Agile Retrospective: Opportunities to Perform Agile Acquisition Differently

Session 11a

Supannika Mobasser and Jodene Sasine
The Aerospace Corporation

Overview

- Agile acquisition has significant challenges for the Government sector as opposed to the commercial software-intensive industry
  - *How to smartly apply Agile concepts to the ground system acquisition lifecycle?*

- Agile acquisition discussion topics
  - *Agile Working Group 2019 Outbrief*
  - *Agile Readiness at SMC*
  - *Agile-compatible milestones and battle rhythm*
  - *Which CDRLs, when, and how?*
  - *Using Organizational Baselining to Inform Adoption Planning of New Practices*
  - *Continuous integration, verification, and testing*
  - *Just-in-time certification and accreditation*
  - *Smarter and faster data-driven metrics*
  - *Agile & Model Based Engineering (MBE)*
  - *Transparency and Openness*

- Share your Agile adoption experiences and learn from others
  - *Participants with all levels of Agile expertise are welcome*

Introductions

- What is your name?

- Which organization are you from?

- One good thing about your experiences in Agile acquisition

- One pain point about your experiences in Agile acquisition

- What is your expectation for this working group?

Pain Points about Agile Adoption

Expectations for this Agile Working Group

Schedule

Time	Presentation and Discussion
1:00 – 1:20pm	Session Overview
1:20 – 1:45 pm	*Agile Working Group 2019 Outbrief* Jodene Sasine, The Aerospace Corporation
1:45 – 2:10pm	*Agile Readiness at SMC* Capt Patrick Wu, SMC/ACX
2:10 – 3:00pm	General discussion • *Agile-compatible milestones and battle rhythm* • *Which CDRLs, when, and how?*
3:00 – 3:30pm	Break
3:30 – 3:50pm	*Using Organizational Baselining to Inform Adoption Planning of New Practices* Suzanne Miller, Software Engineering Institute
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Working Group Outbrief

Ground System Architectures Workshop
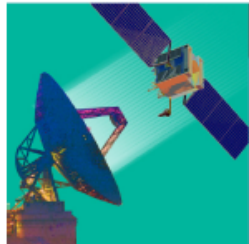
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Smarter Acquisition with Agile Approaches

Supannika Mobasser and Jodene Sasine

The Aerospace Corporation

Ground System Architectures Workshop

Participants

- William Rossiter, NGA/GFCG
- Bart Hackenmack, SEI
- Enrique Praga, GMV
- Barry Boehm, USC
- Melissa Tucker, Noblis
- Britany Chamberlain, Aerospace
- Ernie Foster, Lockheed Martin
- David Wilson, Raytheon
- Gary Chinault, USAF
- Taiko Hine, Mitsubishi Electric
- Dwain Harris, Aerospace
- John Eichner, Aerospace
- Brian Bone, Kratos
- Neal Faradineh, Rocket Communication
- Jannell Villegas, Aerospace
- Barbara Mills, Sandia National Labs

- Jennifer DeNicholas, Radiant Solutions
- Sue Mobasser, Aerospace
- Jodene Sasine, Aerospace
- Scott Nigel, Aerospace
- Curt Holmer, Aerospace
- Marvin Dolin, Lockheed Martin
- Margaret Eckerman, Aerospace
- Tony Chiles, DOD Civilian
- Alan Annett, DOD Civilian
- Jeffrey Schloemer, Raytheon
- Emily Vieth, Raytheon
- Marta Verdigo, ISISpace
- Necdet Engm Oztuna, TAI
- LaDell Weinbach, Aerospace
- B. Hochstein, SMC/AD

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1:00 – 1:20pm	Session Overview
1:20 – 1:45 pm	Agile Working Group 2018 Outbrief Jodene Sasine, The Aerospace Corporation
1:45 – 2:10pm	Scaled Agile in a traditional fixed contract world: A case from Satellite Monitoring and Control Enrique Fraga Moreira, GMV Aerospace and Defence
2:10 – 2:35pm	Revisit on Agile Fit Check Supannika Mobasser, The Aerospace Corporation
2:35 – 3:00pm	Agile Anti-Patterns Supannika Mobasser, The Aerospace Corporation
3:00 – 3:30pm	Break
3:30 – 5:00pm	General discussion • *Smarter software factory and product delivery* • *Smarter program oversight and incentive structure* • *Smarter quality assurance, compliance, and accreditation* • *Smarter practices and other domains*

