

# The U.S. Department of Defense Systems Engineering Competency Model

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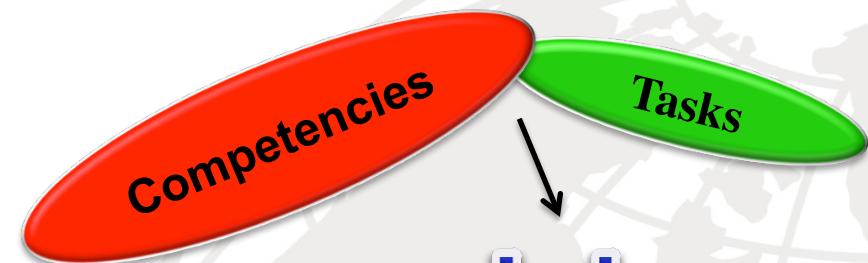
# Outline

- What is a Competency?
- Summary Competency Model Development
- Model Competencies
- Variation of Critical Competencies Across Components
- Comparison to INCOSE SE Handbook 4<sup>th</sup> Edition
- Implications
- Summary

# What is a Competency?

An observable, measurable pattern of skills, knowledge, abilities, behaviors and other characteristics that an individual needs to perform work roles or occupational functions successfully (U. S. Office of Personnel Management).

## Individuals



## Job Positions



- The Department of the Navy Deputy Assistant Secretary of the Navy for Research, Development, Test, and Evaluation (DASN RDT&E) sponsored a project to *research current and future capabilities of the systems engineering workforce through the development of a systems engineering competency model.*
- The Office of Personnel Management (OPM) Human Resources Solutions division *verified* the model to ensure it would be *suitable for use in a variety of human resources activities.*
- *The verified model includes competency definitions and task statements*, based on a survey developed in conjunction with panels of subject matter experts from the U.S. Navy, Army, Air Force and Missile Defense Agency.



# Methodology Summary

- Created draft model by reviewing existing position descriptions, occupational analyses, manpower and other occupational related studies, and past competency modeling studies conducted by OPM for other agencies (Most notably USAF)
- Conducted employee and supervisor SME panels to create an Occupational Analysis Survey
- Deployed survey an appropriate population of 7,486 defense systems engineers and supervisors
  - Survey respondents asked to rate tasks and competencies on frequency, importance, and whether or not tasks/competencies were “required at entry”
  - Respondents also asked to respond to series of questions to self-identify as individuals who perform or supervise personnel who perform specified type of work



# SECCM Competencies

## Systems Engineering Career Competency Model (SECCM)

### Technical Management

- Acquisition
- Risk Management
- Requirements Management
- Configuration Management
- Technical Assessment
- Data Management
- Software Engineering Management
- Decision Analysis
- Interface Management
- Technical Planning

### Business Acumen

- Industry Awareness
- Organization
- Cost Estimating
- Proposal Process
- Supplier Management
- Negotiations
- Cost, Pricing and Rates/Cost Management
- Financial Reporting and Metrics
- Business Strategy
- Industry Motivation, Incentives, Rewards
- Contract Negotiations

### Analytical

- Transition
- Integration
- Design Considerations
- Tools and Techniques
- Stakeholders Requirements Definition
- Requirements Analysis
- Validation
- Verification
- Mission-Level Assessment
- Architecture Design
- Implementation
- Engineering Disciplines
- Requirements Analysis

### Professional

- Communication
- Leading High Performance Teams
- Personal Effectiveness/ Peer Interaction
- Problem Solving
- Professional Ethics
- Strategic Thinking
- Coaching & Mentoring
- Managing Stakeholders
- Mission and Results Focus
- Sound Judgment
- Continual Learning

The SECCM also contains 179 Task Descriptions (not shown)



# SECCM Competencies and Task Description Relationship

No.	Competency	Description
1	MISSION-LEVEL ASSESSMENT	Collaborates with user community to assess mission areas end-to-end, across system and platform boundaries, to identify and close integration and interoperability (I&I) gaps in mission critical capabilities.
No.	Task	
MISSION-LEVEL ASSESSMENT		
1	Analyzes gaps between mission objectives, mission threads, existing or planned capabilities, and available funding to enable program decisions.	
2	Analyzes mission-level requirements to determine if they are feasible across programs or an enterprise (e.g., component, DOD, federal agencies, international coalitions).	
3	Analyzes the solution space to identify potential solutions that meet mission requirements and leverage opportunities.	
4	Conducts trade analysis to refine a proposed solution to meet mission requirements.	
5	Contributes to the development of various scenarios for system use, functions, and performance in line with the Concept of Operations.	
6	Contributes to the development of operational and top-level systems requirements that are traceable to mission-level requirements, feasible, complete, and verifiable.	
7	Identifies and analyzes mission technical problems, issues, risks, and opportunities to enable informed program decisions.	



