



# **Characterization of Materiel Solution Analysis Phase Engineering and Technical Analysis**

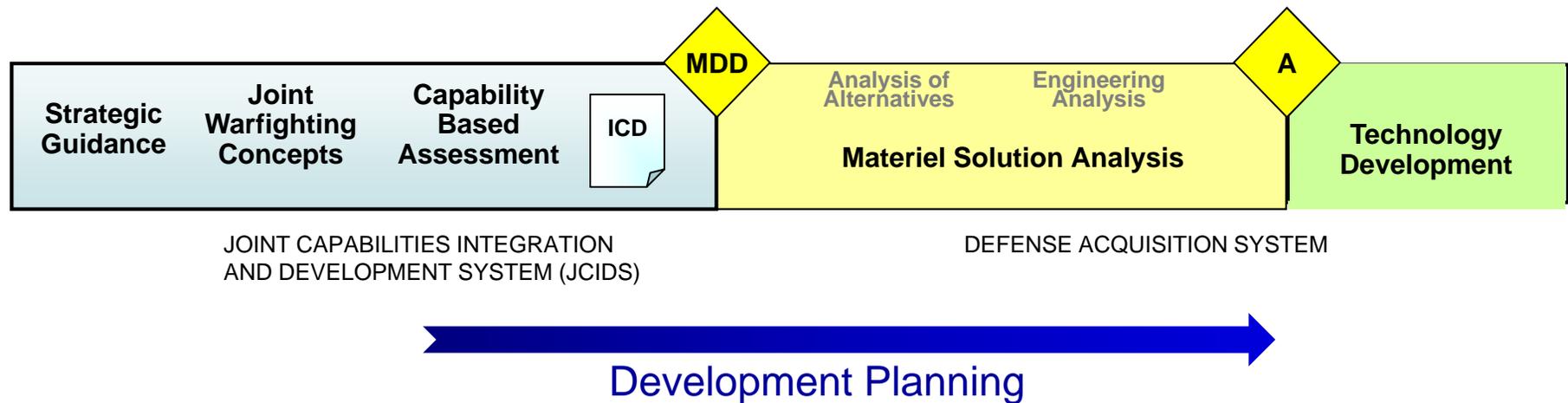
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**Office of the Deputy Assistant Secretary of Defense  
for Systems Engineering**

**15th Annual NDIA Systems Engineering Conference  
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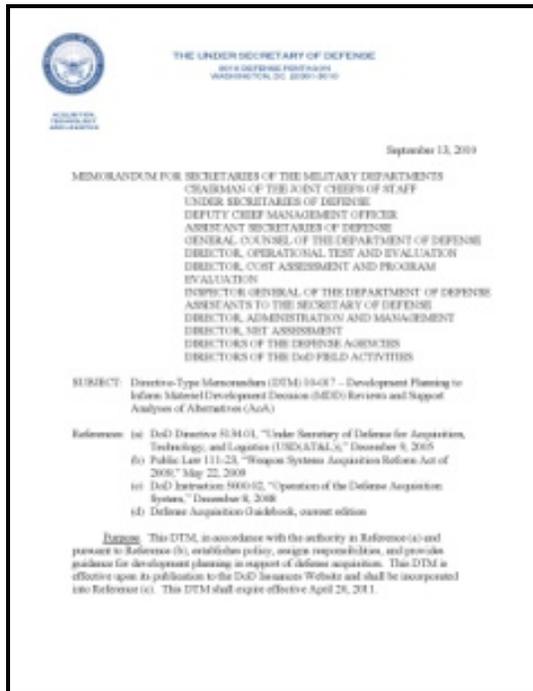
# Development Planning



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



# Development Planning Policy Memo (DTM 10-017)



*DTM 10-017, signed  
13 Sep 2010*

## MDD Entrance Criteria

1. The candidate materiel solution approaches have the potential to effectively address the capability gap(s), operational attributes and associated dependencies.
2. There exists a range of technically feasible solutions generated from across the entire solution space, as demonstrated through early prototypes, models, or data.
3. Consideration has been given to near term opportunities to provide a more rapid interim response to the capability need.
4. The plan to staff and fund analytic, engineering, and programmatic activities supports the proposed milestone entry requirements.

