Defense Acquisition Guidebook (DAG) Chapter 4 Systems Engineering Update: Overview Briefing

Office of the Deputy Assistant Secretary of Defense for Systems Engineering
May 2013

https://acc.dau.mil/dag4

Why Update the DAG Chapter 4?

- **Improve guidance to fully reflect current policy and DASD(SE) initiatives**
  - Define systems engineering activities to support the updated Joint Capabilities Integration and Development System (JCIDS) (Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01H)
  - Reflect Better Buying Power initiatives
  - Respond to systems engineering systemic root cause analyses recommendations from program assessments
  - Incorporate Department-wide best practices; avoiding Service and domain-specific implementations

- **Improve currency, consistency, usability, and readability– less theory, more utility**

- **Emphasize the role of Systems Engineering in providing balanced solutions (managing cost, schedule and risk) that deliver needed capability to the war fighter**

- **Make Chapter 4 a more effective tool for the Program Manager and the Systems Engineering Practitioner**

Update Approach and Participation

- **Used a product-centered approach, where the product is the weapon system or capability under development**

- **Threaded policy, activities/processes, and product together**
  - Policy (Direction / Requirement) → Process (How) → Product (What)

- **Did not restate policy, rather clarified intent of policy and identified expectations**

- **Avoided inventing policy and removed preferences**

- **Minimized number of links (improved information flow)**

- **Included DoD-wide participation in update**

  - 24 organizations (DoD Services/Agencies)

  - 149 participants contributed as authors, collaborators, reviewers, and independent subject matter experts (includes ODASD(SE))

The New DAG Chapter 4 Message and Framework

- **SE provides balanced approach in delivering a capability to the warfighter**
- **SE supports program success through systematically increasing maturity and reducing risk over the acquisition life cycle**

4.1 Introduction
- Systems Engineering Definition
- Why it's important

4.2 Systems Engineering Activities in the Life Cycle
- Description of Technical Maturity Points
- By-phase description of key technical activities
- Technical Reviews and Audits

4.3 Systems Engineering Processes
- Description of technical and technical management processes
- Design Considerations (include Specialty Engineering)

DAG Chapter 4 Outline
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4.0 Overview

    4.0.1 Purpose

    4.0.2 Contents

4.1 Introduction

    4.1.1 Systems Engineering Policy and Guidance

    4.1.2 Systems Engineering Plan

    4.1.3 Systems Level Considerations

    4.1.4 Engineering Resources

    4.1.5 Certifications

    4.1.6 Systems Engineering Role in Contracting

4.2 Systems Engineering Activities in the Life Cycle

    4.2.1 Life Cycle Expectations

    4.2.2 – 4.2.7 Acquisition Phases

    4.2.8 – 4.2.17 Technical Reviews and Audits

4.3 Systems Engineering Processes

    4.3.1 Systems Engineering Processes Overview

    4.3.2 – 4.3.9 Technical Management Processes

    4.3.10 – 4.3.17 Technical Processes

    4.3.18 Design Considerations (includes 24 subsections, one for each design consideration)

    4.3.19 Tools, Techniques, and Lessons Learned

New DAG Chapter 4 Major Content Changes

- **Focused on target audience being Program Manager and Systems Engineering practitioners**

- **Consolidated and strengthened Systems Engineering Plan (SEP) Outline content in 4.1.2**

- **Added new content:**
  - 4.1.3 Systems Level Considerations (includes Software)
  - 4.1.5 Certifications
  - 4.1.6 Systems Engineering Role in Contracting
  - 4.3.19 Sustainability Analysis

- **Added detailed SE technical reviews and audits information (4.2.8-4.2.17)**

- **Enhanced Design Considerations section 4.3.18:**
  - Streamlined Parts Management and Standardization
  - Added new subsections: Anti-Counterfeiting; Intelligence; Operational Energy; and Packaging, Handling, Storage, and Transportation (PHS&T)
  - Added guidance for Producibility (under Producibility, Quality, and Manufacturing Readiness)

- **Removed/reduced topics covered in other DAG chapters**
  - Earned Value Management and Integrated Baseline Reviews (IBR) content removed, both found in Chapter 11 Program Management
  - Test and Evaluation content reduced, found in Chapter 9 Test & Evaluation

- **Removed phase-specific systems engineering 'V's**

DAG Chapter 4
Version Comparison

Content	DAG Chapter 4 (October 2012)	DAG Chapter 4 (February 2013)
Major Sections	**7 (4.0 to 4.6)** **Note: 4.0 included SE definition and SE Policy and Guidance**	**4 (4.0 to 4.3)** • **Expanded 4.1 Intro to include SE definition and SE Policy and Guidance** • **Removed 2 sections related to tools (embedded content into 4.1 Intro and 4.3 SE Processes)** • **Moved 1 section on Design Considerations (embedded into 4.3 SE Processes)**

