Characterization of Materiel Solution Analysis Phase Engineering and Technical Analysis

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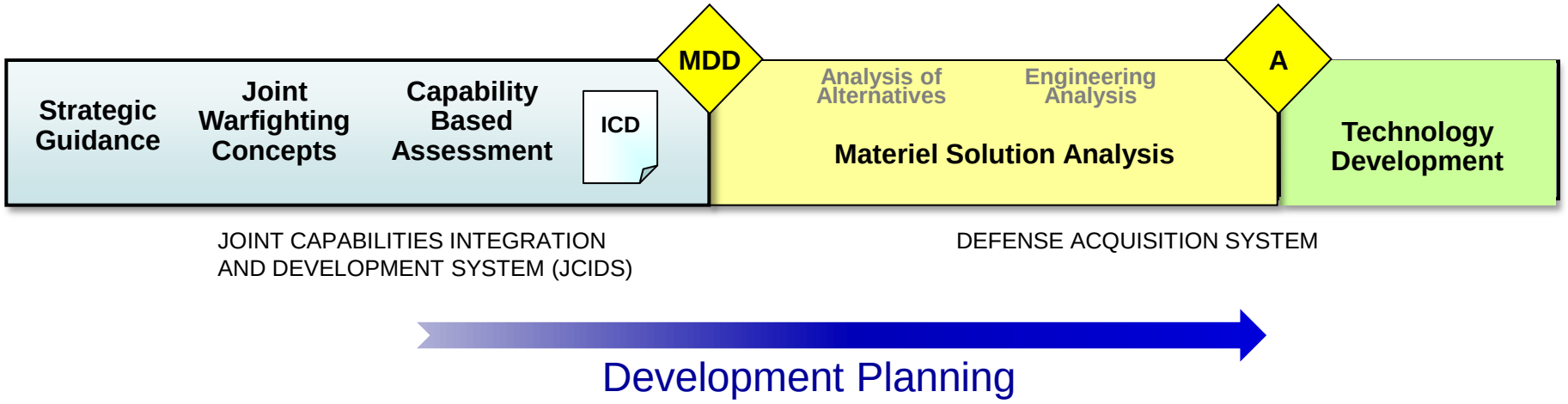
Development Planning



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

Development Planning Policy Memo (DTM 10-017)

THE UNDER SECRETARY OF DEFENSE

September 13, 2010

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DEPUTY CHIEF MANAGEMENT OFFICER
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, COST ASSESSMENT AND PROGRAM EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, NET ASSESSMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DoD FIELD ACTIVITIES

SUBJECT: Directive-Type Memorandum (DTM) 10-017 – Development Planning to Inform Materiel Development Decision (MDD) Reviews and Support Analyses of Alternatives (AoA)

References: (a) DoD Directive 5134.01, "Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L))," December 9, 2005
(b) Public Law 111-23, "Weapon Systems Acquisition Reform Act of 2009," May 22, 2009
(c) DoD Instruction 5000.02, "Operation of the Defense Acquisition System," December 8, 2008
(d) Defense Acquisition Guidebook, current edition

Purpose: This DTM, in accordance with the authority in Reference (a) and pursuant to Reference (b), establishes policy, assigns responsibilities, and provides guidance for development planning in support of defense acquisition. This DTM is effective upon its publication to the DoD Issuances Website and shall be incorporated into Reference (c). This DTM shall expire effective April 28, 2011

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)

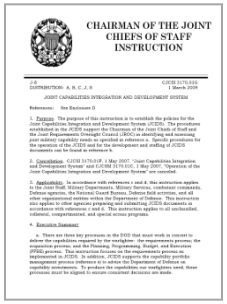
Drivers for Better Understanding of MSA Phase Technical Activities

WSARA
May 2009

BBP Memo
Sep 2010

IMPE Memo
Jun 2011

CJCSI 3170
Jan 2012



- **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
- **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"

