Agile in DoD Acquisition

A Systemic Problem

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26 Oct 2016
Overview

➢ Compare & Contrast Each Methodology and Core Philosophy
  • Systems Development LifeCycle
  • DoD Acquisition Framework
  • Agile
  • Innovation

➢ Present Agile Challenges
  • High level

➢ Recommendations

➢ Explanation of Our Agile Implementation Strategy

➢ Summary

➢ POCs
Contrasting SDLC and DoD Acquisitions Framework

**Systems Development LifeCycle**

- Also known as the Software Development LifeCycle
- Originally developed in the late 1960’s or early 1970’s
- Intended for a Waterfall (phased) approach to systems development
  - Concept Development & Requirements Generation
  - Architectural Planning and Design
  - Development
  - Testing
  - Deployment
- Variations on the phased approach
  - V-Model
  - Spiral
  - Iterative
  - Synchronize and Stabilize
  - etc

**DoD Acquisition Framework**

- Based on SDLC
- Structured for a Waterfall (phased) approach to systems development
  - Solution Analysis
  - Technology Maturation and Risk Reduction
  - Development & Developmental Test
  - LRIP / Limited Deployment and Operational Test
  - Production, Deployment & Sustainment
  - Disposal
- Variations on the phased approach
  - V-Model
  - Spiral
  - Iterative
  - Agile?
Core Philosophies
Agile and SDLC

Agile

• People
  – Allows people the freedom to decide what needs accomplished for a given effort
  – Empowered

• Customer Collaboration & Interaction
  – Refine the system continuously over the course of the effort.

• System Change
  – Assumes change will occur frequently
  – The system is incrementally defined
  – Personnel possess the flexibility to respond quickly to emerging challenges

• Verification & Validation
  – Executed incrementally in parallel

Systems Development LifeCycle

• Processes
  – Provides people a process to govern their actions and lead them through a given effort
  – Personnel are expected to follow a process as long as it is compliant with latest policy

• Contracts and other Work Definition Documents
  – System is defined once in the beginning

• System Change
  – Assumes no change will occur
  – The system definition is extensively documented and associated work is parsed out

• Verification & Validation
  – Executed separately in sequence

The Underlying Core Philosophies Between Agile and SDLC are Diametrically Opposed in Every Possible Category!
Agile Suitability

- Agile is not Suitable for All Efforts
  - We aren’t going to build the next Aircraft Carrier using an agile methodology

<table>
<thead>
<tr>
<th></th>
<th>Agile</th>
<th>SDLC</th>
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<tbody>
<tr>
<td>User Requirements</td>
<td>Iterative</td>
<td>Detailed user requirements are well defined before design work begins</td>
</tr>
<tr>
<td>Rework Cost</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Development Direction</td>
<td>Readily Changeable</td>
<td>Fixed</td>
</tr>
<tr>
<td>Testing</td>
<td>On Every Iteration</td>
<td>When design is completed</td>
</tr>
<tr>
<td>Additional Personal Skills Needed</td>
<td>Interpersonal skill and basic business knowledge</td>
<td>Nothing</td>
</tr>
<tr>
<td>Suitable Project Scale</td>
<td>Low to Medium</td>
<td>Large</td>
</tr>
<tr>
<td>Documentation</td>
<td>Little</td>
<td>Vital</td>
</tr>
<tr>
<td>Collaboration Amongst All Project Participants</td>
<td>High (Vital)</td>
<td>Low</td>
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The Relationship Between Agile and Innovation

- Innovation is NOT a new Technology
- Innovation is New Concept Entirely, Separate and Distinct from a Specific Technology
  - Innovation is Multi-Level
  - A new way of doing things or a new way of looking at things
  - Generally, multiple technologies and/or processes will sprout from a single concept

- Innovation Basics
  - Like agile, the focus should be on the people and the concept, not on established policies and procedures
    - Innovation generally causes creative friction.
  - Like agile, it requires a very strong, well understood, central focus amongst the team members
  - Like agile, the team members need to be empowered to explore the concept as they see fit
  - Like agile, to an outside observer, the innovation team generally does not appear to be a well oiled machine, and in fact, may appear to be chaotic and/or undisciplined
    - The answers are not known and the team is exploring
    - The team should be judged on how well they deliver results, not comply with industrial age procedures
DoD Vertical Process Control

Who is Actually in Control of DoD Efforts?

