

Headquarters U.S. Air Force

Integrity - Service - Excellence

Air Force Activities in Support of WSARA

**NDIA 12th Annual Systems Engineering
Conference
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Colonel Shawn “Magnum” Shanley
Chief, Engineering & Technical Management Division
SAF/AQR

shawn.shanley@pentagon.af.mil

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- **Background**
 - AF Acquisition Improvement Plan & WSARA
 - Problem Statement
 - Early SE & Earlier SE – Study Recommendations
- **Employing Early Systems Engineering**
 - Increased Focus on Systems Engineering
 - Addressing the Content Gap – Current State
 - Concept Characterization & Technical Description (CCTD) approach
- **Path Ahead**



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USAF Flight Path

Air Force 2008-2010 Strategic Plan

- *Reinvigorate AF Nuclear Enterprise*
- *Win Today's Fight*
- *Develop & Care for Airmen & Families*
- *Modernizing Aging Air & Space Inventories*
- **Recapture Acquisition Excellence**



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



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AF Acquisition Improvement Plan (AIP) & 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 ...



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Background/Problem Statement

Problem Statement

- “Overstated and unstable requirements that are difficult to evaluate during source selections”
- “Ensure acquisition involvement and leadership in support of the lead command early in the development of program requirements”

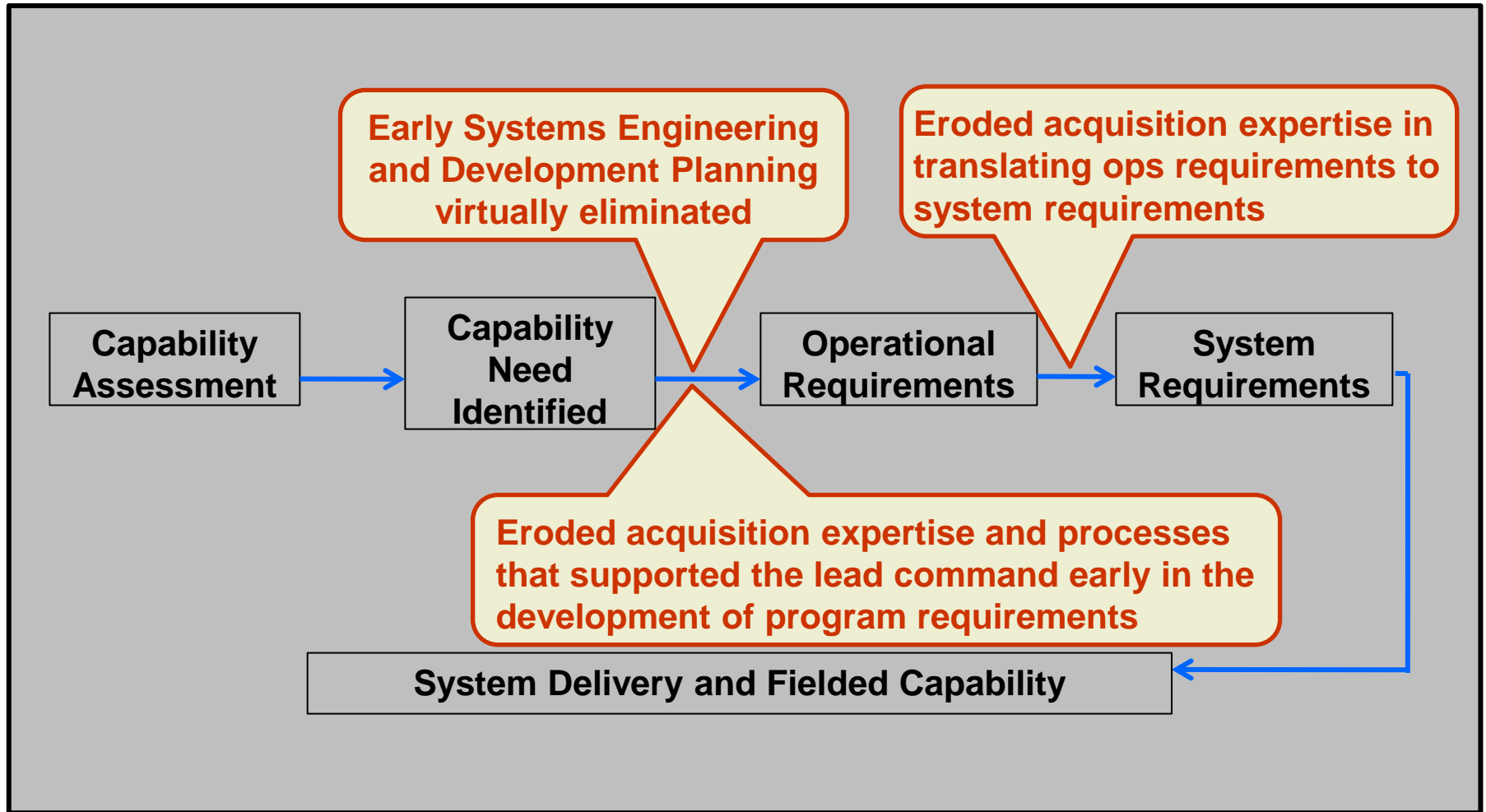
Reference: Acquisition Improvement Plan, 4 May 09

