
Concept Development & Enterprise Architecting

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U.S. AIR FORCE

Integrity - Service - Excellence



Agenda



- **The Concept Development Challenge**
- **Ongoing Enterprise Architecture Efforts**
- **Lessons Learned**



Early Decisions Impact Overall System Life Cycle Cost

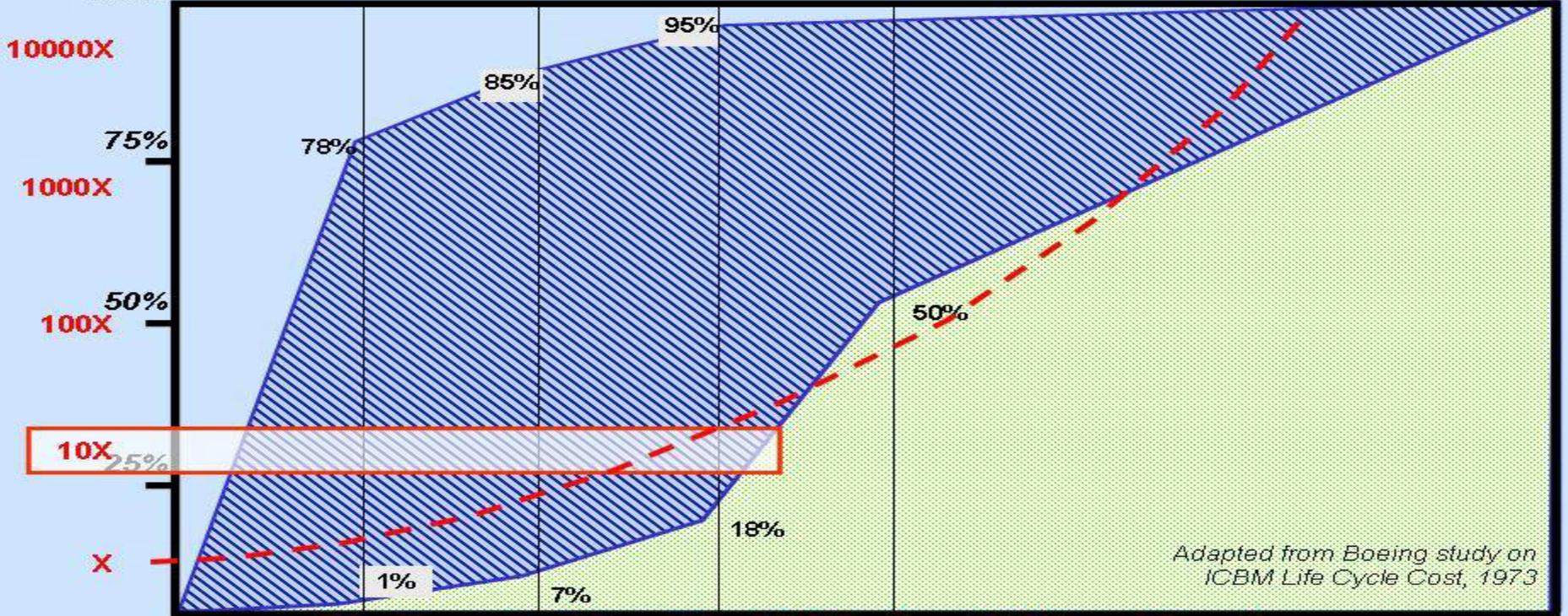


Cumulative LCC

Cost to Fix

100%

- Percent of Baseline LCC Incurred
- Percent of Baseline LCC Committed
- Cost to Identify & Resolve a Defect, and Incorporate Change



