DoDI 5000.02 and WSARA* Impacts on Early Systems Engineering

Sharon Vannucci

Systems Engineering Directorate
Office of the Director, Defense Research and Engineering

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* Weapon Systems Acquisition Reform Act

UNCLASSIFIED

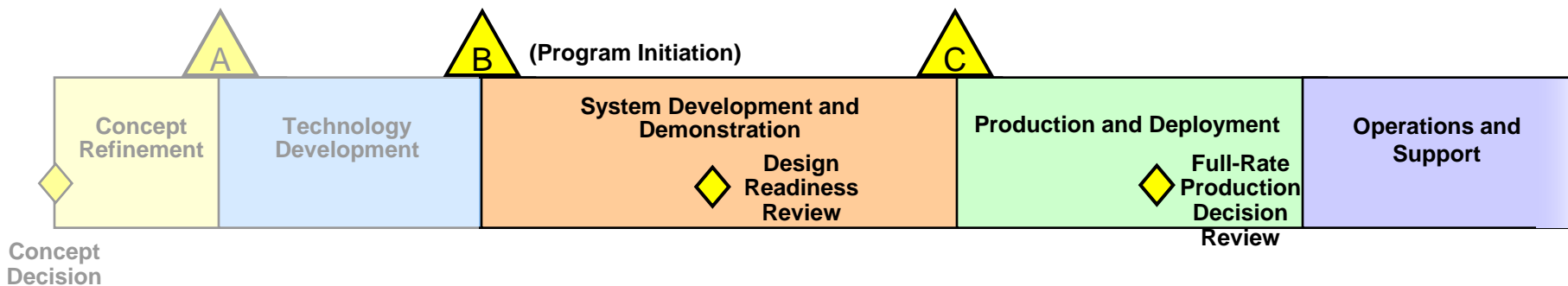# The Bottom Line Up Front – Impact of New Statute and Policy …

- **DoDI 5000.02 changes emphasize early stages of pre-systems acquisition - prior to Milestone B (MS B)**
  - Reduce risk before making business commitment
  - Improve likelihood of being able to meet these commitments

- **The Weapon Systems Acquisition Reform Act of 2009 furthers this emphasis with additional certification requirements at MS A and B, mandatory competitive prototyping, and system-level Preliminary Design Review before MS B for all Major Defense Acquisition Programs (MDAPs)**

Knowledge-based Acquisition – Starting Programs Right!

A Little Acquisition Lifecycle History – the Phantom Phases

DoDI 5000.2, the Defense Acquisition Management System
May 12, 2003 – December 8, 2008

A (Program Initiation)

B

C

| Concept Refinement | Technology Development | System Development and Demonstration | Production and Deployment | Operations and Support |

Design Readiness Review

Full-Rate Production Decision Review

Concept Decision

In the 5+ years, 2003-2008:*

- **Only 1 non-ship pre-MDAP has gone through a MS A**
- **20 MDAPs have gone through a MS B**
- **14 MDAPs had had Nunn-McCurdy breaches**

