Headquarters U.S. Air Force

Integrity - Service - Excellence

USAF View of National Research Council "Pre-Milestone A and Early-Phase Systems Engineering" Study Committee Recommendations as Addressed By Weapon System Acquisition Reform Act of 2009 (PL 111-23)

NDIA Systems Engineering Division
Annual Conference
San Diego, CA
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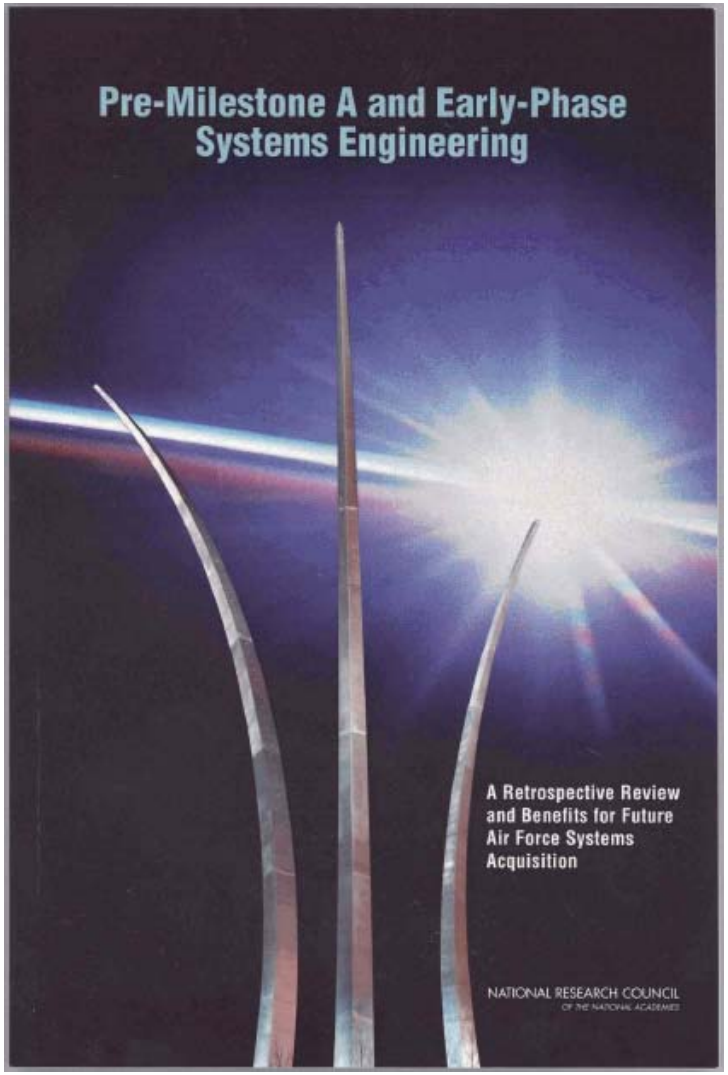
NRC Study Committee Report



"Pre-Milestone A and Early-Phase Systems Engineering: A Retrospective Review and Benefits for Future Air Force Systems Acquisition"

December 2007

http://books.nap.edu/catalog.php?record_id=12065

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Recommendations

- **Recommendation #1**

  Air Force leadership should require that Milestones A and B be treated as critical milestones in every acquisition program and that … the "Pre-Milestone A/B Checklist" … be used to judge successful completion.

Sec.102 (a)(1)(b)(5)(A)

… policies and guidance for … the use of systems engineering principles and best practices, generally …

Sec.102 (a)(1)(b)(5)(E)

… inclusion of systems engineering requirements in the process for consideration of joint military requirements by the (JROC) including specific input relating to each (CDD) …

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Checklist (1 of 4)

Concept Development

Have at least two alternative concepts been evaluated?
Can an initial capability be achieved within ~5 years from MS/KDP B? If not, can critical subsystems (or a key subset) be demonstrated within that timeframe?
Will high-risk new technologies have been matured prior to MS/KDP B? If not, is the risk mitigation plan adequate?
Have external interface complexities (incl. dependencies on other programs) been identified and minimized? Is there a plan to mitigate risks?

KPPs and CONOPS

At MS/KDP A, have KPPs been identified in clear, comprehensive, concise, understandable terms?
At MS/KDP B, are major system-level requirements (including all KPPs) sufficiently well defined to provide a stable basis for system development?
Has a CONOPS been developed showing that system operation can handle expected throughput and meet response time requirements?