Events – circa 1989-1993 – and their unintended consequences

- **Acquisition Workforce reduction**
 - Early Systems Engineering and Development Planning functions virtually eliminated
 - As a consequence, there was erosion of acquisition expertise and processes that supported the lead command early in the development of program requirements
- **Ownership of funding and program advocacy shifted from AFSC to MAJCOMs**
 - Further eroded acquisition early involvement
- **Congress “zeroed” Development Planning PE**
- **Significant reduction of specifications and standards – thru 1998**
 - Shifted burden to industry
 - Acquisition expertise in translating operational requirements into system requirements eroded



So What?





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Get Back to Early SE Roots?

- **Weapon Systems Acquisition Reform Act 2009**
 - “Support...each MDAP prior to Milestone A approval...through a rigorous systems analysis and systems engineering process”
- **Acquisition Improvement Plan**
 - “There will be acquisition involvement earlier in the AF requirements development process and systems engineering techniques will be applied”
- **NRC “Pre-Milestone A and Early-Phase Systems Engineering” study committee report (Jan 08) –**
 - “Attention to a few critical SE processes ... particularly during preparation for Milestones A and B is essential to ensuring ... programs deliver ... on time and on budget.”
- **GAO Report – 09-326SP “Defense Acquisitions”**
 - “... ensure new programs ... follow a knowledge-based approach ... must begin with strong systems engineering analysis”