# Example SECCM Competencies

**ARCHITECTURE DESIGN** Creates and maintains architectural products throughout the life-cycle integrating hardware, software, and human elements; their processes; and related internal and external interfaces that meet user needs and optimize performance.

**IMPLEMENTATION** Applies a methodical and disciplined approach for the specification, design, development, realization, technical management, operations, and/or retirement of a system.

**INTEGRATION** Plans, manages, and executes the systems integration process to form higher-level elements and eventually the finished products.

**LEADING HIGH-PERFORMANCE TEAMS** Leads and builds teams by managing group processes, providing technical direction, and fostering commitment to the mission.

**MANAGING STAKEHOLDERS** Identifies stakeholders; builds and manages effective relationships with all stakeholders; collaborates across boundaries, and finds common ground with a widening range of stakeholders. Utilizes contacts to build and strengthen internal support.

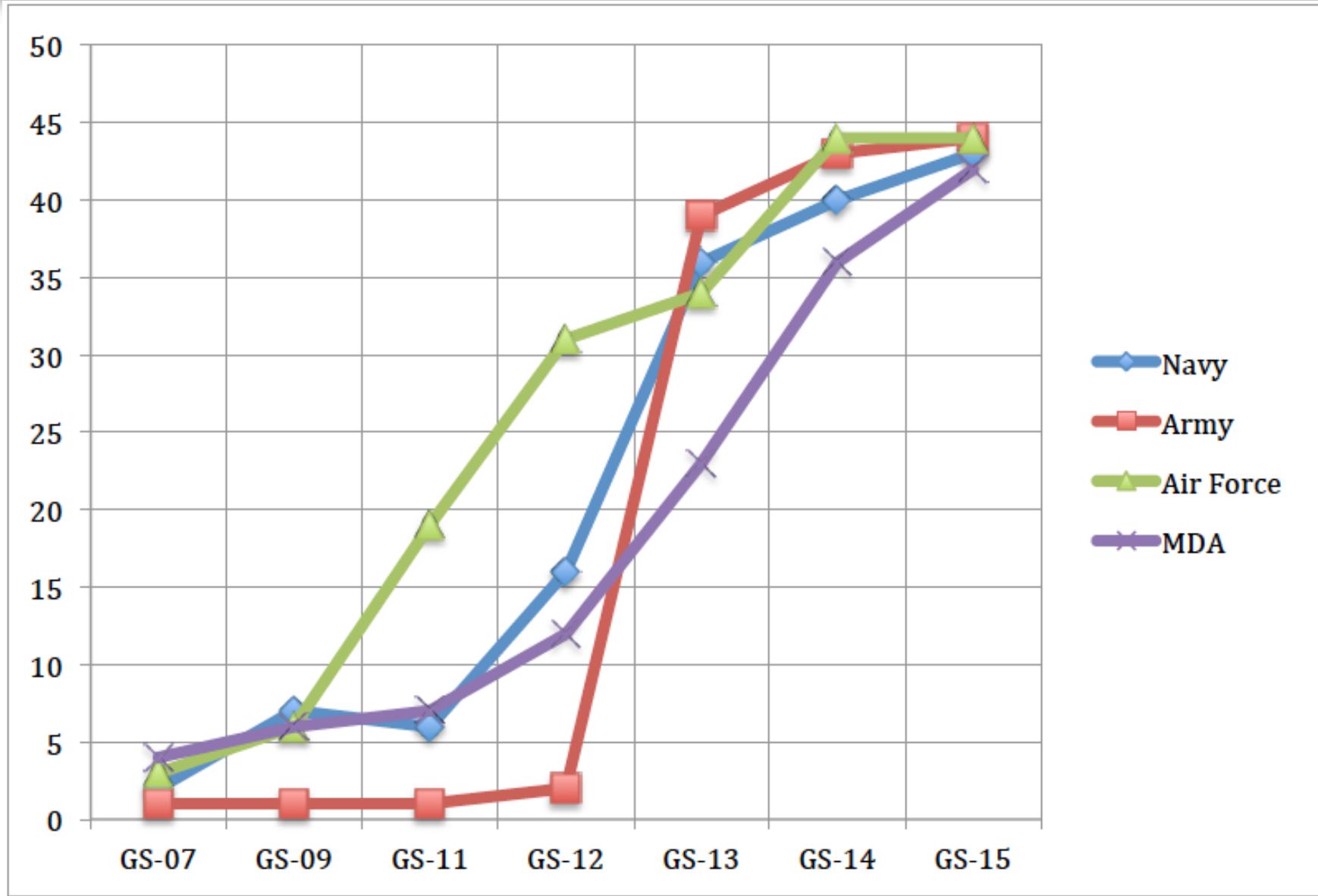
**STAKEHOLDER REQUIREMENTS DEFINITION** Works with the user to establish and refine operational needs, attributes, and performance parameters based on established processes and ensures all relevant requirements and design considerations are addressed to establish a set of baseline capability requirements.