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Smarter Software Factory

- Do you agree with the following minimum essential elements of a software factory?
  - Continuous integration, Continuous testing
  - Tool chain with maximum automation
  - Reusable code
- How can we make it smarter?
  - Templates : Pre-made application elements with placeholders for arguments.
  - Recipe : Automate procedures in routine tasks
  - Architecture guidance and patterns
  - IV&V with machine learning?
  - Data-driven
  - Cloud-based?
  - Continuous deployment
    - Should we / can we do that? Deploy to where?
      - *For sustainment, DevOps delivery daily or quarterly*
      - *More frequent deliveries may need reduced oversight*

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Smarter Software Factory (cont.)

- How can we make it smarter?
  - *Better integration of system testing by External groups (LDTO, AFOTEC, ...) not at end*
  - *Continuous integration testing – reserve 6 weeks at end for independent system tests*
  - *Balance capability deliveries to Operations to reflect when needed*
  - *Use technical debt analyzer (avoid potential blow-ups of debt)*
  - *Require transparency of development pipeline for the Government*
  - *Create cohesive team (e.g., Civilian Govt and contractors on the team together)*
    - *Civ. Govt fosters/cultivates the team relationship and collaboration.*
    - *Civ. Govt PO makes final decision if team can't get there.*
  - *Metrics wants*
    - *For Govt, provide real-time test results, development progress using Ktr tools*
    - *FFRDC suggests number of regressions, average number of bug (found outside of sprint), bug age, story point estimation*
    - *Re-brand a 'bug' found in a sprint to a "SAVE"*
    - *Understand type of bug (i.e., functional, screen color, etc....) and impact*
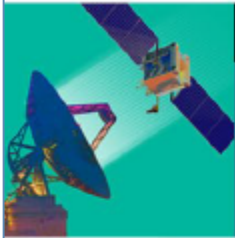
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Smarter Cybersecurity Compliance

- Do you agree with the following minimum essential elements of Cybersecurity approach?
  - Automated Testing/Test Reporting
    - *Automated pipeline kicks off on code check-in; performs static code analysis*
    - *New automated testing written by independent developer (need to understand programming language of automated test tool); done within the sprint*
  - Automated Security Scanning
  - CI/CD integrated with source code scans (security and quality)
  - All deployment candidates scanned prior to deployment
  - *Other techniques:*
    - *Red team penetration testing*
    - *Embed in static analysis where critical; peer review based on static analysis*
- How can we make it smarter?
  - Automated compliance monitoring
    - *Embedded in continuous integration/build pipeline*
    - *FOSS testing / risk assessment*

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Smarter Certification and Accreditation

- Do you agree with the following minimum essential elements of certification and accreditation process?
  - Plan for early and upfront involvement
  - Define as part of acceptance criteria and definition of done
- How can we make it smarter?
  - Composable certification [DARPA 2018]
    - Use the evaluated criteria of a subsystem as evidence in a system evaluation
  - Automated evaluation [DARPA 2018]
    - Produce compelling, checkable assurance arguments backed by evidence
  - Data-driven evidence

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Smarter Certification and Accreditation (cont.)

- How can we make it smarter?
  - *Include accreditors, AO as part of Agile team*
  - *Provide baseline of security controls to start from*
  - *Accreditors need to know what they're accrediting*
  - *Certification and accreditation needs to cognizant of DevOps risks*
  - *AI driven 24 hour certification by DARPA*
  - *Use containers for accreditation scope*
  - *Microservice architecture for accreditation to support continuous ATO*

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Smarter Government-Led Testing

- How can the government test be performed early and often?
  - How early?
    - *Pre-ATP, be part of the team to write RFP and SOW*
    - *Very early; need a large paradigm shift for Govt to fully staff early*
    - *Govt test team (i.e., external, AFOTEC, ops acceptance team (typically require 6-8 month lead time))*
  - How often?
    - Sprint-level, quarterly, annually, one-time
    - *Deliver as often as possible based on operational availability and risk*
- How can we make it smarter?
  - *Govt tester sitting with developer*
  - *When requirements are defined gain agreement of how it will be tested/verified/signed-off*
  - *Include early testing in acquisition strategy (i.e., need agile testing strategy for verification/acceptance)*
  - *AFSPC has stood up a test organization to install a better methodology for testing – contractor-level testing, embedded LDTO structure, ….*

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Smarter Incentive Structure
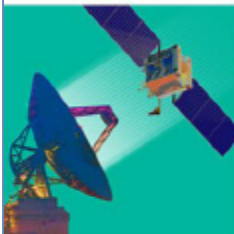
- "Be careful what you wish for"
- From Govt to contractor
  - What to incentivize?
    - Specific goal? Stretch goal? Innovation? Schedule? Quality?
  - What not to incentivize?
- From high level management to development team
  - What to incentivize?
    - Specific goal? Stretch goal? Innovation? Schedule? Quality?
  - What not to incentivize?