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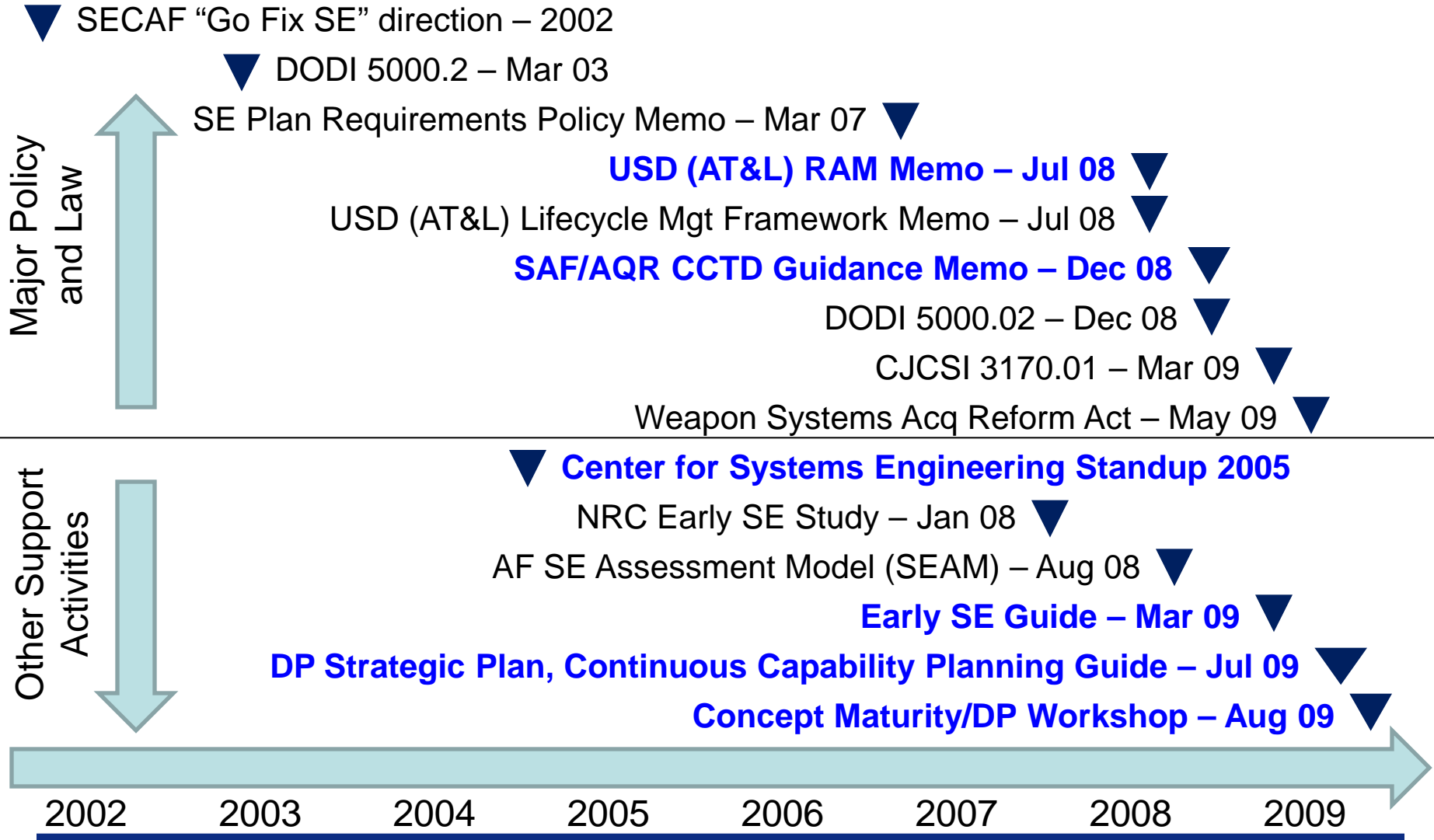
National Research Council Study Recommendations

- 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.**
- 2. Assess career field needs and develop a program to address**
- 3. Pre-A decisions should be supported by rigorous SE processes and analyses involving teams of acquirers, users, and industry**
- 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.**



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Increased Focus on Systems Engineering