Breaches COULD be indicative of insufficient technical knowledge to establish Milestone B cost and schedule baselines.
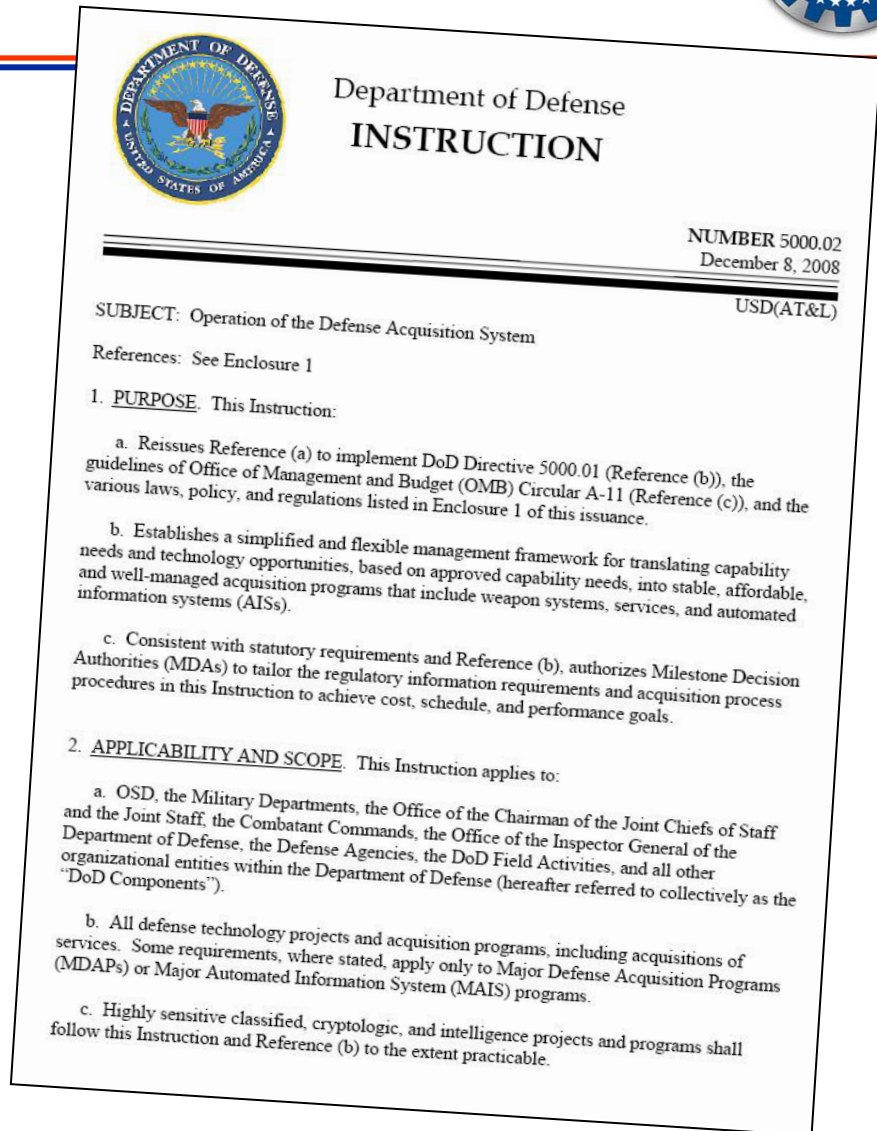
*Data from Program Support Reviews

DoD Instruction 5000.02

- **Mandatory Materiel Development Decision**

- **Mandatory Milestone A for all "major weapon systems" requiring technology development**

- **Mandatory system-level PDR and CDR with reports to and assessments by the MDA**

- **Strengthened MDA certifications at Milestones A and B**

Department of Defense
INSTRUCTION

NUMBER 5000.02
December 8, 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.
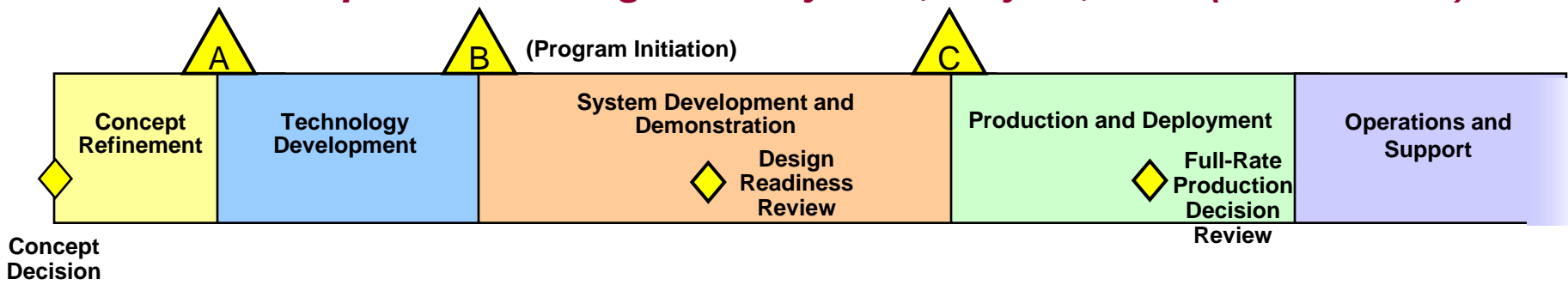
Acquisition Reform

