



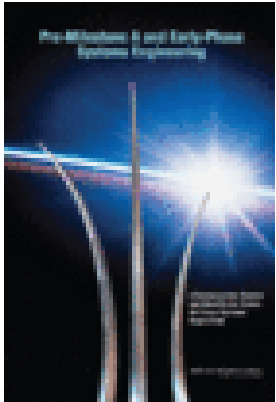
Early Systems Engineering and Development Planning

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Background



National Research Council

“Pre-Milestone A and Early-Phase Systems Engineering”
Jan 2008

- **National Academies of Sciences Study**
 - All programs destined to fail without early [pre-MS A] systems engineering
 - Developmental planning can implement pre-MS A early systems engineering

• DoD Acquisition Regulations (DoDI 5000.02) Update

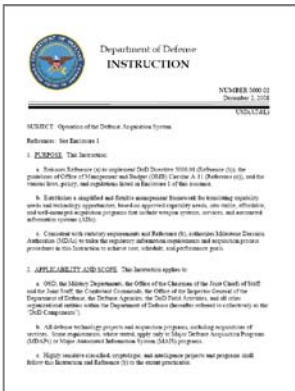
- Increased focus on early pre-acquisition phases
- Implication for added early SE

• Weapon Systems Acquisition Reform Act of 2009 (WSARA)

- Direction to reinvigorate Development Planning

DoD 5000.02
December 2008

WSARA
May 2009



Increase in Emphasis on Early Systems Engineering

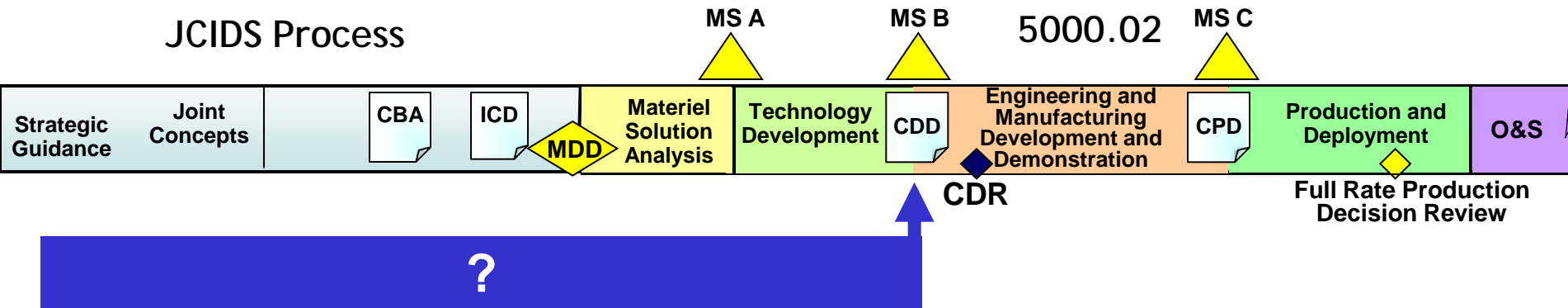


Topics

- Issues driving early SE
- Impact of 5000.02 on early SE
- Impact of recent legislation on early SE and development planning
- Next steps



