of Record
Prototype Capability
Terminate

Lessons Learned Feedback
Rethinking How We Buy?

Can we increase the speed of our rigorous process?

Balance Rigor & Repeatability w/ Speed & Effectiveness?

Can we increase the rigor of our rapid process?

Adopt Commercial Deployment Models?

Problem Identification
Solution Matching
Implementation Tools
Transition

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Lessons Learned Feedback
Major Initiatives: Development Planning

Materiel Development Decision (MDD) – Formal entry into Acquisition

- Understanding of Need
- Understanding of Solution Space Feasibility
- Alternative Acquisition Models
- Resourced Plan for detailed Engineering Analysis

MDD is the opportunity to start programs with a strong early Systems Engineering foundation
Major Initiatives:
Reinvigorating Defense Standardization

- Service product centers are currently pursuing independent efforts to reinvigorate standards processes
- Opportunity for SE to advocate for and coordinate service efforts
- USD(AT&L) appointed the Director, Systems Engineering as the Defense Standardization Executive
  - Standards, DMSMS, GIDEP, Interagency Coordination

Opportunity to leverage our Standardization Processes and Products As a Key Engineering Tool in Promoting Acquisition Excellence
Major Initiatives:
Systems 2020 Research Areas

- **Model Based Engineering**
  - Modeling and simulation tools for concurrent design, development and manufacture

- **Platform Based Engineering**
  - Architectural and automated design tools to rapidly insert new capabilities

- **Capability on Demand**
  - Systems embedded with organic adaptation capabilities

- **Trusted Systems Design**
  - Design methods and tools for system assurance that detect malice or enable self-awareness
Opportunities

Acquisition reform efforts have recognized criticality of strong Systems Engineering focus for program success

- **Systems Engineering toolkit focused on identifying and managing risk – in development, production and life-cycle supportability**

Growing focus on addressing “early-acquisition” phases

- **Leading to more informed decisions at MS B**

Our development processes need to evolve to provide faster product cycles, more adaptable products and address emerging technical challenges

Future US Defense capabilities depend on a capable US engineering workforce in and out of government

- **Need to create opportunities to grow future “Engineering Heroes”**
Systems Engineering: Critical to Acquisition Success

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