



# ***ESOH*** in Early SE Development Planning - ***“Is it Really Important?”*** *(yes...here’s why.)*

***NDIA 17<sup>th</sup> Annual Systems Engineering Conference –  
Track: Environment, Safety, and Occupational Health (ESOH)***

*Thursday, 30 October 2014, 10:15 AM – 10:50 AM  
Marriott Courtyard Springfield, 6715 Commerce St.  
Springfield, VA 22150-1633*

Mr. Jim Rudroff  
Director, Environmental Acquisition  
OASN (EI&E)/ODASN (Environment)  
Pentagon Room 4A-674  
703-614-4217  
[jim.rudroff@navy.mil](mailto:jim.rudroff@navy.mil)



# Weapon System Acquisition Reform

## ❖ Weapon Systems Acquisition Reform (WSARA) – 2009

“The key to successful acquisition programs is **getting things right from the start** with **sound systems engineering**, cost estimating, and developmental testing early in the program cycle.”

“...This legislation is needed to focus acquisition and procurement on **emphasizing systems engineering; more effective upfront planning and management of technology risk**; and growing the acquisition workforce to meet program objectives.”

## ❖ DASD (SE) - Systems Engineering focuses on engineering excellence - the creative application of scientific principles:

- To design, develop, construct and operate complex systems
- To forecast their behavior under specific operating conditions
- To deliver their intended function while addressing economic efficiency, *environmental stewardship and safety of life and property*

✓ \*Development Planning is the upfront technical preparation to ensure successful selection and development of a materiel solution.

Public Law 111-23  
111th Congress

An Act

May 22, 2009  
[S. 454]

Weapon Systems Acquisition Reform Act of 2009.  
10 USC 101 note.

To improve the organization and procedures of the Department of Defense for the acquisition of major weapon systems, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

(a) **SHORT TITLE.**—This Act may be cited as the “Weapon Systems Acquisition Reform Act of 2009”.

(b) **TABLE OF CONTENTS.**—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.  
Sec. 2. Definitions.

**TITLE I—ACQUISITION ORGANIZATION**

Sec. 101. Cost assessment and program evaluation.  
Sec. 102. Directors of Developmental Test and Evaluation and Systems Engineering.  
Sec. 103. Performance assessments and root cause analyses for major defense acquisition programs.  
Sec. 104. Assessment of technological maturity of critical technologies of major defense acquisition programs by the Director of Defense Research and Engineering.  
Sec. 105. Role of the commanders of the combatant commands in identifying joint military requirements.

**TITLE II—ACQUISITION POLICY**

Sec. 201. Consideration of trade-offs among cost, schedule, and performance objectives in Department of Defense acquisition programs.  
Sec. 202. Acquisition strategies to ensure competition throughout the lifecycle of major defense acquisition programs.  
Sec. 203. Prototyping requirements for major defense acquisition programs.  
Sec. 204. Actions to identify and address systemic problems in major defense acquisition programs prior to Milestone B approval.  
Sec. 205. Additional requirements for certain major defense acquisition programs.  
Sec. 206. Critical cost growth in major defense acquisition programs.  
Sec. 207. Organizational conflicts of interest in major defense acquisition programs.

**TITLE III—ADDITIONAL ACQUISITION PROVISIONS**

Sec. 301. Awards for Department of Defense personnel for excellence in the acquisition of products and services.  
Sec. 302. Earned value management.  
Sec. 303. Expansion of national security objectives of the national technology and industrial base.  
Sec. 304. Comptroller General of the United States reports on costs and financial information regarding major defense acquisition programs.

**SEC. 2. DEFINITIONS.**

**In this Act:**

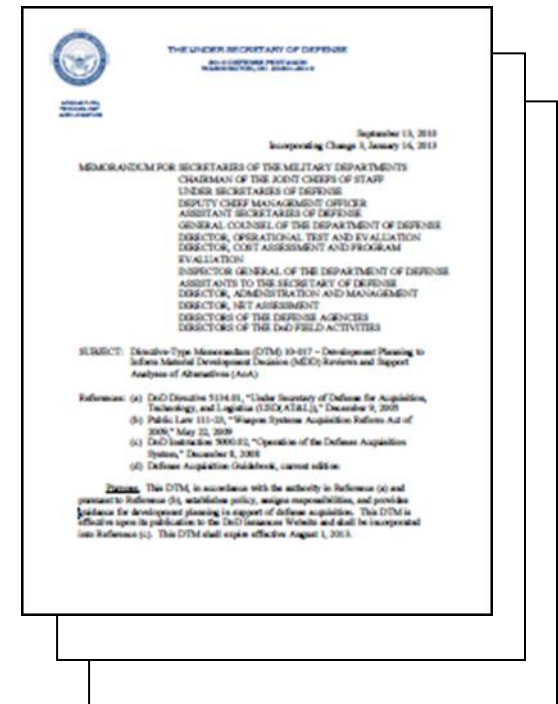
(1) The term “congressional defense committees” has the meaning given that term in section 101(a)(16) of title 10, United States Code.

10 USC 2430 note.



# Background: SE Development Planning

- ❖ Directive-Type Memorandum (DTM) 10-017 – Development Planning to Inform Materiel Development Decision (MDD) Reviews and Support Analyses of Alternatives (AoA) – 9/2010; 1/2013
  - Establishes policy, assigns responsibilities, and provides guidance for development planning in support of defense acquisition
  - OUSD(AT&L)/ODASD(SE) - Lead
- ✓ *"Development Planning encompasses the **engineering analysis** and **technical planning activities** that provide the foundation for **informed investment decisions** on the fundamental path a materiel development will follow to effectively and affordably meet operational needs.*
- ✓ *Development Planning is initiated prior to the Materiel Development Decision, continues throughout the Materiel Solution Analysis phase, and eventually transitions to the program environment.*





# Linking “*ESOH*” to Acquisition

- ❑ Integrate ESOH Risk Management; Compliance; Lower Costs; Reduce Waste; and Head-Off Potential Impacts to Training and Operations.
  - ❑ Drivers: Statutory Requirements, Policy, Technical Guidance, Specs., Stds, etc.
  - ❑ Cross-Cutting Issues Which Influence:
    - ❑ Technology Development (R&D through T&E)
    - ❑ System Specification
    - ❑ Training and Operations
    - ❑ Industrial Operations and Sustainment
    - ❑ End of life decisions (donation, dismantling, disposal, etc.)
- ❑ Road Map –
  - ❑ Support the Development of Policy and Utilize JCIDS and Acquisition Processes to Enhance the Integration of Environment into JCIDS and DON Acquisition.
    - ❑ Aligned, Transformative, Seamless, Transparent
  - ❑ Sufficient analytic rigor to support critical assessment at the earliest phase of the process.
  - ❑ Support Analysis and Decision-making wrt Affordability and Performance throughout the Acquisition Process