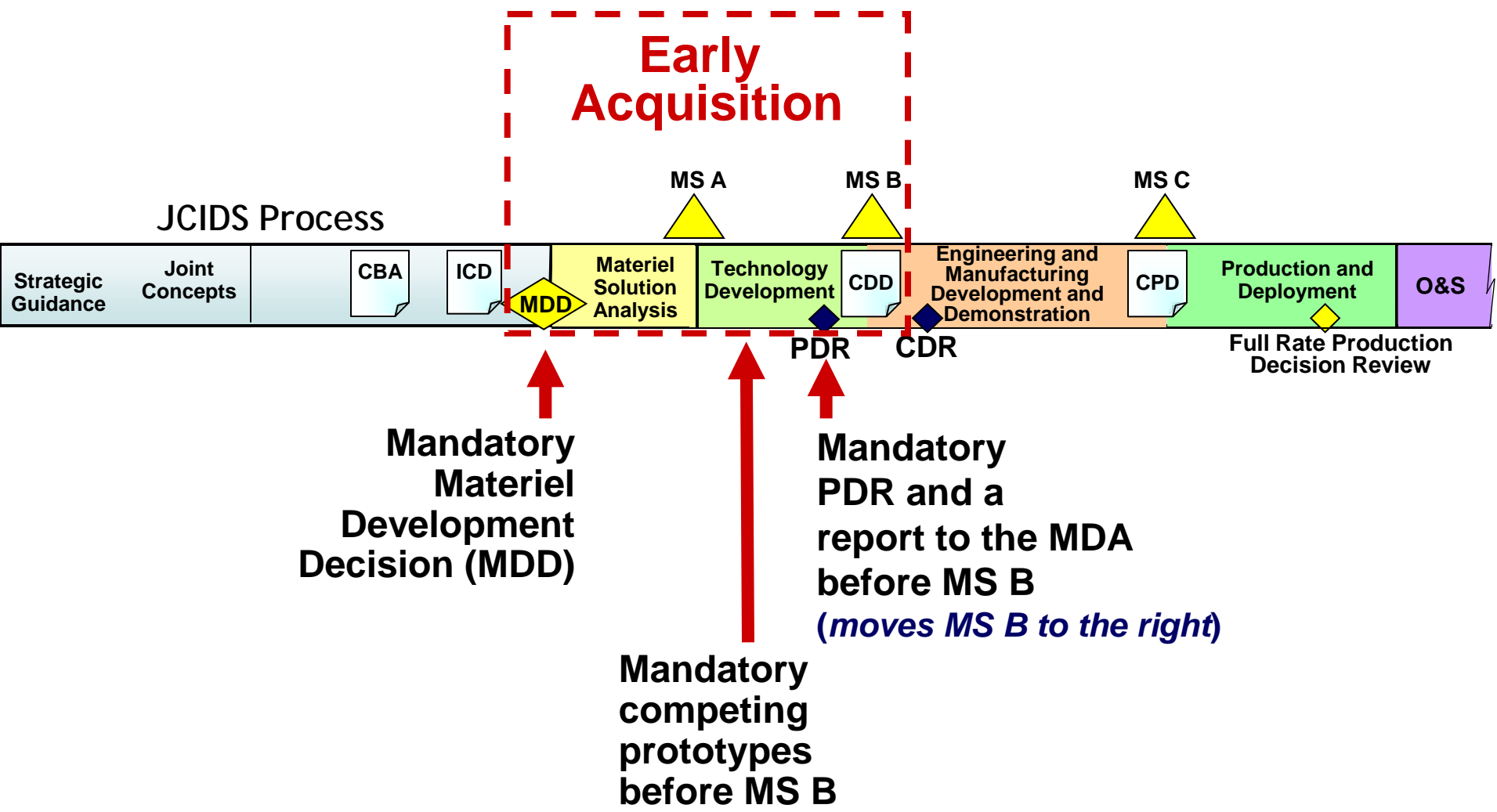
Why Early SE?



- Programs are being formally initiated at MS B without adequate understanding of the technology, feasibility and risks of the proposed solution
 - Underestimates of time and cost leading to **delays and overruns** against plans
 - Technology and technical integration and implementation **risks** have not been identified and are not effectively addressed before committing to development approaches, schedules and cost



