

Headquarters U.S. Air Force

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The ABCs of Concept Evolution: A Better-Informed Materiel Development Decision for USAF Programs



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KEY POINTS

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- **Setting the Stage**
- **Relationships Among Capability Planning, DP, SE, and Acquisition**
 - **Definitions in context**
 - **Why it's important**
- **Policy and Guidance**
- **Development Planning and Early SE**
 - **Support to AF planning and requirements**
 - **Concept Characterization & Technical Description (CCTD) principal elements**
 - **Visualizations**
- **Summary**



The Situation

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- **The Functional Solutions Analysis (FSA) and the Analysis of Materiel Alternatives (AMA) no longer exist in either JCIDS or DoDI 5000.02**

THIS MEANS THAT

- **Neither the requirements community nor the acquisition community has explicit responsibility to either perform or resource these activities**

BUT

- **The intellectual integrity of these analyses is still required in support of pre-acquisition decisions**
 - **Materiel Development Decision (MDD)**
 - **Milestone A**



Shifting the Paradigm

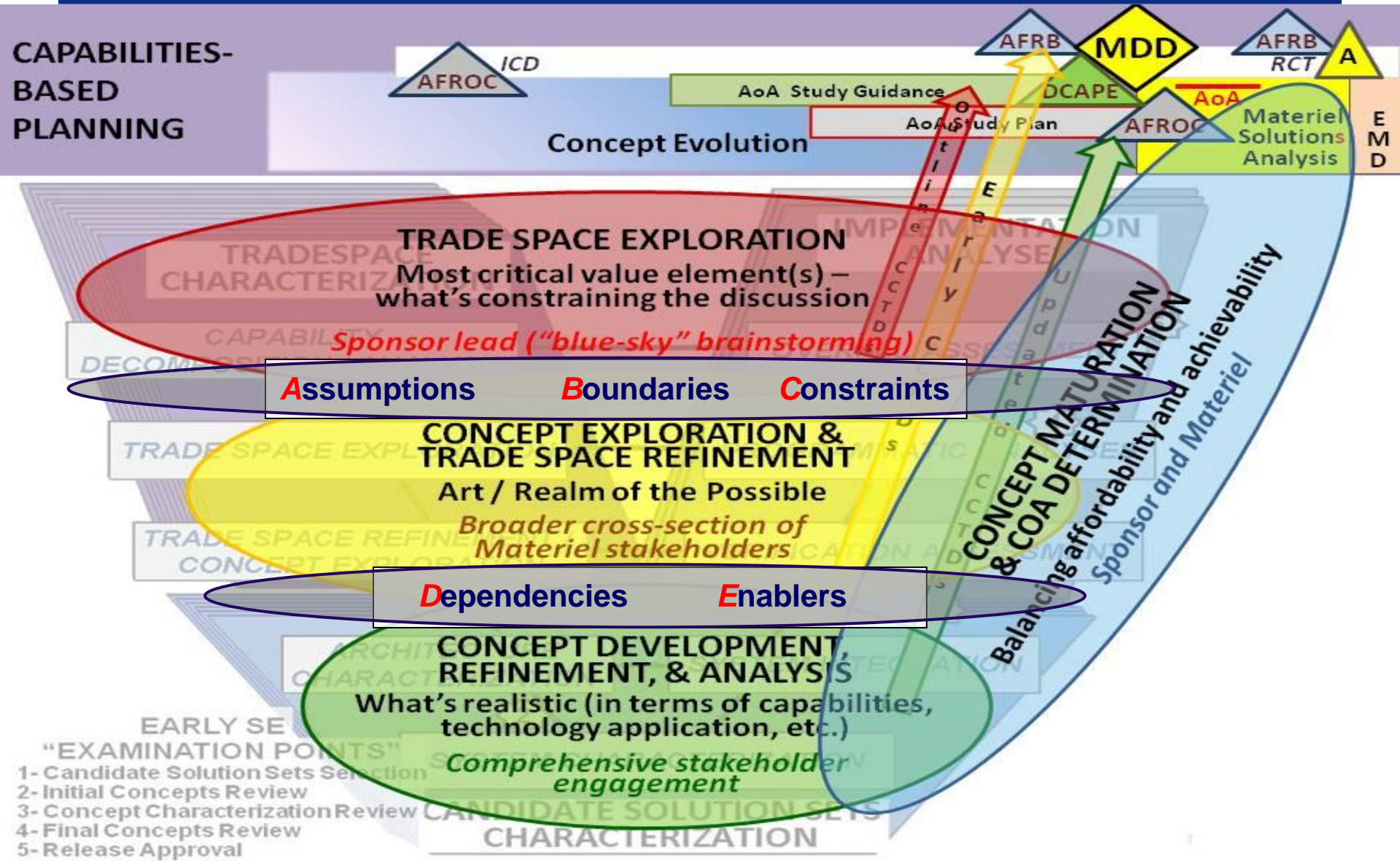
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- MDD (and Concept Decision before that) widely viewed as opportunity to decide **“What are we going to acquire?”**
- MDD is really an investment decision – **“Do we need to acquire anything to address this capability need?”**
 - An acceptable answer is “Not now; pursue S&T investment(s) and revisit the need in a few years”
 - Another acceptable answer is “More (or different utilization) of what we currently have”
- AoA Report provides information to ask **“What could we realistically afford to think about acquiring?”**
- Sponsor – with materiel support – develops COAs and proceeds to MS A with focus on **“What are we going to start down the path to acquire?”**