# Roadmap



## JCIDS – JCIDS Document Reviews (ICD through CPD)

DON ESOH Reviews Supporting Navy & Marine Corps -JCIDS Process

### SOP:

- ✓ Identify Gaps/Deficiencies in ESOH Requirements/Considerations
- ✓ Provide Text Recommendations to Specific Documents.
- ✓ Provide SA for ESOH SMEs at SYSCOMs and Fleet.
- ✓ Maintain Data which Provides a JCIDS Document Review “Snapshot”

### Way Ahead:

- ✓ Analyze, Assess, (& Measure) the Integration of Recommendations.
- ✓ Assess ESOH in JCIDS Training for JCIDS Developers.
- ✓ Future Policy/Guidance Changes to Improve ESOH Integration.



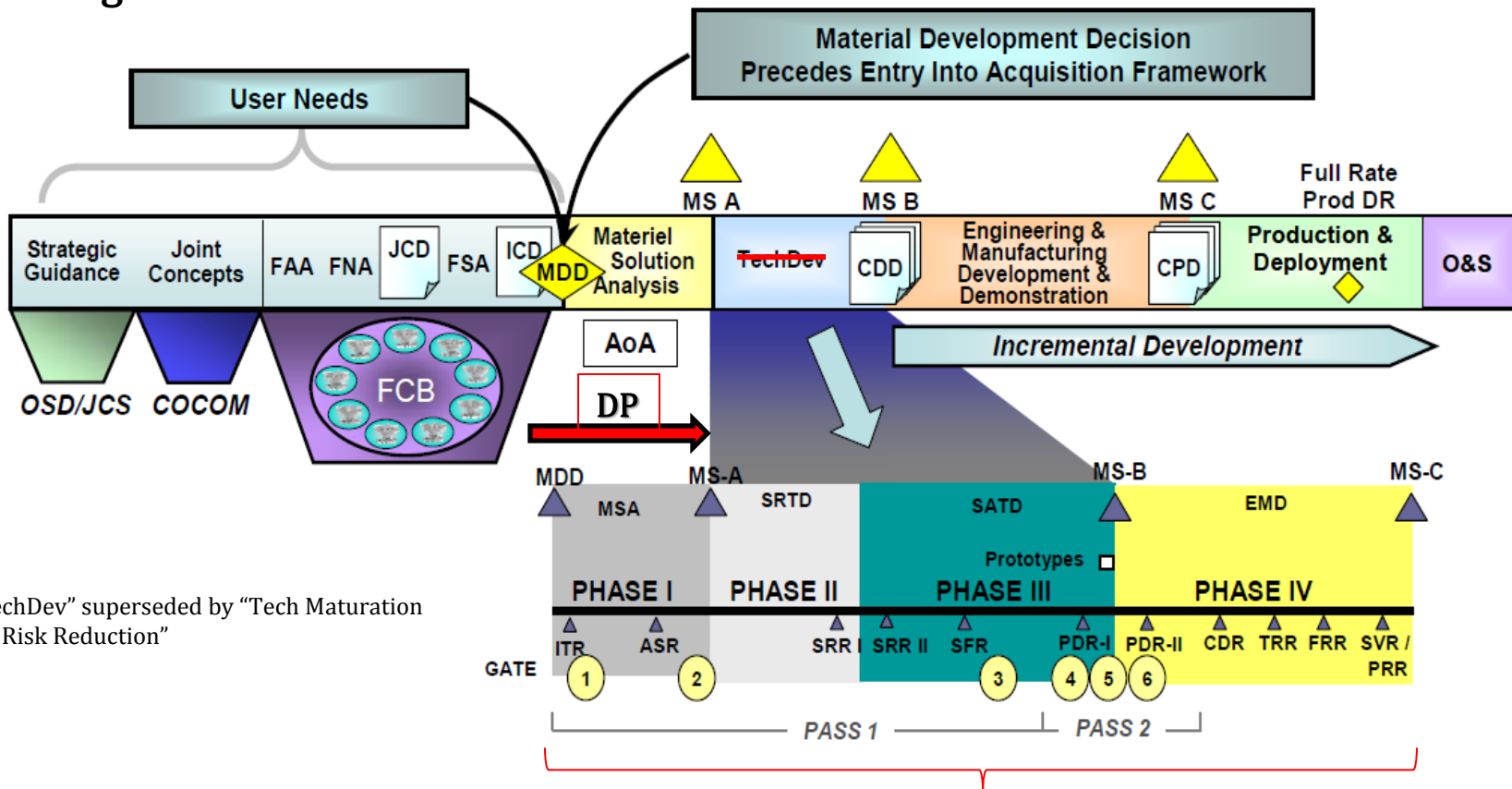
## DON Acquisition – Focus: “Early” Awareness & Engagement

- Effects/Impacts of “Late or No” Integration Are Documented.
- “Design-In” ESOH and Plan for & Coordinate Long Lead Time Items i.e., NEPA
- What’s “Early”? Pre-MS B, Pre-MS A, Pre-MDD?
  - ✓ Focus: Material Solution Analysis (MSA) Phase



# JCIDS & DoD Acquisition Phases w/ DON Acquisition Governance Process (2-Pass/6-Gate Review Process)

“Big Picture”:



\*“TechDev” superseded by “Tech Maturation and Risk Reduction”

