Development Planning

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Office of the Director, Systems Engineering
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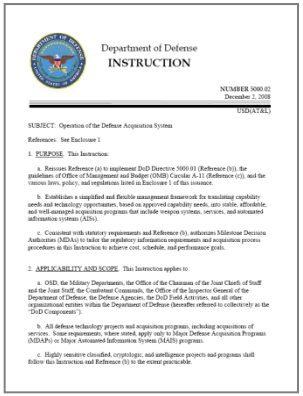
Pre-Acquisition Technology Development/Early System Engineering

National Research Council

"Pre-Milestone A and Early-Phase Systems Engineering" Jan 2008

DoD 5000.02
December 2008



Department of Defense
INSTRUCTION

NUMBER 5000.02
December 2, 2008
USD(AT&L)

SUBJECT: Operation of the Defense Acquisition System

References: See Enclosure 1

1. PURPOSE. This Instruction:

a. Reissues Reference (a) to implement DoD Directive 5000.01 (Reference (b)), the guidelines of Office of Management and Budget (OMB) Circular A-11 (Reference (c)), and the various laws, policy, and regulations listed in Enclosure 1 of this issuance.

b. Establishes a simplified and flexible management framework for translating capability needs and technology opportunities, based on approved capability needs, into stable, affordable, and well-managed acquisition programs that include weapon systems, services, and automated information systems (AISs).

c. Consistent with statutory requirements and Reference (b), authorizes Milestone Decision Authorities (MDAs) to tailor the regulatory information requirements and acquisition process procedures in this Instruction to achieve cost, schedule, and performance goals.

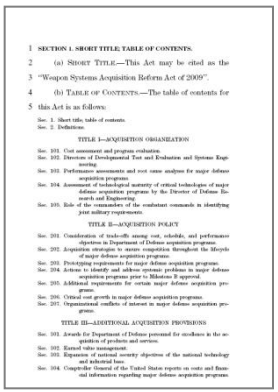
2. APPLICABILITY AND SCOPE. This Instruction applies to:

a. OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").

b. All defense technology projects and acquisition programs, including acquisitions of services. Some requirements, where stated, apply only to Major Defense Acquisition Programs (MDAPs) or Major Automated Information System (MAIS) programs.

c. Highly sensitive classified, cryptologic, and intelligence projects and programs shall follow this Instruction and Reference (b) to the extent practicable.

WSARA
May 2009



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.

- **National Academies of Sciences Study**
  - All programs destined to fail without early [pre-MS A] systems engineering
  - Development planning can implement pre-MS A early systems engineering
- **DoD Acquisition Regulations (DoDI 5000.02) Update**
  - Increased focus on early pre-acquisition phases
  - Implication for added early systems engineering
- **Weapon Systems Acquisition Reform Act of 2009 (WSARA)**
  - Directs SE responsibilities to reinvigorate Development Planning