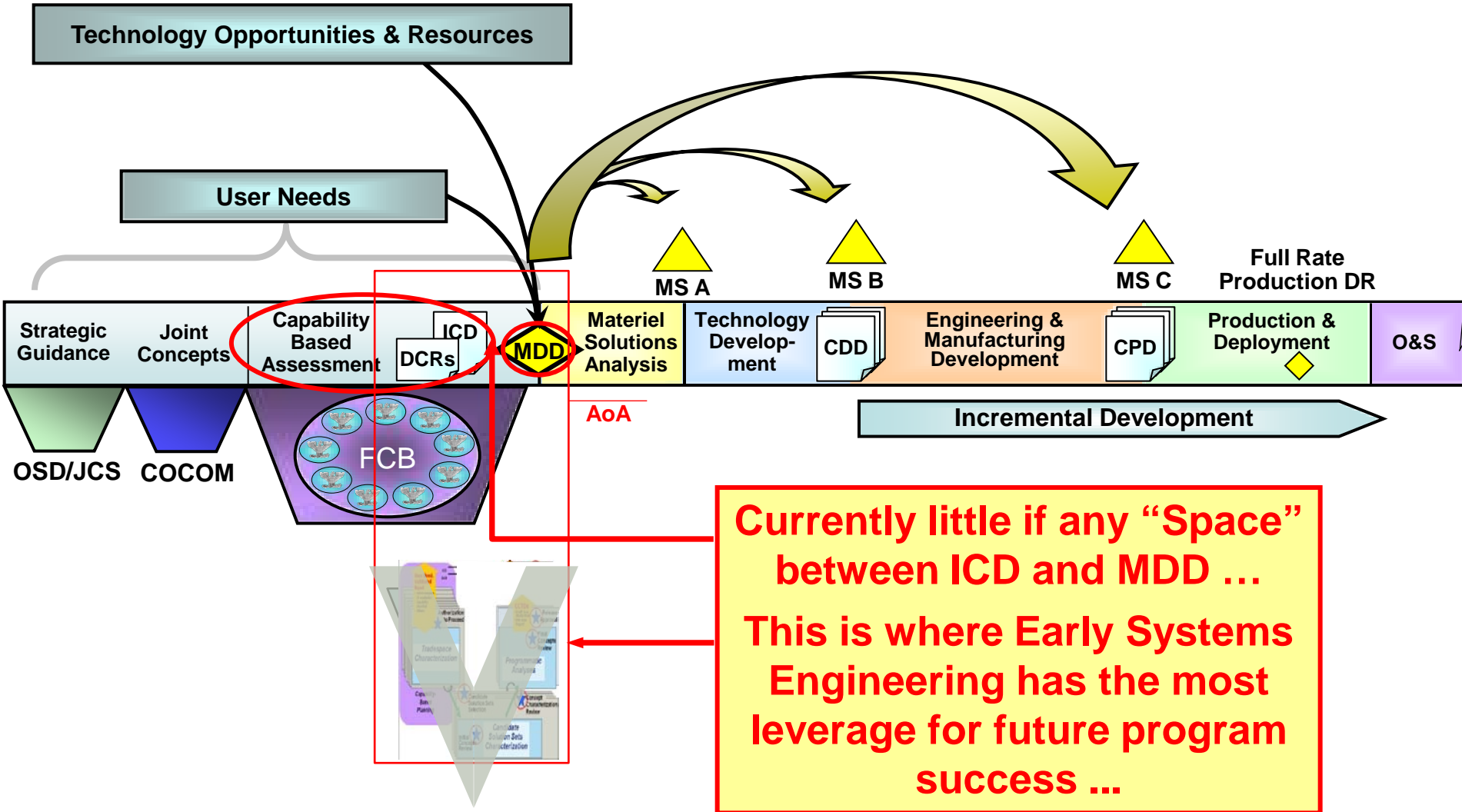


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Current State Filling the Gap Between CBA and MDD





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Early Systems Engineering Vision

- ***Disciplined, repeatable processes*** from JCIDS CBA (pre-ICD) to AoA; **Pre-MDD Focus**
 - Inform decision makers on technical feasibility of prospective concepts for materiel solutions
 - Initial integrated risk assessment addressing both operational and programmatic issues
- **Support realistic program formulation through application of early Systems Engineering**
 - Robust and disciplined up-front technical planning
 - Solid technical foundation for the future program
 - Reduce the chances of poorly planned concepts emerging from AoA with relatively high rankings
 - Extensive user/developer collaboration early & throughout lifecycle

Clear, Actionable Policy & Process

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Early Systems Engineering, Capability