SEP Outline	• **Content split between two locations:**
	  • **4.1 SE Overview**
	  • **4.5 SE Execution: Key SE Tools and Techniques**
	• **Missing guidance on mandatory table for Certifications**
		• **Consolidated into one section, 4.1.2 Systems Engineering Plan**
		• **Strengthened content supporting SEP Outline (e.g., Technical Performance Measures, Design Considerations)**
		• **Added new section 4.1.5 Certifications**

Technical Reviews and Audits	• **Embedded in phases throughout 4.3** • **Summary in 4.5.9**	• **Detailed information on SE Technical Reviews and Audits, 4.2.8-17** • **Separated out from phases, focused on technical maturity and risk** • **Changed ASR based on CJCSI 3170.01H demand signal** • **Removed ITR, IBRs, TRR**
Design Considerations	**22 in section 4.4**	**24 in section 4.3.18** • **Combined Parts Management and Standardization** • **Moved Software to 4.1.3 Systems Level Considerations** • **4 New: Anti-Counterfeiting, Intelligence, Operational Energy, PHS&T** • **Added guidance for Producibility (under PQM)**
Added content		• **Added 4.1.3 Systems Level Considerations** • **Added 4.1.6 SE Role in Contracting** • **Added 4.3.19. Sustainability Analysis**
Non-SE content	• **Earned Value Management (EVM)** • **Integrated Baseline Reviews (IBR) (one per each acquisition life cycle phase)** • **Test and Evaluation (T&E) content**	• **Removed EVM, covered in DAG Chapter 11 PM Activities** • **Removed IBRs, covered in DAG Chapter 11 PM Activities** • **T&E content reduced, linked to DAG Chapter 9 Test & Evaluation**

Other Changes Between DAG Chapter 4 Versions

Metric	DAG Chapter 4 (October 2012)	DAG Chapter 4 (February 2013)
Page Count	197	250 (minus table of contents)
Links	825 (478 external, 347 internal to DAG Chapter 4)	359 (external only)
Sections	7 (4.0 – 4.6)	4 (4.0 – 4.3)
Diagrams	14 (includes 5 different 'V' diagrams)	34 (includes life cycle diagram depicted 17 times; **removed phase specific 'V' diagrams**)
Design Considerations	22	24
SE Processes	16	16 (Implementation Process includes design and realization)

Updated DAG Chapter 4 posted to DAU website in May 2013

https://acc.dau.mil/dag4

For additional information, contact dasd-se@osd.mil

Backup

4.0   Overview
    4.0.1 Contents
    4.0.2 Definition of Systems Engineering
    4.0.3 DoD Policy and Guidance on Systems Engineering
4.1   Systems Engineering Overview
    4.1.1 Systems Engineering in DoD Acquisition
    4.1.2 Participants in Systems Engineering
    4.1.3 Systems Engineering Throughout Life-cycle Management
    4.1.4 System of Systems (SoS) Engineering
    4.1.5 Systems Engineering Within the Integrated Product and Process Development (IPPD) Framework
    4.1.6 Systems Engineering Leadership
4.2   Systems Engineering Processes: How systems Engineering is Conducted
    4.2.1 Process Standards and Capability Models to Accomplish Systems Engineering
    4.2.2 The Contractor's Systems Engineering Processes
    4.2.3 Standardization Process Terminology
    4.2.4 Application of Systems Engineering Processes
4.3   Systems Engineering Activities in the System Life Cycle
    4.3.1 – 4.3.5 Acquisition Phases
    4.3.6 Evolutionary Acquisition Programs
4.4   Systems Engineering Design Considerations
    4.4.1 – 4.4.22 (22 subsections on design considerations)
4.5   Systems Engineering Execution: Key Systems Engineering Tools and Techniques
    4.5.1 Systems Engineering Plan (SEP)
    4.5.2 Integrated Master Plan (IMP)
    4.5.3 Integrated Master Schedule (IMS)
    4.5.4 Earned Value Management (EVM) and Work Breakdown Structure (WBS)
    4.5.5 Value Engineering (VE)
    4.5.6 Types of Technical Assessments
    4.5.7 Trade Studies
    4.5.8 Modeling and Simulations (M&S)
    4.5.9 Summary of Technical Reviews
4.6   Systems Engineering Resources and Tools
    4.6.1 Best Practices
    4.6.2 Case Studies
    4.6.3 Lessons Learned
    4.6.4 Standards and Models
    4.6.5 Handbooks and Guides

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