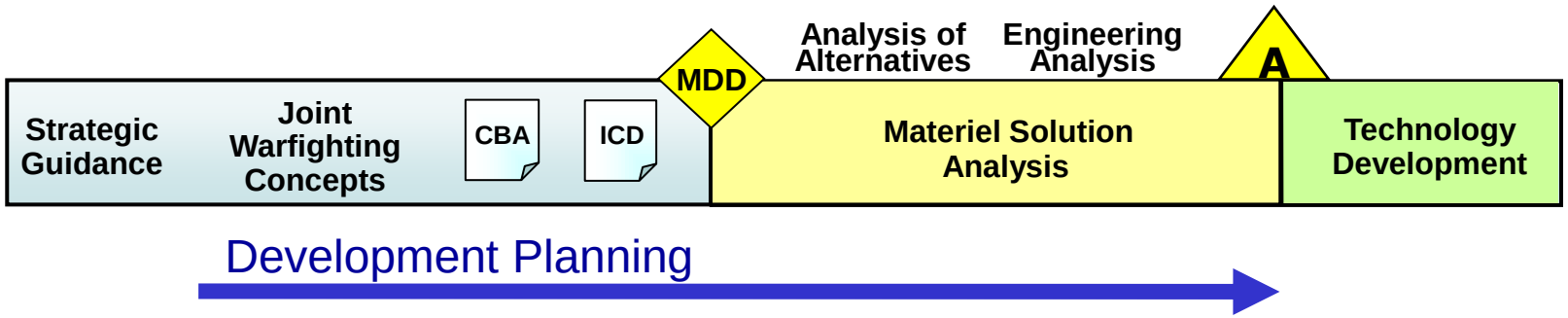
WSARA Development Planning Requirements

- ***Development Planning*** **is a new function identified in the 2009 legislation**
- **Specifically, SE is required to:**
  - Monitor and Review systems engineering and *development planning* activities of the major defense acquisition programs
  - Provide advocacy, oversight, and guidance to elements of the acquisition workforce responsible for systems engineering and *development planning*
  - Provide input on the inclusion of systems engineering requirements in the process for consideration of joint military requirements by the Joint Requirements Oversight Council
  - Periodically review the organizations and capabilities of the military departments with respect to systems engineering and *development planning* capabilities

DDR&E FY10 Development Planning Objectives

- **Establish Development Planning policy, guidance & criteria**
- **Establish capability to perform oversight**
- **Advocate tools, resources for development planning**

Development Planning



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

Three Critical Impacts on Early Acquisition

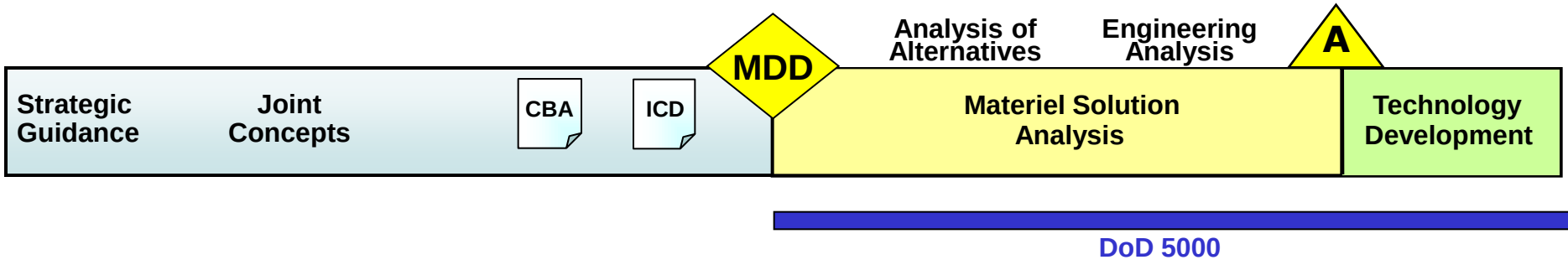
- **2009 Update to CJCSI 3170 eliminated the Functional Solutions Analysis (FSA) from the JCIDS, leaving a process gap in the identification of solutions for consideration in the AoA**

- **In September 2009, GAO issued a report entitled "Many Analyses of Alternatives Have Not Provided a Robust Assessment of Weapon System Options"**
  - "Department of Defense weapon programs often experience significant cost and schedule problems because they are allowed to start with too many technical unknowns and not enough knowledge about the development and production risks they entail."
  - GAO RECOMMENDATION: "[Secretary of Defense shall] establish specific criteria and guidance for how AoAs should be conducted, including how technical and other programmatic risks should be assessed and compared."

