

Applying  
Business Process Modeling  
to  
Develop  
Systems Engineering Guidance  
for  
New DoD Acquisition Regulations

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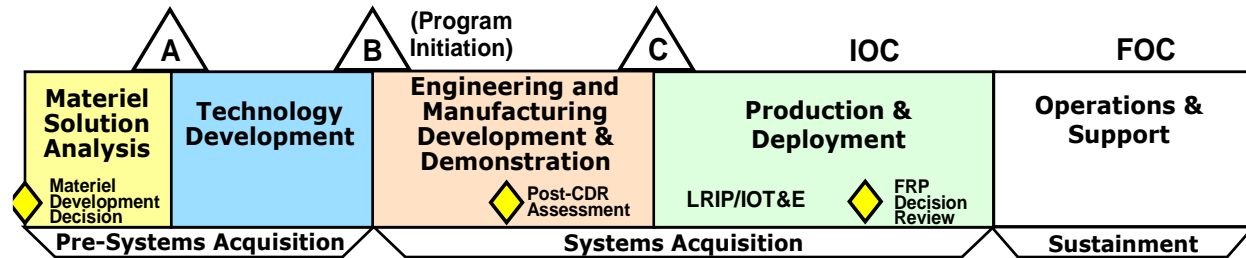
# Background

- Recognized need for enhanced SE early in the acquisition process to provide robust technical foundation for acquisition success
- DoD acquisition regulations (DoD 5000) changes address more structure in early phases of acquisition
- Defense Acquisition Guide (DAG) updates to address the changes in acquisition regulation
- A Business Process Model of DoD 5000 and SE Guidance has been constructed to provide technical support to this process

Acquisition is a complex process requiring systems thinking and SE analysis like other complex systems

# DoD Acquisition Regulations and Guidance

Regulations  
DoDI 5000.02



◆ = Decision Point    △ = Milestone Review

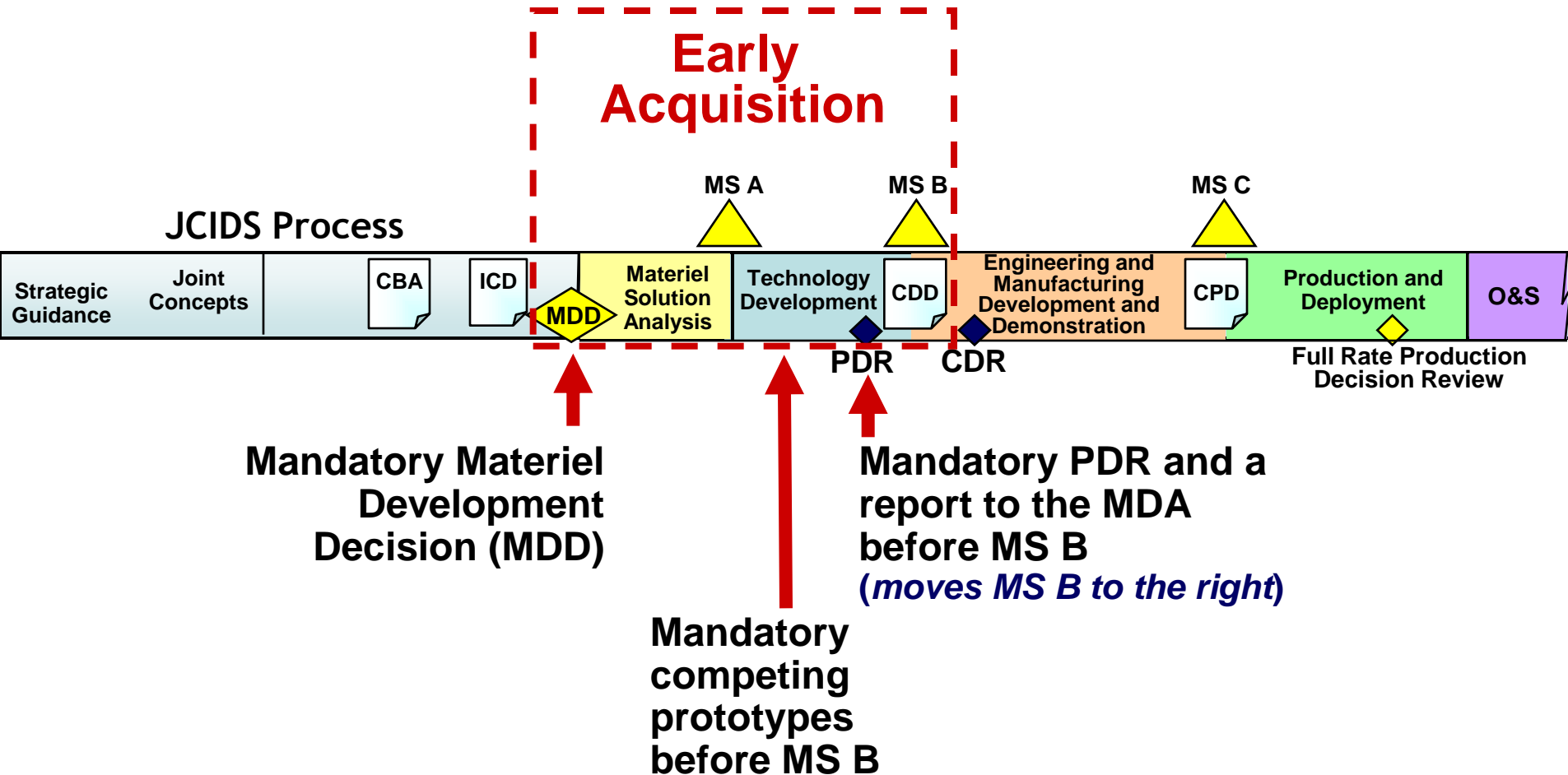
Guidance  
Defense  
Acquisition  
Guide