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Capability Planning, DP, Early SE, and Acquisition





Definitions In Context

- **DEVELOPMENT PLANNING (DP)**
 - DP is the materiel contribution to Air Force capability planning
 - DP is a collaborative process bridging warfighter-identified capability needs to planning for acquisition of materiel solutions
 - DP includes analytically-based decision-quality assessments, studies, strategies, and options in pursuit of new capabilities
 - DP is generally executed by Product Center XR (Capability Planning / Development / Integration) offices

- **EARLY SYSTEMS ENGINEERING (Early SE)**
 - Early SE enables the technical elements of DP
 - Early SE looks like traditional SE
 - Early SE identifies technology alternatives



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Why It's Important

■ **Links JCIDS to acquisition**

- Link CBA/P and development planning actions (coupling capability needs, enabling technologies, and system solutions)
- Development of informed, feasible operational requirements
- Leverage and inform technology planning and investments
- Develop consistent mission-based system-of-systems approaches
- Produce high-confidence strategies for timely, effective solutions

■ **WSARA**

- “JROC must vigorously challenge requirements, ... prioritize capabilities within JCA portfolios ... ”
- Concept descriptions for AoA guidance
- Independent technology maturity assessments

■ **SECAF/CSAF “Acquisition Improvement Plan”**

- Task #2: Improve Requirements Generation Process
 - ... deliver products and services that perform on time, within budget
-



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Why It's Important



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Why we need early technical planning

TODAY IS THE THREE-YEAR ANNIVERSARY OF OUR FIRST MEETING TO DISCUSS PROJECT REQUIREMENTS.

AND WE'RE STILL DISCUSSING REQUIREMENTS. DOES ANYONE ELSE SEE A PROBLEM HERE?

WHEN YOU'RE DONE, CAN WE TALK ABOUT NEW REQUIREMENTS?

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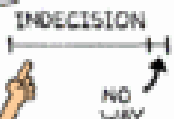
THE ORIGINAL SCHEDULE LOOKED LIKE THIS...

ONE MONTH FOR A MANAGEMENT DECISION AND ONE YEAR TO DO THE PROJECT.



THE REVISED SCHEDULE IS THIS...

ONE YEAR OF INDECISION FOLLOWED BY INTENSE PRESSURE TO DO THE IMPOSSIBLE BEFORE THE DEADLINE.



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MDD Information Needs – Forthcoming OSD Policy

The MDA must ... decide whether an investment shall be made to fill the capability gap ... Decisions must be based on effective development planning and a strong technical foundation. To support those decisions, the (MDA requires) evidence at the MDD Review (to) facilitate the determination that:

- a. The candidate materiel solution approaches have the **potential to successfully address the capability gap(s) and associated dependencies**, and desired operational attributes.
- b. There exists a **range of technically feasible solutions** generated from **across the entire solution space**, as demonstrated through early **[AF add: studies, analyses,]** prototypes, models, or data.
- c. Consideration has been given to **near-term opportunities** to provide a **more rapid interim response** to the capability need.
- d. The **plan to staff and fund analytic, engineering, and programmatic activities** supports the proposed milestone entry requirement.



