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

**Guidance**
Defense
Acquisition Guide

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**Focus of current activity**

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Context is worth 50 IQ Points
Draft Early Acquisition Policy Changes*

Mandatory Materiel Development Decision (MDD)

Mandatory PDR and a report to the MDA before MS B
*(moves MS B to the right)*

Mandatory competing prototypes before MS B

Coordination Draft, DoDI 5000.02
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 over burdened 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

MDD
- AoA Planning
- AoA Conduct
- AoA Review & MS A Prep
- Prototype Planning
- Prototype Conduct
- Prototype Assessment
- Preliminary Design
- Prep for MS B
- Development

SE
- JCIDS
- Represent the SE actions, technical reviews, and products based on ESEWG drafts

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

Ch 1
- Ch 2
- Ch 3
- Ch 4
- Ch 5
- Ch 6
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Birdseye View of the Model

Model provides a way to visualize MDD to MS B

Best viewed as 4’ x 10’ version
• 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

- 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

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

Decision Lanes

5000

MDD  MS A  MS B

AoA Planning  AoA Conduct  AoA Review & MS A Prep  Prototype Planning  Prototype Conduct  Prototype Assessment  Preliminary Design  Prep for MS B  Development

PDR  CDR

JCIDS

SE Ch 4

Ch 1 Decision Support Systems
Ch 2 Acquisition Strategy
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Birdseye View of the Model

- Progress is being made in developing DAG chapter 4

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