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

Focus of  
current  
activity

Context is worth 50 IQ Points

# Draft Early Acquisition Policy Changes\*



# Why is this hard?

- Very little experience with current pre- Milestone B SE guidance
  - Makes it difficult to know what to ‘adjust’ given changes
- The current DAG guidance is voluminous
  - Online resource with over 500 printed pages of information without hotlinks
- Limited understanding about the interdependencies among the guidance provided to the program office from different perspectives
  - Any added SE guidance will compete attention from already overburdened program office
- Consequently, it was important to understand how SE fits into the context of early acquisition
  - What is the relationship between SE and guidance for other areas

**Need a structured approach to understanding how SE fits into larger context**

# Why Business Process Modeling?

- Business process modeling (BPM) rapidly articulates processes and relationships
  - Supports communication and common understanding among stakeholders
  - Provides a means for understanding relationships among concurrent stakeholder activities
- Information to update the DAG is closely aligned to information for the pilot model; efficient leveraging of effort
- Objective is to support understanding of how SE fits into the larger context of DoD 5000 and guidance
- An BPM model has been developed to address SE guidance in context of regulations and other guidance ‘lanes’ addressing
  - Proposed DoD 5000
  - SE guidance (draft updates to DAG Chapter 4)
  - Relationships between SE guidance and 5000 and guidance in other DAG chapters (limited)