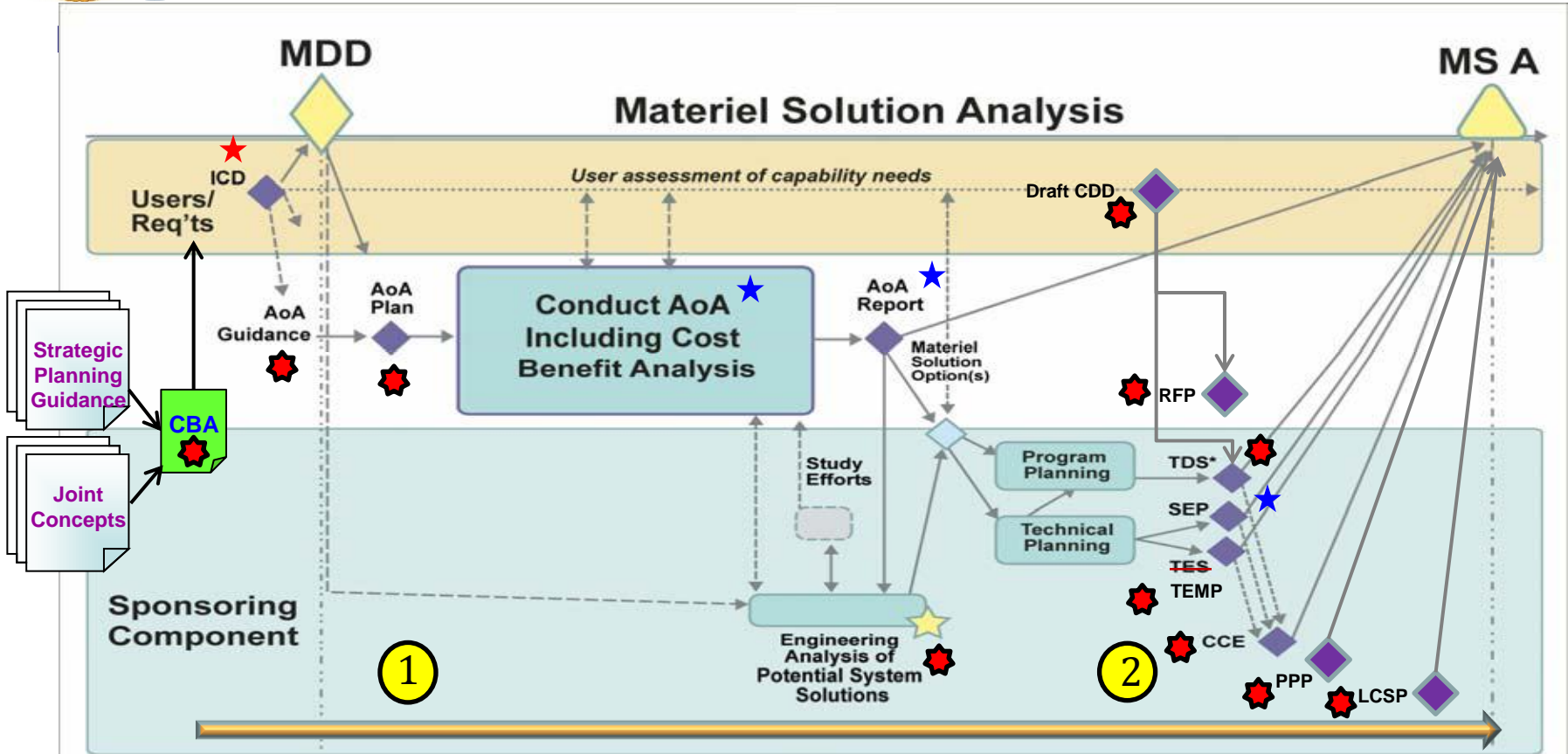
DON Acquisition Governance Process (2-Pass/6-Gate Review Process)



# Material Solution Analysis (MSA) Phase

## (ESOH Engagement)

Source: Systems Engineering Activities, Products, and Activities in Materiel Solution Analysis  
 \*ODDR&E/SE – Dahmann, Kelley, 09/09



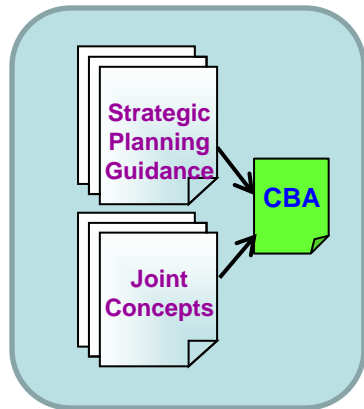
\*Includes initial Technology Readiness Assessment (TRA)

- AoA Analysis of Alternatives
- TDS Technology Development Strategy
- SEP Systems Engineering Plan
- ~~TES Test and Evaluation Strategy~~
- CCE Component Cost Estimate
- TEMP Test and Evaluation Master Plan

ACTIVITIES		PRODUCTS			
	Government		Required		Leads to
	Industry		Recommended		Informs
	Required		Environmental Considerations		
	Decision		SECNAV 5000.2E Policy		Focus Areas
			Technical Review		



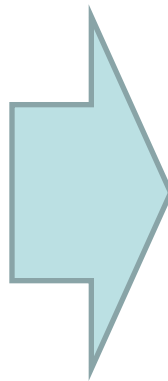
# Capabilities Based Assessment (CBA)



- Informed by Strategic Planning Guidance (SPG) and Joint Concepts
- First step in the JCIDS Process
- Defines Capability Gaps & Preferred Set of Solutions to Resolve Gaps.
- Solution Set: Technologically sound, safe, testable, sustainable and affordable.

- **CBA Scope (Elements):**

- **Capabilities Desired**
- Scenarios Considered
- Functions Considered
- Types of Solutions Considered
- CONOPS
- Measures of Effectiveness (MOE)



