Headquarters U.S. Air Force

Integrity - Service - Excellence

A Status Report – Progress and Challenges to Improving AF Acquisition by Using SE Standard Practice Standards

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2011 NDIA Systems Engineering Conference, 27 Oct 11

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The Focus

- Review: types of standards and the AF need
- Revitalizing standard practices: strategy and progress to date
- Some remaining challenges

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Types of Defense Standards*

- Interface standards: physical, functional, or military operational environment interface characteristics of systems, subsystems, equipment, assemblies, components, items, or parts.
- Design criteria standards: military-unique design or functional criteria (required) in the development of systems, subsystems, equipment, assemblies, components, items, or parts.
- Test method standards: the procedures or criteria for measuring, identifying, or evaluating qualities, characteristics, performance, and properties of a product or process.
- Manufacturing process standards: the desired outcome of a manufacturing process or specific procedures or criteria on how to perform a manufacturing process. (highly discouraged)
- Standard practices: procedures on how to conduct non-manufacturing functions that, at least some of the time, are obtained via contract from private sector firms. * MIL-STD-962D(C1)

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What is "Institutionalizing Standard Practices"?

- A carefully considered and measured approach to restore structure and consistency in executing systems engineering processes in AF acquisition and sustainment programs by…
- Employing tailored standard practices to describe a program's systems engineering tasks
  - Through the Statement of Work

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Need for SE Standard Practices: AF Experience

- **2003 – SMC Specs & Standards Revitalization**
  - **Driven by production and on-orbit anomalies post-1995**
  - ***45% of all satellites experienced one or more mission critical failures***
  - ***Root cause analysis: loss of SE discipline in program execution***
- **2004 – AF Inspection Agency Report on Mechanical System Integrity policy compliance**
  - **Policy-required tasks in MIL-HDBK not recognized**
  - ***MIL-HDBK considered as guidance-only by MAJCOM, Center, and SPO leadership***
- **2006 - NDIA SE Division Task Group Report, Top Systems Engineering Issues in US Defense Industry**
  - ***#1 Issue: "Key systems engineering practices known to be effective are not consistently applied* across all phases of the program life cycle"**
  - ***Status in 2010: "Institutionalization of practices has shown value when adopted, but adoption tends to be spotty*. Determination of proficiency in applying practices appears to be problematic."**

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Need for SE Standard Practices: AF Experience, Cont'd

- **2008 - Defense Standardization Council (DSC) Reinstatement of MIL-STD-1547, Electronic Parts, Materials, and Processes for Space and Launch Vehicles**
  - ***All space mission critical failures related to management of parts, materials, and processes*** **(PM&P) in space acquisition**
  - ***Most directly related to the cancellation of MIL-STD-1546 and MIL-STD-1547*** **under Acquisition Reform**
- **2009 - ASC/EN 360 Degree Manufacturing and Quality Study**
  - **Response to long list of grounded weapon systems, unhappy customers, numerous independent review teams, cost overruns, supplier quality escapes, and production transition problems**
  - ***Feedback from Manufacturing and Systems Engineering VP level counterparts*** **at major aerospace companies:**
    - **Lack of knowledge and Govt personnel in manufacturing and quality**
    - ***Failure to specify the right deliverables and task requirements in development contracts***

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Need for SE Standard Practices AF Experience, Cont'd

- **2010 - Industry Feedback on AF Acquisition Processes**
  - **…to AF Team working on improved request for proposal (RFP) preparation guidance. The industry panel found that:**
  - **"*Acquisition reform (loss of Government standards),* competitive pressures, and industry over-reliance on modeling/analysis, *parented a loss of critical systems engineering fundamentals*;**

    and in a consensus opinion"…
  - **"*If the government doesn't require definition of the core practices to mature a product design…then, technical activities (ie fundamental systems engineering practices) are within industry's "trade space" and can be eliminated unilaterally* – very likely to occur with pressures of competition in today's acquisitions"**

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Need for SE Standard Practices: AF Experience, Cont'd

- **2009-2010 - AF Acquisition Improvement Plan (AIP)**
  - **GAO upheld protests of CSAR-X helicopter and KC-X tanker contract awards**
  - **AF leadership directed comprehensive internal look at AF source selection process and assessment of Air Force acquisition as a whole**
  - **Resulting major sub-task "2.1 - Improve the Requirements Generation Process" in part recognized *need to revitalize and institutionalize the standard practices for acquisition program use and common training***