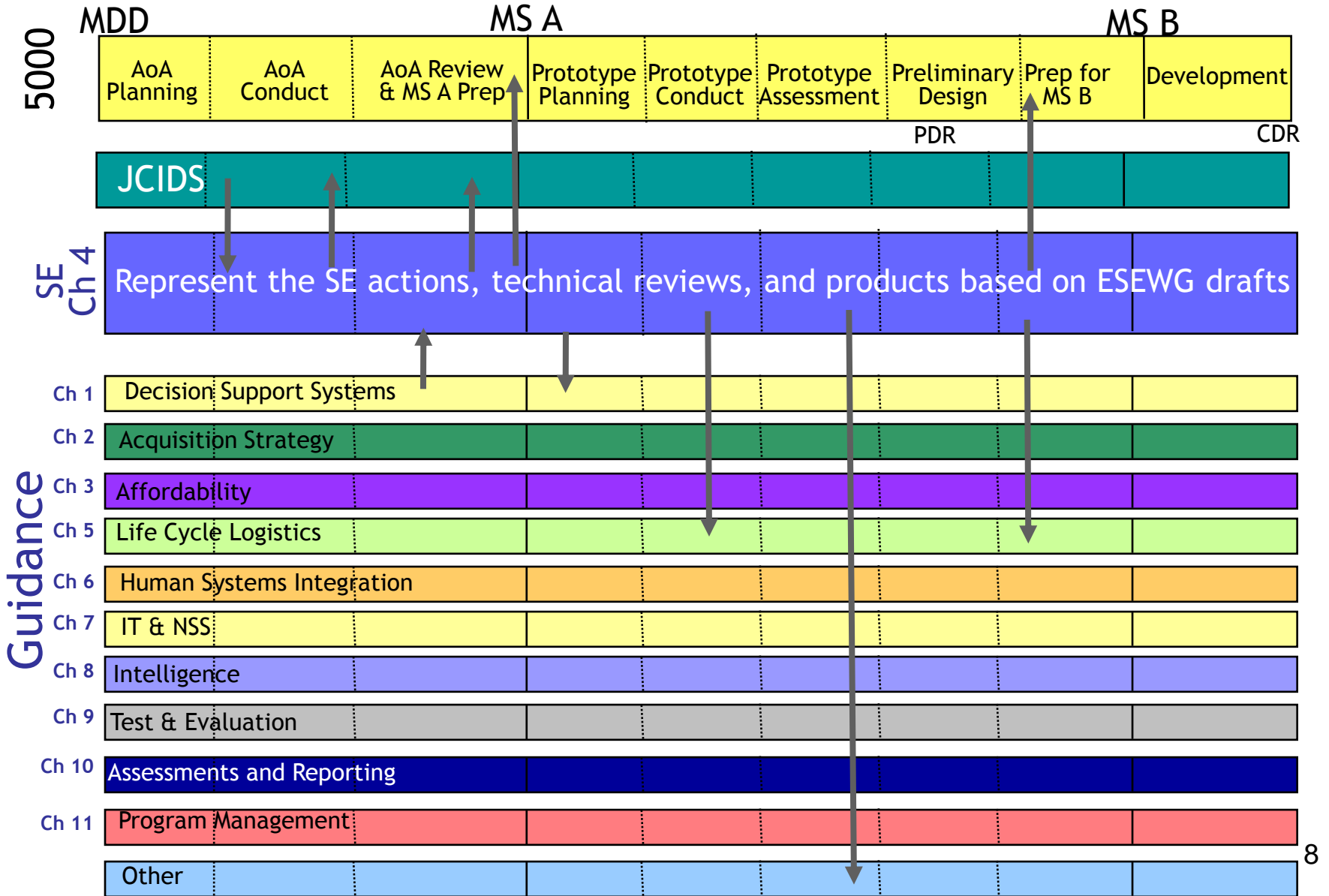
**Model provides a framework to articulate the role and relationship of early SE**

# Approach

- Iterative approach to building, reviewing, applying the model
  - Begin with a ‘first pass’ rapid development based on the current 5000 documentation using ‘surrogate’ subject matter expert (SME)
  - Review ‘first pass’ model with SMEs
  - Update (second pass), review and revise
  - Conduct an initial assessment, review and revise in collaboration with stakeholders
- Use model as a framework for enterprise level exchanges