AF Policy and Guidance

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- **AFI 10-601 “Operational Capability Requirements Development”**
 - Updated Jul 10, added DP language including CCTD
- **AFI 63-101 “Acquisition and Sustainment Life Cycle Management”**
 - Interim Change adding ~10 instances of DP language (roles/ responsibilities, CCTD as MDD decision support product, etc.) currently in coordination
- **AFI 63-1201 “Life Cycle Systems Engineering”**
 - Interim Change adding DP language (as above, plus detailed 4-page Attachment) currently in coordination
 - To be completely revised/reissued; first draft to coordination Feb 11
- **Early SE Guide issued Mar 09**
 - Practitioner community has provided numerous suggestions and comments for updated content
- **DP Guide issued Jul 10**
- **CCTD Guide issued Oct 10**
- **Guides to be consolidated into official AF publication on DP**
 - Phase 1 (add Early SE content, incorporate CCTD Guide as Appendix, rescind Early SE Guide) start Nov 10
 - Phase 2 (complete content update and conversion) start Oct 11



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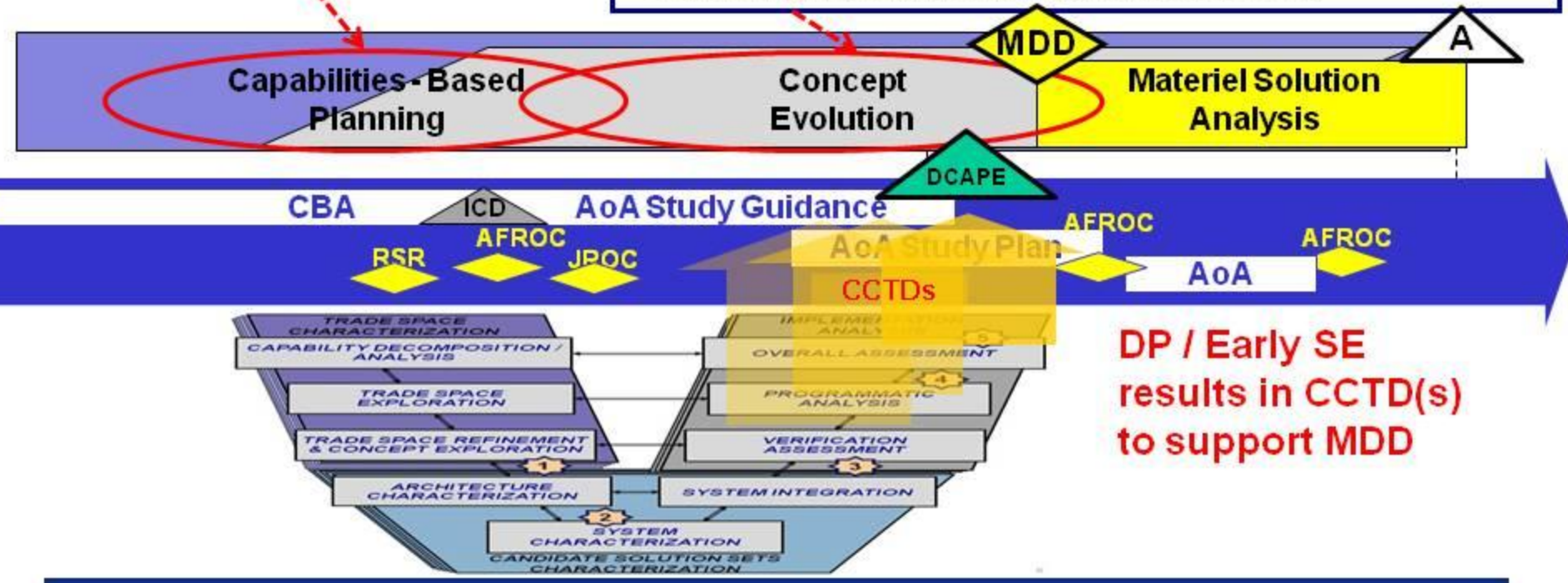
DP and Early SE Support to AF Planning and Requirements

SE involvement here should provide:

- An aid in identifying excess capabilities or shortfalls
- Early evaluation of technology feasibility against shortfalls
- Assistance in developing capability investment priorities

SE involvement here should provide:

- Evaluation of technical feasibility weighted against identified capability needs
- Use of M&S to evaluate alternatives and identify constraints
- Increased potential for validating / verifying concepts
- Improved concepts definition addressing performance, cost, schedule, and technological risk
- Guidance for Materiel Development Decision (MDD)
- A basis for Materiel Solutions Analysis / AoA





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Concept Characterization and Technical Description (CCTD) Principal Elements