- It isn’t the person actually executing the effort

Relates To:

- Employee Empowerment
- Ability to execute an agile approach
DoD Vertical Process Control
(An Analogy)

➢ The American People are DoD’s Customers
  • They are also the shareholders
  • Like any shareholder, they require transparency and accountability

➢ Congress is the Board of Directors
  • Ensures the welfare of the American People is met
    – Establishes primary organizational policies

➢ Moving Towards Future
  • Like any organization, we need to evolve to remain relevant
    – Integration of Agile control mechanisms to allow for innovation
Agile Employment Challenges Within the Current SDLC Based Framework

**Vertical Process Control Mechanisms**
- Only a single mechanism is currently available
  - Designed as a “one size fits all” approach
  - Industrial age production mentality
  - Extremely Structured
  - Government employees within the vertical have narrowly defined decision rights
    - Commonly referred to as “Employee Empowerment”
    - Intended for complicated systems
    - Reducible Systems

**Culture**
- DoD is huge
  - Process based approach
  - People stick to what they know, even if it isn’t the best approach, or if another approach is authorized

**Failures**
- Can potentially incur significant loss of investment
- Regulated sequential process
- Less S&T risk taking

**Research, S&T Focus**
- Versus acquisition of goods
Recommendations

What Can We Do?
- The services should examine the current control mechanisms to identify areas where they can be modified to support agile.
- Need to begin to socialize and experiment with new ways of acquisition to accommodate Agile and Innovation.
  - The intent is to support early stage concept development, associated research, and S&T design and development.

Develop an Alternate Framework Based on the Modified Control Mechanisms
- Do not redact the current framework, it is still needed!
- Options should be available initially to decide which acquisition framework best supports the effort at hand.

End Users Need to be Fully Integrated in System Development Efforts
- The occasional survey or workshop is not enough.
- Sustained, open, and end-user interaction is needed from start to finish.

Close the V&V Gap
- Given the complexity of DoD systems, can we really execute both RDT&E and OT&E activities simultaneously?
- We can better prepare for OT&E if:
  - We integrate OPERATIONAL models and simulations with our technical models and simulations.
  - Develop a DoD enterprise-wide Virtual Operations Simulation Environment (VOSE).
    - Focus on operations, not technology.
    - Focus on Systemic Realism, not Fictional Realism.
Our Strategy for our Current Effort

Distributed MBSE in Support of Agile Methodologies: A Three-Pronged Approach

- The utilization of a cloud based, distributed M&S tool capable of full lifecycle management
- The formation of a stakeholder / developer High Performance Team (HPT)
- The development and implementation of agile processes allowable within the current process control mechanisms
  - Workflow Integration for a Distributed Agile Team (WI-DAT)
A Model for Distributed, Real-Time MBSE

- A Distributed Front-End Work Environment Linked to a Back End Integrated Data Repository

Integrated Architectural Repository

ICDs and Architecture

Risk

CONOPS

Briefs and Other Documents

Test Plans

NSWCDD-PN-17-00011
We Intend to Organize Stakeholders in a HPT

• As opposed to the traditional Integrated Product Team (IPT) or Working Group (WG)
• To encourage open communications and high quality interactions, the HPT will be supported by an online social business and knowledge management tool
  – MilSuite.mil

Challenges

• Culture: Most are not familiar with a HPT or what it entails
  – It is more than simple organization
• Culture: Direct contact with the development team
• Online: “Social media like” interaction in lieu of email stove-pipes and required meetings
  – Culture: “Great, its another IT system I need to learn”
Workflow Integration for a Distributed Agile Team (WI-DAT)

Intent

• To allow for the execution of agile-like management and development processes within the current DoN acquisition framework
• Incorporate various acquisition processes to the minimum extent necessary to allow tailoring to the needs of a given effort
  – Configuration Management and Control
  – Program Protection
  – Intellectual Property Strategy and Management
  – Etc

Challenges

• It is being developed through the perspective of our own effort
• We are already coming up against hard boundaries imposed by the vertical process control mechanisms
Summary

➢ Implementation of Agile System Engineering Methodologies in Support of System Design Provides
  • Continuous, high quality interaction amongst the design team regardless of geographic location
  • Sponsors and Stakeholders are part of the design effort; not standing outside of it
    – Continuous, high-quality interaction amongst all the stakeholders and between the stakeholders and designers
  • Iterative Design Process
    – The System WILL change

➢ Vertical Process Control Mechanisms
  • DoD Acquisition Framework
    – Works exceedingly well for what it is intended for
    – Do not redact or significantly alter
  • Employee Empowerment
    – Examine the allocation of decision rights across the vertical process control mechanisms
    – Identify opportunities for modification of decision rights necessary to meet the challenges of the future
    – Implement an alternate framework parallel to the existing framework

➢ Process Gaps
  • We need to close the V&V gap
  • We need to end the segregation between the developers and end users
    – End users should be integrated in the development effort, from start to finish
POCs

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