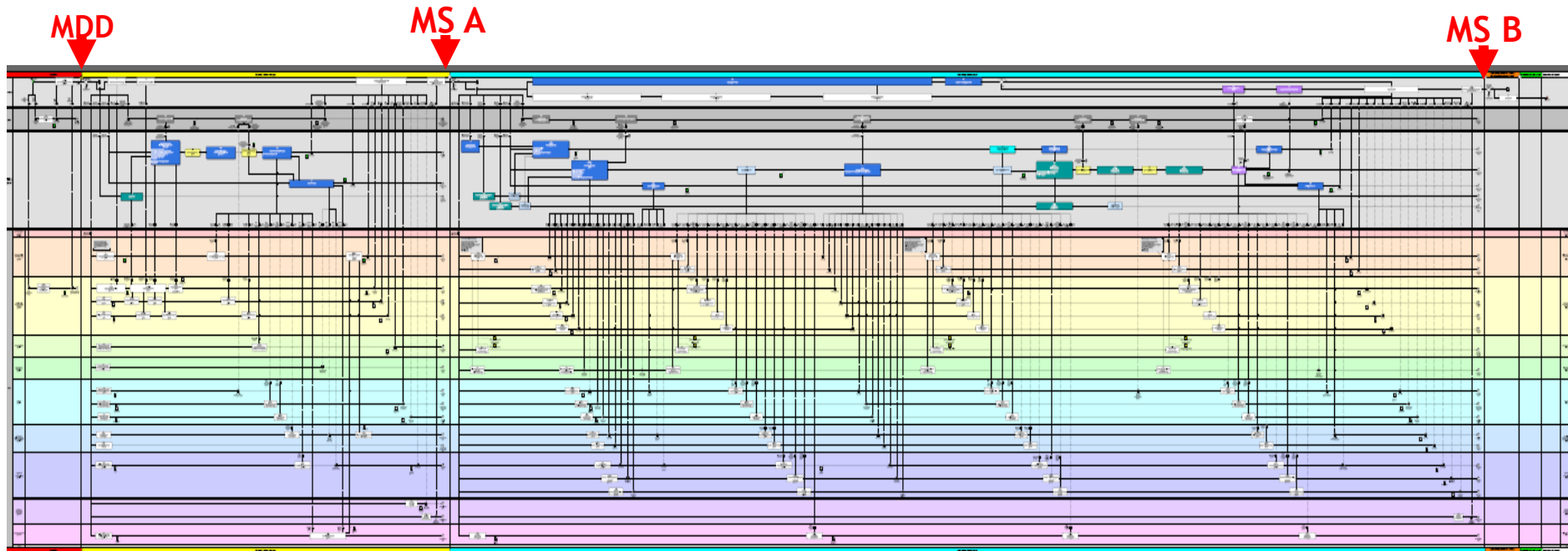
Version 1.0 if the model is in place and in use  
Work in progress

# Notional Initial Model Layout





# Birdseye View of the Model



Best viewed as 4' x 10' version

Model provides a way to visualize MDD to MS B

# Results (1 of 2)

- Clear description of
  - Key elements of new DoD 5000
    - Provided a abstracted view of complex process
    - Understand and communicate the changes
  - Relationship among the guidance across the DAG chapters particularly with respect to systems engineering
    - Identified activities at different points in the process
    - Helped to frame questions about relationships
  - Focus for SE Guidance during early phases of acquisition process including
    - SE actions during each phase
    - Expected input from other processes
    - Expected outputs to other processes
    - Time criticality of information exchanges

Model provides a framework to look at issues across various guidance lanes

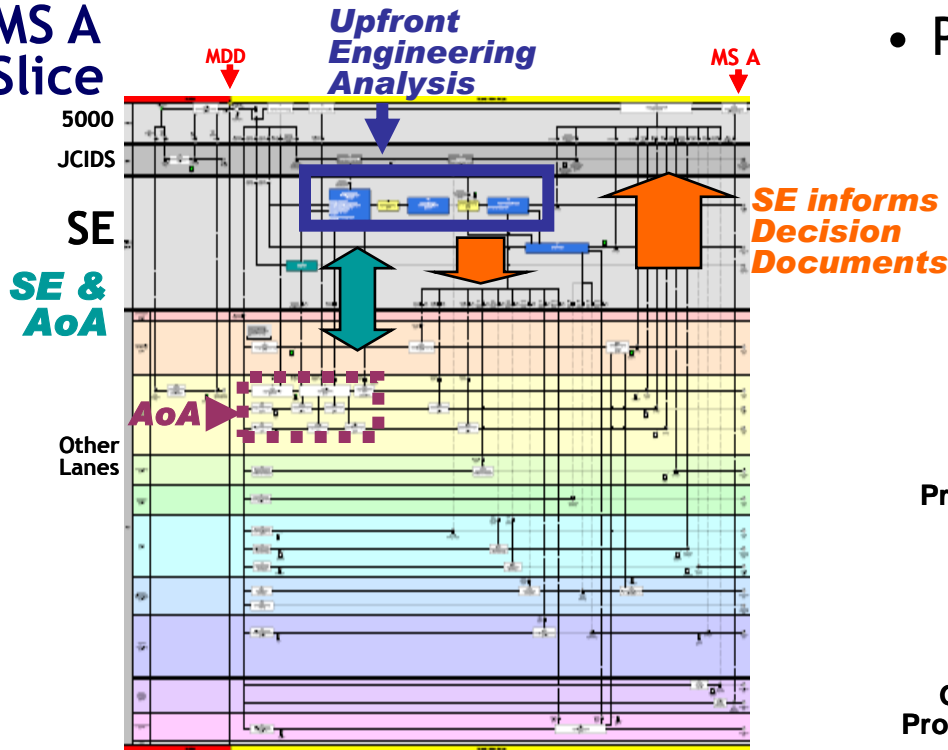
# Results (2 of 2)

