Acquisition Perspectives on the Incremental Commitment Model

16 June 2008

Dr. Peter Hantos
Software Acquisition and Process Department
Software Engineering Subdivision

Prepared for:
Space and Missile Systems Center
Air Force Space Command
483 N. Aviation Blvd.
El Segundo, CA 90245-2808

Contract No. FA8802-04-C-0001

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    - Mission-Oriented Investigation and Experimentation (MOIE) Research Program (Software Acquisition Task)
Agenda

- Objectives
- Incremental Commitment Model (ICM) – The 10,000 Foot View
- ICM and DOD (Department of Defense) Acquisition Life Cycle Model Phases
- Evolutionary Acquisition
- Selected Evolutionary Acquisition and Spiral Development Challenges
- Renaming Anchor Points in ICM
- Conclusions
- Acronyms
- References
Objectives

- Identify strengths and weaknesses of the new Incremental Commitment Model
- Explore to what extent the new model will mitigate known problems of the defense acquisition system
ICM - The 10,000-Foot View*

- Based on and inherits most characteristics of the Spiral Model
  - Risk-driven spiral planning is the most significant element
- The uncoiled spiral metaphor replaces spiral
  - Every spiral cycle maps into a life cycle phase
  - For depicting concurrency, builds on the well-known IBM/RUP® diagram of core process work flows
- Major emphasis on formalized stakeholder commitment
  - Anchor Point (AP) reviews are renamed to Commitment Reviews (CR)
  - The new Commitment Reviews emphasize life cycle phase-entry instead of phase-exit
- Most CRs are aligned with DOD 5000.2 Acquisition Life Cycle Milestones (See next slide)

* Discussion is based on [Pew 2007]
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ICM and DOD Acquisition Life Cycle Model Phases

Pre-Systems Acquisition
- Concept Refinement
- Technology Development

Systems Acquisition
- System Development & Demonstration
- Design Readiness Review
- Low-Rate Initial Prod Approval

Sustainment
- Production & Deployment
- Operations & Support
- Initial Operational Capability
- Full Rate Production Approval
- Final Operational Capability

Exploration
- Concept Decision

Valuation
- Technology Development Approval

Architecture
- System Development & Demonstration Approval

Development
- Design Readiness Review
- Low-Rate Initial Prod Approval

ICM

USC/ISSE 2007 – Peter Hantos

Acronyms
DODI  Department of Defense Instruction
ICM  Incremental Commitment Model
Evolutionary Acquisition

- Current DOD direction embraces Evolutionary Acquisition (EA) and Spiral Development (SD)
  - EA is an acquisition strategy, and SD is a development process
    - Note that unique life cycle models are associated with both
  - Per DOD 5000.2, SD is preferred because (supposedly) it supports EA
- Current state
  - EA is well understood and widely practiced
  - SD is still not well understood, sporadically practiced, and many times misrepresented

The following discussion is highly relevant, since ICM is a successor of the Spiral Model

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Slide 7
Selected EA-SD Challenges

- Uncoiling the spiral and mapping it into DOD 5000.2 phases have been a concern from the beginning
  - Common interpretation is that spiral increments are mapped into DOD 5000.2 phases
    - This notion is reinforced by the fact that DOD 5000.2 requires risk-identification and risk-reduction activities in every phase
Spiraling After Milestone B is Problematic

After Milestone B, system requirements must be agreed to; this is needed to secure funding for the first acquisition increment. Spending of funds is highly constrained.

Legend: JROC: Joint Requirements Oversight Council
PPBE: Planning, Programming, Budgeting, and Execution. For details see [DODP 2003]
### Bogeyman – The Nunn-McCurdy Breach

<table>
<thead>
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<th>Reporting Thresholds</th>
<th>“Significant”</th>
<th>“Critical”</th>
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<tr>
<td>Current Baseline Estimate is exceeded by</td>
<td>+15%</td>
<td>+25%</td>
</tr>
<tr>
<td>Original Baseline Estimate is exceeded by</td>
<td>+30%</td>
<td>+50%</td>
</tr>
</tbody>
</table>

Congress is very closely monitoring cost growth. Program re-baselining cannot be taken lightly.
“Conventional” Risk Management vs. Risk-driven Spiral Planning in ICM Spirals