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Checklist (2 of 4)

Cost and Schedule

Are major cost and schedule drivers and risks explicitly identified, and is there a plan to track and reduce uncertainty?
Have principal stakeholders accepted the confidence level (risk assessment) associated with cost estimates?

Performance Assessment

Are models and simulations adequate and appropriate to validate the selected concept and CONOPS against the KPPs?
At MS/KDP B, do the requirements consider likely future mission growth over the life cycle?

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Checklist (3 of 4)

Architecture, Risk

Has the system been partitioned to define segments that can be independently developed and tested?
By MS/KDP A, is there a plan to have information exchange protocols in place by MS/KDP B?
At MS/KDP B, is the program plan structured to ensure that the contractor addresses rqmts decomposition / allocation to hardware, software, and human elements sufficiently early in development?
Are all key risk drivers (including but not limited to critical technologies) identified?

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Checklist (4 of 4)

Program Implementation

Does the program implementation plan account for necessary and sufficient numbers and skill levels of organic (military and civilian), FFRDC, and support contractor personnel to manage the program?
At MS/KDP A, is there a plan in place that identifies all necessary activities and resources to reach MS/KDP B?
Is there a top-level system integration and test plan?
At MS/KDP B, are the necessary and sufficient program management and systems engineering management personnel in place? Have they been empowered to tailor processes and enforce requirements stability through IOC?
Has the government attempted to align the duration of the program manager's assignment with key milestones and deliverables?

Recommendations

- **Recommendation #2**

  Assess career field needs and develop a program to address

Sec.102 (b)(2)(B))
… resources are needed to attract, develop, retain, and reward developmental test and evaluation personnel and systems engineers with appropriate levels of hands-on experience and technical expertise

Recommendations

- **Recommendation #3**

  Pre-A decisions should be supported by rigorous SE processes and analyses involving teams of acquirers, users, and industry

Sec.102 (a)(1)(b)(5)(E)

… inclusion of systems engineering requirements in the process for consideration of joint military requirements by the (JROC) including specific input relating to each (CDD) …

Sec.102 (b)(1)(B)(iii)

… identify systems engineering requirements … during the Joint Capabilities Integration Development System process, and incorporate such systems engineering requirements into contract requirements …

Findings and Recommendations

- **Recommendation #4**

  A development planning function should be established in the military departments to coordinate the concept development and refinement phase of all acquisition programs to ensure that the capabilities … as a whole are considered and that unifying strategies such as … interoperability are addressed.

Sec.102 (b)(1)

(SAE) … develop & implement plans to ensure … appropriate resources for …

(B) Development planning and systems engineering organizations with adequate numbers of trained personnel in order to—

(i) support key requirements, acquisition, and budget decisions made for each major defense acquisition program prior to Milestone A approval and Milestone B approval through a rigorous systems analysis and systems engineering process; …

(iii) identify systems engineering requirements … during the Joint Capabilities Integration Development System process, and incorporate such systems engineering requirements into contract requirements …

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AIP and WSARA

Acquisition Improvement Plan

- **Revitalize the Air Force acquisition workforce**
- **Improve requirements generation process**
- Establish clear lines of authority and accountability within acquisition organizations
- ***Instill budget and financial discipline***
- ***Improve Air Force major systems source selections***

Weapon System Acquisition Reform Act (PL 111-23)
Sec. 102 Directors of Developmental Test and Evaluation and Systems Engineering

(a) In General

§ 139d. (b) (5) Director of Systems Engineering shall

(D) provide advocacy, oversight, and guidance to elements of the acquisition workforce responsible for systems engineering, development planning, and lifecycle management and sustainability functions;

(E) provide input on the inclusion of systems engineering requirements in the process for consideration of joint military requirements by the Joint Requirements Oversight Council …