- **2008 DoDI 5000.02 Update drives greater technical work, including competitive prototyping and the Preliminary Design Review before Milestone B, creating greater demand for pre-Milestone A technical analysis and planning.**

Significant Technical Issues Pre-MS A

Issues	Implications
Lack of materiel engagement pre-MDD	• *Limited awareness of potential solutions* leading to missed solution opportunities and too narrow an AoA scope • *Limited understanding of user performance needs* and context, leading to cost/schedule growth due to lack of understanding of the CONOPS and user considerations • *Immature alternatives enter the AoA* leading to increased AoA time and cost due to evaluation of solutions that are not feasible
Program-focused analysis, when solutions will impact broad sets of systems and SoS	• Delivery of a system that *will not integrate*, or that has reduced benefit because of external system issues • Unanticipated costs due to needed *changes to other systems* in order to achieve capability objective
Insufficient engineering engagement between MDD and A	• Lack of engineering on preferred solutions leading to *poor planning for Technology Development* and technical issues leading development problems



Strengthening MDD Entrance Criteria

Material Development Decision (MDD)

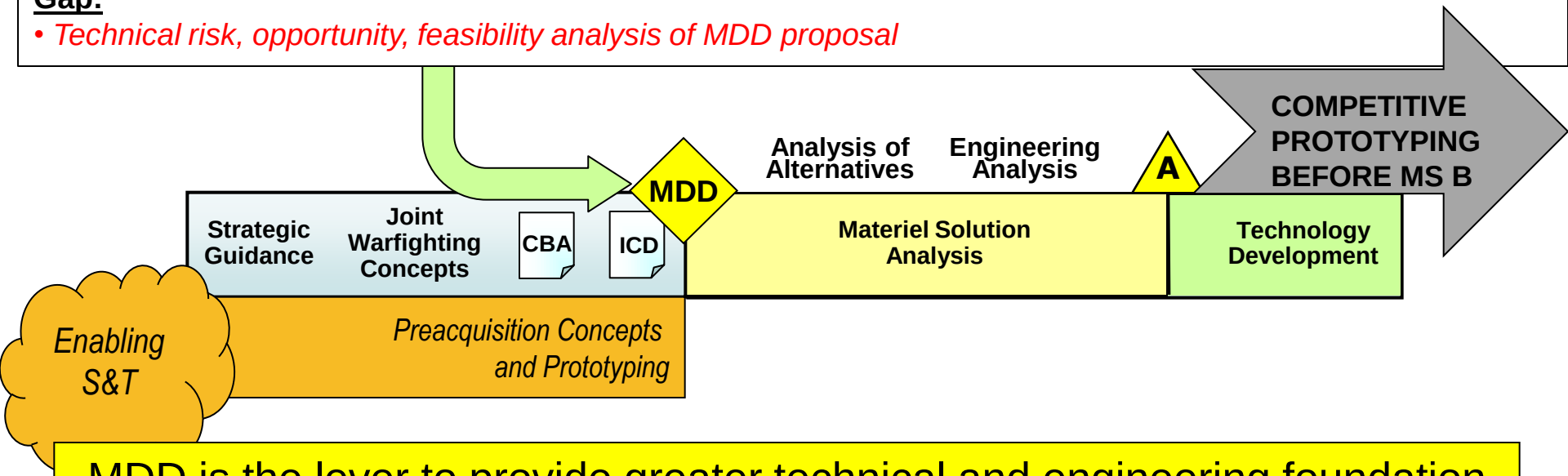
- Defined in DoDI 5000.02 as "the *formal entry point* into the acquisition process and mandatory for all programs"

MDD Entry Criteria:

- JROC approved *ICD*
- CAPE approved *AoA Study Guidance*
- DoD component presents approved ICD, preliminary concept of operations, a description of the needed capability, the operational risk, and the basis for determining that non-material approaches will not sufficiently mitigate the capability gap

Gap:

- *Technical risk, opportunity, feasibility analysis of MDD proposal*



MDD is the lever to provide greater technical and engineering foundation for initiating an acquisition

Development Planning Policy Memo (DTM 10-017)

MDD 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 Director, Cost Assessment and Program Evaluation, and, as agreed upon with that organization, serve as a standing participant and technical advisor in the development of AoA Study Guidance and on the AoA Study Advisory Group for potential programs under USD(AT&L) oversight to facilitate the consideration of technology and engineering risks for the alternatives under consideration.
- Monitor and review the effectiveness of the policy in this DTM and develop additional development planning guidance as needed for incorporation into acquisition policy and the Defense Acquisition Guidebook (Reference (d)).