## Post-MDD DDR&E Engagement

- Cooperate with the D,CAPE and serve as a standing participant and technical advisor in the development of AoA Study Guidance and on the AoA Study Advisory Group

DTM 10-017 being incorporated into DoD Acquisition Regulations (DoDI 5000.02)  
Developed guidance for the Defense Acquisition Guidebook (DAG)



# Drivers for Better Understanding of MSA Phase Technical Activities



## WSARA May 2009



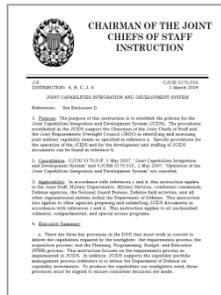
## BBP Memo Sep 2010



- **Weapon Systems Acquisition Reform Act of 2009 (WSARA)**
  - Directs PDR to occur before Milestone B
  - Establishes “development planning” to push increasing technical maturity further to the left

- **USD(AT&L) Memo (14 Sep 2010): Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending**
  - “Affordability Target” established at Milestone A which is treated as a Key Performance Parameter

## IMPE Memo CJCSI 3170 Jun 2011



- **PDUSD(AT&L) Memo (23 Jun 2011): Improving Milestone Process Effectiveness**
  - Requires TD phase RFP to be reviewed by MDA prior to release
- **Joint Capabilities Integration and Development System (JCIDS) [CJCSI 3170] Update**
  - Establishes post-AoA FCB review of preferred alternative
  - Draft CDD now expected at Milestone A

Changes in policy and guidance are driving the need for increased technical knowledge at Milestone A



# OSD Development Planning Working Group (DPWG)



- **Background and Purpose**

- Initiated March 2011; Triggered by issuance of DP Policy (DTM 10-017) to coordinate implementation efforts among the Services and OSD and establish a community of practice
- Bi-monthly meetings with special working sessions as needed
- FY12 Objectives:
  1. Update guidance (including MDD templates) to incorporate pertinent examples of adequate engineering/technical analysis at MDD
  2. Develop a clear understanding of the engineering/technical analysis needed to support Milestone A
  3. Develop recommended changes to acquisition policy and guidance to more fully address Development Planning
  4. Continue to facilitate, and serve as a forum for, the sharing of Development Planning information

- **Representation from across DoD**

- All DoD Components (Army, Navy, Air Force)
- OSD Organizations (CAPE, DTRA, S&TS, SE)
- Requirements community (Joint Staff (J8))



# Developing a Plan to Characterize MSA Phase Engineering and Technical Activities



- **Objective: Develop a clear understanding of the engineering/technical analysis needed to support Milestone A**
  - Thread policy, product, activities and processes together
  - “Do not invent guidance to fill a gap in policy, should not reflect preference but capture current processes”
- **Approach:**
  - Begin with current Milestone A requirements according to policy of record
  - Determine which requirements are technical (SE) in nature
  - Given the current information requirements (i.e. SEP outline, etc), what are the critical thinking activities that must be accomplished [i.e. activities that provide the justification of what is codified in documentation]