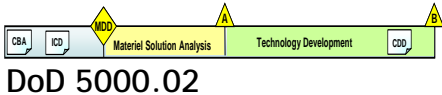
DoDI 5000.02 Early Acquisition Changes



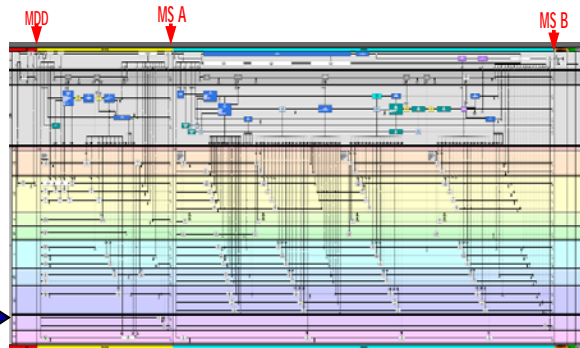


Analysis of SE Role in Early Acquisition

Acquisition Regulations and Guidance



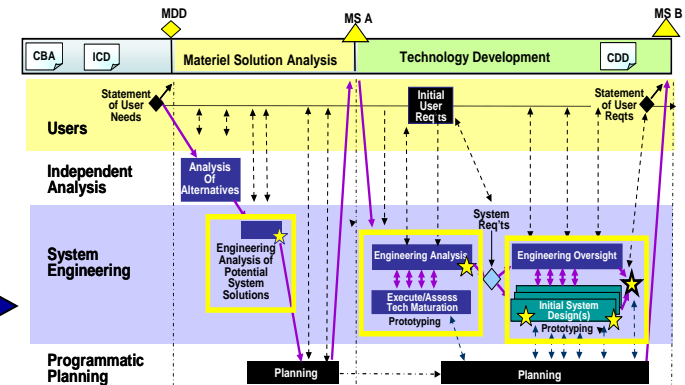
Acquisition Guidance Model



Ch	Topics
1	Decision Support Systems
2	Acquisition Strategy
3	Affordability & Life-Cycle Estimates
4	Systems Engineering
5	Life Cycle Logistics
6	Human Systems Integration
7	IT & NSS
8	Intelligence
9	Test & Evaluation
10	Assessments and Reporting
11	Program Management