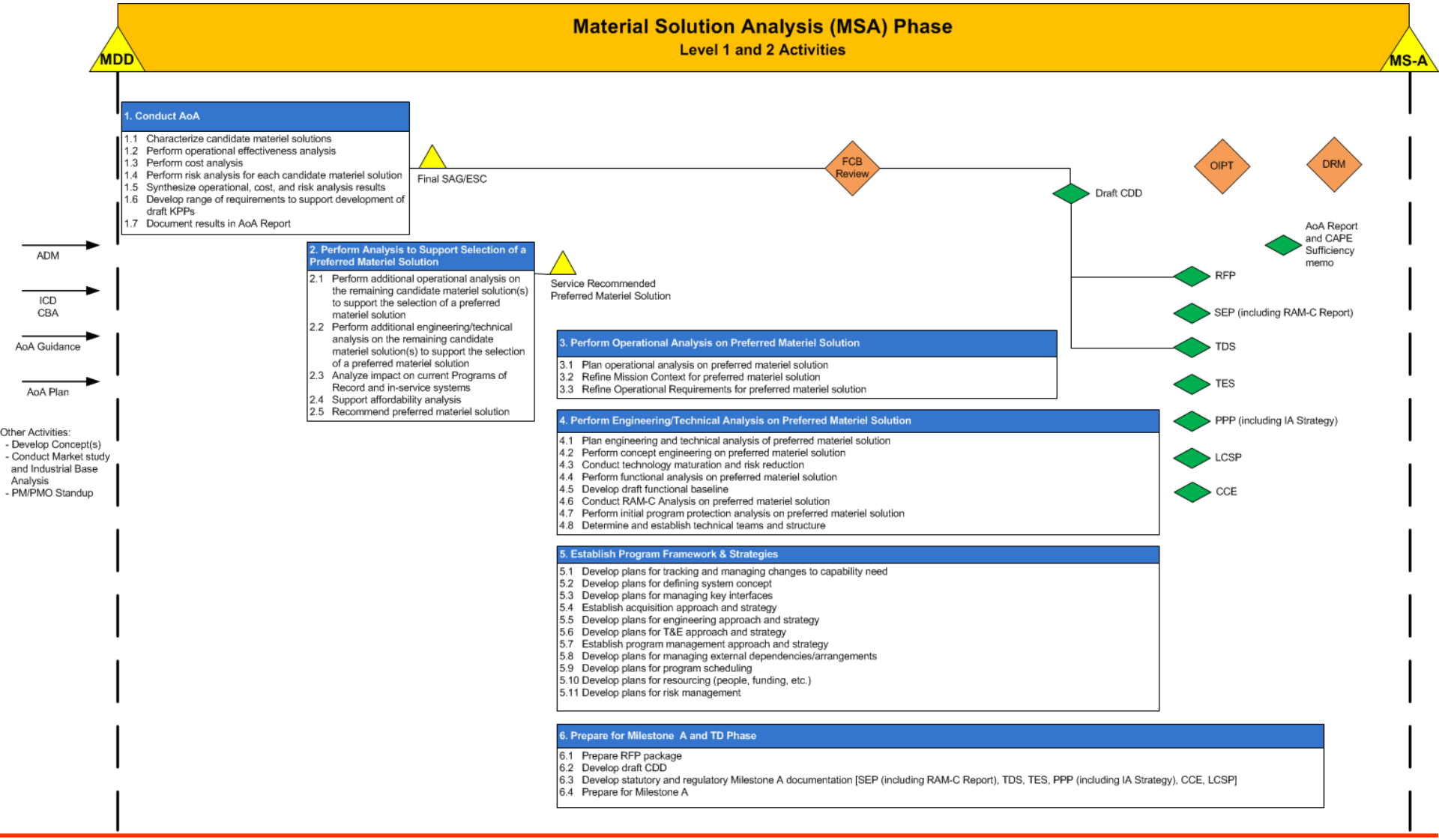
- **Approach:**
  - Begin with current Milestone A requirements according to policy of record
  - Determine which requirements are technical (SE) in nature
  - Given the current information requirements (i.e. SEP outline, etc), what are the critical thinking activities that must be accomplished [i.e. activities that provide the justification of what is codified in documentation]