Additional Evidence Requirements at MDD

The candidate materiel solution approaches have the potential to effectively address the capability gap(s), operational attributes and associated dependencies.

- *Common understanding of the root cause* of the gap between the operational analytical and acquisition communities
- Problem is *defined with adequate specificity* while maintaining *solution independence*
- *Associated dependencies*, to include other gaps, legacy systems, systems of systems baseline considerations and DOT_LPF implications
- Candidate materiel solution approaches have the potential to *effectively address the gap*
- The *urgency/priority of the gap*, including the operational community's requirements on schedule for deployment

There exists a range of technically feasible solutions generated from across the entire solution space, as demonstrated through early prototypes, models, or data

- Initial set of solutions have been drawn from the *entire solution space*
- A *broad range of solutions* is proposed for consideration to ensure the highest likelihood of success
- Evidence that demonstrates *technical feasibility* of proposed alternative solutions is presented, including prototypes, models or data
- Technical feasibility considers technical issues of new developments, updates to existing systems, and the *changes needed given the dependencies* of the proposed system

Additional Evidence Requirements at MDD

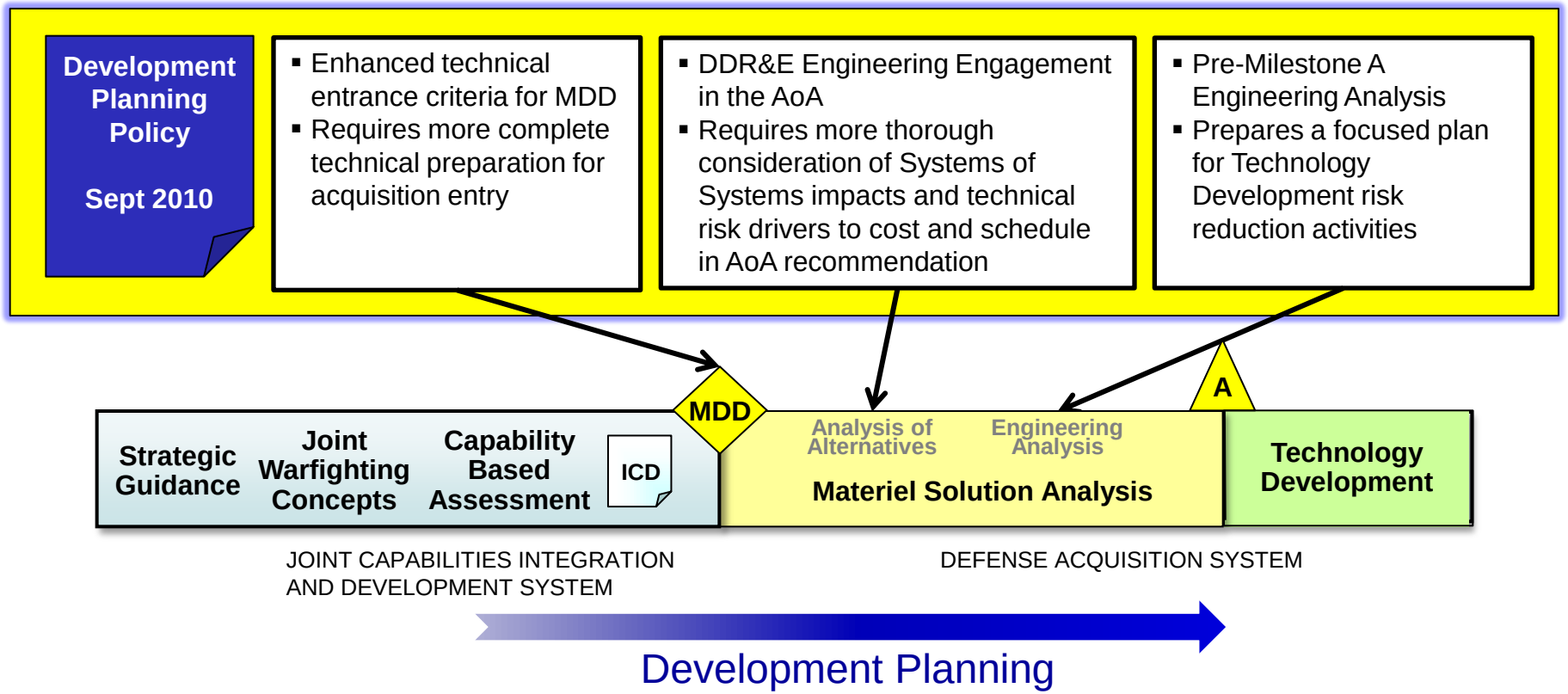
Consideration has been given to near term opportunities to provide a more rapid interim response to the capability need