Adapted from Boeing study on ICBM Life Cycle Cost, 1973

Materiel Solutions Analysis	Technology Development	Engineering & Manufacturing Development	Production & Deployment	Operations & Support
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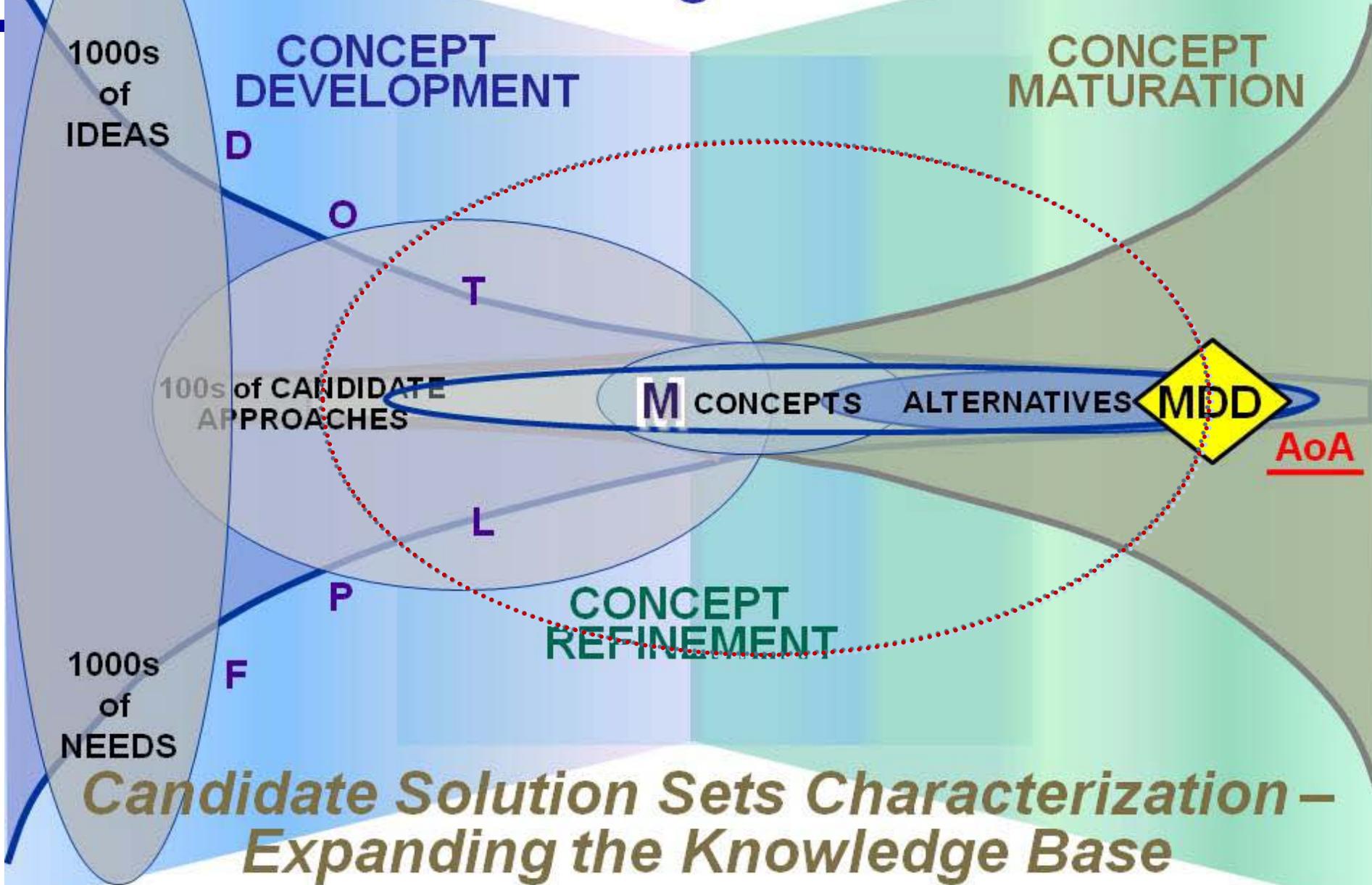
AF Vision for Systems Engineering



- ***Disciplined, repeatable processes*** from JCIDS CBA (pre-ICD) to AoA that result in Concept Characterization and Technical Descriptions (CCTD)
 - 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