Work backward from the information/knowledge required



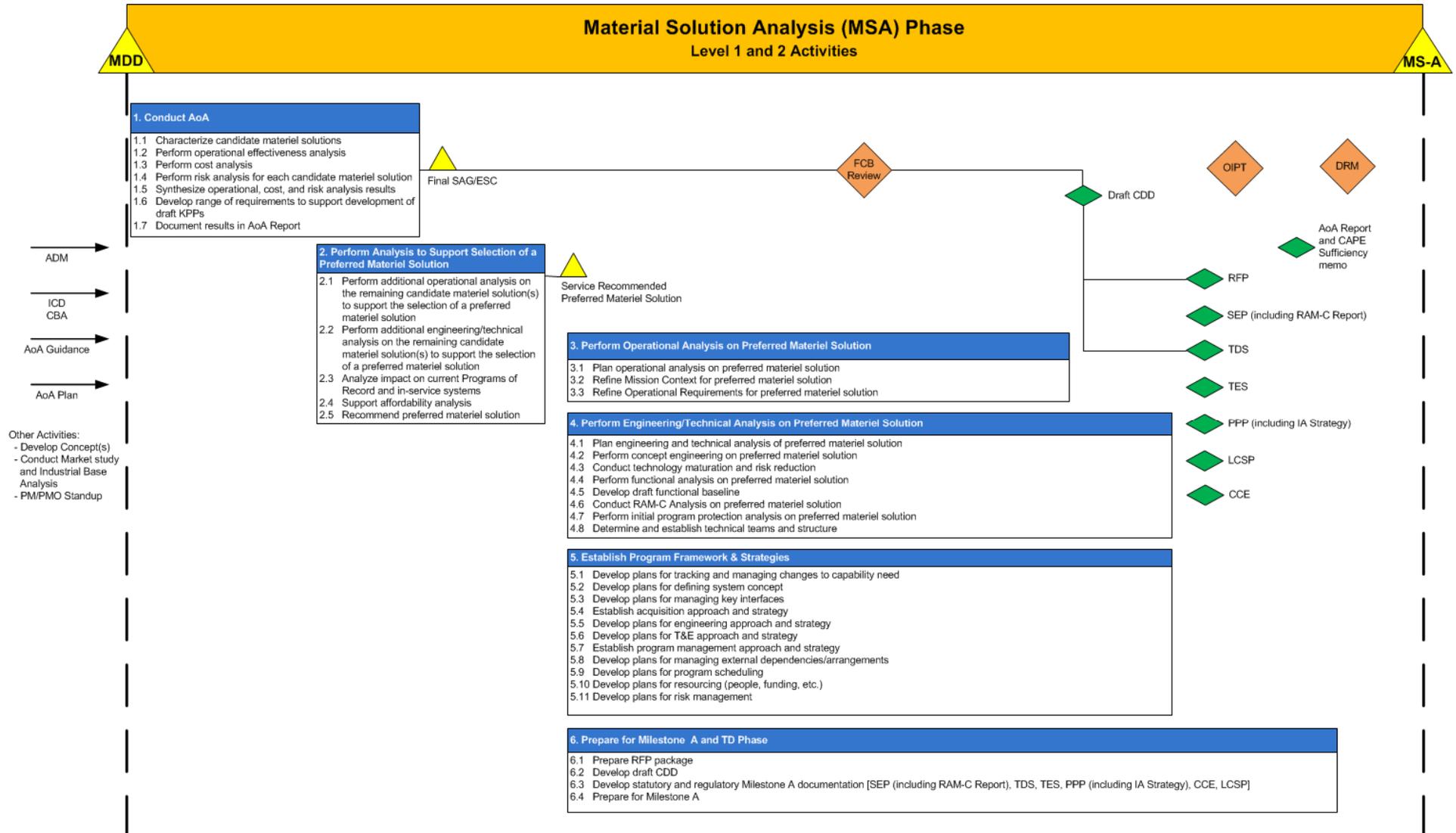
# MSA Phase Analysis: Process and Outcomes



- **Five workshops conducted between January and June 2012**
- **Major steps:**
  - Each of the Services presented their interpretation of what is done in the MSA phase
  - Reviewed DASD(SE) direction and formulated approach (activities tied to policy and Milestone A entry criteria)
  - Brainstormed initial set of activities, building off of the Air Force model
  - Normalized and regrouped the major activities to reduce overlaps
  - Developed a standard set of AoA activities based on Service feedback and analysis of recent AoAs; received informal concurrence from CAPE
  - Traced required content in Milestone A documents (including SEP, RFP, TDS, TES, PPP, RAM-C, LCSP, and CCE) backwards to identify missing or redundant activities
  - Documented high level sequencing and critical dependencies of lower-level activities
- **Results are being used as input to the Defense Acquisition Guidebook Chapter 4 (Systems Engineering) rewrite**
- **Developing a white paper to document methodology, results, and assumptions of MSA Phase model development**