Defense Acquisition Guide

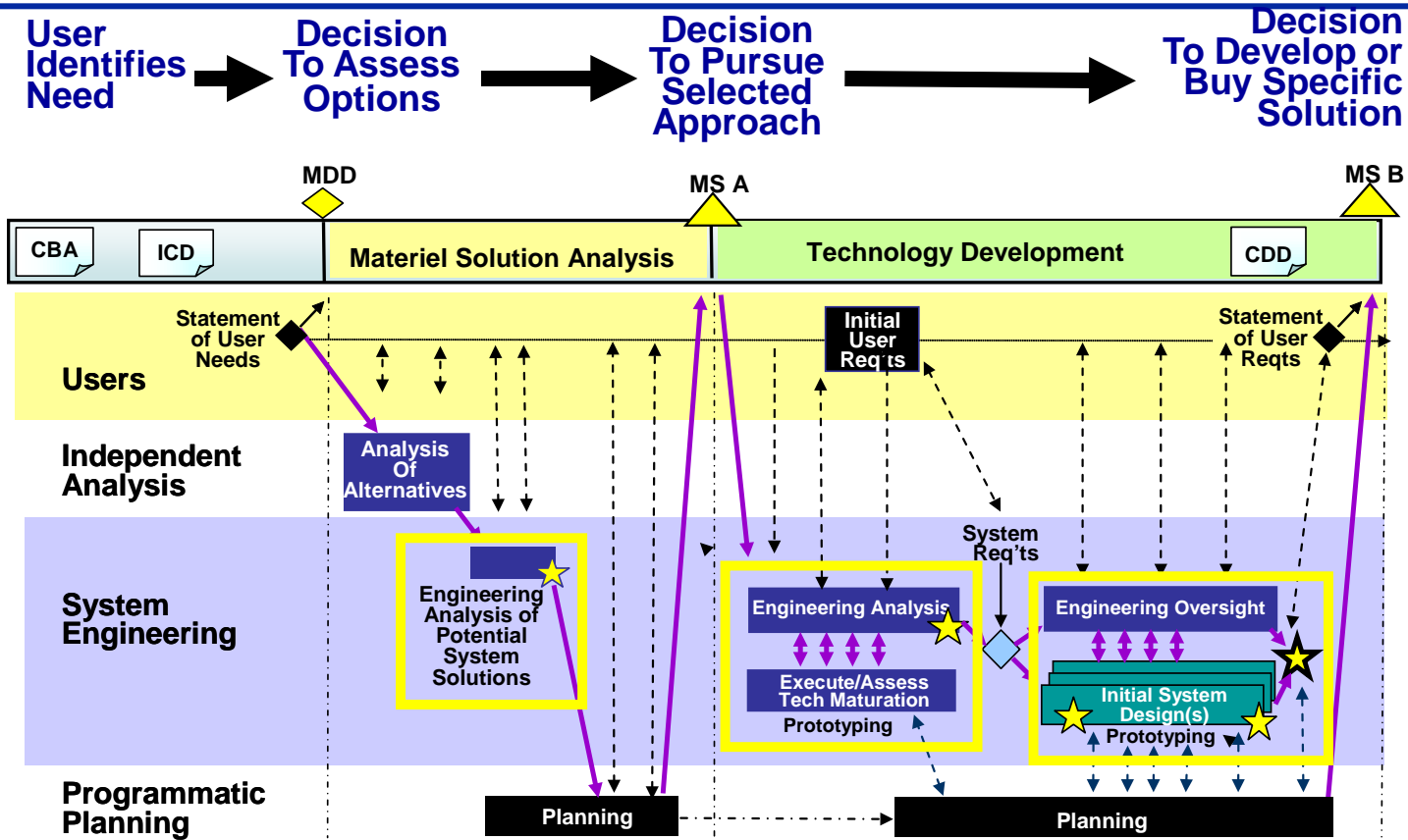
Role of SE in Program Formulation



- **Business Process Modeling used as the vehicle to**
 - Capture acquisition regulations and guidance
 - Identify critical systems engineering activities, events and products and how they impact program decisions



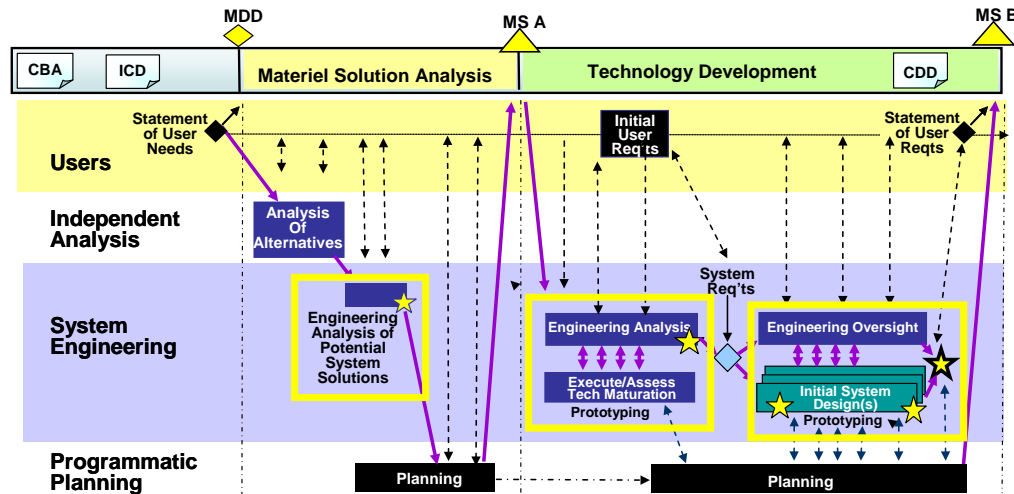
Critical SE Support to Program Formulation



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



Critical SE Support to Program Formulation



Materiel Solution Analysis

Engineering Analysis of Preferred System Solution

- Critical engineering and technical support for Technology Development planning
 - Technical risks and plans for prototyping
 - Plans for initial system design

Technology Development

Engineering Analysis and Oversight

- System requirements development
- Technology maturation and prototyping
- Initial system design through Preliminary Design Review (PDR)
- Technical basis for program decision



Impact of FY09 Legislation

- **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
- **Near-term plans**
 - 1st Year Annual Report Due March 2010
 - Initial Guidance based on current understanding of SE and DP
 - Parallel focus on understanding DP as the basis for guidance



Where Does Development Planning Fit?