- **Completed CBA:**

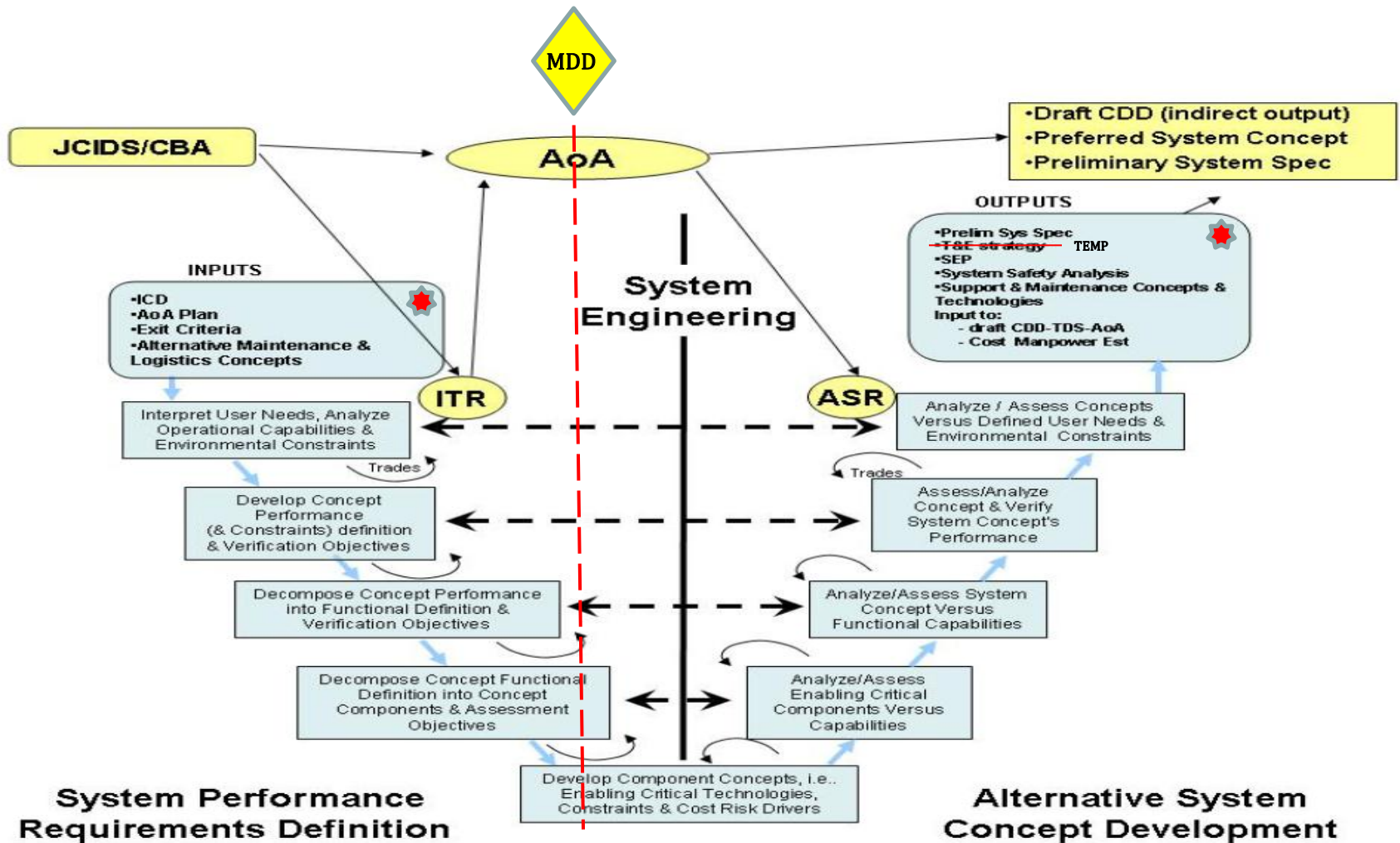
- Description of the mission and military problem being assessed;
- Identification of the tasks to be completed to meet the mission objectives;
- **Identification of the capabilities required;**
- Assessment of how well the current or programmed force meets the capability needs;
- Assessment of op. risks where capability gap exists;
- **Recommendations for possible non-materiel solutions to the capability gaps (DOTMLPF);**
- Recommendations for potential materiel approaches

\*Conceptual Designs – Explore Design Concepts and Estimate System Performance





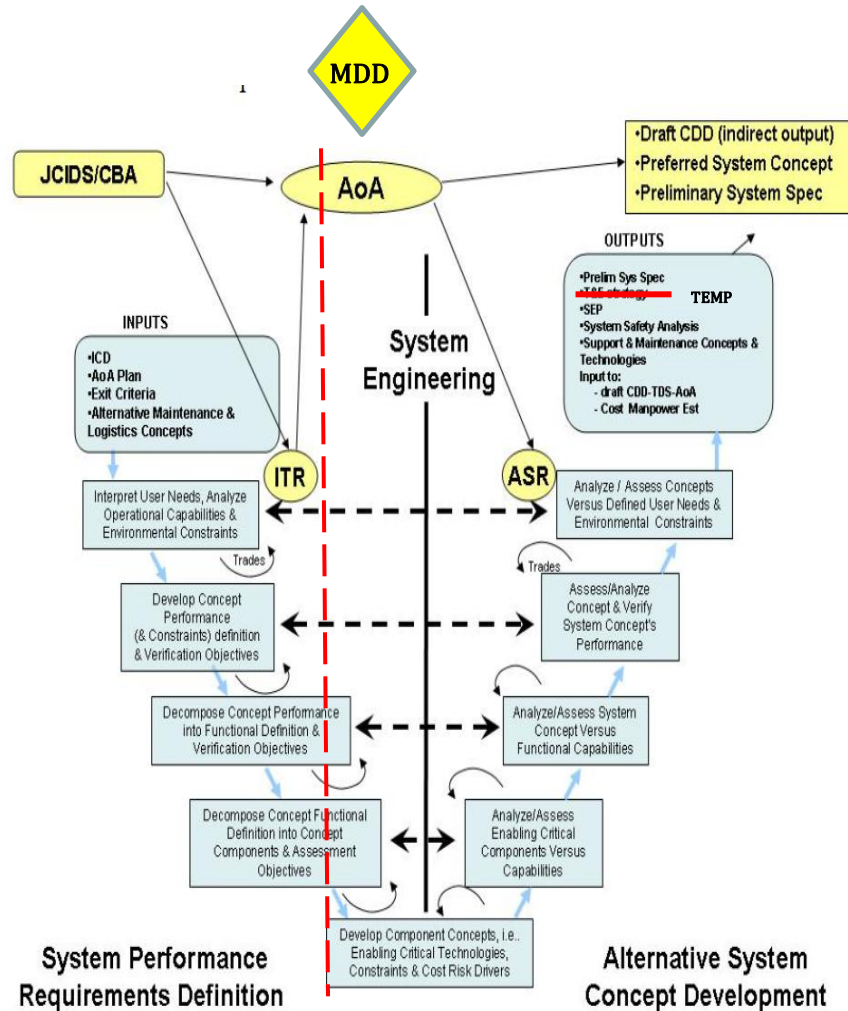
# Systems Engineering Technical Review (SETR) and Analysis of Alternatives (AoA)





# Systems Engineering Technical Review (SETR) and Analysis of Alternatives (AoA)

- ESOH Engagement includes -
  - Shape/Inform ICD
  - Support AoA Process
  - Identify potential "Big-Ticket" ESOH Risks (Platforms)
  - Shaping Strategy for integrating ESOH risk management into SEP