Clear, Actionable Policy & Process

Trade Space Characterization – Narrowing the Field

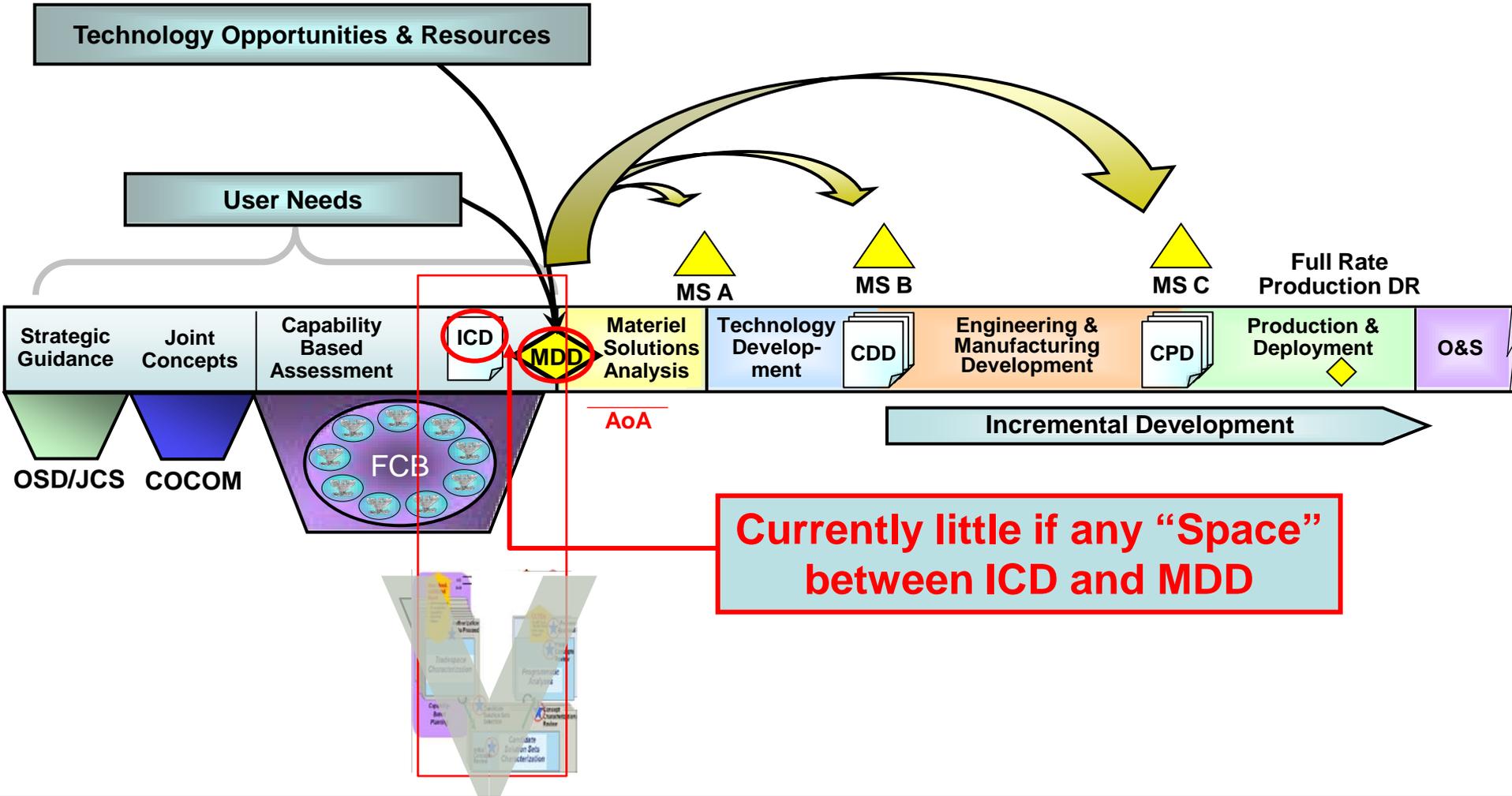


**Candidate Solution Sets Characterization –
Expanding the Knowledge Base**



THE CHALLENGE

Filling the Space Between CBA and MDD



DEMANDS APPLICATION OF EARLY SE



Using CCTD elements to support "Concept Maturity"



CBA (DOTMLPF)

Concept Development (prospective materiel solutions)

MSA

JROC
AFROC

AFRB
JROC
AFROC



AoA

ICD
DCR

AoA Study
Guidance

User Need,
Validated
Rqmt

- JCIDS outputs (if available)
- Capability shortfall
- Others

Authorization
to Proceed

Tradespace
Characterization

CCTDs

- Draft AoA Study Plan
- Pre - AoA Report

Release
Approval

Final
Concepts
Review

Programmatic
Analyses

Capability -
Based
Assessment

Candidate
Solution Sets
Selection

Concept
Characterization
Review

Initial
Concepts
Review

Candidate Solution Sets
Characterization

1

ICD – Initial Capabilities Document
 AFRB – Air Force Review Board
 DOTMLPF – Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities
 DCR – DOT_LPF Change Recommendation
 JROC / AFROC – Joint / Air Force Requirements Oversight Council



Concept Characterization and Technical Description (CCTD)



- **Essentially the “concept spec” or initial technical baseline**
- **Evolves into the Technical Requirements Document / System Requirements Document (TRD / SRD)**
- **Principal 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)**

Annex A, Early Systems Engineering Guidebook, 31 March 09



For the ILCM Business Machine, How do we keep track of ...



- Who is tinkering with the machine at any given time?
- What parts of the machine they are tinkering with?
- The interactions between tinkering of the various teams?
- The incremental changes implemented in the machine?