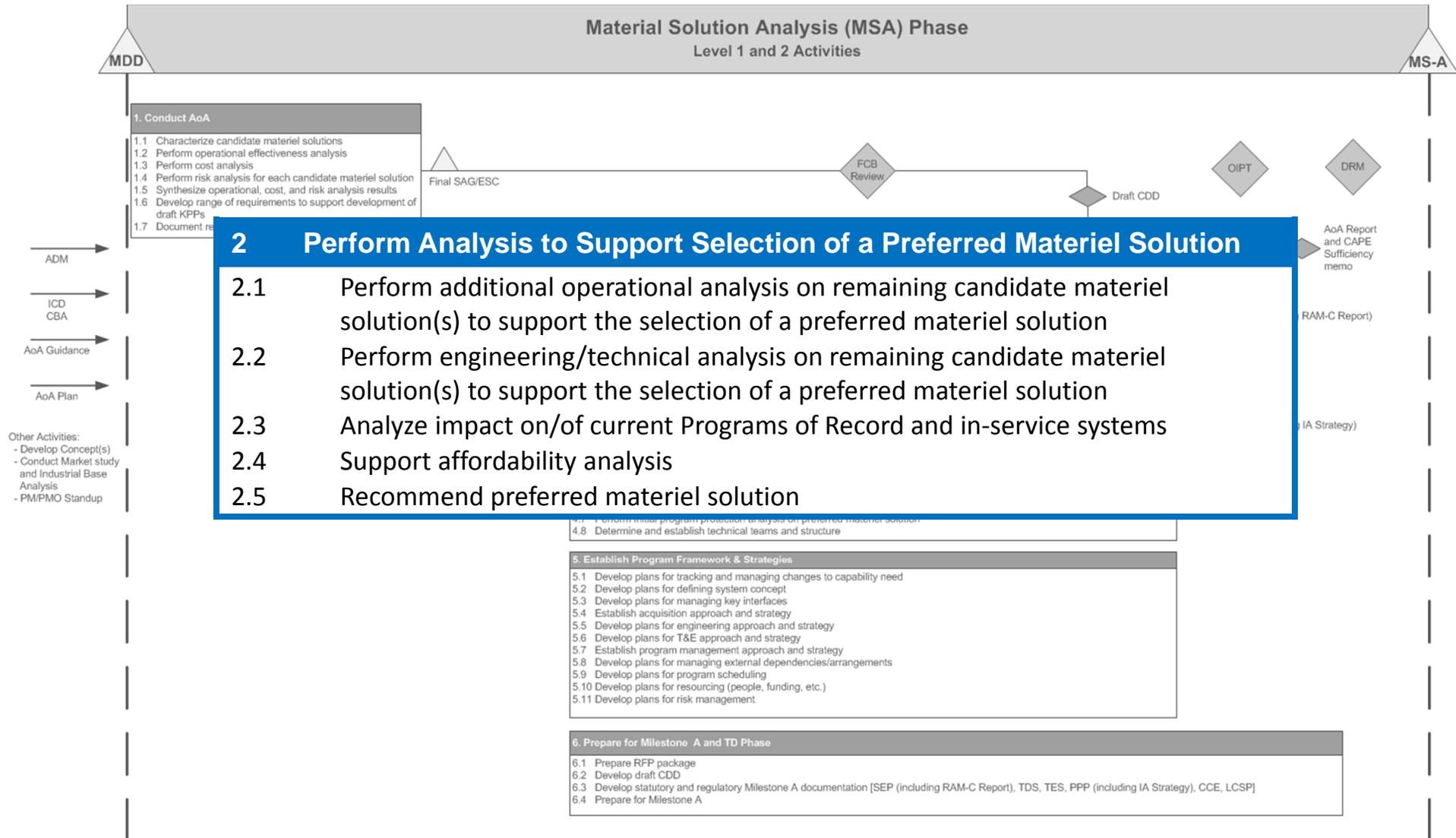


# MSA Activities Model (Draft)





# 2. Perform Analysis to Support Selection of a Preferred Materiel Solution





# 3. Perform Operational Analysis on Preferred Materiel Solution



## Material Solution Analysis (MSA) Phase Level 1 and 2 Activities

MDD

MS-A

- 1. Conduct AoA
  - 1.1 Characterize candidate materiel solutions
  - 1.2 Perform operational effectiveness analysis
  - 1.3 Perform cost analysis
  - 1.4 Perform risk analysis
  - 1.5 Synthesize operational requirements
  - 1.6 Develop range of draft KPPs
  - 1.7 Document results

### 3 Perform Operational Analysis on Preferred Materiel Solution

- 3.1 Plan operational analysis on preferred materiel solution
- 3.2 Refine mission context for preferred materiel solution
  - 3.2.1 Refine operational need date for capability
  - 3.2.2 Refine CONOPS and architecture
  - 3.2.3 Refine operational dependencies and inter-relationships
  - 3.2.4 Refine DOTmLPF-P changes
  - 3.2.5 Refine threat assessment
  - 3.2.6 Refine intelligence, logistics, information support needs/constraints for preferred materiel solution
  - 3.2.7 Identify OT&E critical operational issues
- 3.3 Refine operational requirements for preferred materiel solution
  - 3.3.1 Refine and rank-order candidate KPPs and KSAs
  - 3.3.2 Refine operational Reliability/Availability/Maintainability (RAM) requirements

- 5.10 Develop plans for resourcing (people, funding, etc.)
- 5.11 Develop plans for risk management

#### 6. Prepare for Milestone A and TD Phase

- 6.1 Prepare RFP package
- 6.2 Develop draft CDD
- 6.3 Develop statutory and regulatory Milestone A documentation [SEP (including RAM-C Report), TDS, TES, PPP (including IA Strategy), CCE, LCSP]
- 6.4 Prepare for Milestone A

- ADM →
- ICD CBA →
- AoA Guidance →
- AoA Plan →

Other Activities:

- Develop Concept(s)