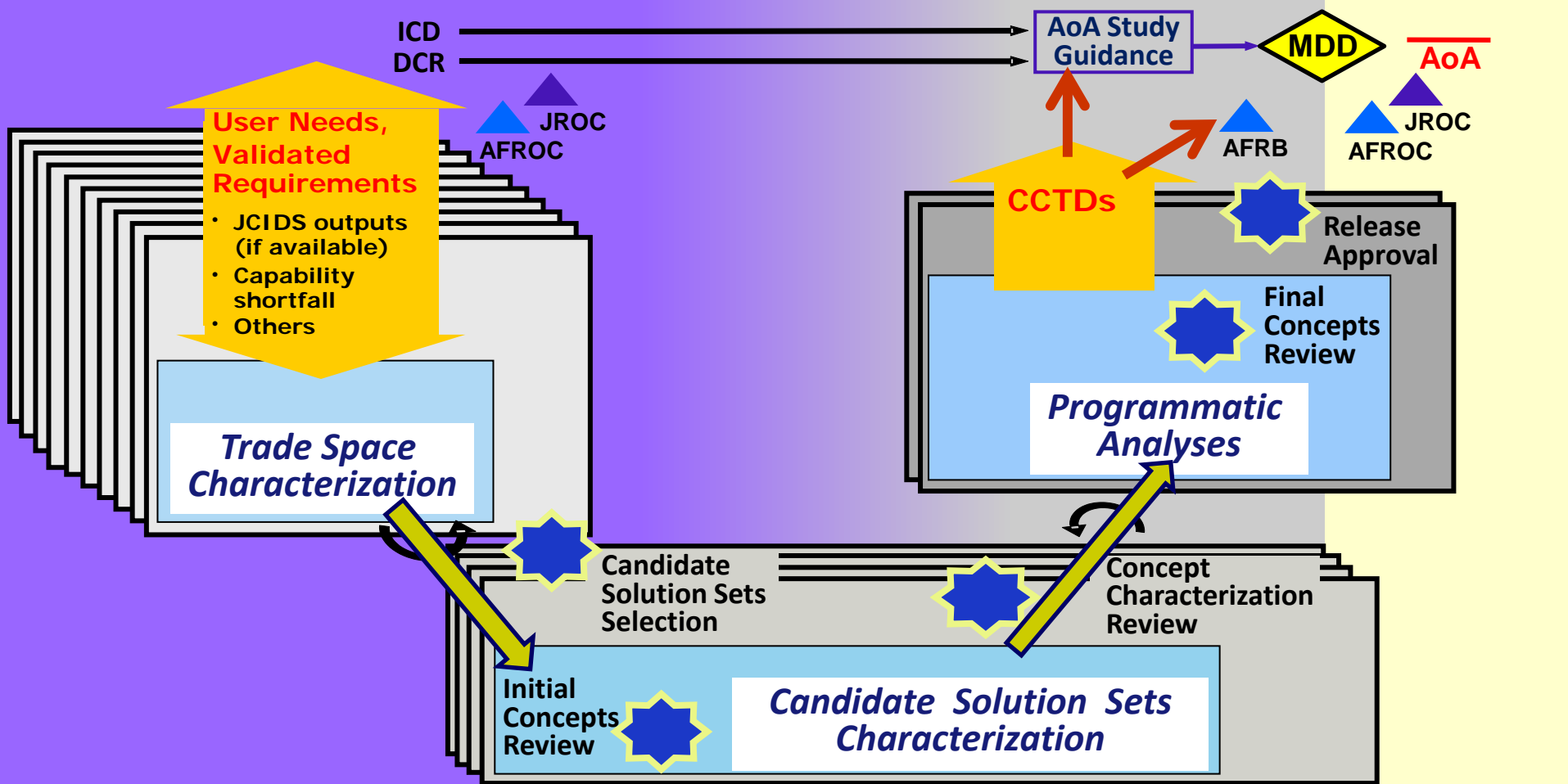
Planning, Development Planning, and 5000.02

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Capability Planning (DOTMLPF)

Development Planning (prospective materiel solutions)

MSA





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Concept Characterization & Technical Description Elements

- 1. Mission / Capability Need Statement / CONOPS**
- 2. Concept Overview**
- 3. Trade Space Definition / Characterization**
- 4. Studies, Analyses, Experiments**
- 5. Concept Characterization / Design**
- 6. Program Characterization**
- 7. Risk Assessment**
- 8. DOT_LPF Implications**
- 9. Conclusions (Capability Description; Traceability to Need Statement)**

**Tailored to meet MDD needs
Tailored to timeline needed to support decision**



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CCTD Summary

- **Supports AoA Study Guidance and MDD**
- **Documents application of disciplined early Systems Engineering processes**
 - Serves as “concept spec” or initial technical baseline
- **“Living document” that later supports development of**
 - Technical Requirements Document (TRD)
 - System Requirements Document (SRD)
- **Generally executed by Product Center Capability Development / Planning / Integration offices (XR)**
 - Assistance from decision makers, user, HAF/A5, AFMC/A5, AFMC/EN, Center/EN, AFRL, others



■ IN WORK

- Institutionalize CCTD process across Product Centers
- Clarify CCTD descriptions; develop Guidebook
 - Simplify implementation
 - Provide template for authors to follow
- Update Early SE Guide – set and enforce policy
- Address resource requirements