- Provides a framework for ‘enterprise’ discussion
  - Showing the numerous guidance ‘lanes’ and where they provide guidance to an acquisition program
  - Identifying issues in aligning guidance with changes in policy
  - Establishing SE relationships with other guidance ‘lanes’
    - Identifying and managing interrelationships
    - Understanding the need and timing for information sharing across ‘lanes’
  - Demonstrating SE contributions to acquisition process and work in other lanes
    - Measuring the impact of earlier interactions
    - Contributing to knowledge base of all ‘lanes’ throughout the process

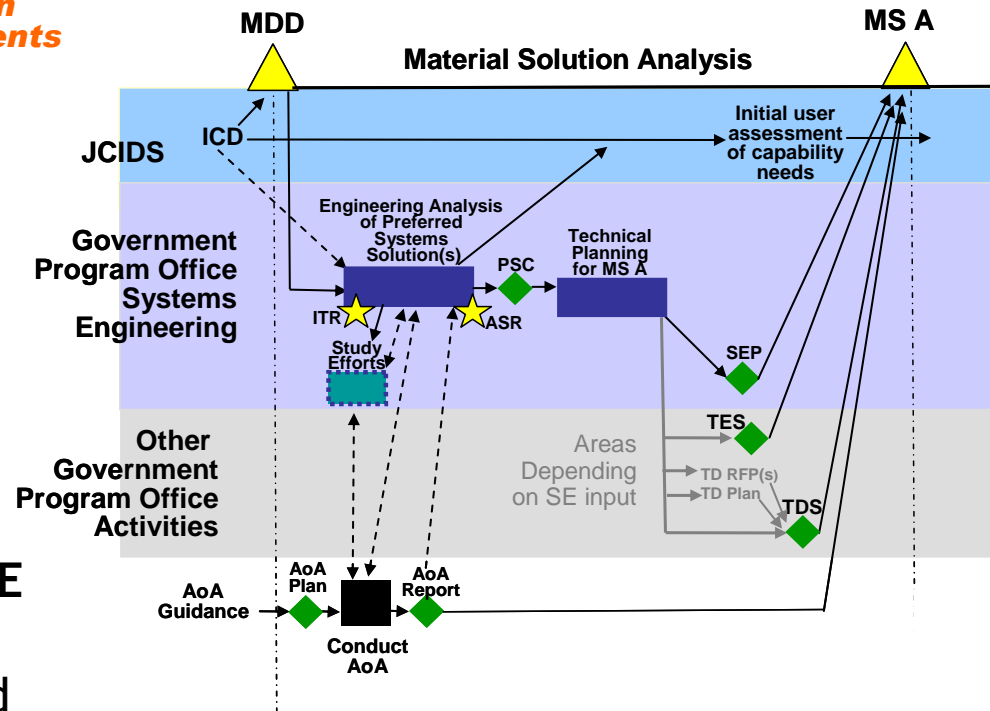
Model provides a framework to articulate the role and contributions of early SE

# Example: Best Practices for MDD to MS A

## MDD to MS A Slice



- Provided basis for DAG SE guidance on
  - Key SE Activities
  - Impact on program planning