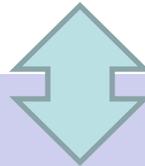


Layered Architectural Framework

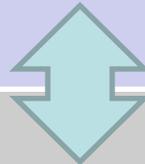
USAF/DoD Oversight & Control Activities



**Capability Planning, Acquisition & Sustainment, Technology
Development Activities**



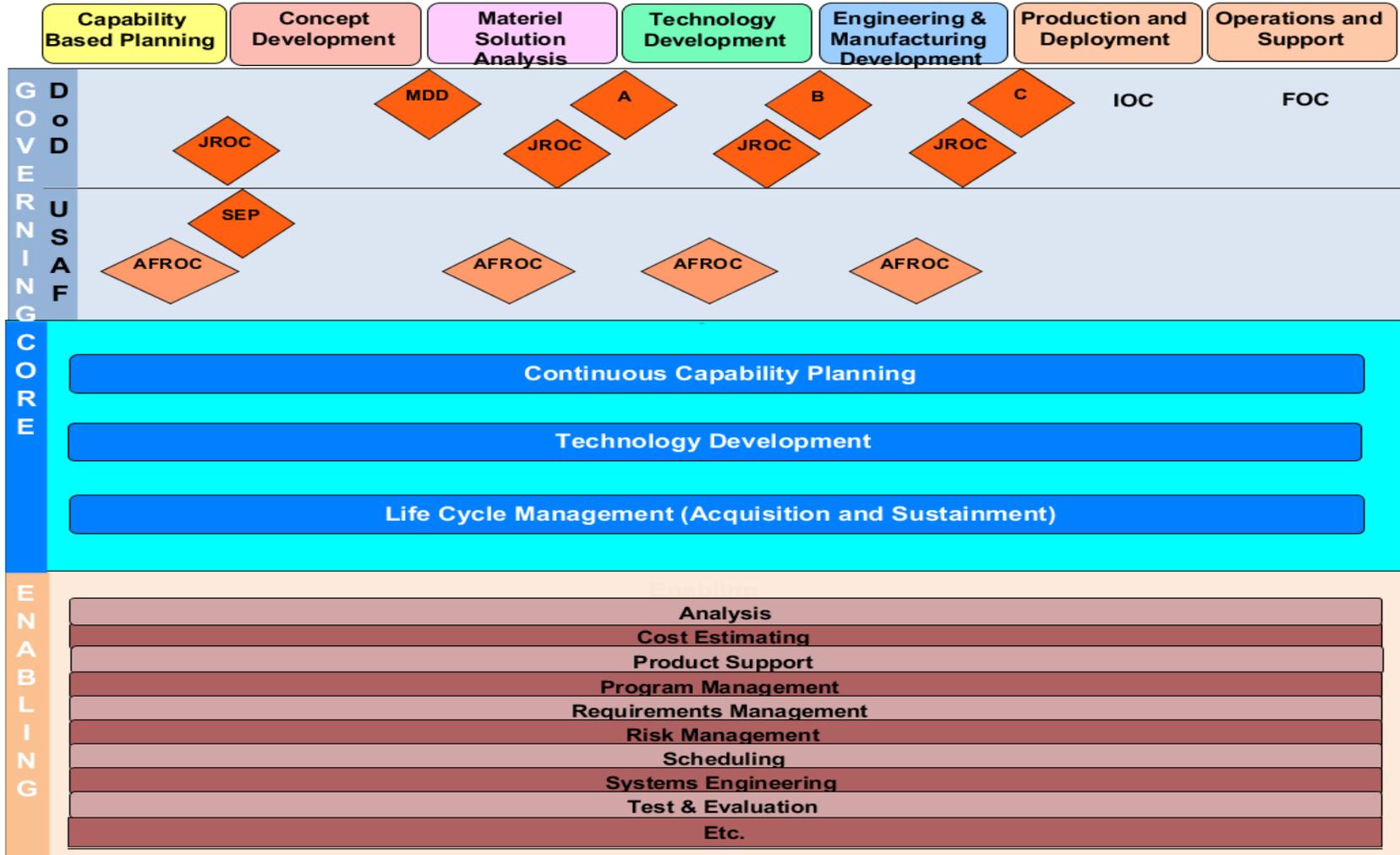
Supporting Business Practices & Rules



Tools, Environments, Organizations, Language