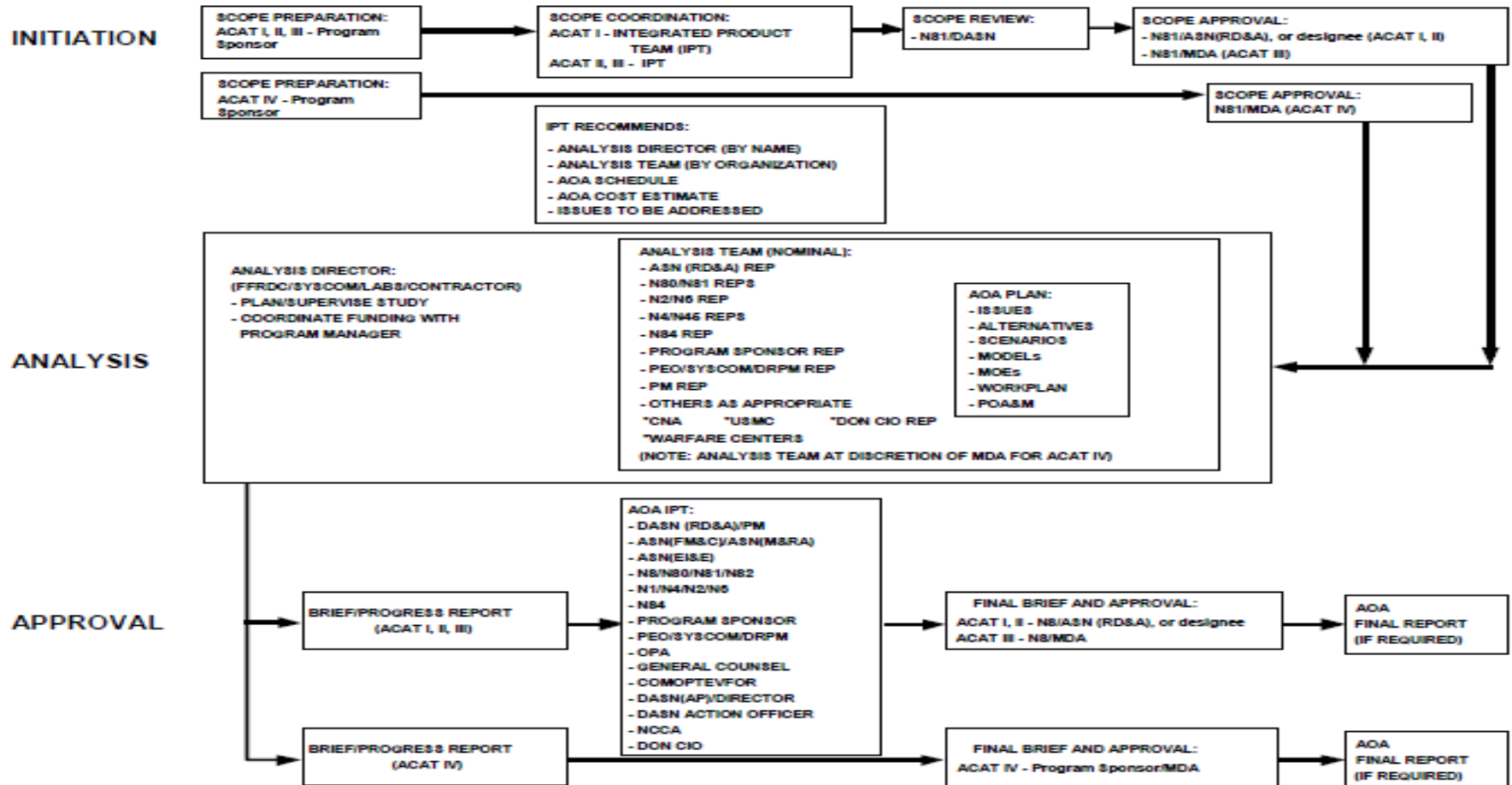


- Intended Outcomes include -
  - ID/Incorporate ESOH Requirements, Constraints, and Performance Attributes for the System.
  - ID potential NEPA/EO 12114 Compliance Environmental Planning Requirement to support Schedule.
  - Provide Prelim. Haz List (PHL)
  - Provide ESOH hazard risk mitigation test and verification meth., and safety release and ESOH risk acceptance approaches.
  - Strategy for Integrating ESOH risk management (MIL-STD-882E) into SEP
  - ID ESOH O&S Issues & Costs