- **New legislation, Public Law 111-23 (WSARA) recognizes the importance of SE to weapon systems acquisition**

- **Heavy focus on starting MDAPs right:**
  - **Development and tracking of measurable performance criteria as part of SEPs and TESs / TEMPs**
  - **Requiring completion of competitive prototypes for all Major Defense Acquisition Programs (MDAPs)**
  - **Requiring completion and MDA assessment of a system-level Preliminary Design Review (PDR) before MS B**
  - **Codifying a role for SE in development planning, lifecycle management and sustainability**

- **Yearly OSD assessment to Congress of Component capabilities for SE, development planning, and DT&E**
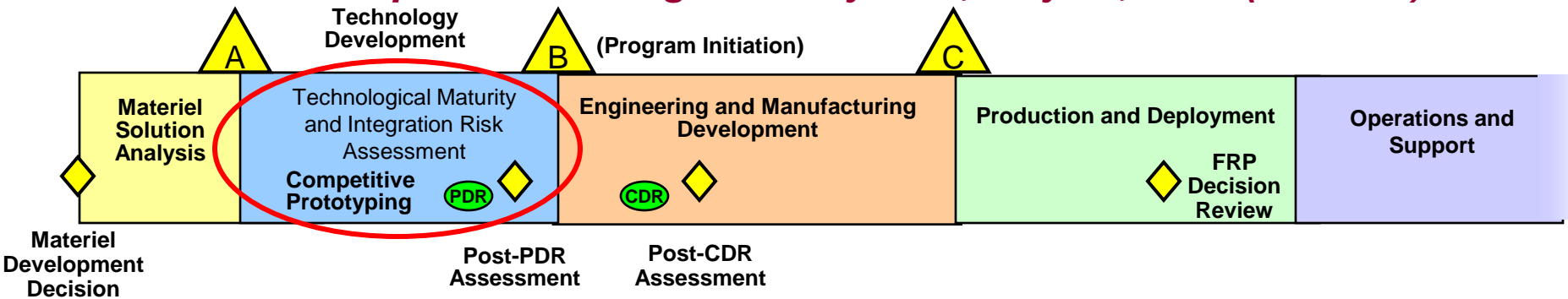
Acquisition Lifecycle Comparisons

Defense Acquisition Management System, May 12, 2003 (DoDI 5000.2)

A	B (Program Initiation)		C	
Concept Refinement	**Technology Development**	**System Development and Demonstration** ◇ Design Readiness Review	**Production and Deployment** ◇ Full-Rate Production Decision Review	**Operations and Support**

Concept Decision

Defense Acquisition Management System, December 8, 2008 (new DoDI 5000.02)

A	B (Program Initiation)		C	
Materiel Solution Analysis	**Technology Development** (PDR)	**Engineering and Manufacturing Development** (PDR) (CDR) ◇	**Production and Deployment** ◇ FRP Decision Review	**Operations and Support**