Needs and Opportunities

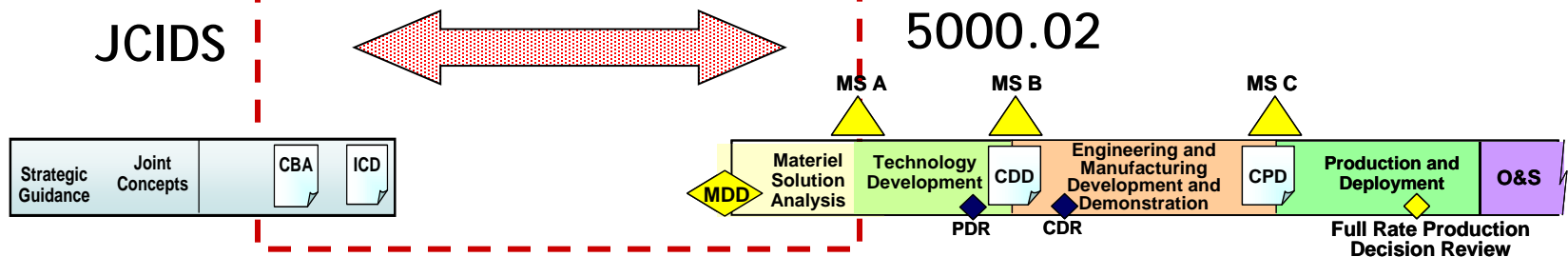
IPL
Urgent Need
New Threat
New Technology
New Strategic Direction
JCIDS