# Navy AoA Process

## ASN(RD&A)/OPNAV AOA INITIATION, ANALYSIS, AND APPROVAL PROCESS

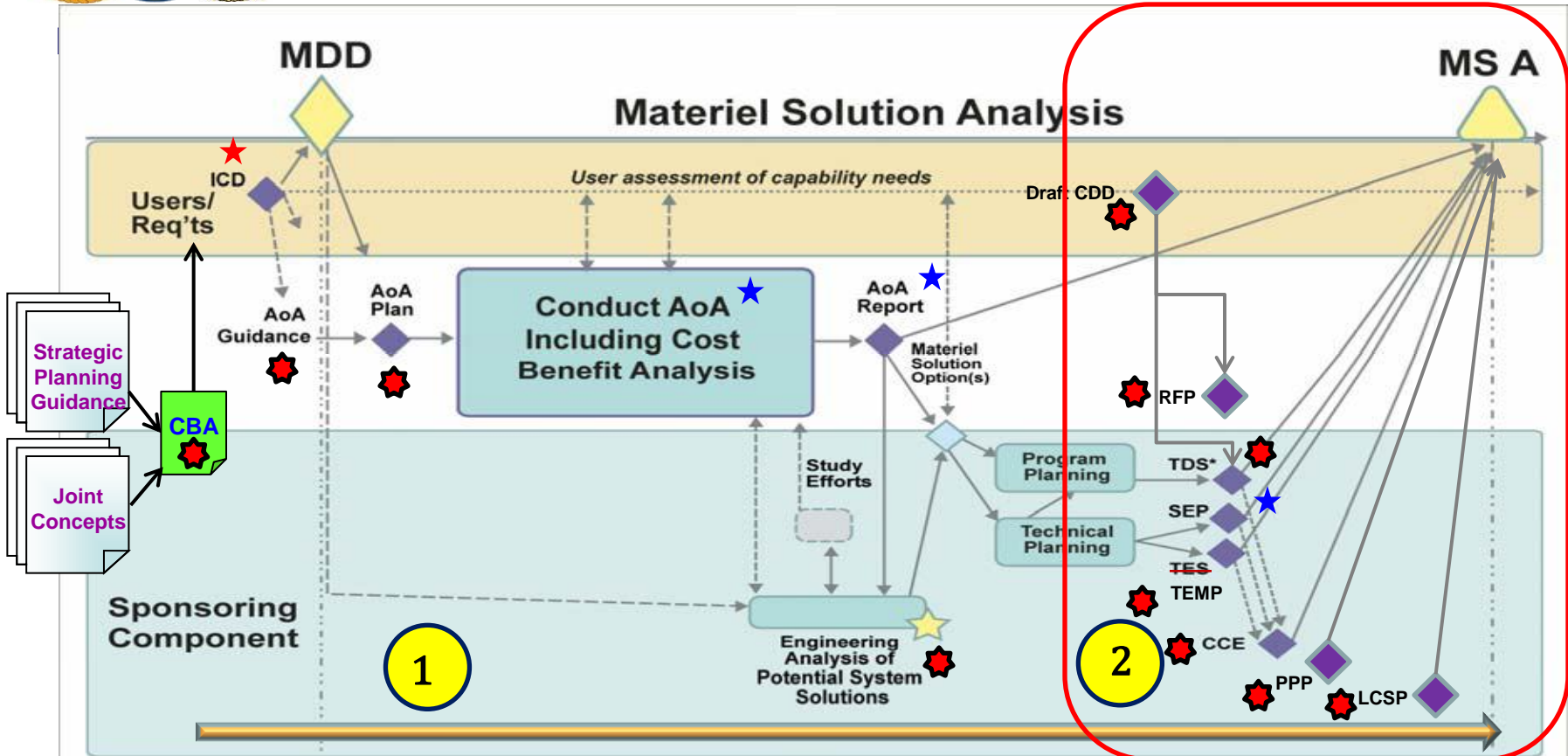




# Material Solution Analysis (MSA) Phase

## (ESOH Engagement)

Source: Systems Engineering Activities, Products, and Activities in Materiel Solution Analysis  
 \*ODDR&E/SE – Dahmann, Kelley, 09/09



\*Includes initial Technology Readiness Assessment (TRA)

- AoA Analysis of Alternatives
- TDS Technology Development Strategy
- SEP Systems Engineering Plan
- ~~TES Test and Evaluation Strategy~~
- CCE Component Cost Estimate
- TEMP Test and Evaluation Master Plan

ACTIVITIES		PRODUCTS	
	Government		Required
	Industry		Recommended
	Required		Environmental Considerations
	Decision		SECNAV 5000.2E Policy
			Technical Review
			Focus Areas
			Leads to
			Informs



# Systems Engineering Technical Review Timing

[https://acc.dau.mil/docs/technicalreviews/dod\\_tech\\_reviews.htm](https://acc.dau.mil/docs/technicalreviews/dod_tech_reviews.htm)

## Systems Engineering Technical Review Timing

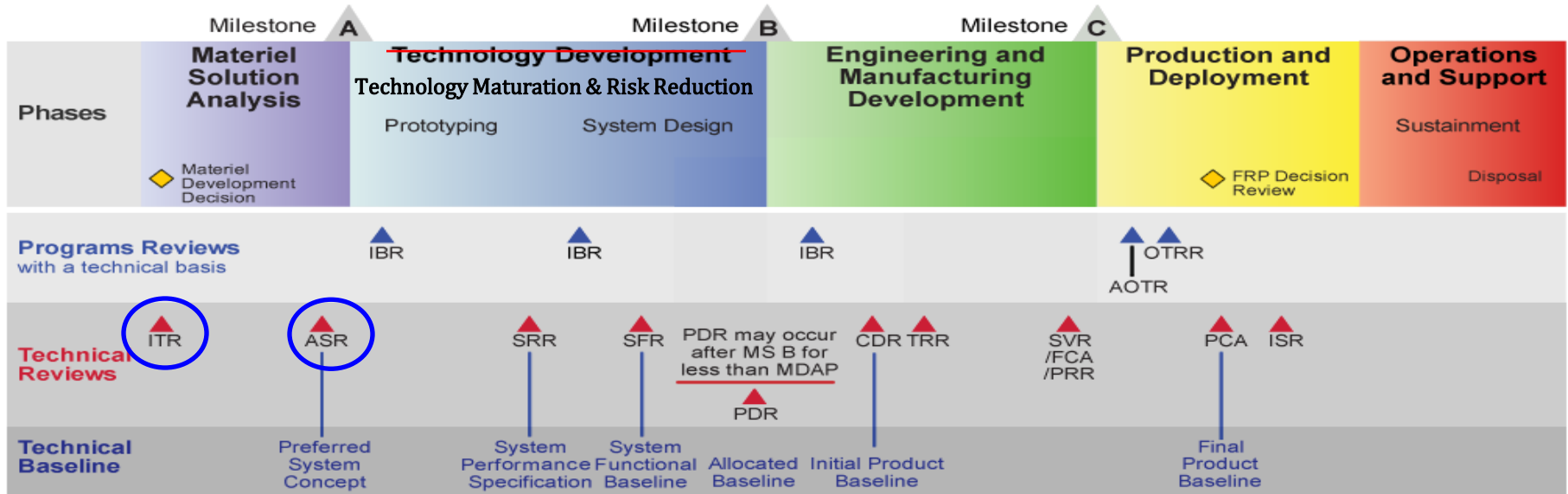


Overview of Technical Reviews

Key Points

Lessons Learned

Feedback



- ▼ Technology Readiness Assessment
- ▲ Technical Reviews and Audits
- ▲ Program Reviews
- ◆ Decision Point
- ▲ Milestone Review

- AOTR - Assessment of Operational Test Readiness
- ASR - Alternative System Review
- CDR - Critical Design Review
- FCA - Functional Configuration Audit
- FRP - Full Rate Production
- IBR - Integrated Baseline Review
- ISR - In-Service Review
- ITR - Initial Technical Review
- OTRR - Operational Test Readiness Review

- PCA - Physical Configuration Audit
- PDR - Preliminary Design Review
- PRR - Production Readiness Review
- SFR - System Functional Review
- SRR - System Requirements Review
- SVR - System Verification Review
- TRR - Test Readiness Review