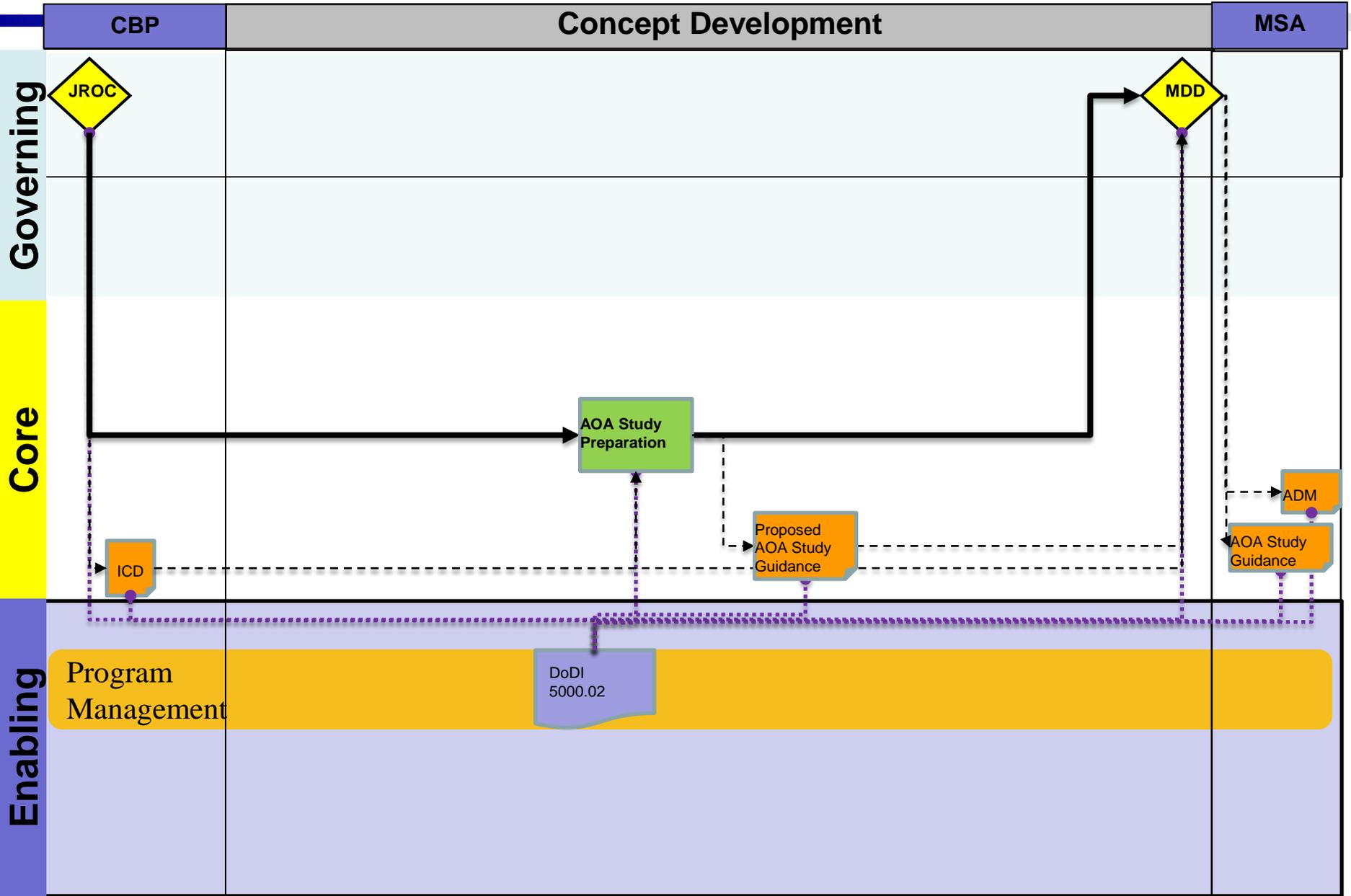
ILCM Decision Framework Tool





Concept Development Phase

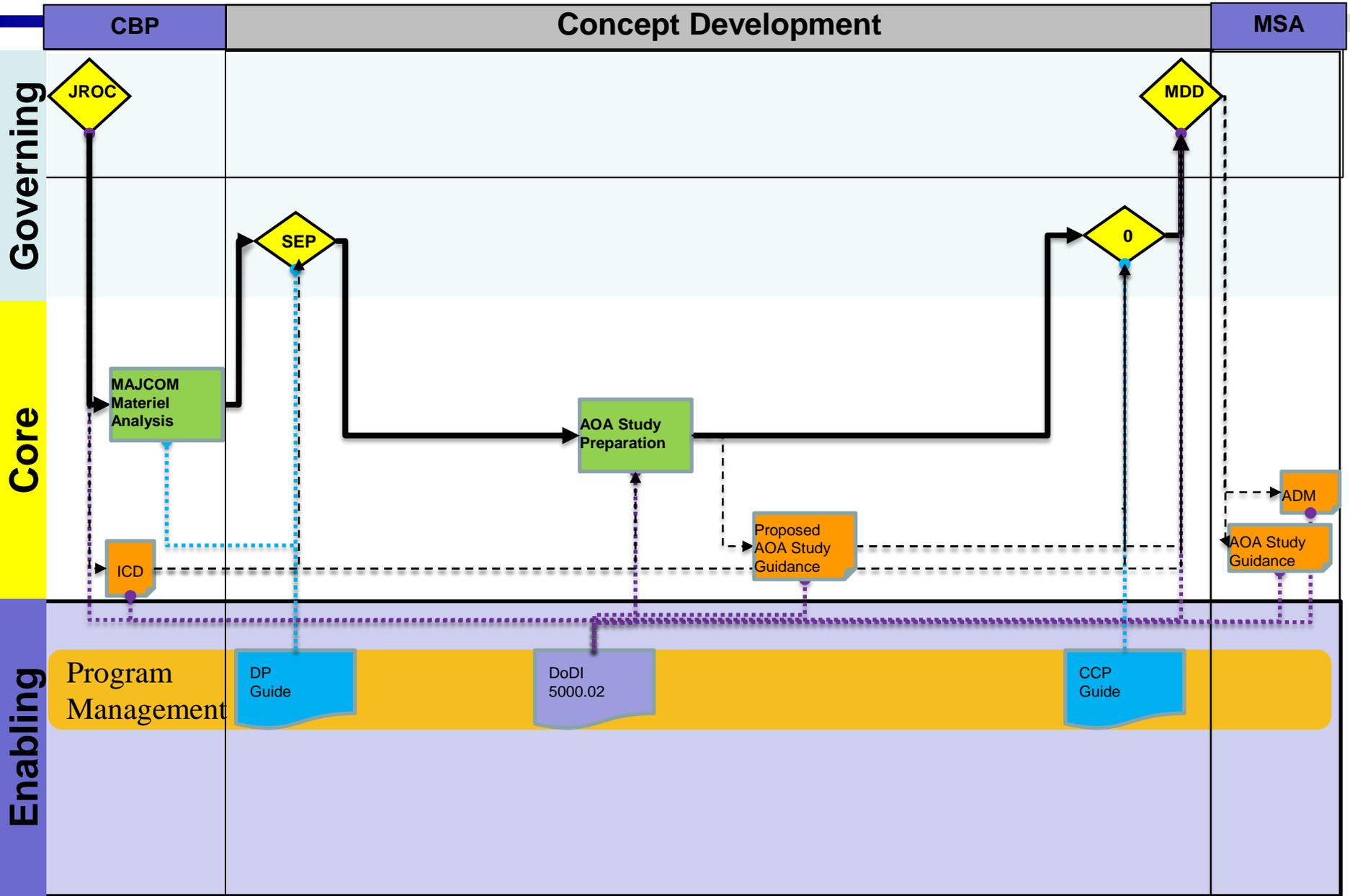
3170/5000.02 Baseline





Concept Development Phase

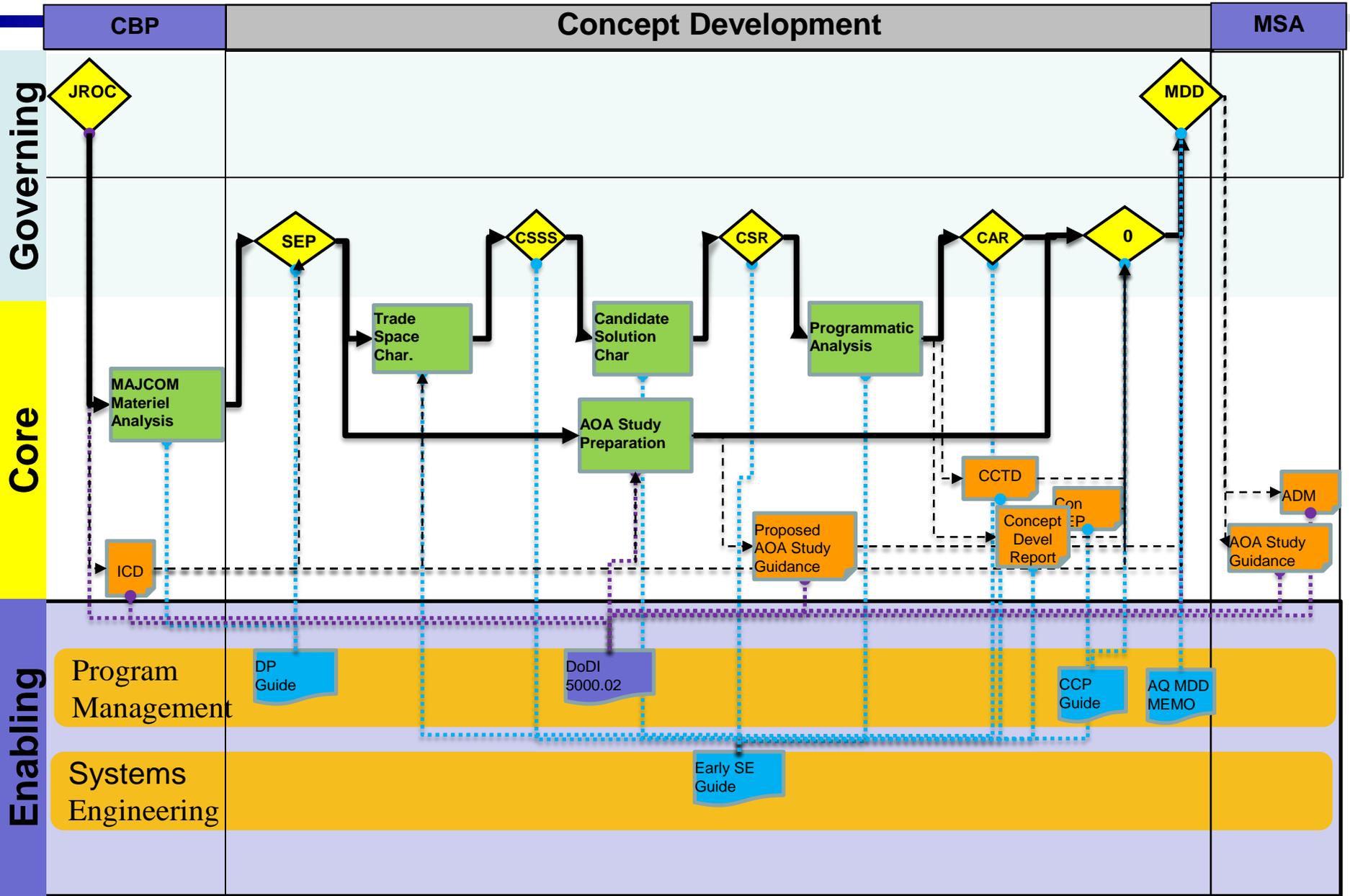
AFMC/AFSPC DP, D&SWS CCP Additions





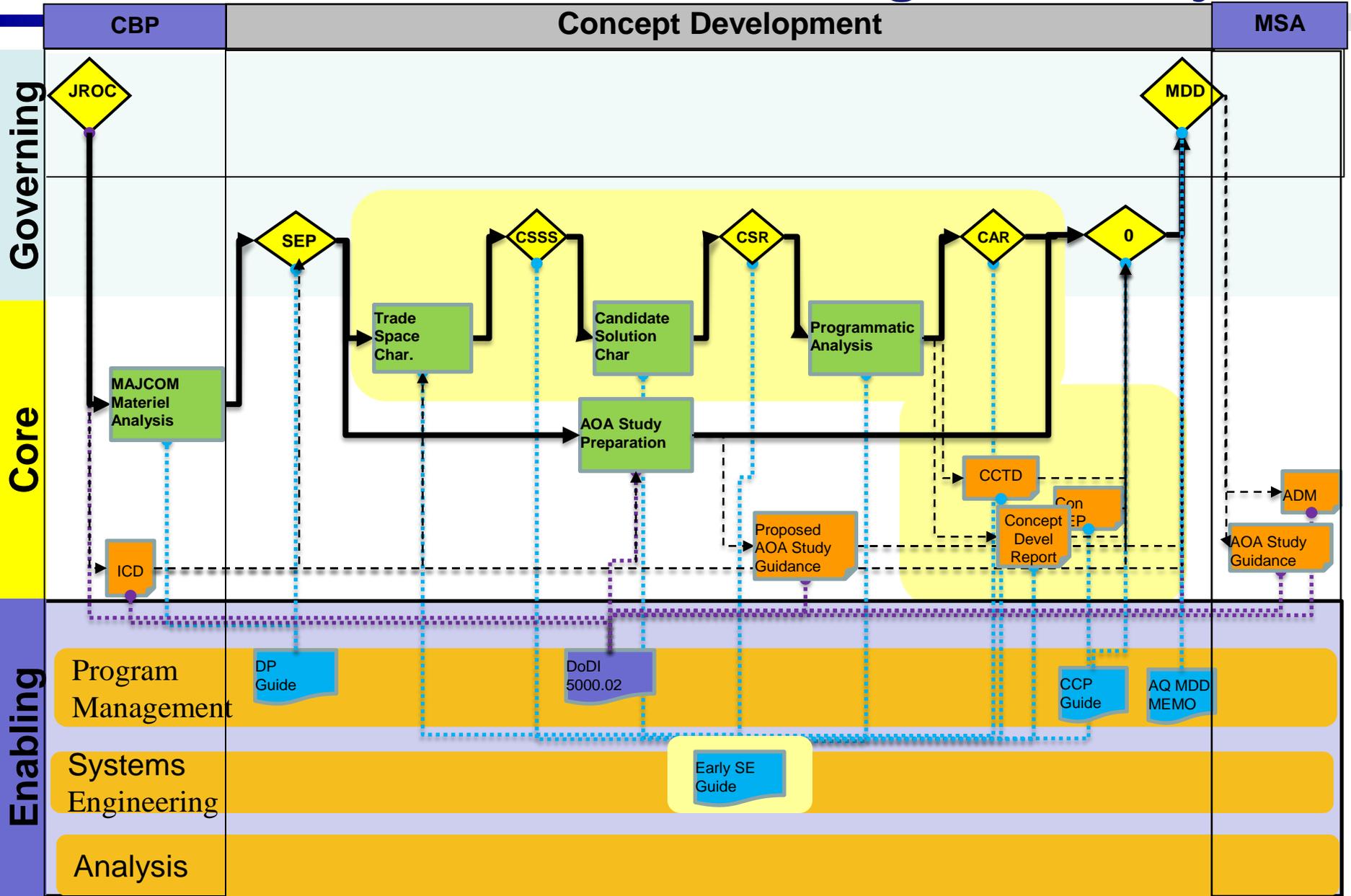
Concept Development Phase

SAF/AQ Additions