Materiel Development Decision

Or

PDR after B w/ Post-PDR Assessment

Post-CDR Assessment
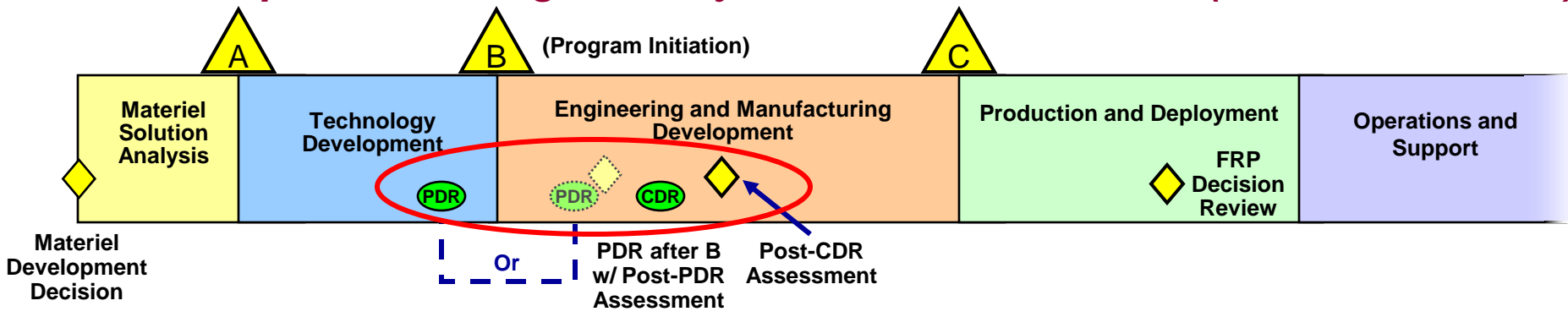
Defense Acquisition Management System, May 22, 2009 (WSARA)

Technology Development

A	B (Program Initiation)		C	
Materiel Solution Analysis	Technological Maturity and Integration Risk Assessment **Competitive Prototyping** (PDR) ◇	**Engineering and Manufacturing Development** (CDR) ◇	**Production and Deployment** ◇ FRP Decision Review	**Operations and Support**

Materiel Development Decision

Post-PDR Assessment

Post-CDR Assessment

DoD 5000.02 and PL 111-23 – the Changed Acquisition Landscape

New 2366a & 2366b Certifications*

MS A   MS B   MS C

| CBA | ICD | MDD | Materiel Solution Analysis | Technology Development | CDD | Engineering and Manufacturing Development | CPD | Production and Deployment | O&S |

JCIDS Process

PDR   **CDR**

Full Rate Production Decision Review

Materiel Development Decision (MDD)

Competitive Prototypes

PDR, PDR Report to the MDA, and Post-PDR-Assessment

System-level CDR with an initial product baseline and a Post-CDR Report to the MDA

Post-CDR Assessment by the MDA between EMD sub-phases

Renewed emphasis on manufacturing across the lifecycle

* Director, SE supports MDA certifications including PDR Report assessment at MS B

Impact of Acquisition Reform Legislation on Early Acquisition Policy

- **Establishes Director, Systems Engineering (D, SE) and Director, Developmental Test and Evaluation (D, DT&E) as principal advisors to the Secretary of Defense and the USD(AT&L) on systems engineering and development planning and on developmental T&E, respectively**

- **Mandates documented assessment of technological maturity and integration risk of critical technologies for MDAPs during the Technology Development (TD) phase**

- **Establishes D, DT&E and D, SE joint tracking and Congressional reporting on MDAP achievement of measurable performance criteria**

- **Mandates competitive prototyping and MDA completion of a formal Post-Preliminary Design Review Assessment for all MDAPs before MS B; additional MDA certification to both at MS B**

- **Strengthens technical analysis of cost and schedule breaches during the Technology Development (pre-MS B) and the Engineering and Manufacturing Development (post-MS B) phases**

New Emphasis on Development Planning and Early SE
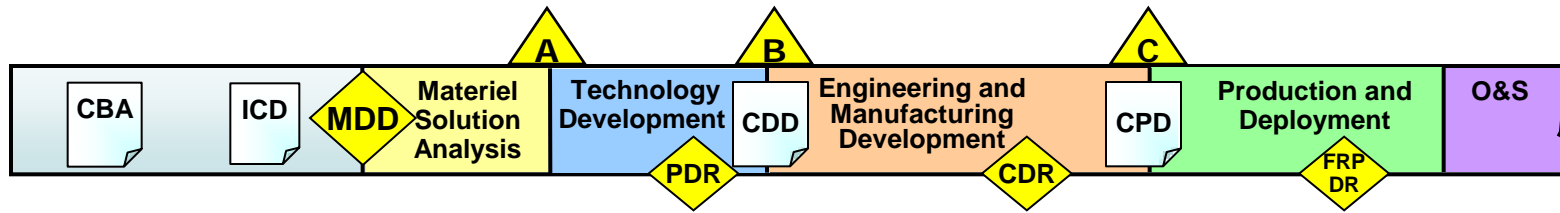
Development Planning → Development

