Addressing the Barriers to Agile Development in DoD

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MITRE Defense Agile Acquisition Guide

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**Addressing the Barriers to Agile Development in DoD**

**MITRE Corporation, 515 Colshire Drive, McLean, VA, 22102**

Presented at the 12th Annual Acquisition Research Symposium held May 13-14, 2015 in Monterey, CA.
How DoD Acquisition professionals can apply Agile concepts within the unique and complex Defense Acquisition Environment

- DoD IT Acquisition Challenges
- Agile Overview
- Program Structure
- Requirements
- Contracting
DoD IT Acquisition Challenges

- Change in IT technology and operations is outpacing DoD IT acquisition development
- IT programs are subject to extensive documentation, reviews, and oversight that inhibits speed and agility needed for IT
- Major DoD systems average 38% cost, 27 month schedule overrun with >$1B/year spent on programs that are cancelled*
- Congress is demanding DoD to reform IT acquisition
  - Early and continual user involvement
  - Multiple, rapidly executed capability releases
  - Early, successful prototypes; evolutionary approach
  - Modular open systems approach

* Assessments of Selected Weapon Programs, GAO-14-340SP: Published: Mar 31, 2014
Agile Acquisition

Small, dynamic, collaborative Gov’t/Industry teams focused on:

- Small, Frequent Releases
- Review Working Software
  - Iteratively Developed
  - Vice Extensive Docs
- Responsive to Changes
- Active User Involvement
  - Operations, Technology, Budgets
  - To Ensure High Ops Value

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DoD Barriers to Agile Acquisition

- Heavily regulated environment of acquisition policies and laws
- Bureaucratic, laborious, and slow processes
- Command-and-control governance structure and authorities

Agile Runs Counter to DoD’s Acquisition Environment

- Iterative releases vs big bang waterfall
- Working software vs extensive docs
- Respond to changes vs upfront plans of budgets, requirements, designs
Programs Should Consider Agile When…

- Requirements can be decomposed into small tasks
- Ops environment supports small, frequent capability deliveries
- Users can engage in development on CONOPS and feedback
- Programs can use existing infrastructure, focus on applications
- Industry has relevant domain expertise in Agile practices
- Decision authority supports Agile and tailored processes
Structuring an Agile Program

**Time Boxed Release**

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
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<tbody>
<tr>
<td>Sprint 1</td>
<td>Sprint 2</td>
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<td>Design</td>
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<td>Demo</td>
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<tr>
<td>Delivery</td>
<td>Feedback</td>
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<td>Final Release</td>
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</table>

Government Testing, Operational Assessments

- **Notional: 6 Month Release with 4-Week Sprints**
  - Continual development, integration, and testing
  - Monthly demonstration of capabilities to users

- **Gov’t testers, certifiers, and users involved early and often**
  - Minimizes work and surprises at the end of the release

**Release Length Based on Program, Ops, and Technical Risk**
Potential Agile Structure

Materiel Development Decision

- Materiel Solution Analysis Phase
  - Analyze trades of cost, performance risks and schedule.
- Technology Maturation and Risk Reduction Phase
  - Reduce risks, mature technologies, conduct design / requirements trades, finalize requirements and strategies.

Materiel Solution Analysis Phase

- IS-ICD
  - Analyze Requirements
    - Develop Initial Acquisition Strategy
      - Market Research
      - Estimate Costs
      - Contract Prep
      - RFP
- Develop Technical Baseline
- Competitive Prototypes
  - Develop Competitive Technical Baseline
  - Competitive Prototypes

Technology Maturation and Risk Reduction Phase

Development RFP Release Decision

- Development Requirements Validation

Initial Operational Capability

- Initial Operational Capability
  - IOC

Full Operational Capability

- Full Operational Capability
  - FOC

Engineering and Manufacturing Development Phase

- Development Decision
- Deployment Decision
- Operations and Sustainment
- Manage Contract(s)

- Operations and Sustainment
  - Manage Contract(s)
- Release Planning (1 Month)
  - Release Design, Development, Integration, Test, and Certification
  - Final Release Test and Cert
- Deployment Decision

- Deployment Decision
  - Deployment Decision
  - Release Planning (1 Month)
  - Release Design, Development, Integration, Test, and Certification
  - Final Release Test and Cert
  - Deployment Decision
Agile Requirements Backlog

- An evolving, prioritized queue of requirements
- Integrates operational and technical requirements
- Actively managed with user inputs and reviews

- Development team commits to scope of work for a sprint
- Sprint scope is locked, while release scope may change
- Sprint demos may identify new features or defects which would be added to the release or program backlogs
JCIDS IT Box Model

- Streamlined requirements process for software >$15M
- JROC approves IS-ICD – delegates approvals of follow-on docs
  - Follow-on docs tailored scope and content

ICD: Initial Capabilities Document
RDP: Requirements Definition Package
CD: Capability Drop
Consider a PEO, portfolio, or enterprise-level contract vehicle

- Streamlined contracting processes result in faster awards, deliveries
- Standardized, effective, and efficient contract management
Contracting for Agile – Service vs Product