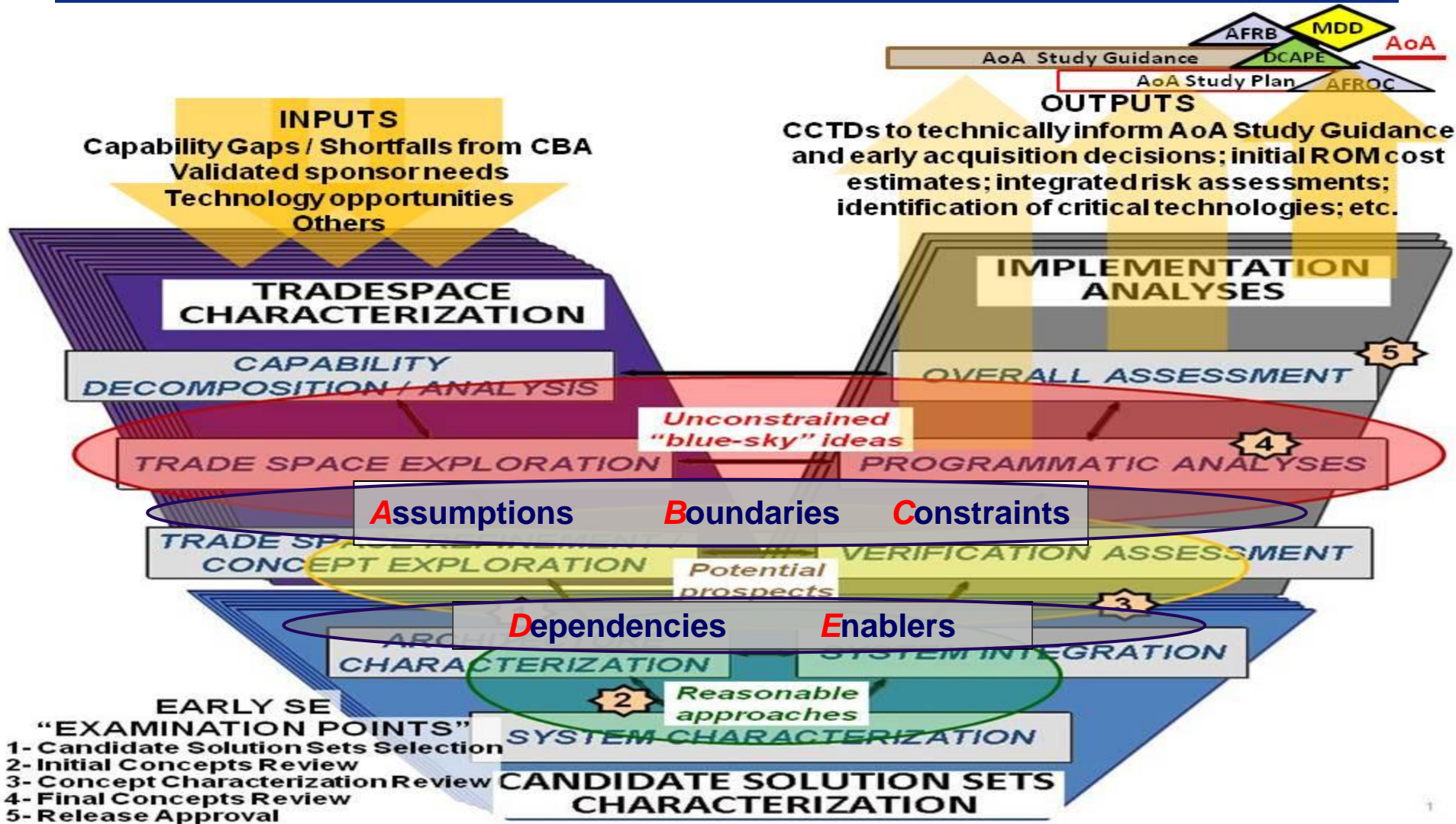
1. **Mission / Capability Need Statement / CONOPS**
2. **Concept Overview**
3. **Trade Space Characterization**
4. **Evaluations (Studies, Analyses, Experiments)**
5. **Concept Characterization / Design** includes Critical Technology Elements
6. **Implementation Analyses** includes Critical Technologies and Technology Maturation Approach
7. **Risk Assessment and Decision-Certain Consequences**
8. **DOT_LPF Implications**
9. **Conclusions** (Capability Description; Traceability to Need Statement)