DP: Development Planning
DT&E: Developmental Test and Evaluation
LCS: Life Cycle Sustainment
SE: System Engineering
CBA: Capabilities Based Assessment
CDD: Capability Development Document
CPD: Capability Production Document
ICD: Initial Capabilities Document
MDD: Materiel Development Decision

Development Planning and Early SE Critical Activities

CBA	ICD	MDD	Materiel Solution Analysis	Technology Development	CDD
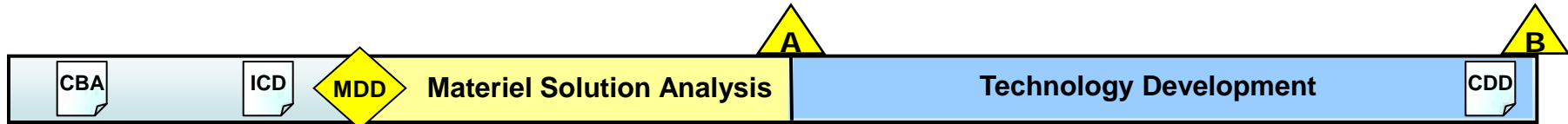
SE Input to MDD	CONOPS
	Awareness of Strategic Context
	Engagement with S&T
	Engagement with JCIDS

Engagement in AoA	Guidance
	Plan
	Analysis Activity
	Report

Engineering Analysis	Consideration of SOS/Interdependency, Interoperability Context
	SEP for Milestone A
	Input to TDS (CTE, CPI), TES, CCE
	SE in TD Contract Requirements
	Tech Reviews (ASR, Early SE Requirements)

*Reference DAG Sections 4.3.1 and 4.3..2

Prototyping & Risk Reduction	Prototyping (Technology and Design)
	CTE TRL Maturation
	Trade Studies
	SE Support for Technology Risk Reduction
	Oversight of Competitive Designs
	Risk Assessment

Input to Acquisition/ Planning, CARD, Budget & Other	SE in Contract Requirements
	SE into the PDR Report to MDA, Acquisition Strategy, TEMP, CARD, and ICE

Evidence of Strong SE Activity	PDR and PDR Report and Assessment
	Technical Reviews up to and including PDR
	Systems Engineering Plan
	Strong Reliability, Availability and Maintainability (RAM)

Inputs to Requirements	System Requirements Definition
	RAM and Sustainability
	Requirements Traceability Matrices
	Translation of Requirements to Contract
	Capability Development Document (CDD)

New Challenges for Program Managers

- **Need for Program Office formation and PM skill-sets after MDD and prior to MS A**

- **Increased importance of the Technology Development Strategy (TDS) (as a surrogate Acquisition Strategy) at MS A**

- **Schedule and funding shifts left – from EMD to TD**

- **Earlier engagement with industry and different contracting strategies for technology maturation, competitive prototyping, data rights, PDR before MS B, etc.**

- **Explicit need for earlier, formal SE process application (e.g., data, configuration, and risk management)**

- **New MS A cost and schedule baselines with breach penalties and MDA certifications for MDAPs**

- **Additional MS B MDA MDAP certifications including formal post-PDR assessment that the program demonstrates a high likelihood of accomplishing its intended mission**

The Milestone A Planning Challenge

Documents / activities / data requiring technical input from the Systems Engineer *before* Milestone A:

- **Analysis of Alternatives**
- **Technology Development Strategy**
  - **Critical Program Information**
  - **Technology maturation plans**
  - **Competitive Prototyping plans**
  - **Net-Centric Data Strategy**
  - **Market Research**
  - **Data Management Strategy**
- **Component Cost Estimate**
- **Systems Engineering Plan**
- **Test and Evaluation Strategy**

The PM's Dilemma: Where to find the data!?

