Improving Work Breakdown Structure (WBS) Guidance for Weapons Systems with Substantial Software

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supporting the
Office of the Deputy Director,
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SYSTEMS & SOFTWARE ENGINEERING
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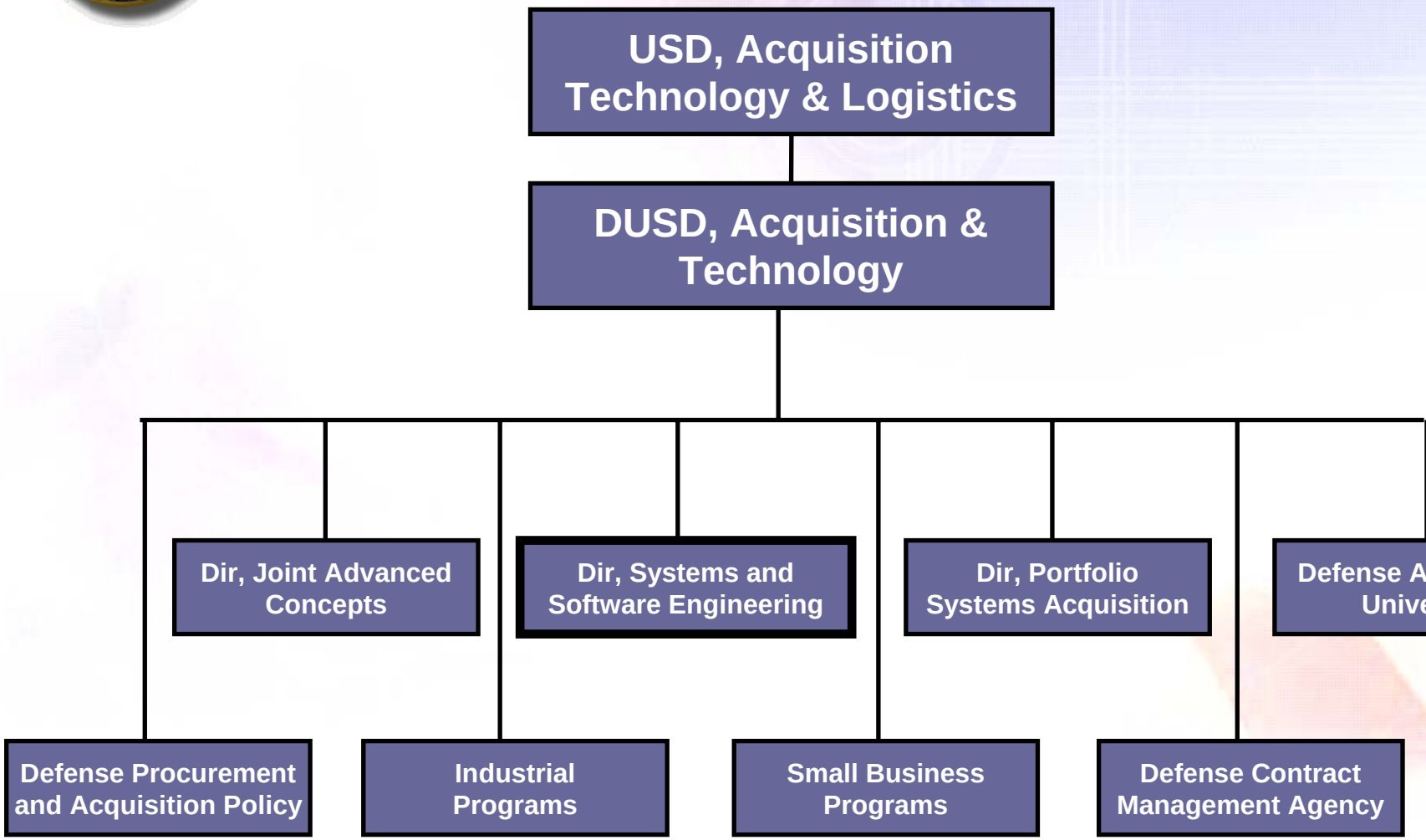
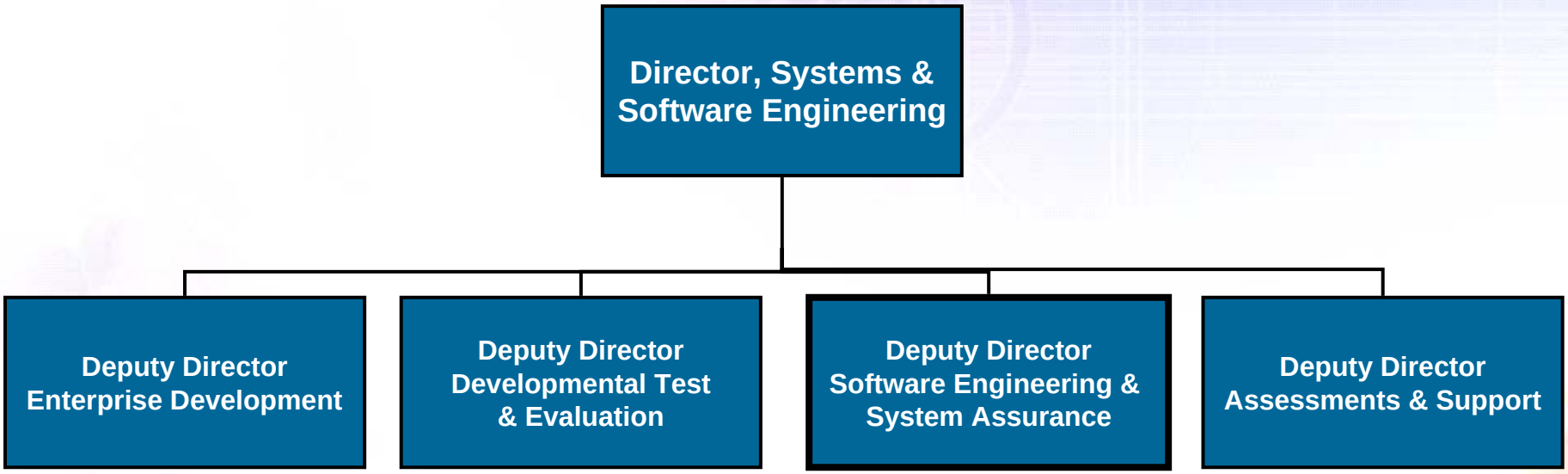
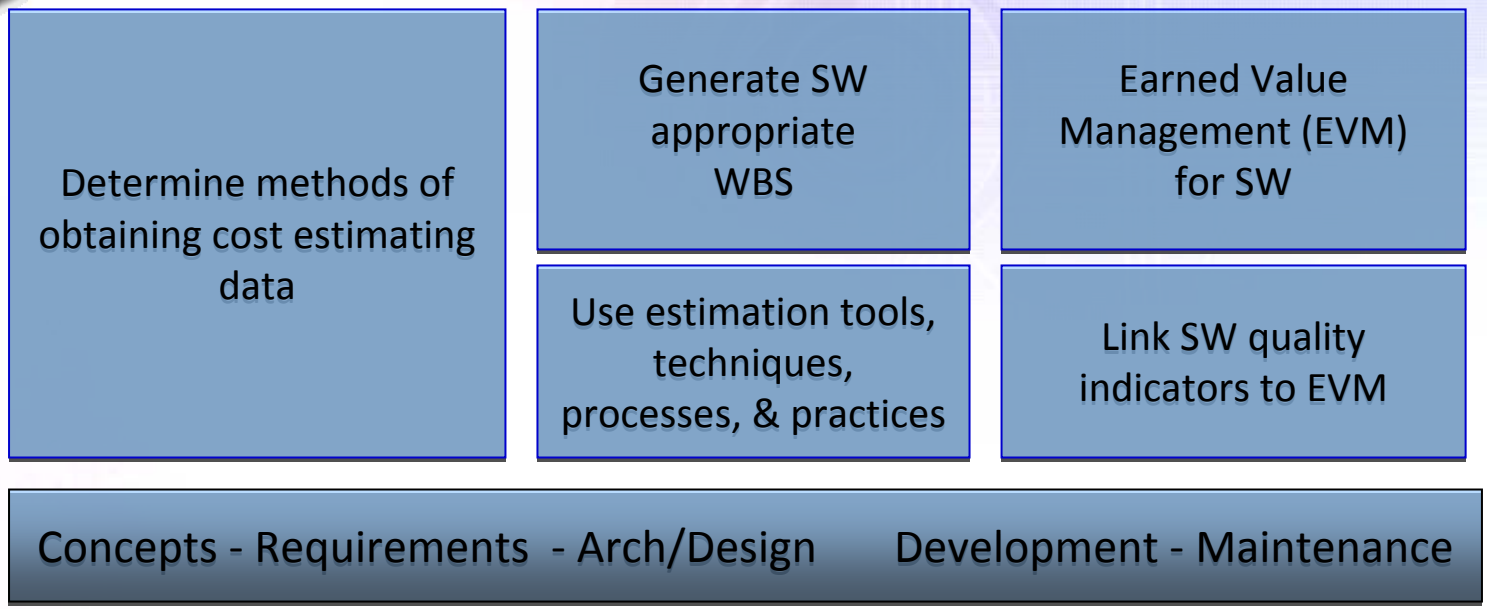
OUSD AT&L Organization