- Conduct Market study and Industrial Base Analysis
- PM/PMO Standup





# 4. Perform Engineering/Technical Analysis on Preferred Materiel Solution



## 4 Perform Engineering/Technical Analysis on Preferred Materiel Solution

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- 4.1 Plan engineering and technical analysis on preferred materiel solution
- 4.2 Perform concept engineering on preferred materiel solution
  - 4.2.1 Perform trade studies and sensitivity analyses
  - 4.2.2 Update market research and industrial base analysis
  - 4.2.3 Refine life cycle cost estimates
- 4.3 Conduct technology maturation & risk reduction
  - 4.3.1 Demonstrate proof of concept and approach
  - 4.3.2 Identify Critical Technology Elements (CTEs)
  - 4.3.3 Identify technology dependencies
- 4.4 Perform Functional Analysis on preferred materiel solution
  - 4.4.1 Decompose system requirements from missions
  - 4.4.2 Develop system requirements from other design considerations (i.e. ESOH, HSI, Corrosion Prevention, etc.)
- 4.5 Develop draft functional baseline
  - 4.5.1 Document the System Specifications, interface requirements, and design standards
  - 4.5.2 Document system environment requirements (natural, induced, enemy action)
  - 4.5.3 Document design and construction constraints (e.g., physical, architectural, flexibility)
- 4.6 Conduct RAM-C analysis on preferred materiel solution
  - 4.6.1 Establish RAM goals
  - 4.6.2 Develop RAM and sustainment requirements
  - 4.6.3 Support RAM life cycle cost estimates
- 4.7 Conduct initial program protection analysis on preferred materiel solution
  - 4.7.1 Perform initial criticality analysis
  - 4.7.2 Identify candidate Critical Program Information (CPI) and critical functions
  - 4.7.3 Identify potential countermeasures
- 4.8 Determine and establish technical teams and structure