New Certifications for MDAPs

- ## At Milestone A (2366a):
  - Technology Development Report must be submitted with 2366a certification to serve as schedule and cost baseline for the program during Technology Development phase
  - If cost or schedule is breached by 25%, the MDA must report to Congress

- ## At Milestone B (2366b):
  - Appropriate tradeoffs among cost, schedule, and performance objectives have been made to insure that the program is affordable
  - The MDA has received a PDR Review Report and conducted a formal post-PDR assessment that the program "demonstrates a high likelihood of accomplishing its intended mission"
  - Technology in the program has been demonstrated in a relevant environment as determined by the MDA on the basis of an independent review and assessment by the Director of Defense Research and Engineering

Increased technical rigor before Milestone decisions

New Competitive Prototyping Challenge

PL 111-23 ("Acquisition Reform"), Section 203:

- **Requires the Secretary of Defense to modify acquisition policy to require each MDAP's acquisition strategy provides for competitive prototypes prior to a MS B decision**

- **Allows prototyping to occur at the system or subsystem level**

- **Includes provision for Milestone Decision Authority (MDA) waiver only on the basis that the cost of producing the competitive prototypes exceeds the expected life-cycle benefits (in constant dollars) of producing the prototypes or for critical national security objectives**

- **Programs receiving a waiver must**
  - **still produce <u>a</u> prototype before MS B**
  - **be reported in writing by the MDA to the congressional defense committees and the Comptroller General of the US**
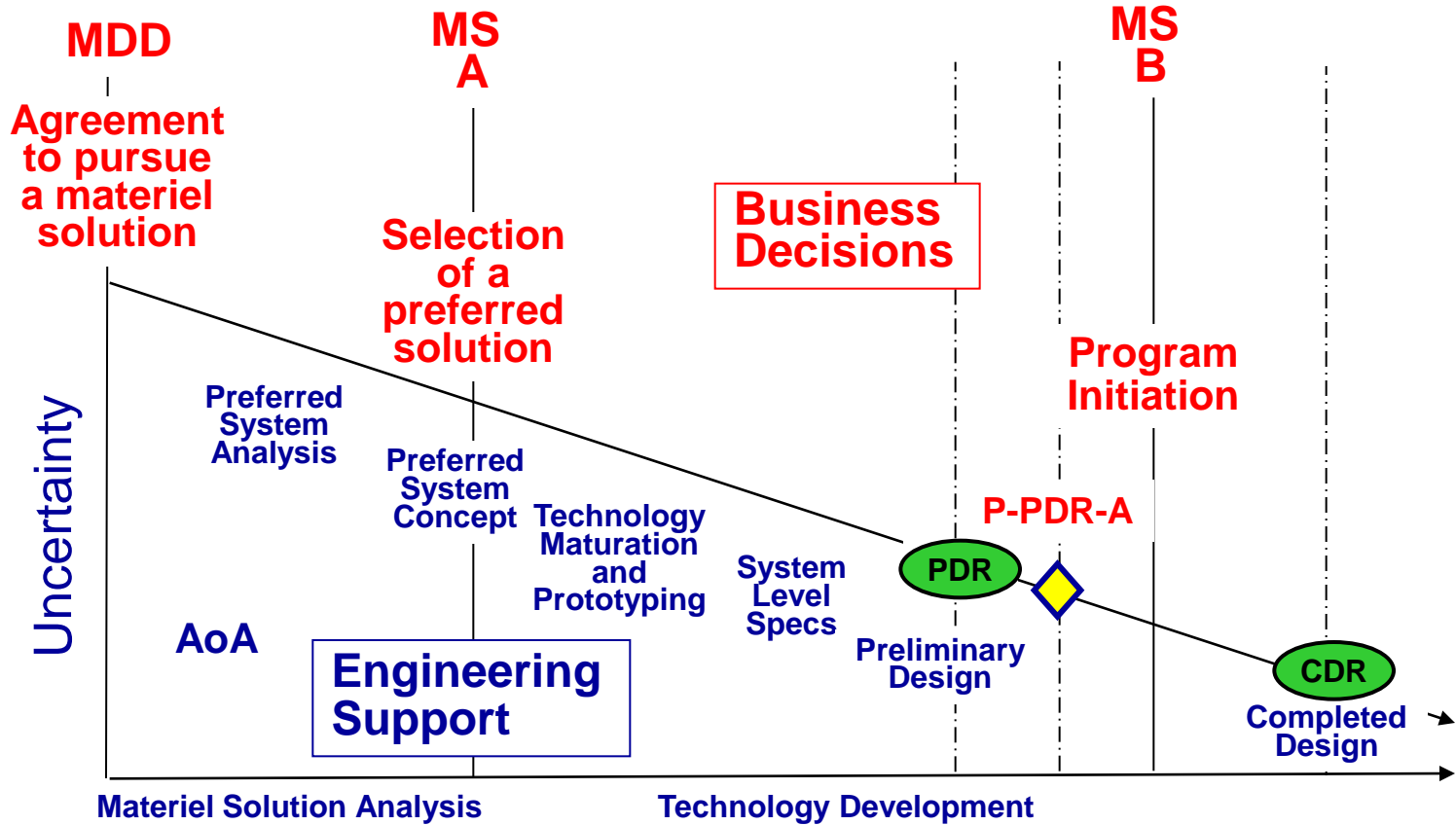
Why is this hard?