Systems and Software Engineering



Notional View of Software Measurement



Software Engineering and Systems Assurance (SSA) initiatives

- Software Resources and Data Report: Feasibility Study
- **Revision of MIL-HDBK-881A to improve software guidance**
- Program feasibility analysis using estimation models
- Integration of software metrics with EVM to assess consistency of estimates

MIL-HDBK-881A

- Military Handbook 881A is the Department of Defense handbook on Work Breakdown Structures (WBS) for Defense Materiel Items
  - A WBS provides a consistent and visible framework for defining work and structuring contracts within a program
  - Approved guidance for DoD Departments & Agencies
  - Current version was released on 30 July 2005
  - MIL-HDBK-881A is controlled by the Office of the Undersecretary of Defense (Acquisition, Technology, and Logistics) (OUSD (AT&L)) Acquisition Resources and Analysis (ARA)

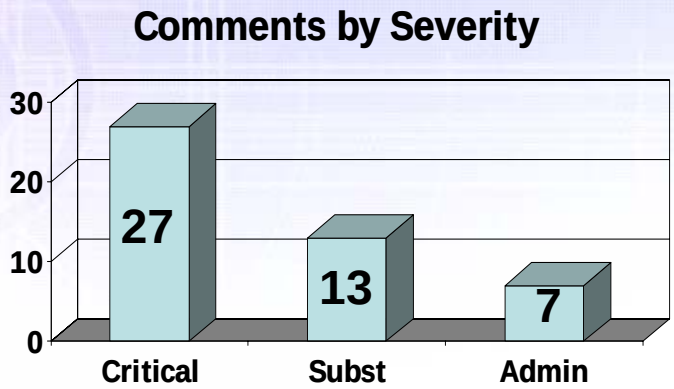
MIL-HDBK-881A due for update consideration

Software in MIL-HDBK-881A

- SSA initiated a Software Cost Control Working Group project to provide software recommendations
  - Including representation from the Services, DCMA, ARA, DAU, NDU, PA&E/DCARC and using NDIA software experts panel
- MIL-HDBK-881A revision objectives:
  - Make handbook acceptable of software engineering practice
  - Correct errors and inconsistencies
- Walkthrough of MIL-HDBK-881A revealed inconsistencies with respect to defense material items and software intensive systems development
  - Handling of System Development & Demonstration (SDD) phase software engineering activities is insufficient
  - Decision made to provide revisions versus complete rewrite

Comment Summary

- Notable changes:
  - Replace 'material item' with ' acquisition program'
  - Add words to make 'artifacts' equal to 'products'
  - Include words that make 'product-oriented' and 'DoDAF architecture' views acceptable WBS hierarchy structures
- Results
  - Compiled into Comment matrix
  - Drafted a new Appendix B for software



Critical comments directly support revision objectives

Substantive comments highlight incorrect, misleading, potentially unnecessary, or inconsistent text

Administrative comments captures typos, paragraph structure, etc.

Example #1 Revision

Comment Matrix Entry #16: Paragraph 1.7 WBS Evolution:

"For material item acquisitions, ~~Since~~ the system is mainly a concept at this point, it is not until the System Development and Demonstration (SDD) phase that the system is broken into its component parts and a detailed WBS can be developed. In the SDD phase, configuration items that describe the Program WBS are first identified and contracts can be awarded to develop these items. By the end of SDD, the WBS is fully defined to its lowest levels that best represents the system.

For software intensive systems and acquisition programs that involve procuring in single or very low volume, there needs to be a greater refinement of the engineering activities in the Technology Development phase within the Program WBS. For these types of acquisition programs, it is essential that both government and contractor can agree on a fully defined WBS at Milestone B, prior to entering SDD. "

Example #2 Revision

Comment Matrix Entry #25: Delete Paragraph 2.3.1 Specifications and Drawings:

" The family of specifications and drawings, resulting from the progressive steps of the systems engineering process, provides the basis for the Program WBS, the Contract WBS, and its extensions."

Rationale: For software intensive systems, specifications and drawing are products normally produced after PDR which is too late to drive the development of the initial Program WBS.

Overview of New Appendix B

- Leveraged text from draft MIL-HDBK-171
- Contains three WBS examples to encourage thoughtful tailoring based on project characteristics
- Emphasized use of standards and consistent use of terminology when defining WBS elements
- Maintained Appendix 'look and feel' as the other Appendices
- Included 'notes' to provide guidance on handling COTS and software development methodologies

MIL-HDBK-881A Project Summary

- Working group met our goal to provide a software community-coordinated set of recommendations to OUSD AT&L ARA as they began official review and update process
  - Maintained ‘software’ focus
- Reached out to industry members of NDIA to review the suggested changes
  - Validated recommended changes are improvements from industry perspective
  - Obtained additional examples to include in Appendix B
- Next steps will be determined based on results of ARA update (i.e., contents of MIL-HDBK-881B)

Questions / Discussion

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