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



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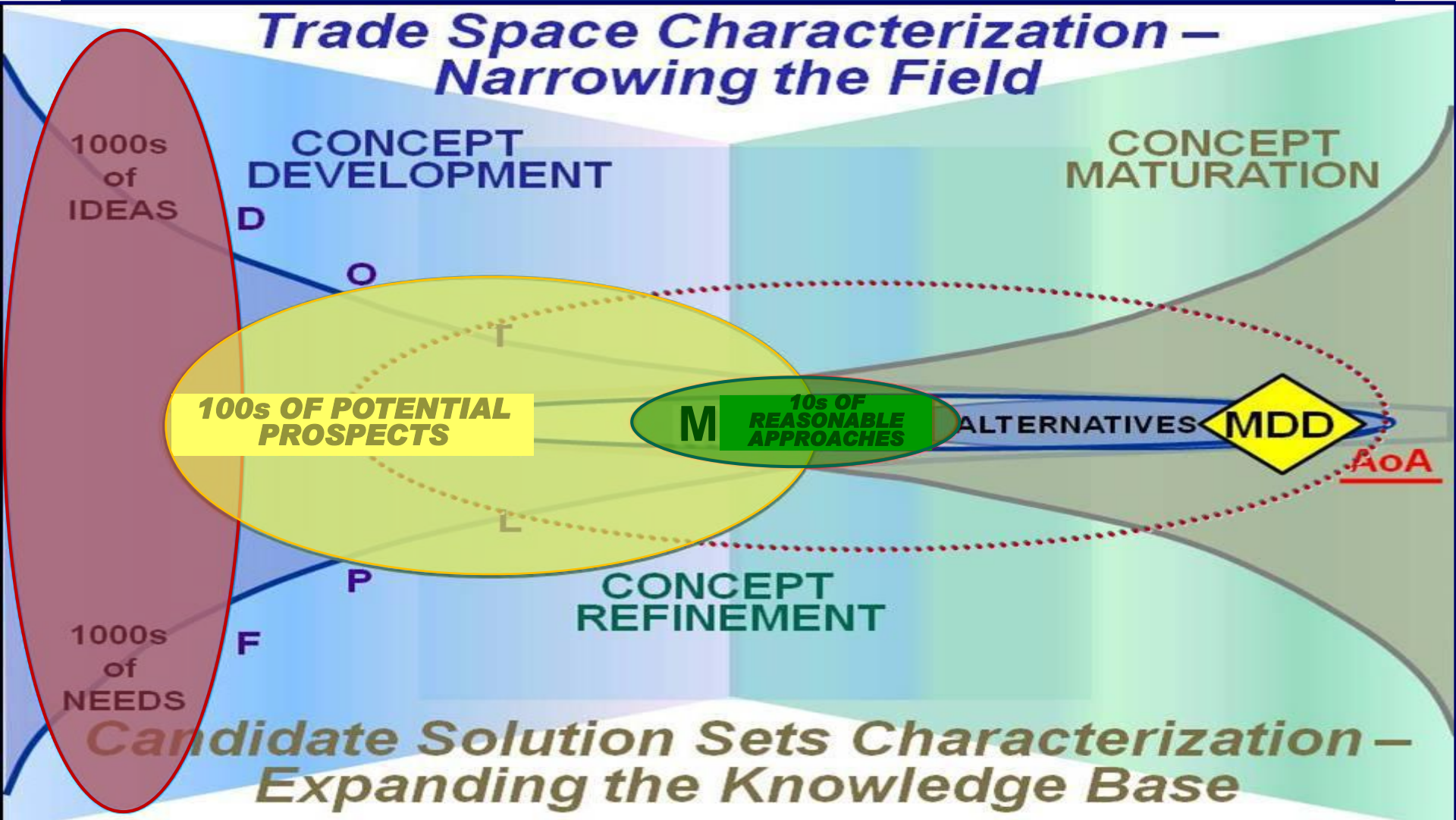
Capability Planning, Development Planning, Early SE, and Acquisition





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Trade Space Characterization – Narrowing the Field





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Summary

- **Operational users want capability, not technology**
 - Capability is provided by platforms and systems
 - Technology must be “systemized” to be useful
- **DP ensures proper pre-acquisition analysis**
 - Early SE facilitates DP
 - S&T informs and enables early SE
- **CCTD is primary Early SE artifact that provides pre-acquisition decision support information**
- **AF policy will help institutionalize the best practices**