• Conventional risk management (required by DOD 5000.2)
  ❖ Fundamental characteristics
    – Assigns a likelihood and impact value to the risk to facilitate prioritization
    – Simple monitoring is an acceptable way of handling risks
    – Most of the time a risk “burn-down” plan is put in place for risk mitigation
  ❖ In all cases the contractor is supposed to have the costs associated with risk mitigation in the baseline
    – Alternative development paths and experiments might be chosen to deal with risks, but the contracted cost and schedule must not be impacted

• Risk-driven spiral planning
  ❖ All parameters of upcoming increments are “up for grab”
  ❖ Number of spirals should not be administratively limited
    – In fact, spinning-off iterations with engineering objectives, even without delivering any additional, useful functionality is an essential characteristic of iterative development

Iteration represents a sensible engineering approach, but might be incompatible with the overarching acquisition structure.
The Previously Shown Spiral Mapping Does Not Support EA

- The previously shown mapping of spiral increments has nothing to do with EA; those spirals are localized, internal matters of a single acquisition increment
- Spirals shown in the earlier mapping are far removed from the upgrade decision that triggers the creation of the new acquisition increment
- A more reasonable interpretation is as follows:
Renaming Anchor Points to Commitment Reviews in ICM

- CR equivalents of key Anchor Points
  - LCO (Life Cycle Objectives) → ACR (Architecture Commitment Review)
  - LCA (Life Cycle Architecture) → DCR (Development Commitment Review)
  - IOC (Initial Operational Capability) → OCR (Operations Commitment Review)

- The new naming conventions emphasize the importance of stakeholder commitment at the entry to the next phase

  - Pros and cons:
    - The positive impact is the reinforcement and codification of the principles that were used to create the Win-Win extension of the Spiral Model
    - The negative impact is that – inadvertently – the Anchor Point objectives got deemphasized
Conclusions

• **Strengths:**
  - ICM is a promising, new, development life cycle model
  - Recent ICM publications do contribute to the better understanding of spiral development principles
  - In ICM the original spiral graphical metaphor has been replaced with the uncoiled spiral, making the model's use easier for project managers
  - ICM emphasizes the importance of gaining stakeholder commitment before progressing to the next life cycle phase

• **Weaknesses:**
  - The renaming of APs to CRs deemphasized the earlier, important notion in the Spiral Model that all activities in a spiral increment are focusing on the satisfaction of the objectives of the upcoming Anchor Point
  - The mapping of ICM Anchor Points into the DOD 5000.2 milestones is artificial and not supportive of either the DOD 5000.2 Instruction in general, or its preferred, Evolutionary Acquisition strategy in particular
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACR</td>
<td>Architecture Commitment Review</td>
</tr>
<tr>
<td>AP</td>
<td>Anchor Point</td>
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<tr>
<td>CR</td>
<td>Commitment Review</td>
</tr>
<tr>
<td>DAPA</td>
<td>Defense Acquisition Performance Assessment</td>
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<tr>
<td>DCR</td>
<td>Development Commitment Review</td>
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<td>DOD</td>
<td>Department of Defense</td>
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<tr>
<td>EA</td>
<td>Evolutionary Acquisition</td>
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<tr>
<td>ECR</td>
<td>Exploration Commitment Review</td>
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<tr>
<td>FOC</td>
<td>Final Operational Capability</td>
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<tr>
<td>ICM</td>
<td>Incremental Commitment Model</td>
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<tr>
<td>IOC</td>
<td>Initial Operational Capability</td>
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<tr>
<td>JROC</td>
<td>Joint Requirements Oversight Council</td>
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<tr>
<td>LCO</td>
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<tr>
<td>MOIE</td>
<td>Mission-Oriented Investigation and Experimentation</td>
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<tr>
<td>OCR</td>
<td>Operations Commitment Review</td>
</tr>
<tr>
<td>PPBE</td>
<td>Planning, Programming, Budgeting, and Execution</td>
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<td>SD</td>
<td>Spiral Development</td>
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<td>VCR</td>
<td>Valuation Commitment Review</td>
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References


DODP 2003  DOD 7045.14 The Planning, Programming, And Budgeting System (PPBS); Certified current November 21, 2003

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