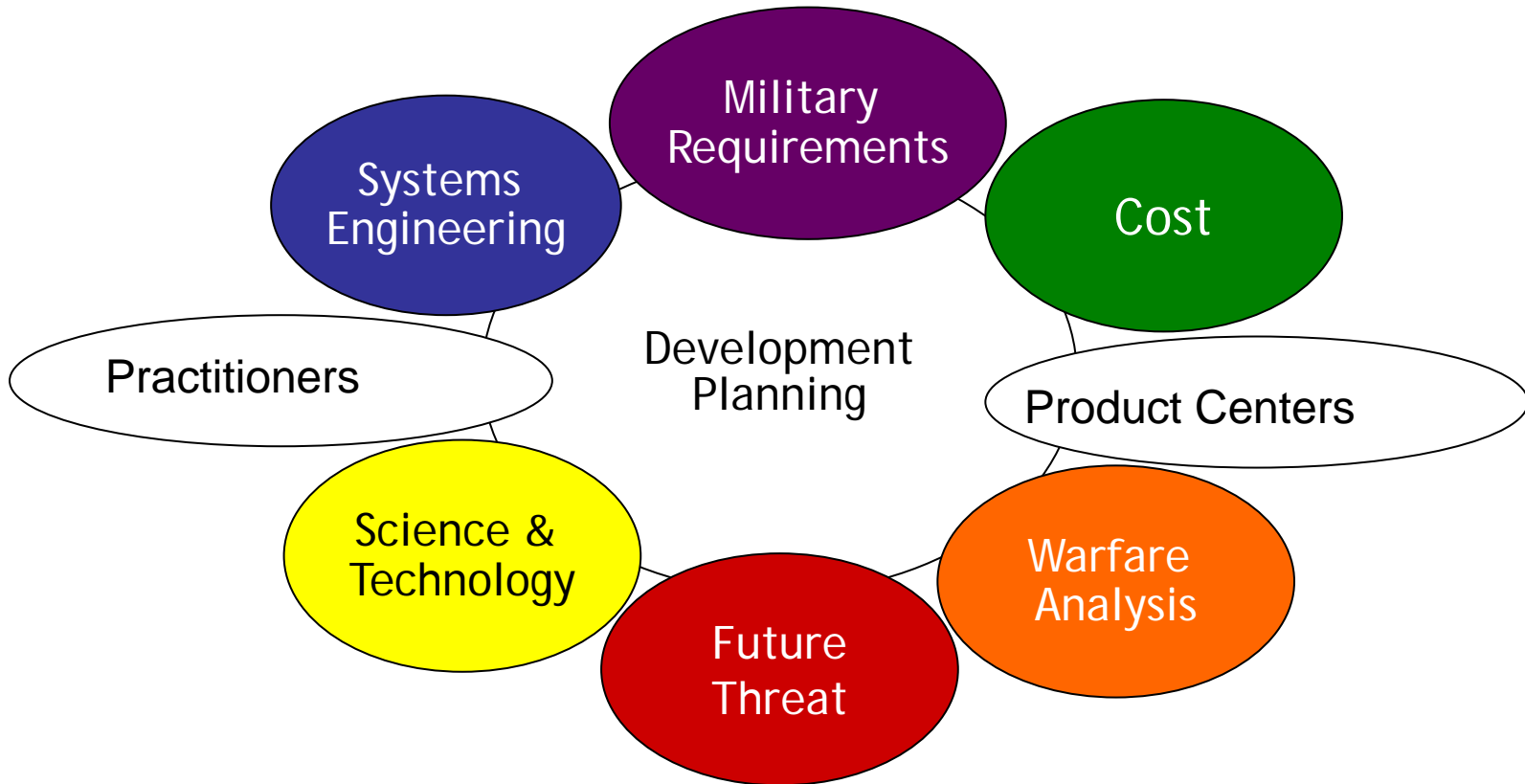
■ FUTURE

- Flesh out “Collaborative Development Centers” concept for use across all Product Centers



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Conclusion: Development Planning Is A Team Sport!



- To be effective, development planning is a collaboration among communities
- Systems engineering provides a structured, disciplined approach as a basis for this collaboration

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Prevent This!