Work backward from the information/knowledge required

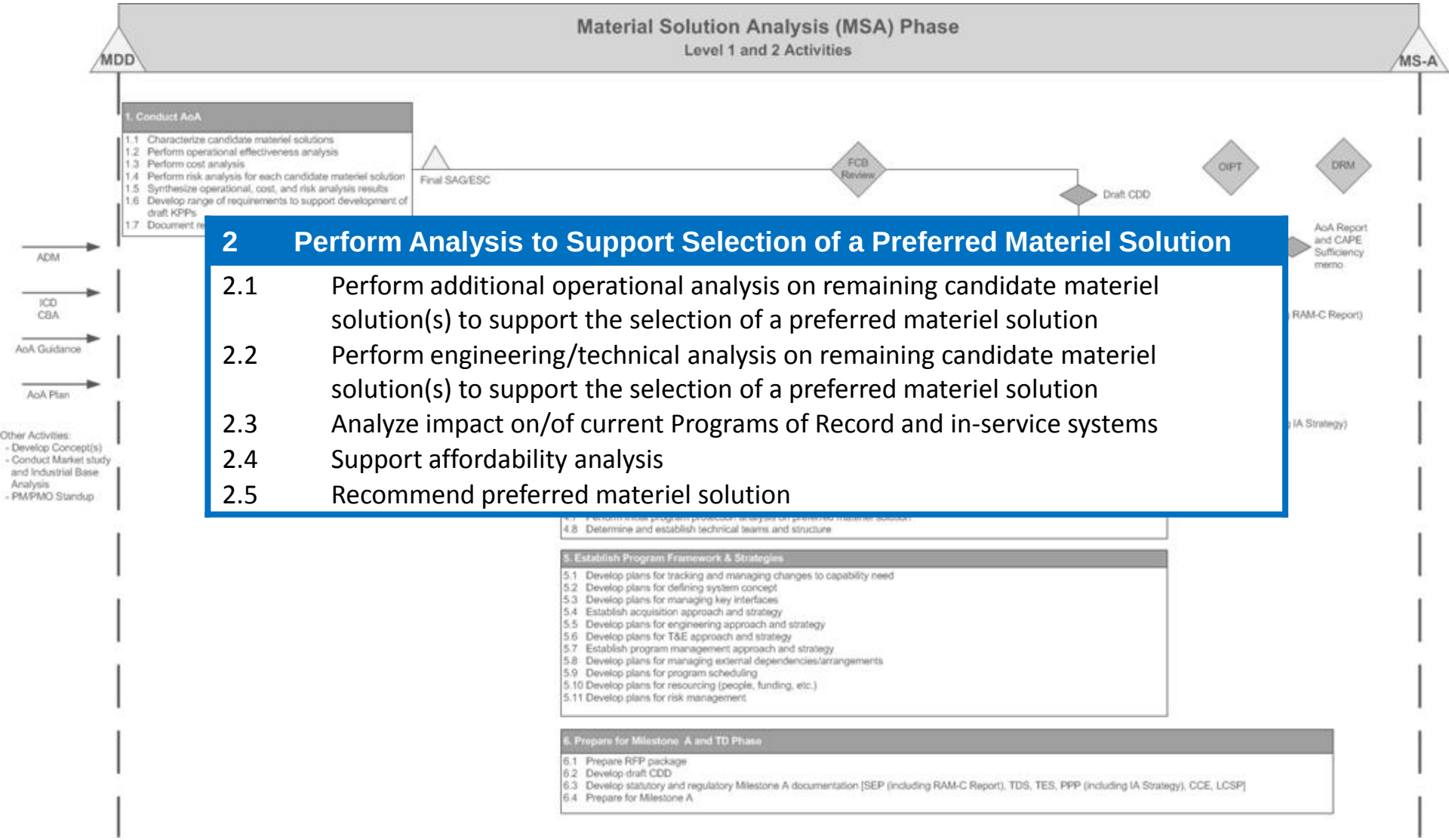
MSA Phase Analysis: Process and Outcomes

- **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)