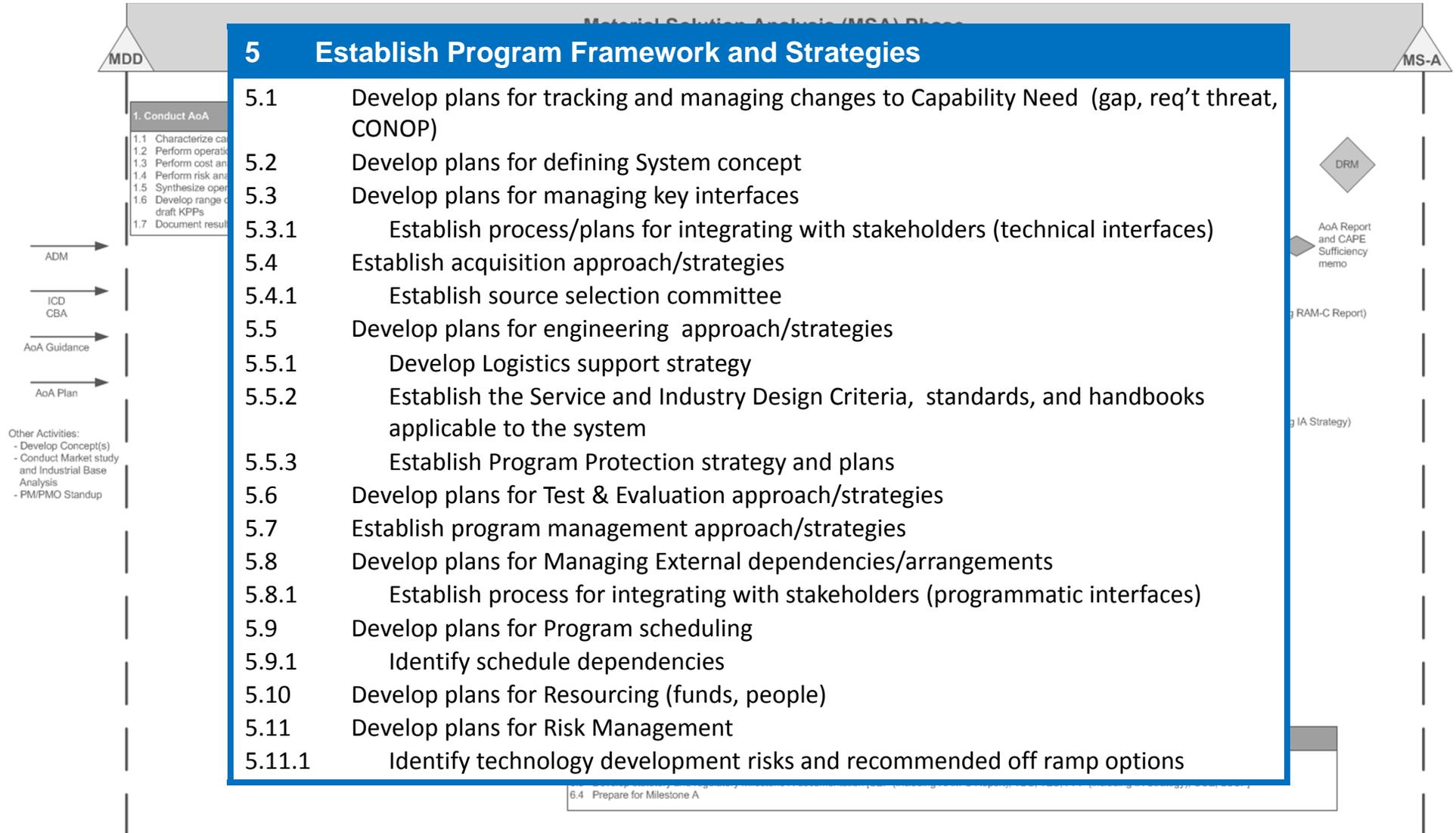
- ADM →
- ICD  
CBA →
- AoA Guidance →
- AoA Plan →