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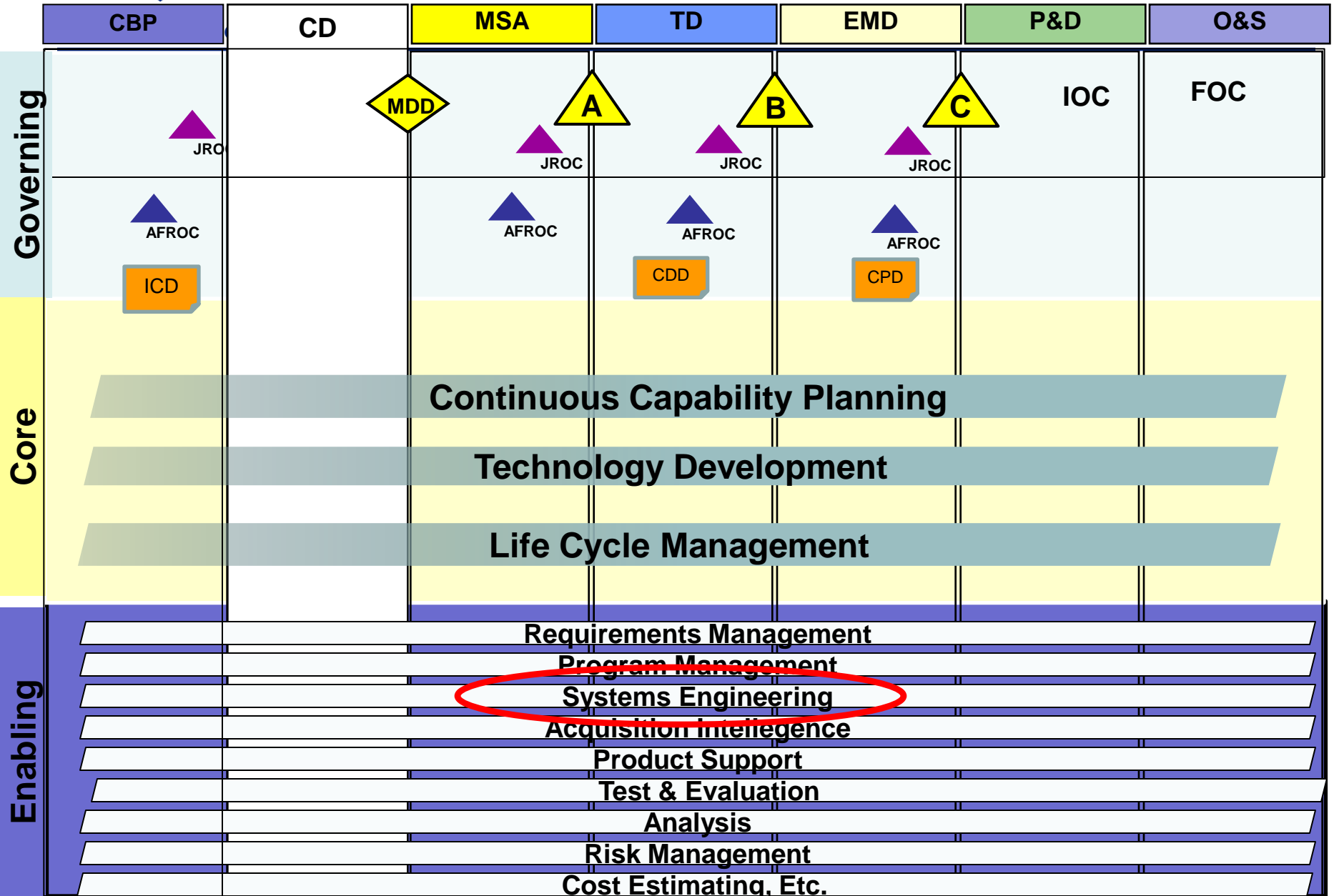
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Backup