- Provide evidence that consideration was given to *interim, more rapid solutions* to mitigate the impact of the capability gap while a system acquisition is underway
- Ensure that *incremental acquisition* has been considered to quickly deliver the solution to the warfighter and deliver added capability with follow-on increments

The plan to staff and fund analytic, engineering, and programmatic activities supports the proposed milestone entry requirements.

- Current DoDI 5000.02 policies mandates full funding of the AoA at the MDD
- Proposed Development Planning policy directs *DDR&E participation in oversight of the AoA* to support greater analysis of technical risk of proposed solutions
- Recent changes to DoDI 5000.02 require *greater pre-MS A engineering and programmatic planning* for the Technology Development phase in support of Milestone A requirements
- Requires evidence of *planning, funding and staffing* to adequately perform additional analysis and planning in the Materiel Solution Analysis phase

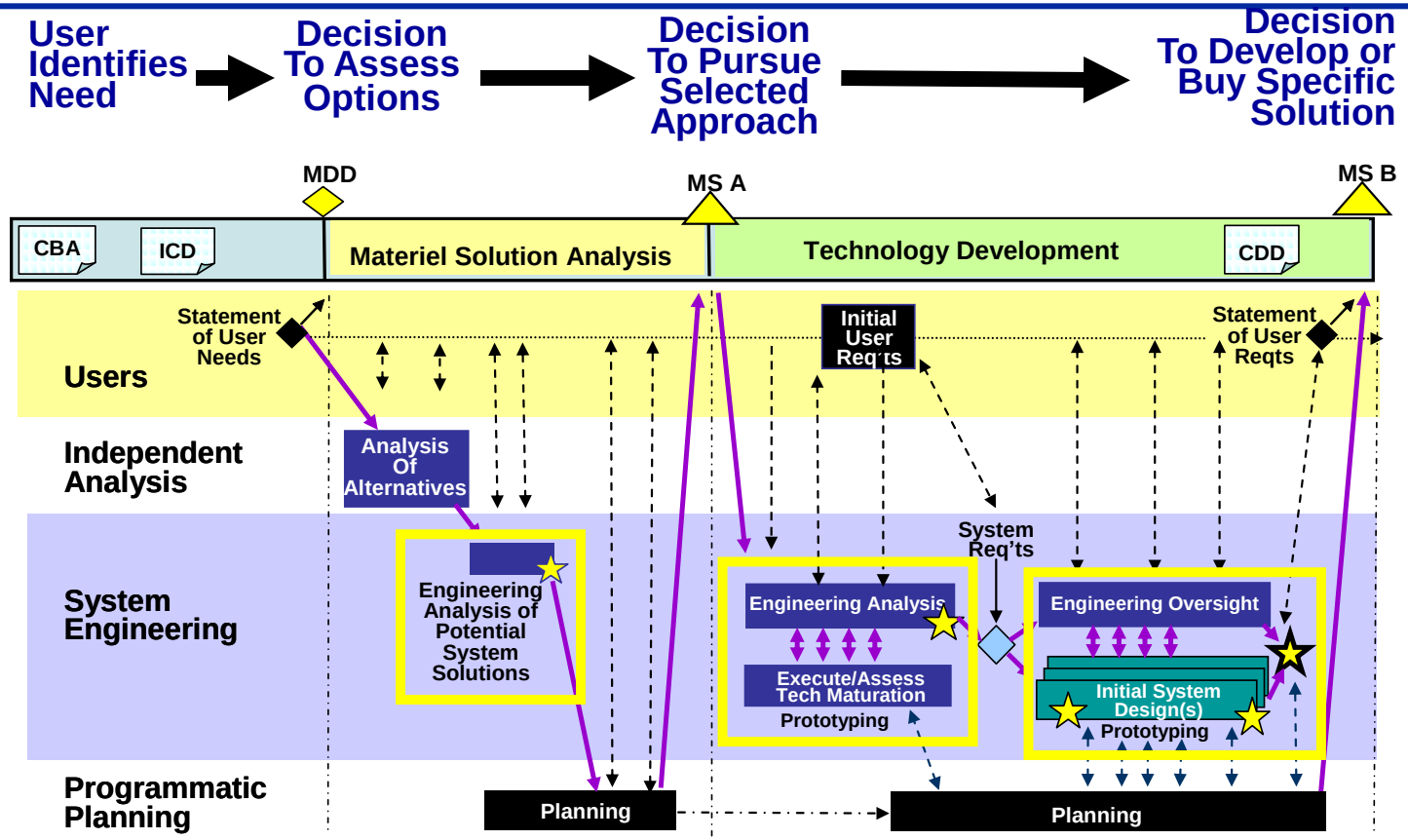
Summary



Development Planning policy drives earlier technical engagement to identify and reduce risk and start programs right

BACKUP

Critical SE Support to Program Formulation



During MSA and TD Systems Engineering Provides the Technical Foundation for Program Decisions

WSARA – Dir, SE Language

(b) DIRECTOR OF SYSTEMS ENGINEERING.—

(1) APPOINTMENT.—There is a Director of Systems Engineering, who shall be appointed by the Secretary of Defense from among individuals with an expertise in systems engineering and development planning.

(2) PRINCIPAL ADVISOR FOR SYSTEMS ENGINEERING AND DEVELOPMENT PLANNING.—The Director shall be the principal advisor to the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics on systems engineering and development planning in the Department of Defense.

(3) SUPERVISION.—The Director shall be subject to the supervision of the Under Secretary of Defense for Acquisition, Technology, and Logistics and shall report to the Under Secretary.