Other Activities:  
 - Develop Concept(s)  
 - Conduct Market study and Industrial Base Analysis  
 - PMPMO Standup

MS-A



# 5. Establish Program Framework and Strategies





# 6. Prepare for Milestone A and TD Phase



## Material Solution Analysis (MSA) Phase Level 1 and 2 Activities

MDD

MS-A

- 1. Conduct AoA
- 1.1 Characterize c
- 1.2 Perform operat
- 1.3 Perform cost a
- 1.4 Perform risk an
- 1.5 Synthesize ope
- 1.6 Develop range
- 1.7 Document resu

### 6 Prepare for Milestone A and TD Phase

- 6.1 Prepare RFP Package
  - 6.1.1 Develop performance specification for TD contract
  - 6.1.2 Identify CDRLS to support SE analysis in TD phase
  - 6.1.3 Support development of proposal evaluation criteria
  - 6.1.4 Conduct industry review of draft specification
- 6.2 Develop Draft CDD
  - 6.2.1 Document CONOPS and architecture summary
  - 6.2.2 Document KPPs, KSAs, and additional performance attributes
  - 6.2.3 Document SoS Synchronization plans
  - 6.2.4 Document capability need date
- 6.3 Develop Statutory and Regulatory Milestone A documentation (SEP [including RAM-C Report], TDS, TES, PPP [including IA Strategy], CCE, LCSP)
- 6.4 Prepare for Milestone A
  - 6.4.1 Staff Milestone A documentation for approval
  - 6.4.2 Staff RFP package for approval
  - 6.4.3 Support Service and OSD review meetings (OIPT, DAB, etc)



AoA Report and CAPE Sufficiency memo

g RAM-C Report)

g IA Strategy)

- ADM →
- ICD →
- CBA →
- AoA Guidance →
- AoA Plan →

Other Activities:

- Develop Concept(s)
- Conduct Market study and Industrial Base Analysis
- PM/PMO Standup

6. Prepare for Milestone A and TD Phase	
6.1	Prepare RFP package
6.2	Develop draft CDD
6.3	Develop statutory and regulatory Milestone A documentation [SEP (including RAM-C Report), TDS, TES, PPP (including IA Strategy), CCE, LCSP]
6.4	Prepare for Milestone A



# Summary and Path Forward



- **Findings were supported by NDIA DPWG collaborative engagement workshop on *Development Planning, S&T, Pre-milestone A SE, and IR&D Interactions***
  - “Correlate the NDIA DPWG Analytic Spreadsheet with the OSD DPWG Milestone A Activities Model”
  - “Determine critical information exchanges between Government Development Planning, S&T, Industry Pre-Milestone A Systems Engineering, and IR&D for DP activities”
- **OSD DPWG objectives for FY13 include exploring ways for enhanced integration with Government and Industry S&T efforts**
  - Plan to invite industry to participate in select sessions
- **Continue to work with MORS to identify/provide the tools to support these efforts**
  - MORS Affordability Analysis workshop will explore methods to infuse affordability thinking and analysis into the pre-Milestone A DP process