# Looking at Milestone A (MS A) Documents

*Interim DoDI 5000.02, November 25, 2013*

Table 2. Milestone and Phase Information Requirements

INFORMATION REQUIREMENT	PROGRAM TYPE <sup>1</sup>				LIFE-CYCLE EVENT <sup>1,2</sup>								SOURCE	APPROVAL AUTHORITY
	MDAP	MAIS	ACAT II ≤ III		MDD	MS A	CDD Val	Dev RFP Rel	MS B <sup>4</sup>	MS C	FRP/FD Dec	OTHER		
NOTES														
ANALYSIS OF ALTERNATIVES (AoA)	•	•	•	•		•		✓		✓		✓	40 U.S.C. 11312 (Ref. (q)) SEC. 811, P.L. 106-398 (Ref. (r)) 10 U.S.C. 2366a (Ref. (n))	MDA DCAPE assesses AoAs for ACAT ID/IAM only
	STATUTORY for MAIS programs and all AISs, including National Security Systems (NSSs), at Milestone A, and updated when required through Milestone C (or Milestone B if there is no Milestone C). STATUTORY for MDAPs at Milestone A. Regulatory for all other marked Program Type-Event combinations. A DoD Component is responsible for conduct and approval of the AoA, as detailed in section 2 of Enclosure 9 and in paragraph 5.d.(2)(b)2 in the core instruction. The distinct assessment and approval roles of the Director of Cost Assessment and Program Evaluation (DCAPE) and MDA associated with the AoA and the selection of the material solution(s) are detailed in section 2 of Enclosure 9 of this instruction.													
ACQUISITION STRATEGY	•	•	•	•		•		•		✓	✓		SEC. 803, P.L. 107-314 (Ref. (p)) Core instruction, para. 5.d.(2)(c) 10 U.S.C. 2350a (Ref. (n))	MDA
	STATUTORY for MDAPs at Milestone A; else Regulatory at other events and for other program types. The Acquisition Strategy will include STATUTORY and Regulatory information. - Use the "Acquisition Strategy Outline" at <a href="https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3282/PDUSD-Approved.TDS_AS_Outline.docx">https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3282/PDUSD-Approved.TDS_AS_Outline.docx</a> . - For DBS, prepare an Acquisition Approach as part of the Business Case instead of an Acquisition Strategy (further described in paragraph 5.a.(1) in Enclosure 12 of this instruction). - For programs responding to Urgent Needs, a highly tailored strategy will include the acquisition approach; a copy of the strategy is due to the Director, JRAC, within 3 business days of MDA approval.													



# Looking at Pre-Milestone A Documents (cont'd)

*Interim DoDI 5000.02, November 25, 2013*

Table 2. Milestone and Phase Information Requirements

INFORMATION REQUIREMENT	PROGRAM TYPE <sup>1</sup>				LIFE-CYCLE EVENT <sup>1,2</sup>							SOURCE	APPROVAL AUTHORITY	
	MDAP	MAIS	ACAT II	ACAT ≤ III	MDD	MS A	CDD Val	Dev RFP Rel	MS B <sup>4</sup>	MS C	FRP/FD Dec			OTHER
NOTES														
Cost Analysis Requirements Description (CARD)	•	•				•		✓	•	✓	✓	✓	Sec. 3 of Enc. 10 of this instruction DoD 5000.4-M (Ref. (ab))	DoD Component
	Regulatory. Due any time an INDEPENDENT COST ESTIMATE (ICE) or an ECONOMIC ANALYSIS is required. Procedures are specified in section 3 of Enclosure 10 of this instruction.													
Life-Cycle Sustainment Plan (LCSP)	•	•	•	•		•		✓	✓	✓	✓	✓	Core instruction, para. 5.d.(14)(a)	MDA
	Regulatory. A draft <sup>5</sup> update is due for Development RFP Release; approved at Milestone B. The LCSP is reviewed by the CAE at least every 5 years after a system's IOC. Use the LCSP outline ( <a href="https://acc.dau.mil/adl/en-US/473039/file/60445/PDUSD-Approved%20LCSP%20Outline%2009-14-2011.docx">https://acc.dau.mil/adl/en-US/473039/file/60445/PDUSD-Approved%20LCSP%20Outline%2009-14-2011.docx</a> ) on the Defense Acquisition Guidebook (Reference (I)) site. For DBS programs, a summary of life-cycle sustainment planning must be included in the Business Case. See Enclosure 6 of this instruction for details about the LCSP.													
Program Protection Plan (PPP)	•	•	•	•		•		✓	✓	✓	✓		DoDI 5200.39 (Ref. (aq)) DoDI 5200.44 (Ref. (ar)) Para. 13.a in Enc. 3 of this instruction	MDA
	Includes STATUTORY and Regulatory information. A draft <sup>5</sup> update is due for the Development RFP Release decision and is approved at Milestone B. Use the PPP outline ( <a href="https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3298/PPP_Outline_and_Guidance_FINAL.DOCX">https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3298/PPP_Outline_and_Guidance_FINAL.DOCX</a> ) on the Defense Acquisition Guidebook (Reference (I)) site. The plan includes appropriate appendixes or links to required information. See section 13 in Enclosure 3 of this instruction. For DBS programs, a summary of the PPP will be included in the Business Case.													