- **Program offices (both government and contractor) have very little experience with pre-MS B acquisition activities, particularly competitive prototyping and PDR before MS B**

- **The DAG guidance is voluminous – online resource with over 750 printed pages with relevant phase-related guidance sprinkled throughout**

- **Program offices have limited understanding about these interdependencies within the DAG guidance**

- **New implementing policy and DAG guidance in response to PL 111-23 will not be available immediately**

Driving Risk out of MS B Decisions . . .

MDD

Agreement to pursue a materiel solution

MS A

Selection of a preferred solution

MS B

Business Decisions

Program Initiation

Uncertainty

Preferred System Analysis

Preferred System Concept

Technology Maturation and Prototyping

System Level Specs

P-PDR-A

PDR

Preliminary Design

CDR

AoA

Engineering Support

Completed Design

Materiel Solution Analysis

Technology Development

"Knowledge-based" Decision Making . . .
making acquisition decisions when you have solid evidence and acceptable risk

Backup

SE Policy and Guidance

DoD 5000.02

Defense Acq Guidebook

Chapter 4 SE	Chapter 8 Security

Data Flow:

Acquisition Policy

⬇

Policy-specific guidance linked to . . .

⬇

. . . all other relevant guidance

M&S Guidance	Risk Mgmt Guide	"Wall Chart"	PPP DoDI 5200.39	
DoD M&S Mgt DoDD 5000.59	SE Slide Rule	SEP Prep Guide	Systems Assurance Guide	
DoD M&S VV&A DoDI 5000.61	Safety/ESOH Guides	DM Guide	DTM 08-048 Supply Chain Risk Management	EW and C2W Countermeasures DoDD 3222.3
RAM Guide	Safety MIL-STD-882D	Functional Architecture Development Guide	PPP Prep Guide	DoD IA DoDD 8500.01E
RAM-C Rationale Report Manual	Contracting for SE Guide		CPI Security Classification Guide	Interoperability & Supportability of IT & NSS DoDD 4630.05
CM Mil Hbk 61A	SOS SE Guide	Tech Review Guide	CPI Identification Tool	
WBS Mil Hbk 881	IMP/IMS Guide	Planned	PP Contract Language Compendium	Acq Security-Related Policies & Issuances Tool
Other Standards & Mil Handbooks	MOSA Guide	Extent		
	Other Design Consideration Guides			

http://www.acq.osd.mil/sse/pg/guidance.html