Viable Solutions

Translating User Needs and Opportunities Into Viable Solutions

Delivery Options

Rapid Fielding
Technology Refresh
O&S Upgrade
Experimentation
JCTDs



- Applies more broadly than JCIDS to 5000.02 acquisition

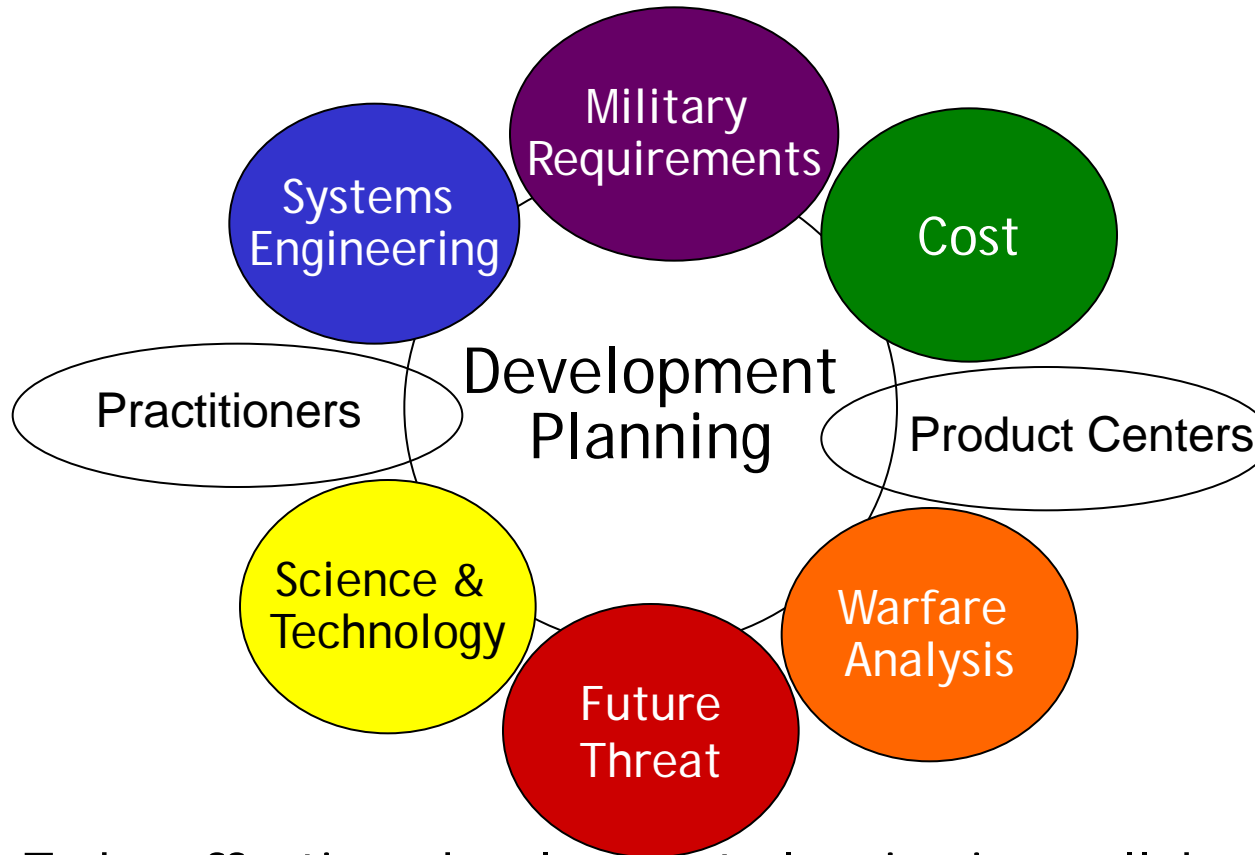


Development Planning Activities

- **Understand need in the context of operations and other systems**
 - Put the need into operational, threat and systems context (CONOPs, and mission threads, thread profile and current SoS architecture)
- **Identify ideas/concepts for solutions**
 - Communicate capability needs and gaps to concept generating organizations (i.e., industry, academia, S&T community, etc.)
 - Receive and catalogue ideas and concepts
- **Assess ideas/concepts to identify feasible material solution options**
 - Apply MS&A to confirm military utility (via modeling, via prototyping)
 - Identify the impact on current systems
 - Conduct initial lifecycle cost estimate
- **Technical analysis of the proposed concepts**
 - Conduct SE and refine concept technical analysis artifact on promising concepts to provide technical foundation (via prototyping)
- **Identify best mechanism to provide solution based on need and solution options**
 - Formal acquisition program, technology refresh, rapid fielding, etc.
- **Continue SA/SE support to the solution development**
 - For acquisition, technical advisor supporting the AoA study and analysis teams