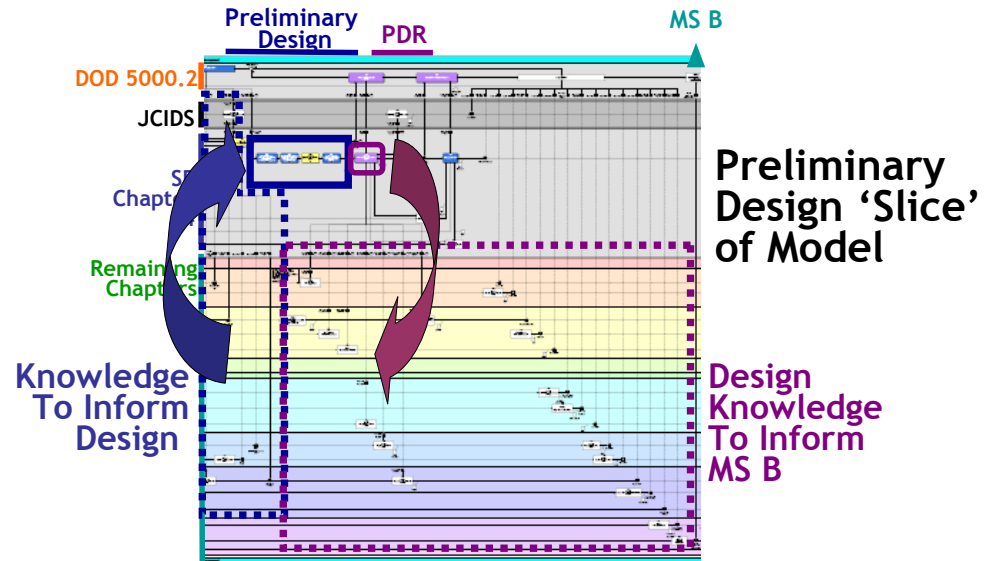
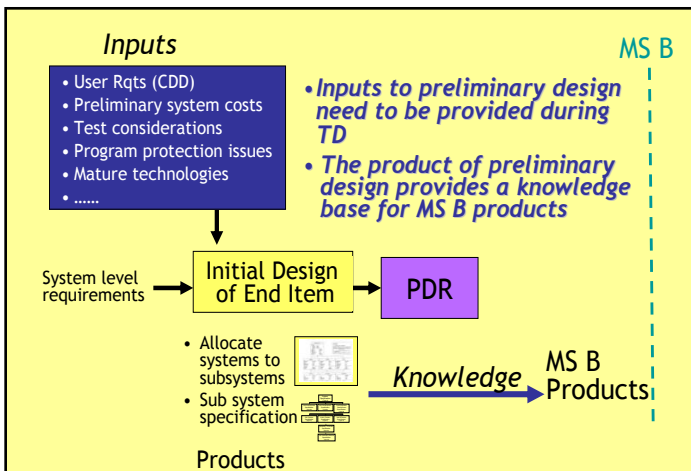
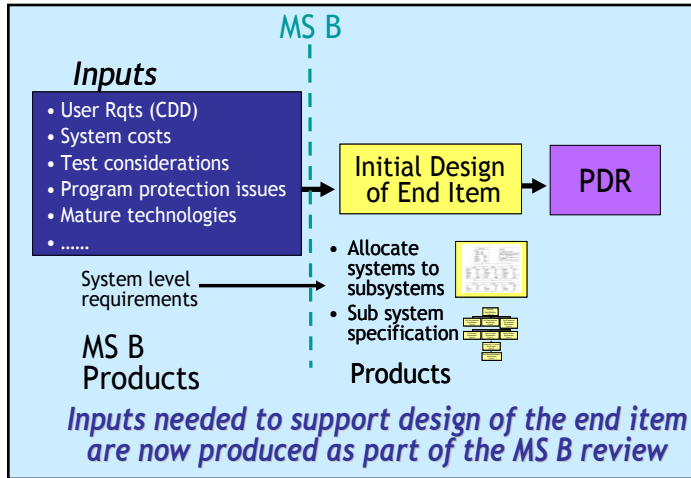