# Looking at Pre-Milestone A Documents (cont'd)

*Interim DoDI 5000.02, November 25, 2013*

Table 2. Milestone and Phase Information Requirements

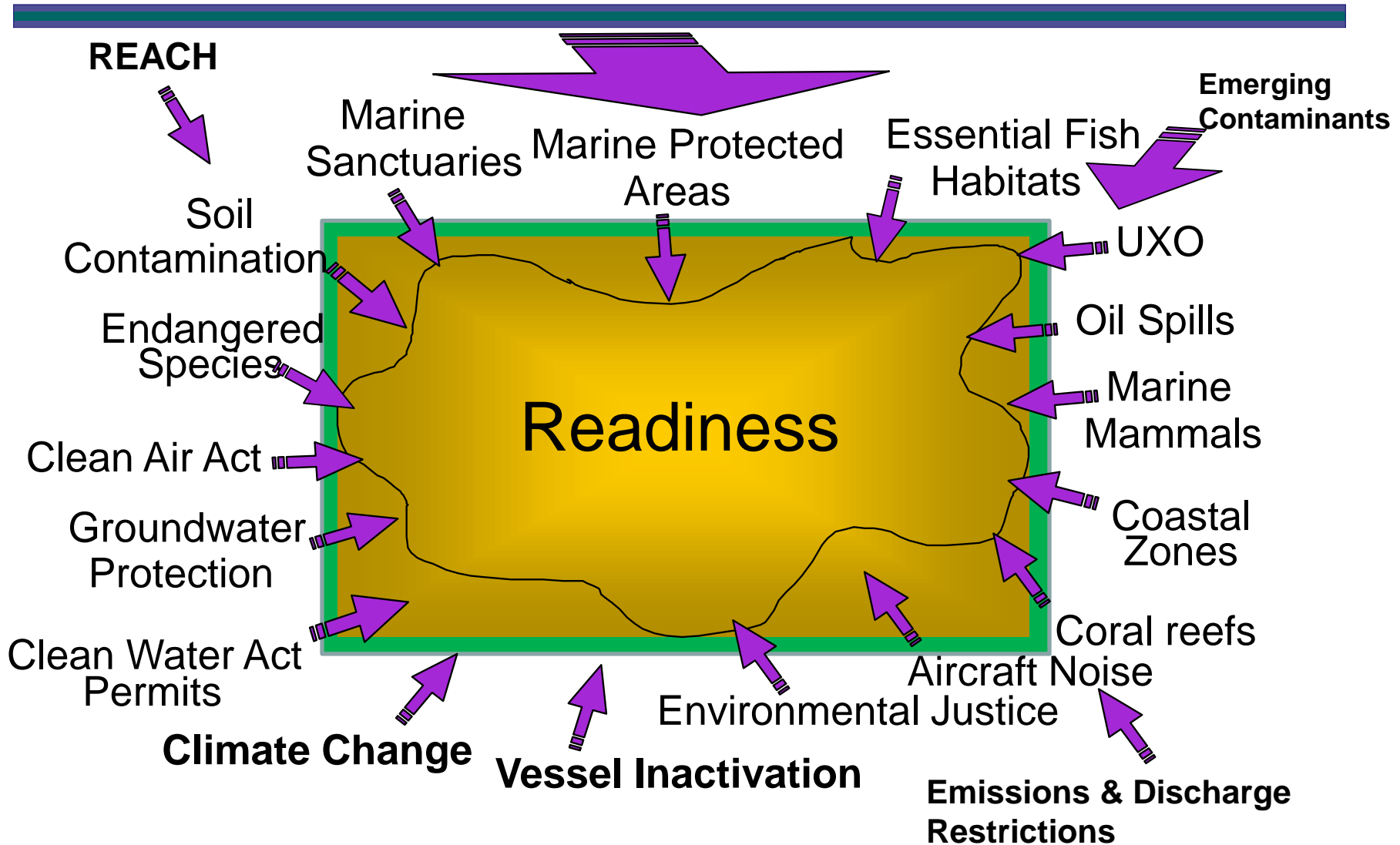
INFORMATION REQUIREMENT	PROGRAM TYPE <sup>1</sup>				LIFE-CYCLE EVENT <sup>1,2</sup>							SOURCE	APPROVAL AUTHORITY	
	MDAP	MAIS	ACAT II ≤ III		MDD	MS A	CDD Val	Dev RFP Rel	MS B <sup>4</sup>	MS C	FRP/FD Dec			OTHER
NOTES														
Request for Proposal (RFP)	•	•	•	•		•		•		•	•		FAR Subpart 15.203 (Ref. (as))	MDA is release authority
	Regulatory. RFPs are issued as necessary; they include specifications and statement of work. See also DFARS subpart 201.170 (Ref. (at)) for the requirement for peer reviews.													
Systems Engineering Plan (SEP)	•	•	•	•		•		✓	✓	✓			Sec. 2 of Enc. 3 of this instruction	DASD(SE) or Component Head (or as delegated)
	Regulatory. A draft <sup>5</sup> update is due for the Development RFP Release Decision Point; approved at Milestone B. Use the SEP outline ( <a href="https://dap.dau.mil/policy/lists/Policy%20Documents/Attachments/3283/PDUUSD-Approved%20SEP%20Outline.docx">https://dap.dau.mil/policy/lists/Policy%20Documents/Attachments/3283/PDUUSD-Approved SEP%20Outline.docx</a> ) on the Defense Acquisition Guidebook (Reference (I)) site. DBS programs may include systems engineering planning in applicable sections of the Business Case and Program Charter. The DASD(SE) is the approval authority for MDAPs and MAIS programs; the Component Head or as delegated will approve the SEP for all other programs.													
Test and Evaluation Master Plan (TEMP)	•	•	•	•		•		✓	✓	✓	✓		Enclosures 4 and 5 of this instruction	See Notes for this row.
	Regulatory. A draft <sup>5</sup> update is due for the Development RFP Release Decision Point; approved at Milestone B. For DBS programs, a summary of the T&E planning for integrated developmental/operational test, jointly developed by the Program Manager, functional sponsor, and T&E community must be included in the Business Case. DOT&E will approve the TEMP for DOT&E Oversight programs (10 U.S.C. 2399, Reference (n)); DASD (DT&E) will also approve the TEMP for DT&E Engagement programs (10 U.S.C. 139b, Reference (n)); the DoD Component equivalent will approve the plan for other programs. TEMP outline guidance is located at <a href="http://www.dote.osd.mil/docs/dote-temp-guidebook/20130712_TEMP_Guide_2.1.pdf">http://www.dote.osd.mil/docs/dote-temp-guidebook/20130712_TEMP_Guide_2.1.pdf</a> .													





# Sustaining Readiness

Operations and Sustainment Costs





# Improving Efficiency / Reducing Total Ownership Costs

- ❑ **O&S Costs – Est'd ~70% of TOC of DoD's Major Weapon Systems**
  - ❑ Plan and Design – Sustaining Operations and Support (O&S)
  - ❑ Support Assessment, Management, and Control of O&S Costs
- ❑ **DoD/DON Cost Estimating Processes**
  - ❑ Estimating O&S Costs
  - ❑ Collection and Retention of Data on O&S Costs
  - ❑ Data to Inform System Design & O&S-related decision making. Support Naval weapon systems affordability across the lifecycle
- ❑ **ESOH Inputs/Opportunities to Support TOC Affordability:**
  - ❑ Supporting Program Office Responsibilities for Total Life Cycle Systems Management (TLCSM)
  - ❑ Understanding Cost Estimation to Support and Inform Decision Making
    - ❑ Hazardous Noise; Environmental Permitting; Hazardous Materials Management, Demil/Disposal, etc.



# Summary

---

## *Bottom-line:*

- ❖ Achieving Defense Acquisition Systems that meet and sustain specified warfighting performance at the lowest total ownership cost (TOC).
- ❖ Identify, assess, and manage ESOH risks through an integrated system engineering process
- ❖ Ensure warfighter's ability to train and operate with the system, in full compliance

## *Benefits/Outcome:*

- Avoidance of acquisition program cost increases, schedule delays or performance impacts.
- Maintaining uninterrupted testing and training of new or modified systems.
- Operational Environmental Readiness: Ensuring the ability of new systems to be used for realistic Fleet training and exercises, in full compliance with applicable environmental law, immediately upon completion of the acquisition process.
- Reducing TOC of acquired systems by integrating estimated “through-life” environmental costs into early acquisition decisions and managing integrated, environmental logistics sustainment over the lifecycle of the system.



# Questions?