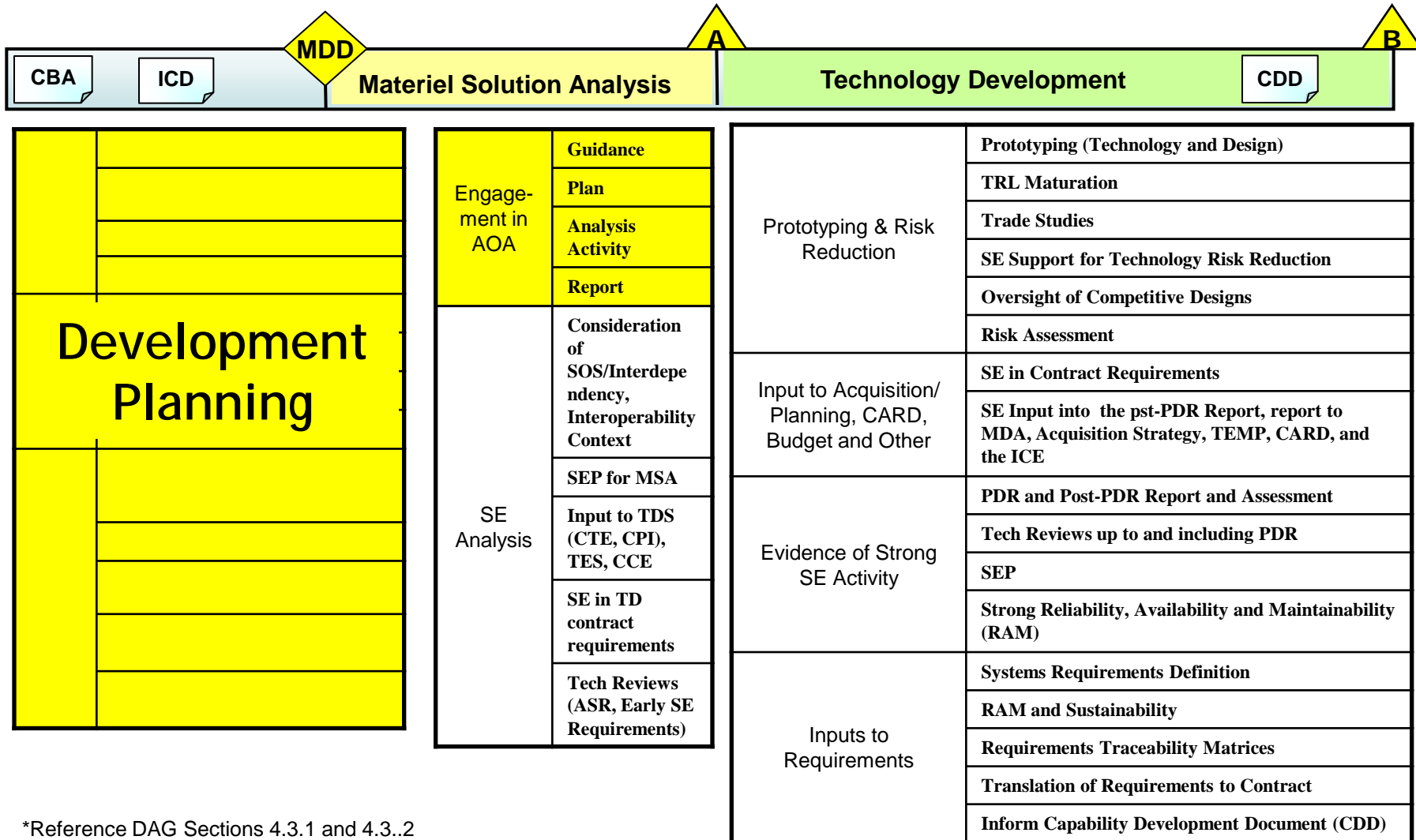
Development Planning Is a Team Sport



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



Extending SE Support to Development Planning



*Reference DAG Sections 4.3.1 and 4.3..2



Development Planning Current Initiatives



- **Determine current baseline of Development Planning practice and execution in the Components**
 - Development Planning Scope & Definition Study
 - Acquisition Guidance Model Development Planning Build
- **Identify and extend Development Planning Network**
 - Development Planning Communities of Interest Outreach
 - Development Planning Mini Workshop(s)
 - MORS Analytic Agenda Conference Planning
 - Development Planning Case Examples
- **Build Development Planning Body of Knowledge**
 - Best practices
 - Resources (e.g. Tools, Human resources)
- **Produce recommendations for Development Planning**
 - Policy & Guidance
 - Workforce Competency
 - Certification
 - Resourcing