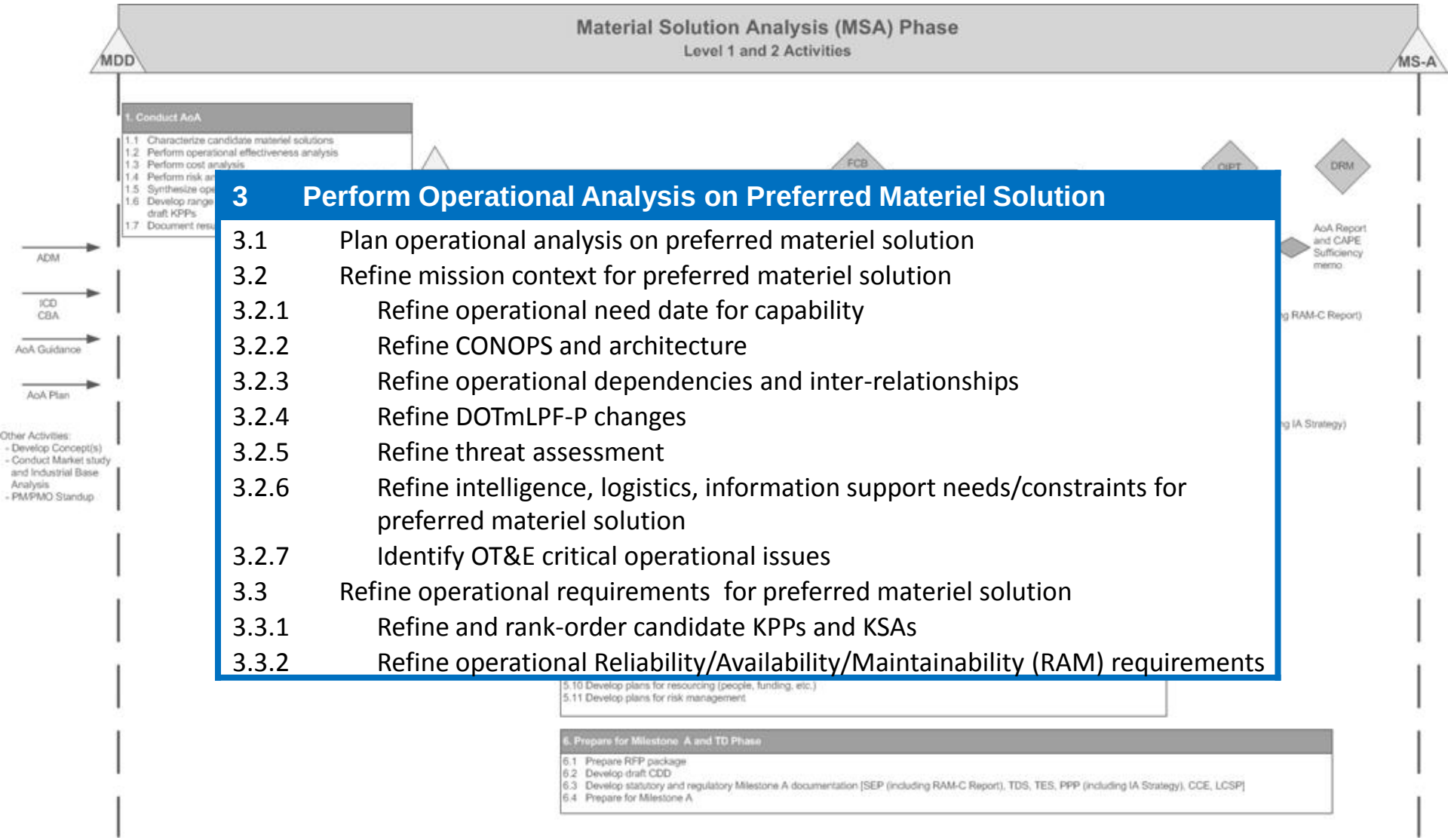


2. Perform Analysis to Support Selection of a Preferred Materiel Solution



2	Perform Analysis to Support Selection of a Preferred Materiel Solution
2.1	Perform additional operational analysis on remaining candidate materiel solution(s) to support the selection of a preferred materiel solution
2.2	Perform engineering/technical analysis on remaining candidate materiel solution(s) to support the selection of a preferred materiel solution
2.3	Analyze impact on/of current Programs of Record and in-service systems
2.4	Support affordability analysis
2.5	Recommend preferred materiel solution

3. Perform Operational Analysis on Preferred Materiel Solution



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

4. Perform Engineering/Technical Analysis on Preferred Materiel Solution

4	Perform Engineering/Technical Analysis on Preferred Materiel Solution
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