ILCM Tool – Process Improvement Change Visibility





Roadmap of AFMC Initiatives Transforming Processes View



See everything going on and planned



01/01/2009

Effective Date

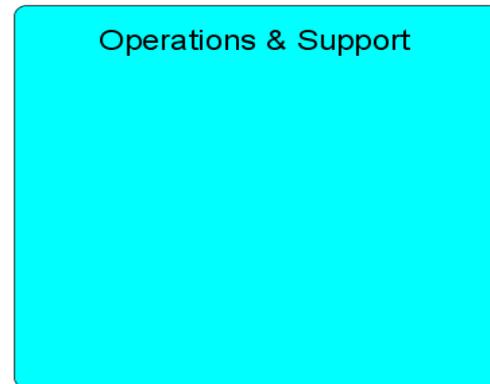
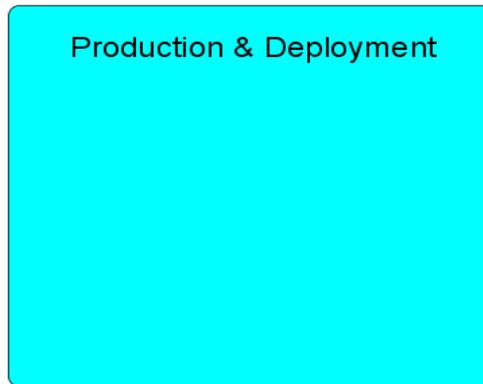
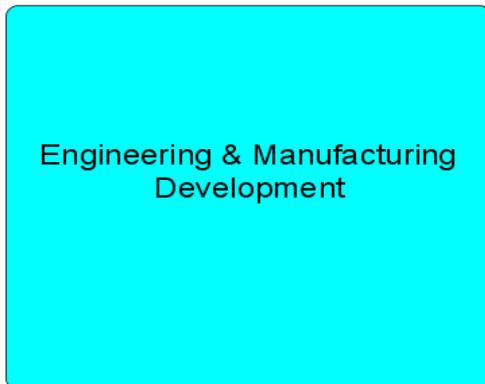
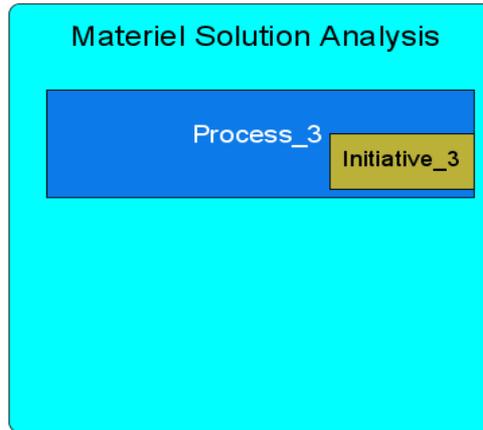