(4) COORDINATION WITH DIRECTOR OF DEVELOPMENTAL TEST AND EVALUATION.—The Director of Systems Engineering shall closely coordinate with the Director of Developmental Test and Evaluation to ensure that the developmental test and evaluation activities of the Department of Defense are fully integrated into and consistent with the systems engineering and development planning processes of the Department.

(5) DUTIES.—The Director shall—

(A) develop policies and guidance for—

(i) the use of systems engineering principles and best practices, generally;

(ii) the use of systems engineering approaches to enhance reliability, availability, and maintainability on major defense acquisition programs;

(iii) the development of systems engineering master plans for major defense acquisition programs including systems engineering considerations in support of lifecycle management and sustainability; and

(iv) the inclusion of provisions relating to systems engineering and reliability growth in requests for proposals;

(B) review and approve the systems engineering master plan for each major defense acquisition program;

(C) monitor and review the systems engineering and development planning activities of the major defense acquisition programs;

(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 pursuant to section 181 of this title, including specific input relating to each capabilities development document;

(F) periodically review the organizations and capabilities of the military departments with respect to systems engineering, development planning, and lifecycle management and sustainability, and identify needed changes or improvements to such organizations and capabilities; and

(G) perform such other activities relating to the systems engineering and development planning activities of the Department of Defense as the Under Secretary of Defense for Acquisition, Technology, and Logistics may prescribe.