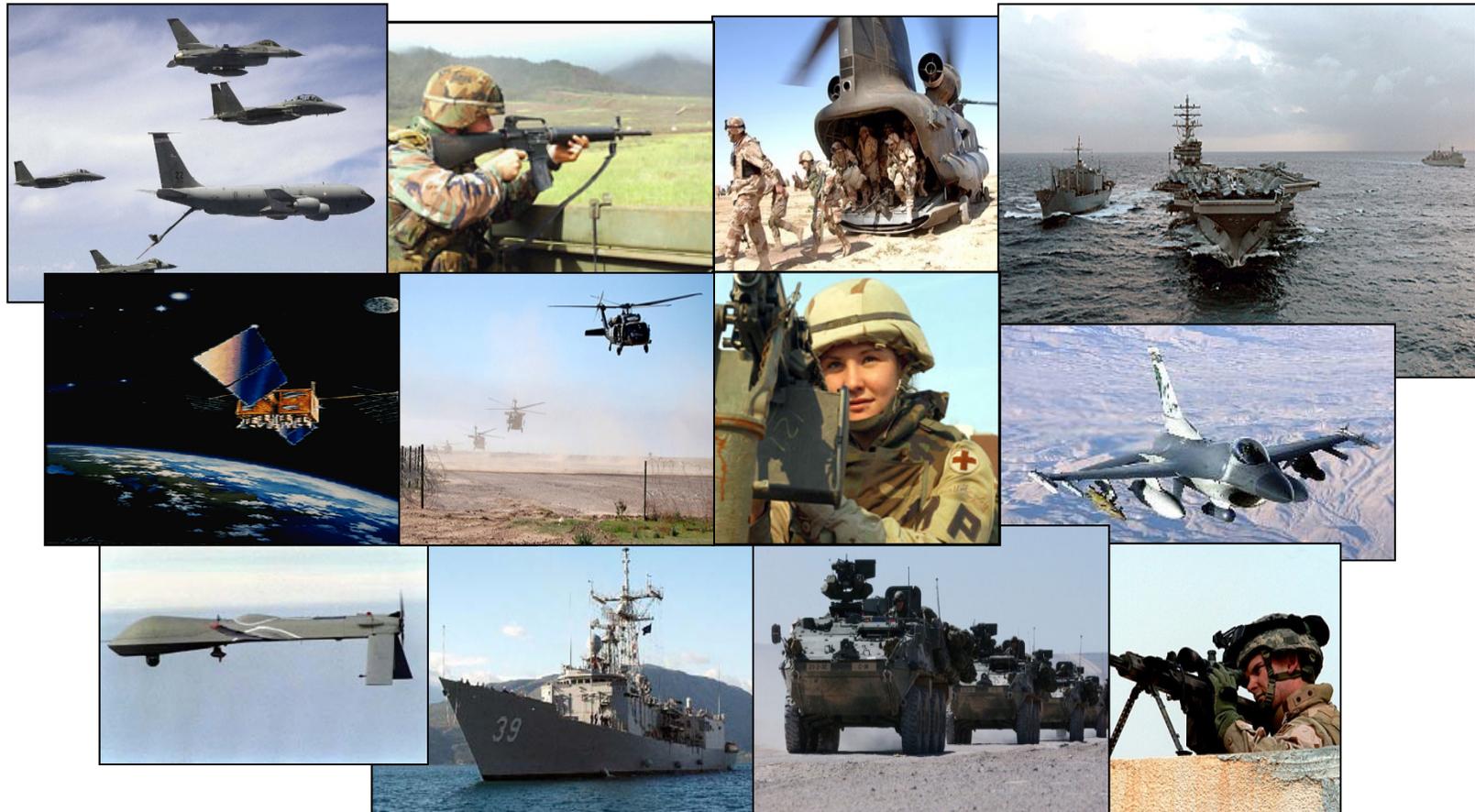


# QUESTIONS?

**For inquiries, please email [DevPIng@osd.mil](mailto:DevPIng@osd.mil)**



# Systems Engineering: Critical to Program Success



*Innovation, Speed, and Agility*

<http://www.acq.osd.mil/se>



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# Additional References



# 1. Conduct AoA