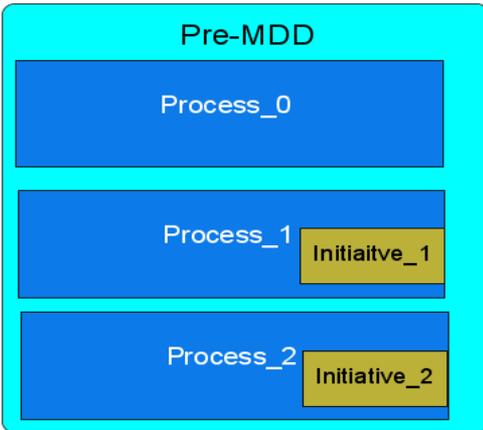
01/01/2009 TO 12/31/2009



12/31/2009

Diagram Name: test2
Opacity: 1

Roadmap of AFMC Initiatives Transforming Processes





Lessons Learned Along the Way



- **Single AF leadership vision is essential**
- **Development Planning efforts ongoing at Materiel Enterprise level -- CCTDs must “feed” these processes**
- **Engagement with MDA and D,CAPE is necessary to scope technical analysis expectations and efforts for each prospective program prior to its MDD**
- **Ease of tool use essential for business process management (web based, intuitive)**
- **We need an environment to develop collaborative solutions (user/materiel team/cost/others)**

Architecture is the Critical Underpinning



QUESTIONS ?