M

MS-A

ADM

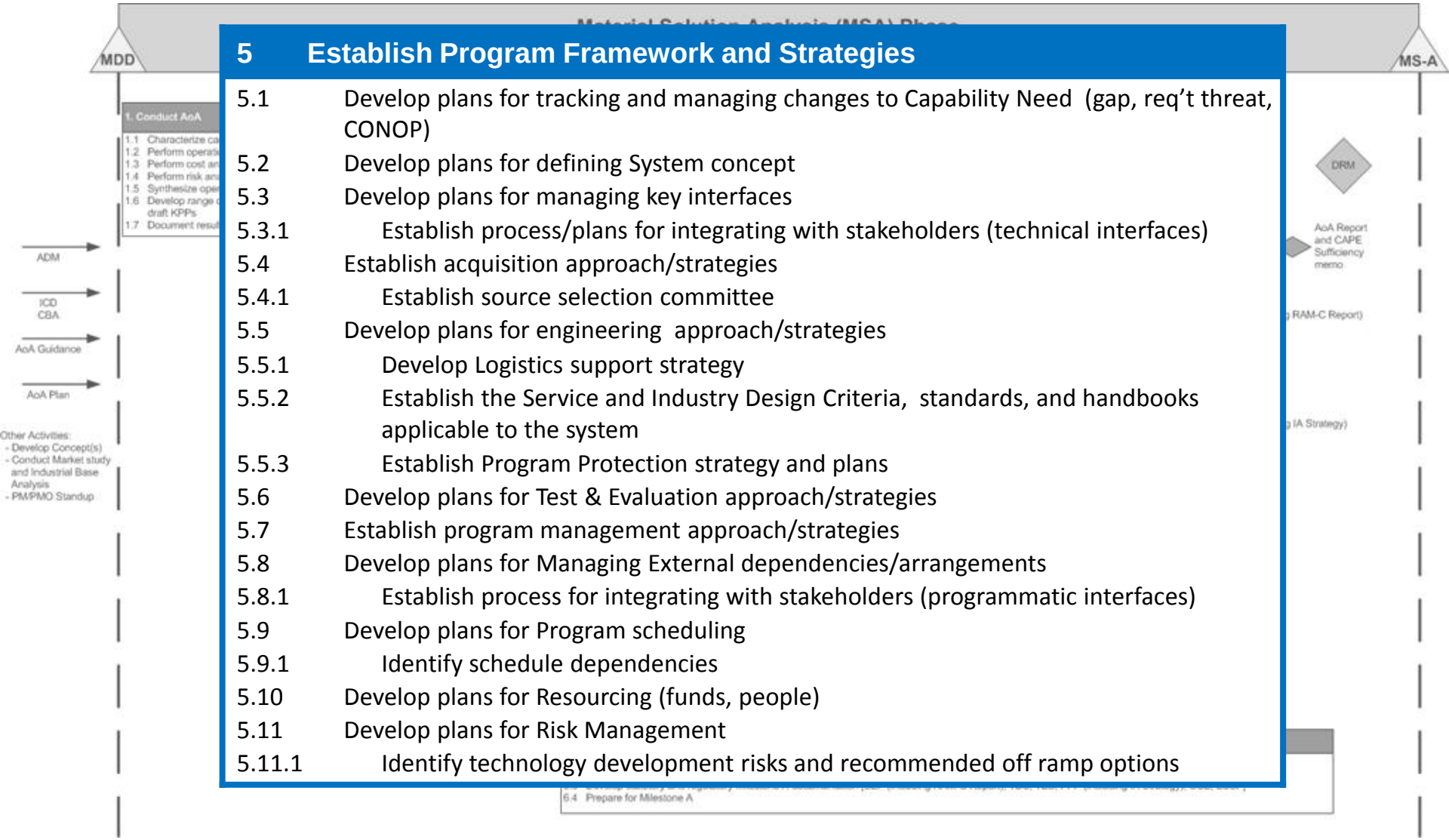
ICD
CBA

AoA Guidance

AoA Plan

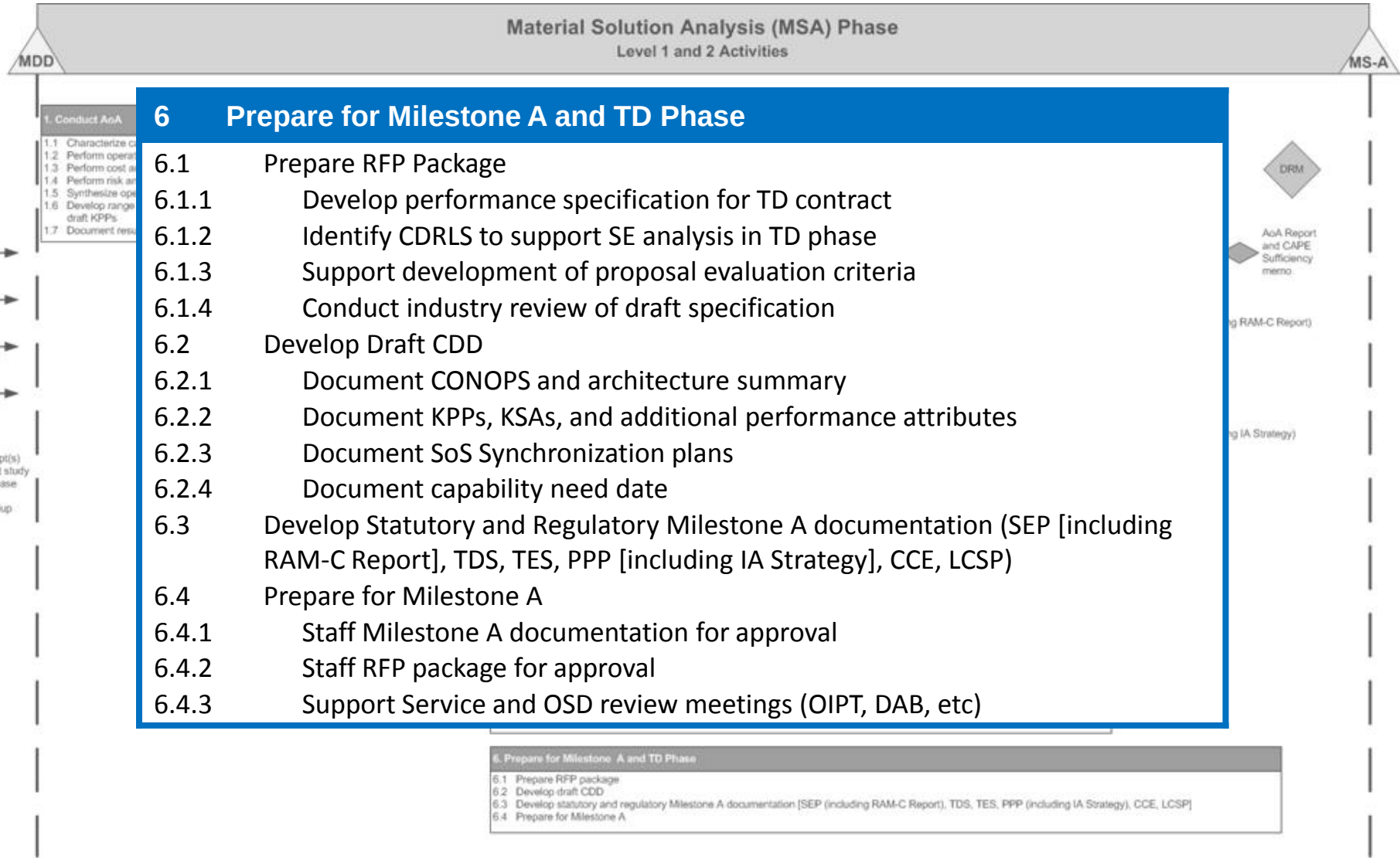
Other Activities:
- Develop Concept(s)
- Conduct Market study and Industrial Base Analysis
- PM/PMO Standup

5. Establish Program Framework and Strategies



5	Establish Program Framework and Strategies
5.1	Develop plans for tracking and managing changes to Capability Need (gap, req't threat, CONOP)
5.2	Develop plans for defining System concept
5.3	Develop plans for managing key interfaces
5.3.1	Establish process/plans for integrating with stakeholders (technical interfaces)
5.4	Establish acquisition approach/strategies
5.4.1	Establish source selection committee
5.5	Develop plans for engineering approach/strategies
5.5.1	Develop Logistics support strategy
5.5.2	Establish the Service and Industry Design Criteria, standards, and handbooks applicable to the system
5.5.3	Establish Program Protection strategy and plans
5.6	Develop plans for Test & Evaluation approach/strategies
5.7	Establish program management approach/strategies
5.8	Develop plans for Managing External dependencies/arrangements
5.8.1	Establish process for integrating with stakeholders (programmatic interfaces)
5.9	Develop plans for Program scheduling
5.9.1	Identify schedule dependencies
5.10	Develop plans for Resourcing (funds, people)
5.11	Develop plans for Risk Management
5.11.1	Identify technology development risks and recommended off ramp options

6. Prepare for Milestone A and TD Phase



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)