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Acquisition Improvement Plan

Prepared by the Office of the Assistant Secretary of the Air Force (Acquisition)

4 May 2009

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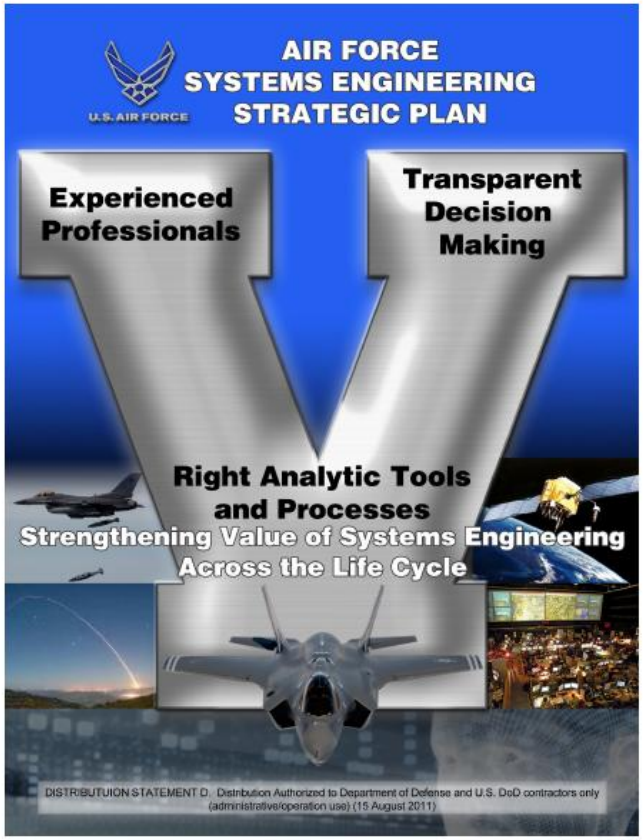
Need for SE Standard Practices: AF Experience, Cont'd

- **2011 – The AF Systems Engineering Strategic Plan (15 Aug)**
  - **Goal 2: *Drive efficiency through tailored / flexible standardization* of policy, *processes, practices*, tools, training and metrics**
  - **Objective 2.2. *Revise policy to identify use of standard practices*, tools, and metrics to apply on future contracts**
    - ***Identify and develop/revise a set of standard SE practices (e.g., Configuration Management, Reliability and Maintainability) for use on AF contracts***
    - **Determine other plans, guidance, practices, and processes to be included in RFPs and as evaluation criteria to drive government desired response from industry**