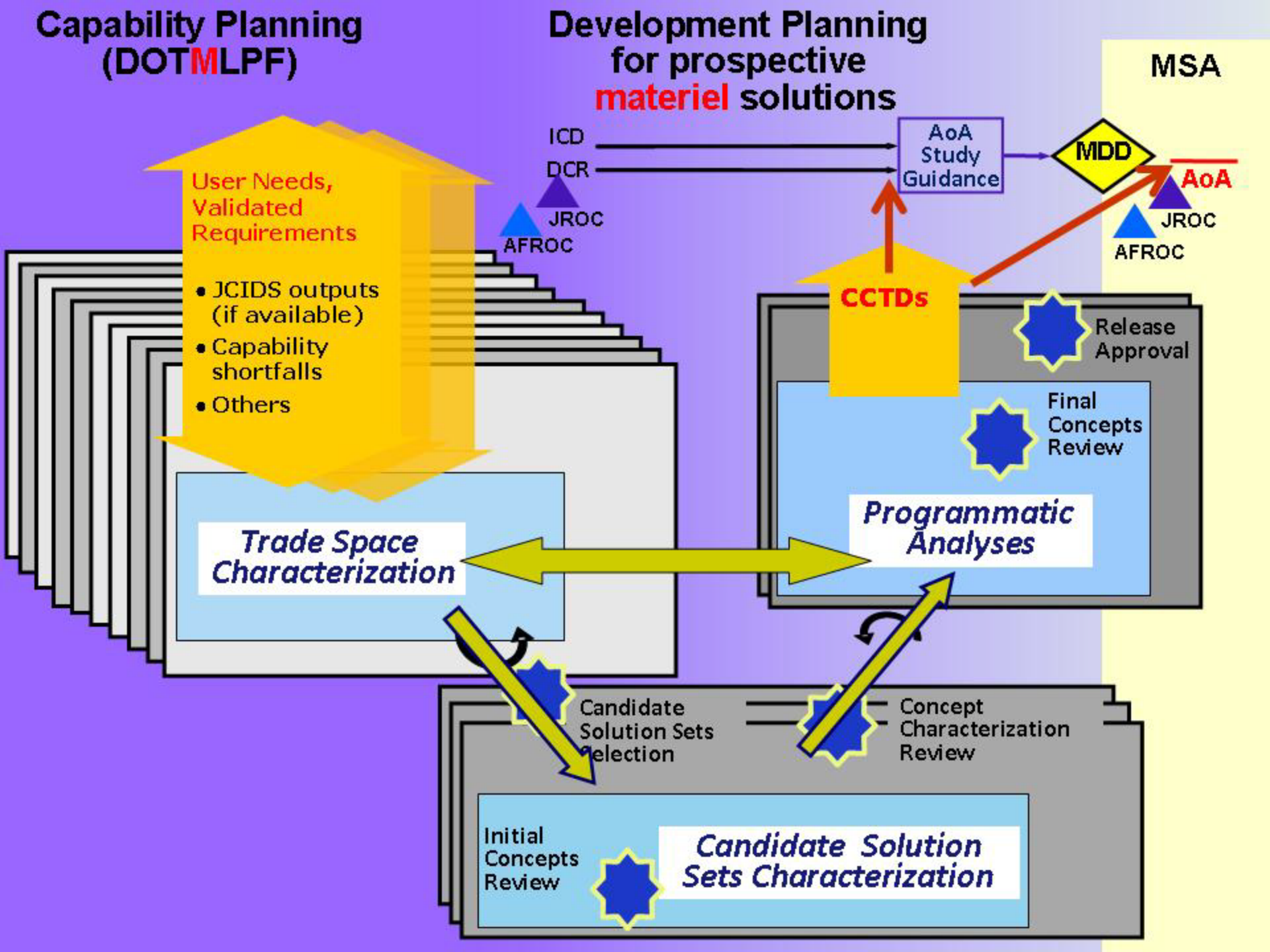
(b) Developmental Test and Evaluation and Systems Engineering in the Military Departments

(1) Plans. -- The(SAE) … shall develop and implement plans to ensure the military department … has provided appropriate resources for …

(B) Development planning and systems engineering organizations with adequate numbers of trained personnel in order to

(i) support key requirements, acquisition, and *budget* decisions made for each major defense acquisition program prior to Milestone A approval and Milestone B approval through a rigorous systems analysis and systems engineering process; …

(iii) identify systems engineering requirements, including reliability, availability, maintainability, and lifecycle management and sustainability requirements, during the Joint Capabilities Integration Development System process, *and incorporate …into contract requirements …*


Capability Planning (DOTMLPF)
Development Planning for prospective materiel solutions
MSA
ICD
DCR
JROC
AFROC
AoA Study Guidance
MDD
AoA
JROC
AFROC
User Needs, Validated Requirements
• JCIDS outputs (if available)
• Capability shortfalls
• Others
CCTDs
Release Approval
Final Concepts Review
Programmatic Analyses
Trade Space Characterization
Candidate Solution Sets Selection
Concept Characterization Review
Initial Concepts Review
Candidate Solution Sets Characterization