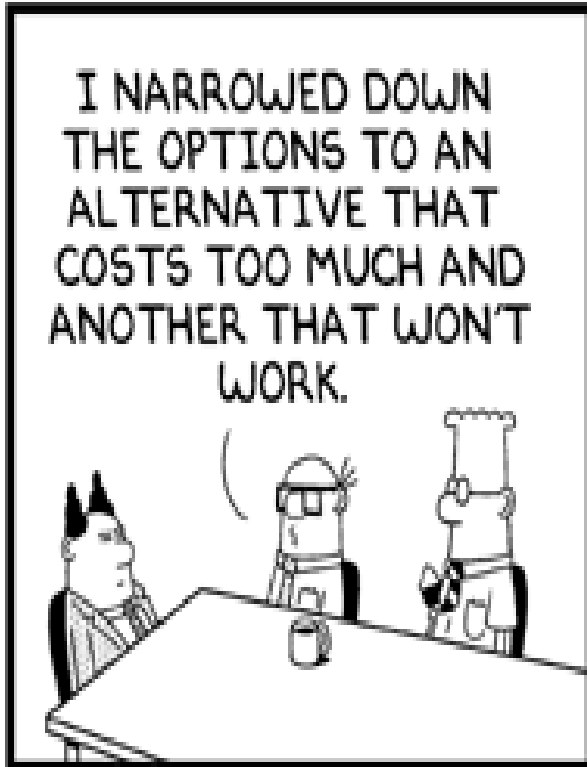
“DO IT RIGHT, DO IT EARLY; DO IT EARLY, DO IT RIGHT”

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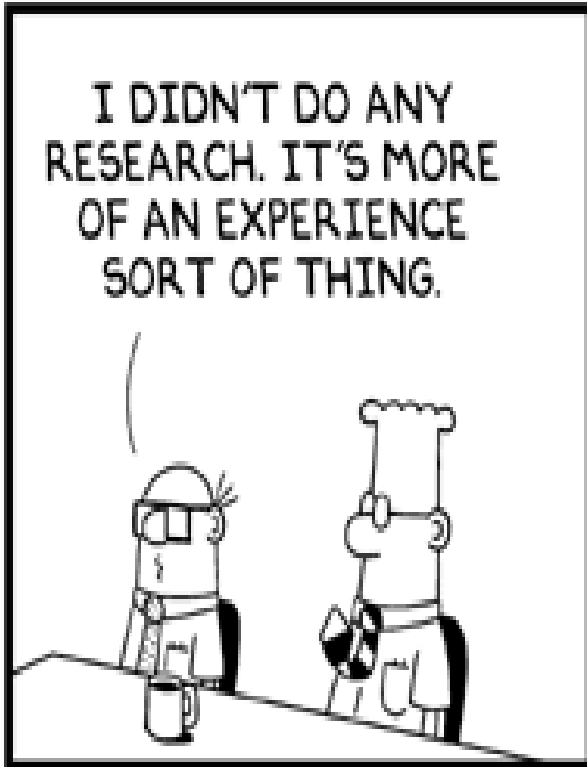


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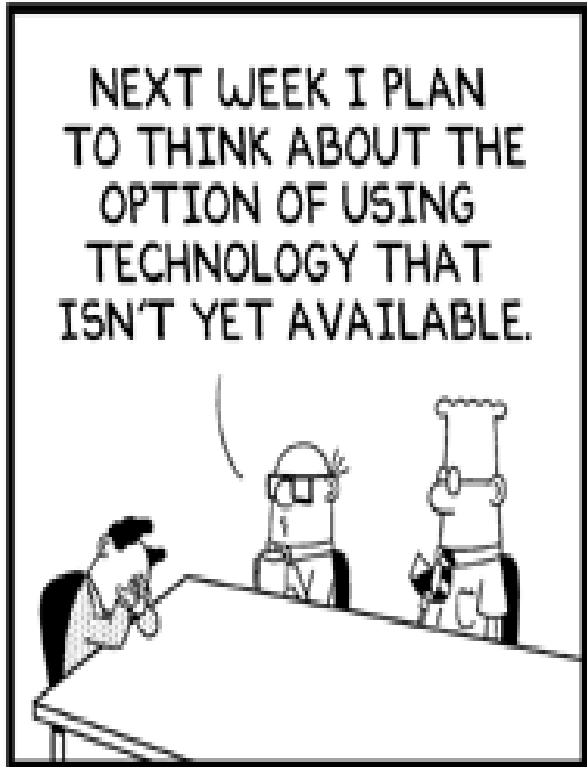
Truth Hurts?



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