**COMMUNICATION** Expresses facts and ideas both verbally and in writing taking into account the audience and the nature of the information; listens to others, attends to nonverbal cues, and responds appropriately.

**PERSONAL EFFECTIVENESS/PEER INTERACTION** Sets personal goals; displays initiative and commitment towards completing assignments; works and collaborates with peers.



# Critical Competencies by Grade Level for Each Component





INCOSE SE Handbook Version 4			SECCM
Process/Method/ Activity	Number	Title	Competency Number
Technical Processes	4.1	Business or Mission Analysis	1
	4.2	Stakeholder Needs and Requirements Definition	2
	4.3	System Requirements Definition	3
	4.4	Architecture Definition	4
	4.5	Design Definition	4, 10
	4.6	System Analysis	12
	4.7	Implementation	5
	4.8	Integration	6
	4.9	Verification	7
	4.10	Transition	9
	4.11	Validation	8
	4.12	Operation	5
	4.13	Maintenance	10
	4.14	Disposal	5, 10



# INCOSE HB Technical Management, Agreement, and Cross-Cutting

INCOSE SE Handbook Version 4			SECCM
Process/Method/ Activity	Number	Title	Competency Number
Technical Management Processes	5.1	Project Planning	13
	5.2	Project Assessment and Control	14
	5.3	Decision Management	12
	5.4	Risk Management	17
	5.5	Configuration Management	15
	5.6	Information Management	18
	5.7	Measurement	14
	5.8	Quality Assurance	10
Agreement Processes	6.1	Acquisition	21
	6.2	Supply	39
Cross-Cutting Systems Engineering Methods	9.1	Modeling and Simulation	11
	9.2	Model-Based Systems Engineering	
	9.3	Functions-Based Systems Engineering	
	9.4	Object-Oriented Systems Engineering	
	9.5	Prototyping	
	9.6	Interface Management	19
	9.7	Integrated Product and Process Development	
	9.8	Lean Systems Engineering	
	9.9	Agile Systems Engineering	



- SECCM Available for Use Across U.S. DOD
  - Available through USA Staffing on-line Human Resources (HR) site
  - Complements USA Jobs site used by HR in conjunction with DOD Hiring Managers to create position descriptions, job announcements, and other HR functions
  - Somewhat aligned to 0801 occupational series
- DOD can now require SE competencies and tasks for hiring
  - This is a new and critical function that the SECCM provides, as this has not been allowed previously due to lack of conformance with Uniform Guidelines



- DOD Developed a SE Competency Model
  - Critical for developing a more well defined and consistent defense acquisition workforce
- Provides Basis for SE Workforce Development
- Aligns Well with INCOSE HB 4<sup>th</sup> Edition
- Aligns Well with INCOSE Competency Framework (under development)
  - Based on authors' participation with CWG



# Questions

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*(This publication includes the complete set of SECCM Competencies and Tasks)*