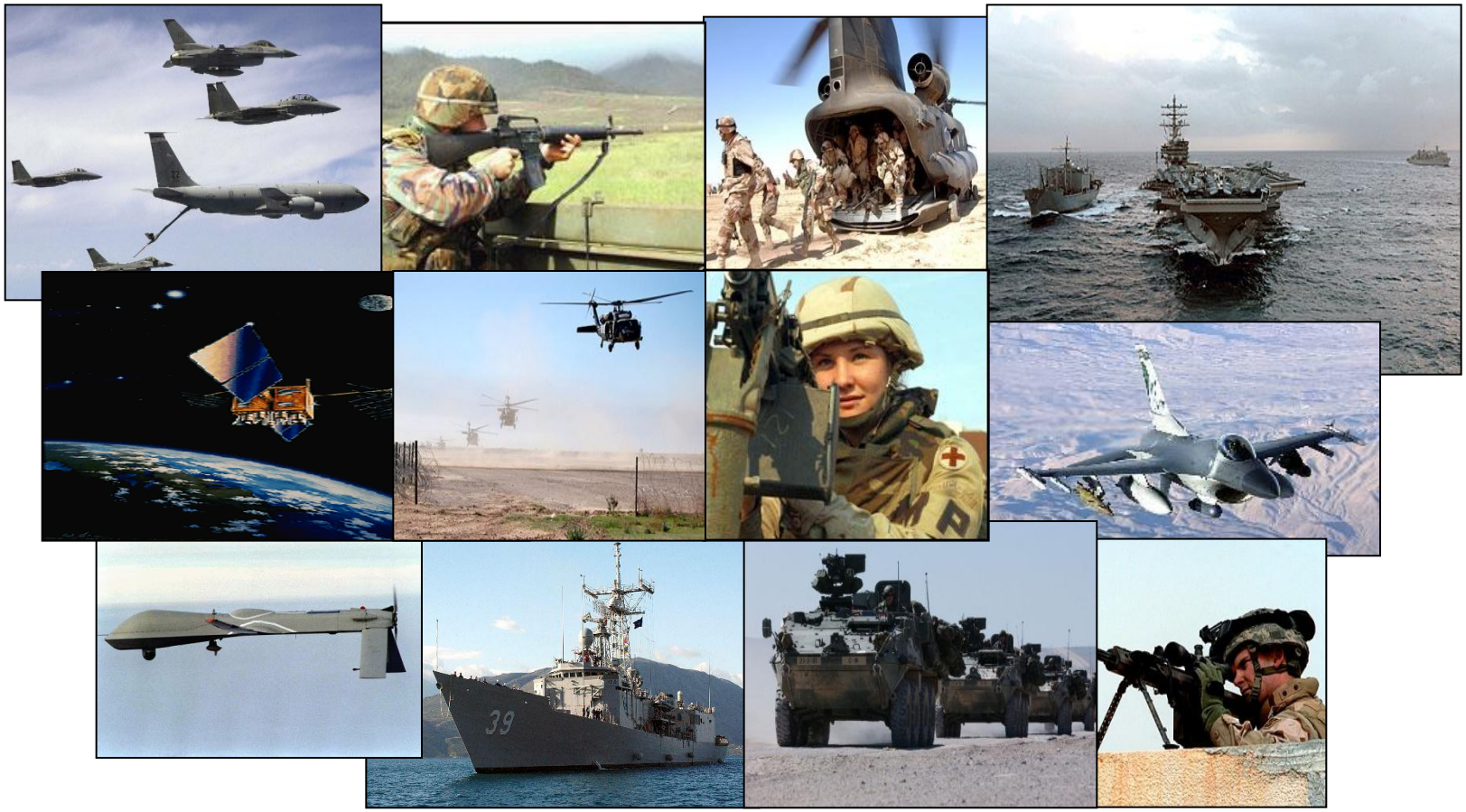
Summary and Path Forward

- **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 DevPlng@osd.mil

Systems Engineering: Critical to Program Success

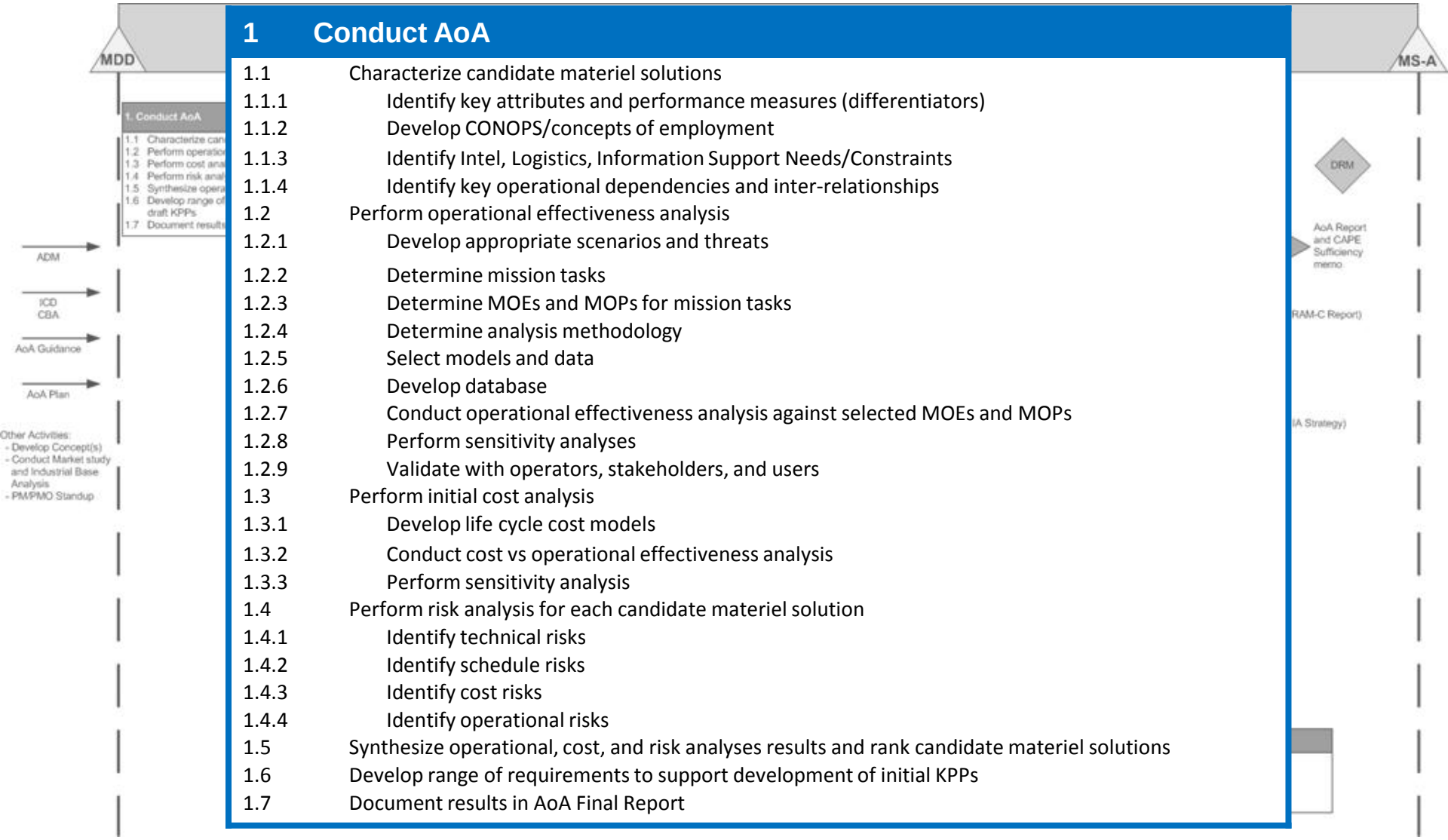


Innovation, Speed, and Agility

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

Additional References

1. Conduct AoA



1 Conduct AoA

1.1	Characterize candidate materiel solutions
1.1.1	Identify key attributes and performance measures (differentiators)
1.1.2	Develop CONOPS/concepts of employment
1.1.3	Identify Intel, Logistics, Information Support Needs/Constraints
1.1.4	Identify key operational dependencies and inter-relationships
1.2	Perform operational effectiveness analysis
1.2.1	Develop appropriate scenarios and threats
1.2.2	Determine mission tasks
1.2.3	Determine MOEs and MOPs for mission tasks
1.2.4	Determine analysis methodology
1.2.5	Select models and data
1.2.6	Develop database
1.2.7	Conduct operational effectiveness analysis against selected MOEs and MOPs
1.2.8	Perform sensitivity analyses
1.2.9	Validate with operators, stakeholders, and users
1.3	Perform initial cost analysis
1.3.1	Develop life cycle cost models
1.3.2	Conduct cost vs operational effectiveness analysis
1.3.3	Perform sensitivity analysis
1.4	Perform risk analysis for each candidate materiel solution
1.4.1	Identify technical risks
1.4.2	Identify schedule risks
1.4.3	Identify cost risks
1.4.4	Identify operational risks
1.5	Synthesize operational, cost, and risk analyses results and rank candidate materiel solutions
1.6	Develop range of requirements to support development of initial KPPs
1.7	Document results in AoA Final Report