<table>
<thead>
<tr>
<th>Services (FAR Part 37)</th>
<th>Product-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay for the time and expertise of an Agile development contractor</td>
<td>Contract for a defined software delivery product</td>
</tr>
<tr>
<td>• Fixed priced</td>
<td>• Firm Fixed Price</td>
</tr>
<tr>
<td>• Cost-reimbursement term</td>
<td>• Cost-reimbursement completion</td>
</tr>
<tr>
<td>• T&amp;M</td>
<td></td>
</tr>
<tr>
<td>• Contractor is selected based on the strength of the development team</td>
<td>• Contractor selected on technical solution</td>
</tr>
<tr>
<td>• Enables a teaming environment between the Government and contractor</td>
<td>• Requires upfront requirements definition for contractor cost estimates</td>
</tr>
<tr>
<td>• Appropriate when the Government wants to drive the development strategy</td>
<td>• Difficult to hold contractor accountable for delivery by directing Agile methods</td>
</tr>
<tr>
<td>• Responsive to requirements changes</td>
<td>• Requirements changes requires contract negotiation, ECPs, and/or mods</td>
</tr>
<tr>
<td>• Close collaboration required to ensure an integrated solution is delivered</td>
<td>• Diminishes flexibility and negotiation power of the Government</td>
</tr>
</tbody>
</table>

Best option for Agile

Very difficult for Agile
## Services Contract Type

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FFP Services</strong></td>
<td>• Generally preferred contract type in DoD</td>
<td>• Requires deliverables for payment (e.g., monthly report) unless progress payments are authorized</td>
</tr>
<tr>
<td></td>
<td>• Easiest contract type to manage</td>
<td>• Contract amount cannot be changed without contract modification</td>
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<td></td>
<td></td>
<td>• Cannot easily change labor mix and # of hours</td>
</tr>
<tr>
<td><strong>Cost Reimbursement Term</strong></td>
<td>• Flexibility to change labor mix and hours under contract ceiling</td>
<td>• Contract ceiling may be difficult to establish, which can affect upfront fee determination</td>
</tr>
<tr>
<td>(Level of Effort)</td>
<td>• Does not require a deliverable for payment</td>
<td>• Requires closer Gov’t monitoring</td>
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<td></td>
<td>• Requires a certified cost accounting system among other FAR requirements</td>
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<td></td>
<td>• Less incentivize for contractor to control</td>
</tr>
<tr>
<td><strong>Time-and-Material (T&amp;M)</strong></td>
<td>• Flexibility to change labor mix and hours under contract ceiling</td>
<td>• Unpopular contract type across the Gov’t</td>
</tr>
<tr>
<td>(Labor Hour)</td>
<td>• Does not require a deliverable for payment</td>
<td>• Requires close Gov’t monitoring</td>
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<tr>
<td></td>
<td></td>
<td>• Contractor is not incentivized to control costs</td>
</tr>
</tbody>
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Summary

- Using Agile development is an attractive option for IT programs
  - Regular capability deliveries
  - Responsive to changes in operations, tech, and budgets
  - Active user involvement and empowered teams

- Structure 6-12 month releases and tailor processes
- Dynamic and iterative requirements management
- Portfolio services contracting for industry partnership

- Tailoring DoD acquisitions to enable Agile adoption, successful IT

- For additional info, see [MITRE Defense Agile Acquisition Guide](#)
Potential Agile Structure

<table>
<thead>
<tr>
<th>FY14</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
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</thead>
<tbody>
<tr>
<td>Materiel Development Decision</td>
<td>Material Validation</td>
<td>Development RFP</td>
<td>Release Decision</td>
<td>PEO Reviews</td>
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<tr>
<td>Solution Analysis</td>
<td>Program Planning</td>
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</tbody>
</table>

Technology Development, Competitive Prototyping, Architecture Development and Evolution

Program Backlog – Continual Grooming and Prioritization

Release Backlogs

- RB1
- RB2
- RB3
- RB4
- RB5
- RB6
- RB7
- RB8

Operations and Support

- Operations
- Support

Release Details

- Release Planning
  - Design Review
  - Test

- Release Design
  - Development
  - Integration
  - Test
  - Certification

Sprint 1

- Design
- Develop
- Integrate
- Test

Sprint 2

- Design
- Develop
- Integrate
- Test

Sprint 3

- Design
- Develop
- Integrate
- Test

Sprint 4

- Design
- Develop
- Integrate
- Test

Sprint n

- Design
- Develop
- Integrate
- Test

Deployment Decision
Potential Contract Construct

- **Portfolio-level agile development contract**
  - Quick execution of orders for each release (e.g., 6 months)
  - Single award for quick orders and consistent contractor
  - T&M for max flexibility (transition to FFP or CR after initial period)
  - Scope/requirements can adjust over time

- **Services-based contract**
  - Contract for the services of the development team
  - Cost-boxed and time-boxed releases and sprints
  - Requirements in product backlog are flexible
  - Structure releases (e.g. 6 months) via separate task orders
Agile Overview

- Leading software methodology – begin in 2001

- Core Elements
  - Small, frequent capability releases
  - Valuing working software over comprehensive documentation
  - Responding rapidly to changes in ops, technology, and budgets
  - Actively involving users throughout development

- Small, empowered, collaborative teams
  - Follow disciplined process
  - Dynamic, tailored, and evolving
  - Continual process improvement
Five Prerequisites for Agile Acquisition

1. Small, frequent capability releases
2. Embrace change
3. Partnership: requirements, acquisition, contractor
4. Small, empowered, high-performing teams
5. Leverage a portfolio structure