- Critical role for early program office SE
  - Advise and review AoA
  - Engineering analysis of recommended solution for TDS technical planning

Key SE Activities, Events and Products and Their Support to Program Planning

# Example: Moving Milestone B to follow PDR

- PDR has been an SE event; change impacts a range of considerations outside of SE



- Model provided a framework for enterprise level discussion
- Identified key inputs needed prior to preliminary design including
  - User requirements, cost constraints, critical technologies, critical protection items

**Topic of a July workshop to address the impact of the change across the guidance lanes (e.g. DAG Chapters)**

# In Sum....

- Use of BPM as a tool for examining acquisition policy and guidance demonstrated the value of systems thinking and structured analysis of what is in effect a complex system
- Follow-on possibilities
  - Extend model to expand description of other lanes and their interrelationships, or add other concurrent activity (e.g. OSD oversight activities)
  - Animate model to understand concurrency, dynamics, and synchronization
  - Add notional resources (manpower, time) for analysis
  - Extend to focus on information as a basis for streamlining 'documentation' across the acquisition process
  - Others....

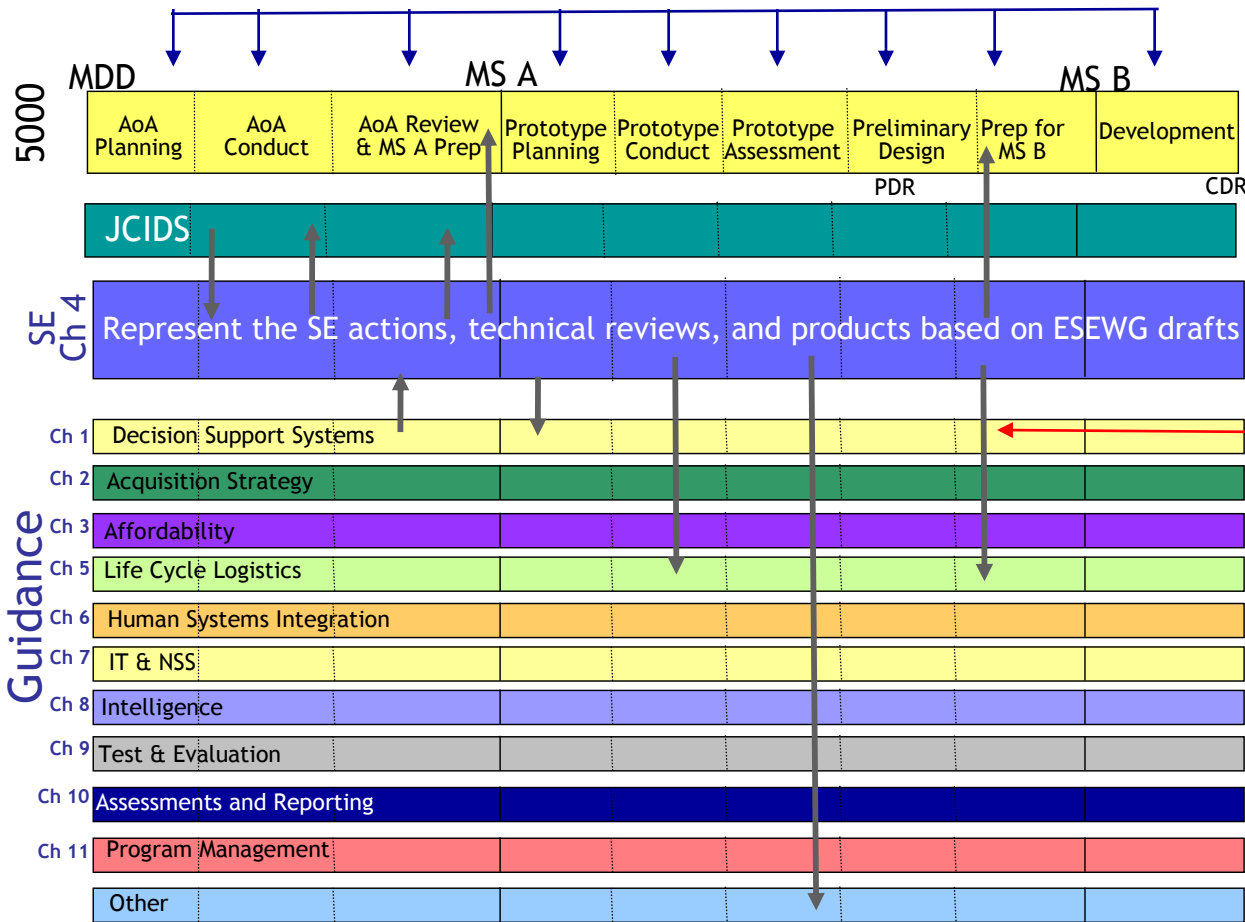
Model provides a framework for examining issues within SE and between SE and other aspects of acquisition