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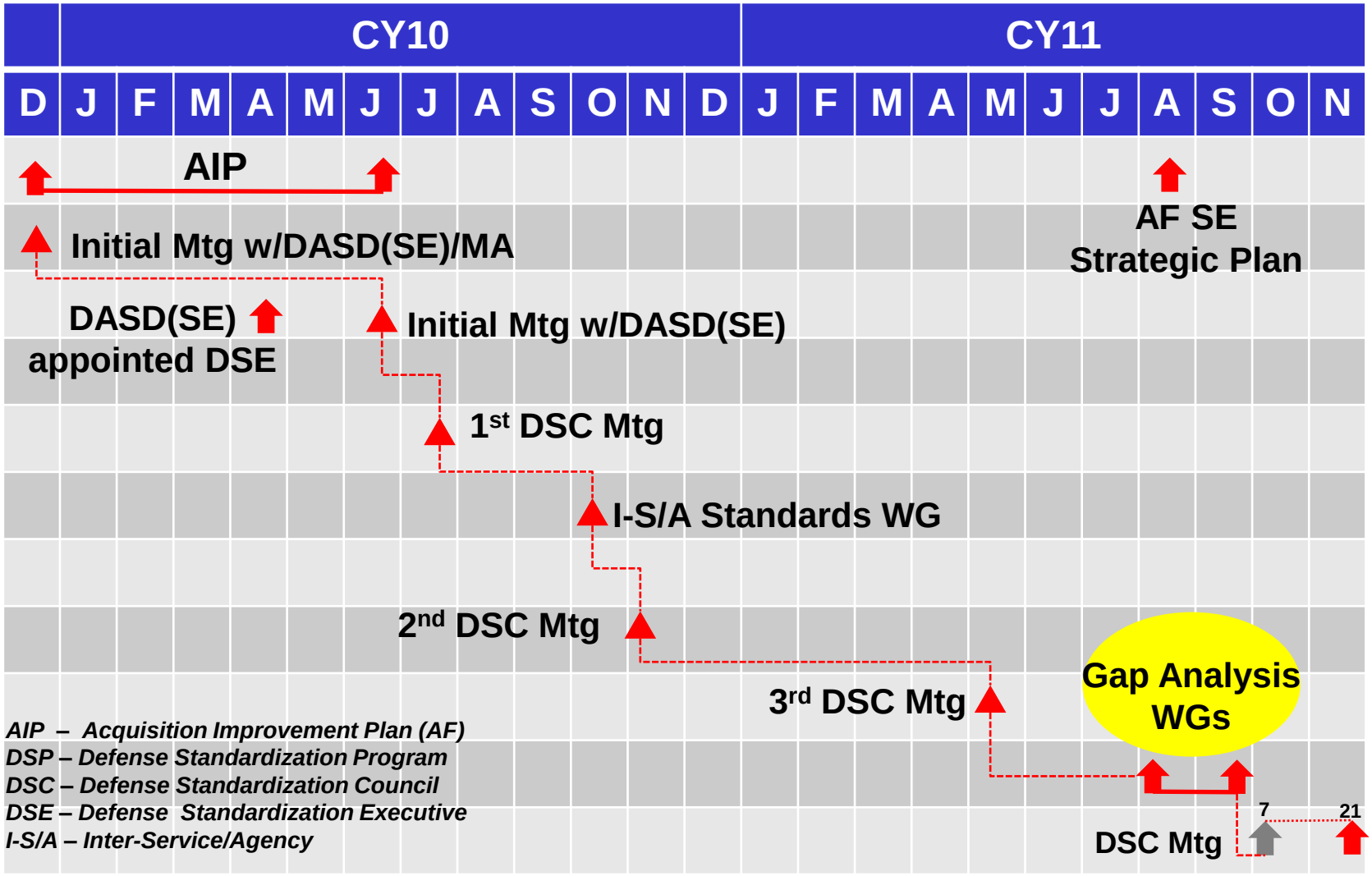
AF Standard Practices Strategy: Use DSP and Engage DSC



Engineering Process Gap Reviews

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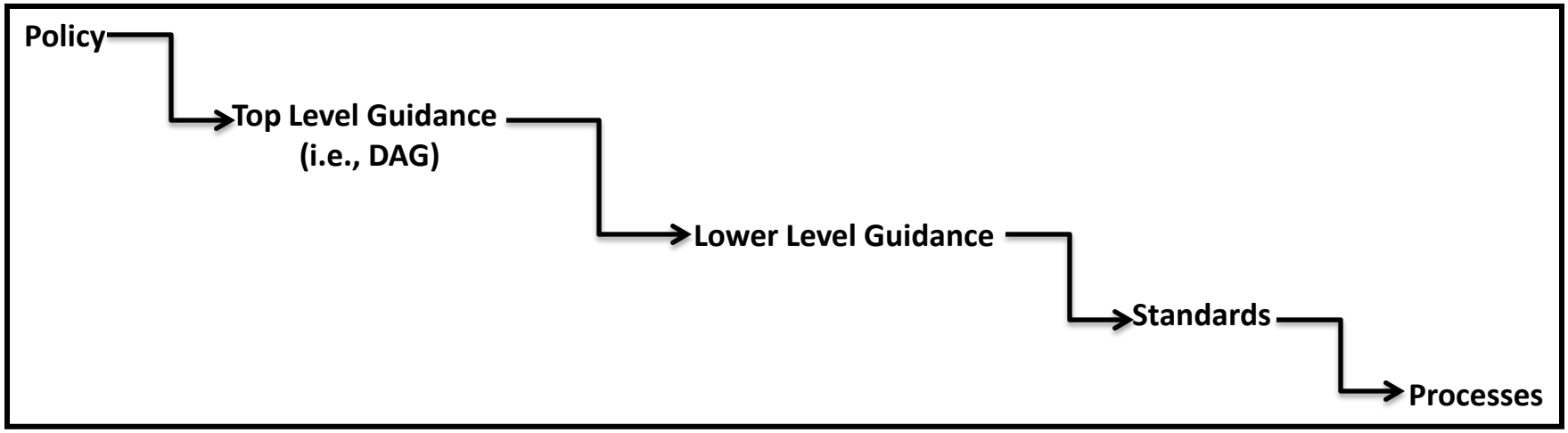
Team 1	Team 2	Team 3		Team 4
Systems Engineering	Technical Reviews	Configuration Management	Logistics Support Analysis	Reliability & Maintainability Engineering	Manufacturing/ Quality

What needs to be done?