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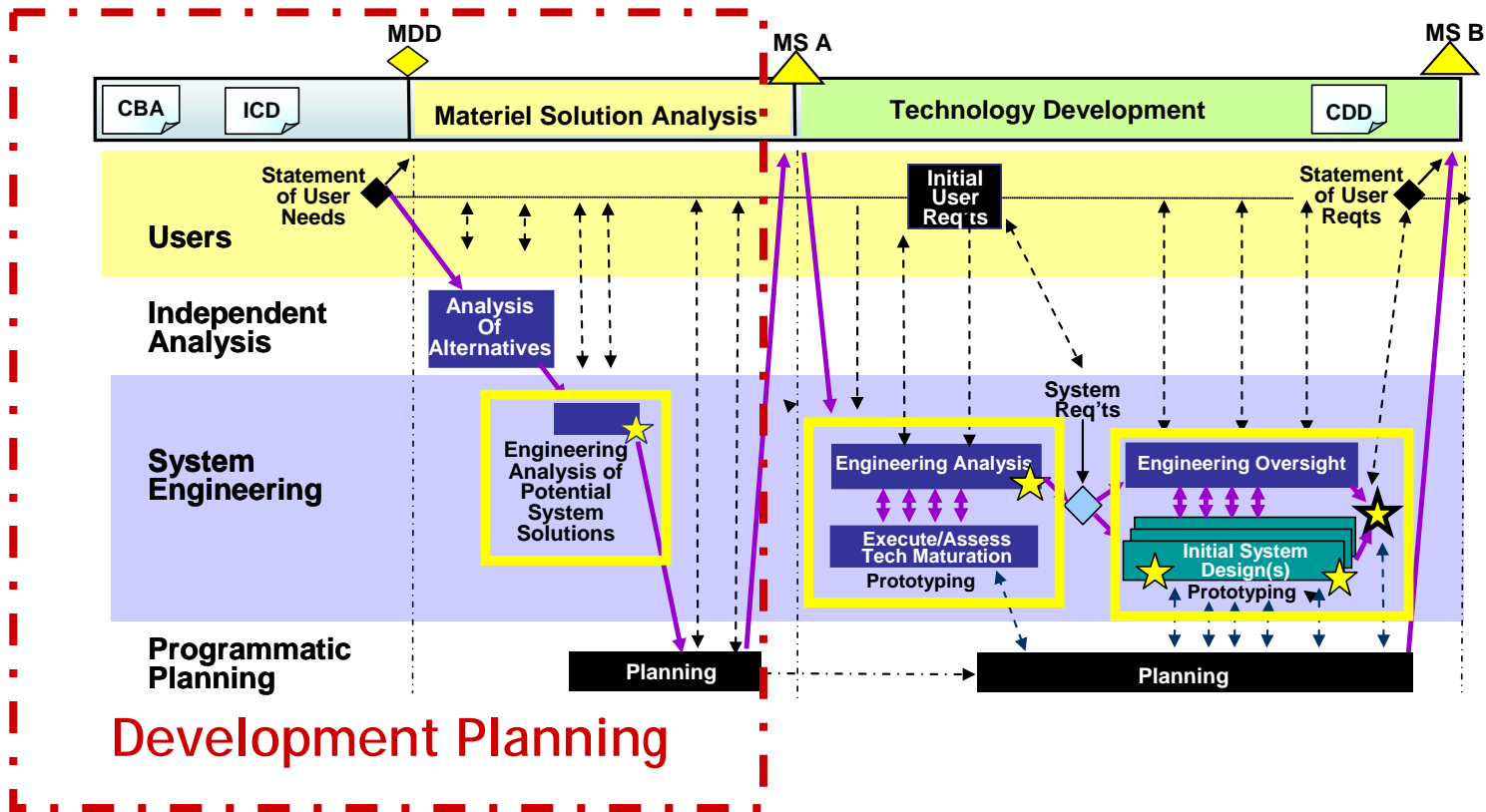
SE Is One of Many Enabling Processes





Development Planning

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- Begins before acquisition
- Natural application of systems engineering process
- Ensures that alternative system approaches evaluated during MSA are validated



Where Does Development Planning Fit?

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Needs and Opportunities

Viable Solutions

Delivery Options

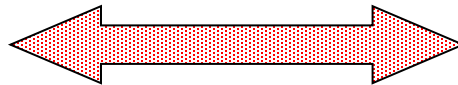
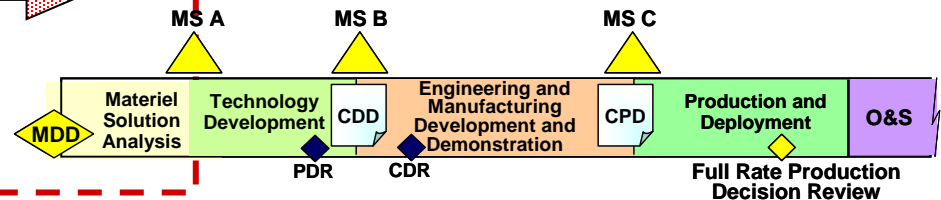
IPL
Urgent Need
New Threat
New Technology
New Strategic Direction

Translating User Needs and Opportunities Into Viable Solutions

Rapid Fielding
Technology Refresh
O&S Upgrade
Experimentation
JCTDs

JCIDS

5000.02



- Applies more broadly than JCIDS to 5000.02 acquisition