# Backup

# Initial Model Scope Concept: Focus on Early SE

First phases of acquisition process, subdivided into discrete stages

Decision Lanes



Represent 5000 and DAG Chapter 4 in some detail

Represent SE 'inputs' and outputs

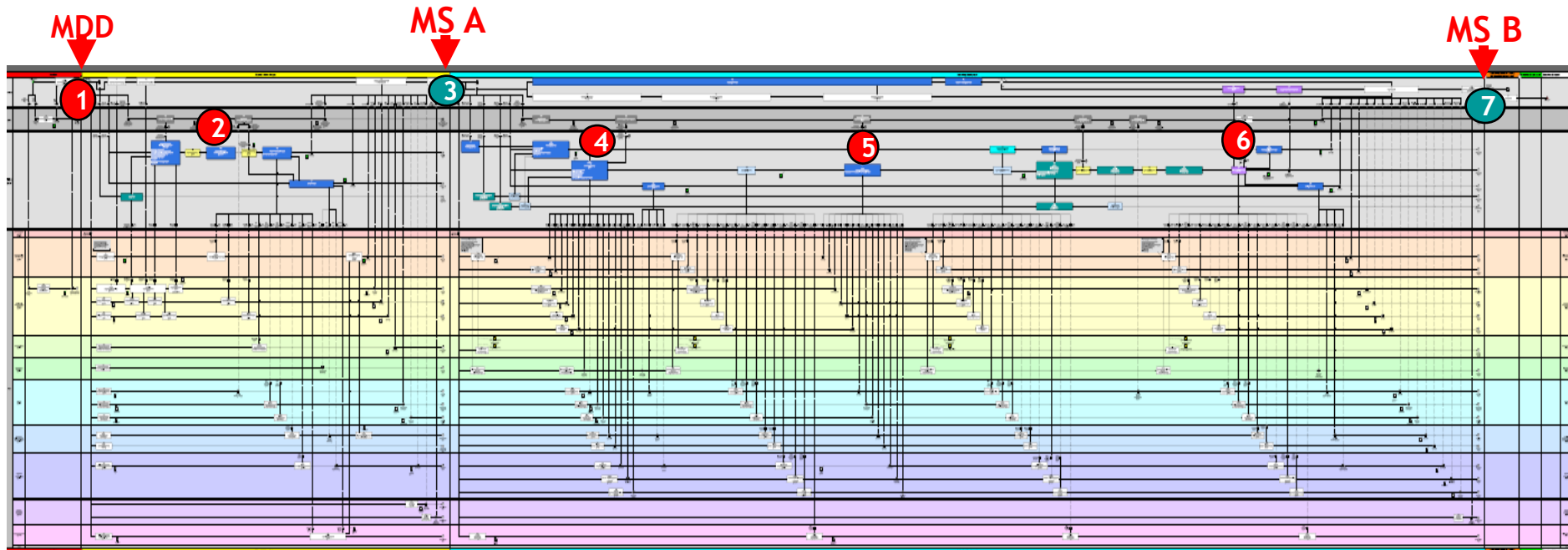
Initially represent other guidance 'lanes' as SE sources and sinks

Include 'other category for unknowns



# Birdseye View of the Model

- Progress is being made in developing DAG chapter 4



Best viewed as 4' x 10' version

Pilot effort has been initiated to explore use of business process modeling to examine relationship and alignment of regulations and SE guidance