What is available?

What are the gaps?

Where should solutions reside?



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WGs Approach

- Identify technical documentation needs [policy, guidance, standards, contract language, etc]
- Examine existing documentation
- Clearly delineate gaps in technical documentation
- Analyze alternate approaches for filling gaps
- Develop recommendations for Defense Standardization Council

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WGs Work Product

- **Prepare a Gap Analysis Report**
  - **Findings**
  - **Conclusions**
  - **Recommendations**
- **Coordinate the Gap Analysis Report with**
  - **Military Services**
  - **Industry Associations**

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SE Standards Under Consideration

Document Number	Title	Status
MIL-STD-1521	Technical Reviews and Audits for Systems, Equipments, and Computer Software	Cancelled April 1995
SMC-S-021	Technical Reviews and Audits for Systems, Equipments, and Computer Software	Active
MIL-STD-499	Engineering Management	Cancelled Feb 1995
ANSI/EIA 632	Processes for Engineering a System	Active
IEEE 1220	Application and Management of the Systems Engineering Process	Active
ISO/IEC 12207 & 15288	Systems and Software Engineering Package	Active
SMC-S-001	Systems Engineering	Active

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CM Standards Under Consideration

Document Number	Title	Status
MIL-STD-973	Configuration Management	Cancelled – October 2009, superseded by ANSI/EIA 649
ANSI/EIA 649	National Consensus Standard for Configuration Management	Active (Revision B published in April 2011)
NASA-STD-005	NASA Configuration Management (CM) Standard	Active
SMC-S-002	Configuration Management	Active

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Mfg/QA Standards Under Consideration

Document Number	Title	Status
MIL-STD-1528	Manufacturing Management Program	Cancelled Feb 1995
MIL-STD-1535	Supplier Quality Assurance Program Requirements	Cancelled May 1995
MIL-HDBK-896	Manufacturing and Quality Program	Active

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LSA Standards Under Consideration

Document Number	Title	Status
MIL-STD-1388-1	Logistics Support Analysis	Cancelled May 1997 [S/S by Mil-HDBK-502]
ANSI/GEIA 0007	Logistics Product Data Model	Active
MIL-HDBK-502	Acquisition Logistics	Active

Challenges: MIL vs Industry Standards – Commercial vs DOD Business Process

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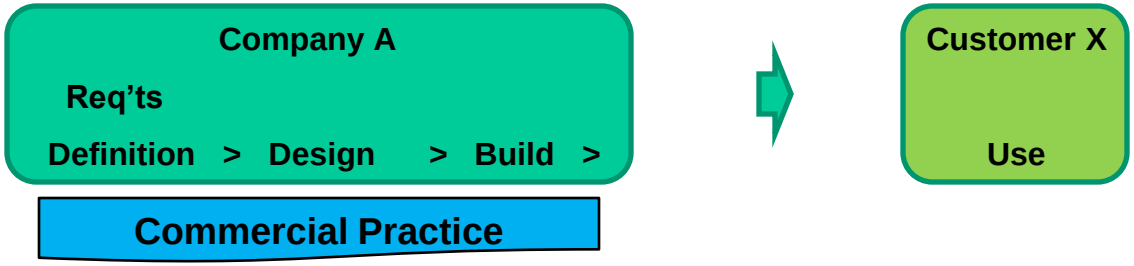
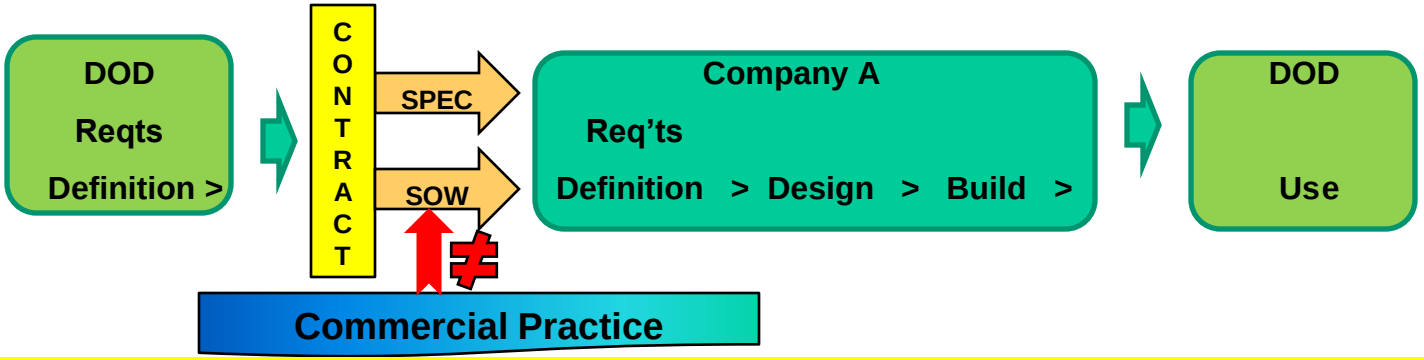
- Every product goes thru life cycle phases of:

  1. Define (requirements) > 2. Design > 3. Build > 4. Use.

- Commercial Business Model to execute this life cycle:



- Typical DOD Business Model to execute this life cycle:



POINT OF VIEW IS NOT THE SAME – ESPECIALLY IN COST PLUS CONTRACTS

Challenges: MIL vs Industry Standards – Standard Practices Use Considerations*

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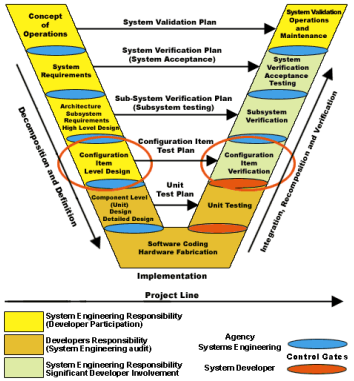
- **Use MIL-STD when:**
  - **Practice is military unique: e.g.** ***Technical Reviews and Audits, System Safety***
  - **Practice should be standardized for integration with other core & interrelated processes: e.g. Systems Engineering,** ***Specification Practices, Configuration Mgmt, Reviews & Audits, Work Breakdown Structure***
  - **Industry practice does not meet DOD requirements or not practical for use on DOD contracts w/o excessive tailoring**



RELIABILITY MIL-STD-785 MIL-STD-1629 MIL-STD-781 ANSI/EIA 0009	MAINTAINABILITY MIL-STD-470	LSA MIL-STD-1388-1 ANSI/EIA 0007	MFG/QA MIL-STD-1528 MIL-STD-1535 MIL-HDBK-896
WORK BREAKDOWN STRUCTURE MIL-STD-881			
TEST RQUIREMENTS DOCUMENTS MIL-STD-1345/1519			
TECHNICAL REVIEWS AND AUDITS MIL-STD-1521			
CONFIGURATION MANAGEMENT MIL-STD-973; ANSI/EIA-649			
SPECIFICATION PRACTICES MIL-STD-490; MIL-STD-961			
SE PROCESS MIL-STD-499; ANSI/EIA 632; ISO/IEC 15288			

- **Use industry standard when:**
  - **Practice meets DOD requirements and is suitable for use on contract, e.g. EIA STD-0007,** ***Logistics Product Data;*** **EIA STD-836,** ***Data Exchange & Interoperability***

**** USAF view***

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Challenges: Weighing Statute & Policy vs Practicality

COMMERCIAL STANDARDS

Statute & Policy

National Technology Transfer and Advancement Act of 1995, PL 104-113

- Sec 12.(d) Utilization of Consensus Technical Standards by Federal Agencies; Reports.

(1) In general.--Except as provided in paragraph (3) … ***all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies***…

(3) Exception.--***If compliance with paragraph (1)*** … ***is*** inconsistent with applicable law or ***otherwise impractical, a Federal agency or department may elect to use technical standards that are not developed or adopted by voluntary consensus standards bodies*** if the head of each such agency or department transmits to the Office of Management and Budget an explanation of the reasons for using such standards…

STAY TUNED…

MILITARY STANDARDS

Practicality

Some Factors Under Consideration by the Gap Analysis Working Groups

- Functionality
- Contract-ability
- Completeness
- Compatibility
- Cost

Document Evaluation

- Pros & Cons
- Estimated Level of Effort
- Risks
- Interim Solution
- Policy & Guidance Implications
- Impacts

Document Comparison

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Questions?

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