Summary



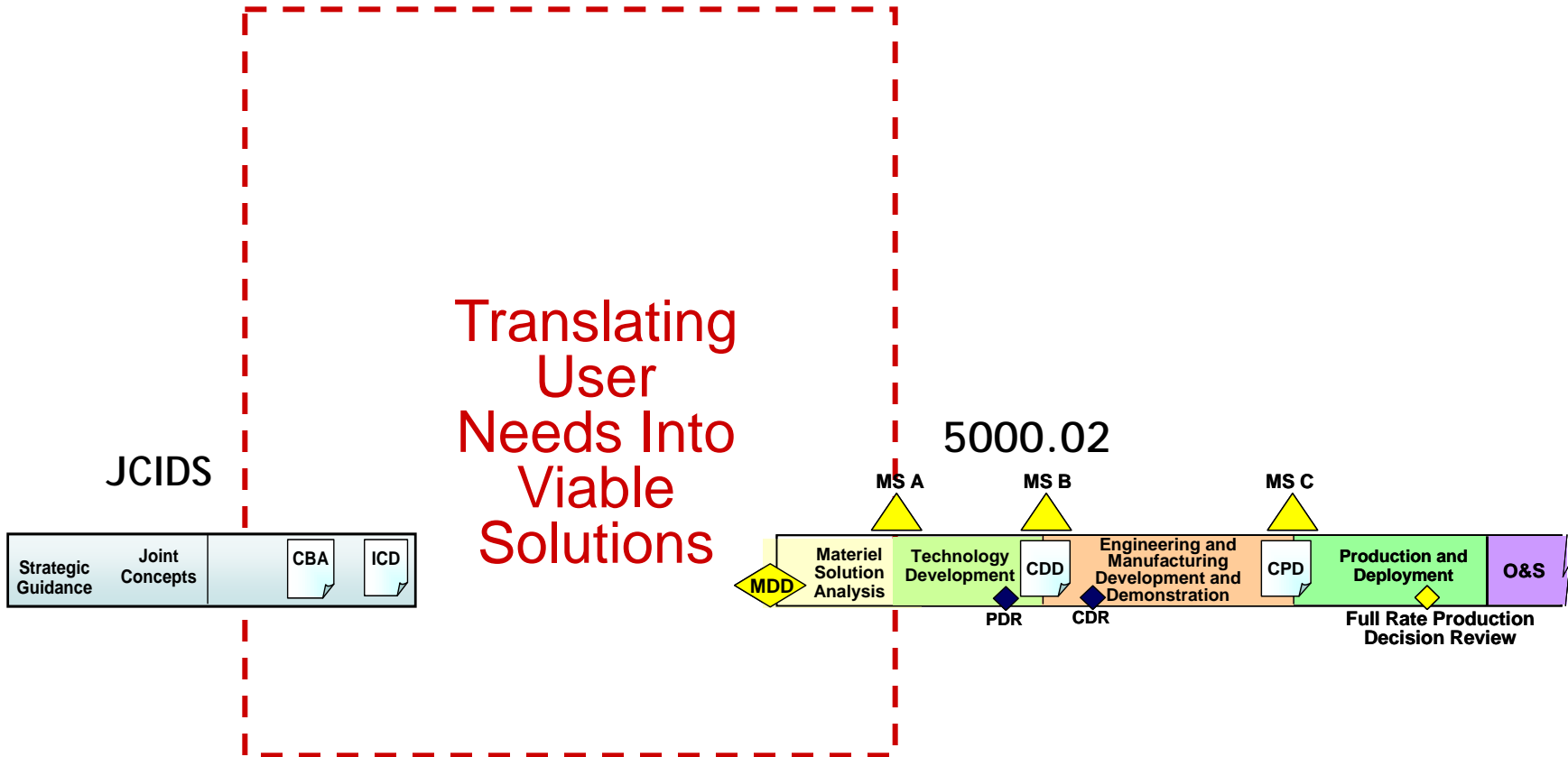
- The need for early systems engineering has been recognized
- The recent update of the DoDI 5000.02 and supporting SE guidance provides added emphasis on the early phases of acquisition and guidance for early SE
- Weapon Systems Acquisition Reform Act of 2009 (WSARA) has further emphasized the need for more SE attention prior to acquisition as part of development planning
- Current SE efforts are underway to understand current and past DP experience, develop best practices as the basis for renewed emphasis on Development Planning



Backup



Where Does Development Planning Fit?



- Bridges the user needs identification (JCIDS) with acquisition of a solution (5000.02)



Development Planning Communities of Interest