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Smarter Incentive Structure (cont.)

- From high level management to development team
  - What to incentivize?
    - *Define mission value and quantify busy-ness*
    - *Incentivize based on number of fixes delivered in a determined amount of time; up award fee based on number of fixes*
    - *Incentivize during test phases based on requirements, capabilities*
    - *Ktr: if we deliver what we signed up for then incentivize ("doing what we said we're going to do" (i.e., in an increment)*
    - *Incentivize developers for each bug they fix*
    - *Govt knows what they want then go fixed price, otherwise go cost plus or capacity (T&M)*
  - What not to incentivize?

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Pain Points

- Fight about how to do Agile
- Not sure how to do it
- How to fit in acquisition paradigm
- Shared understanding, same pace
- Government Agile rhythm, management
- Decision maker (with no authority)
- Buy-in, leadership onboard
- "Responding to change"
- Coordinating with waterfall
- Team coordination

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Good Points

- Good and quick feedback
- Agile and Lean
- Quality, Speed

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Agile-compatible milestones and battle rhythm

- Have you aligned traditional milestones with your program's Agile planning and development battle rhythm? Did you tailor milestone expectations? How?
  - *SRR: Software Requirements Review*
  - *SDR: System Design Review*
  - *PMR: Program Management Review*
  - *PDR: Preliminary Design Review*
  - *CDR: Critical Design Review*
  - *FDD: Full Deployment Decision*
  - *FD: Full Deployment*

- What other Agile-compatible milestones or decision points are you using?

Agile-compatible milestones and battle rhythm

- Programs use different battle rhythms and terminology
  - *Program A: Build (9 months), Program Increment (3 months), Iteration (2 weeks)*
  - *Program B: Program Increment (4 months), Incremental Development Review (4 weeks)*
  - *Program C: Build Decision Review (8 months), System Demo (2 months), Sprint (2 weeks)*

- What battle rhythms do you use?

- What terminology do you use?

Agile-compatible milestones and battle rhythm

- How often do you release?
  - *Release to staging environment*
    - Every Sprint / Iteration (~1-4 weeks)
    - Every Release / Build (~3-6 months)
    - Every major milestone (~1 year)
    - One time Release at the end of development
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***
  - *Release to Ops Floor or Operation/Production environment*
    - Every Sprint / Iteration (~1-4 weeks)
    - Every Release / Build (~3-6 months)
    - Every major milestone (~1 year)
    - One time Release at the end of development
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Release defined as deployment to a non-development environment.

Agile Team

- What is the composition of Agile team(s) on your program?
    - *Contractor-only*
    - *Government, FFRDC, SE&I, SETA, and Contractor*
    - *Government, FFRDC, SE&I, and SETA*
    - *Others?*
    - ***Pros:***
    - ***Cons:***
    - ***Challenges:***

Agile Team

- Who is the Scrum Master for your Agile team(s)?
  - *Contractor*
  - *Government*
  - *FFRDC / SE&I / SETA*
  - *Others?*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Agile Team

- Who is the Product Owner for your Agile team(s)?
    - *Contractor*
    - *Government*
    - *FFRDC / SE&I / SETA*
    - *Others?*
    - ***Pros:***
    - ***Cons:***
    - ***Challenges:***

Pre-Award CDRLs

- Which CDRLs have you excluded, included / tailored for an Agile program?
  - *Statement of Work, Statement of Objectives, Statement of Need*
  - *Pre-Award Product Roadmap: developed by Government team?*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

- Any thoughts on excluding a CDRL but adding corresponding content to the Statement of Work?
  - *CDRL process removed but Contractor has to do the work (e.g., exclude Software Development Plan, or Product Roadmap as a CDRL but add "Shall" to the SOW)*

- Are you using "Shall" statements?

Program Management Level CDRLs

- Which CDRLs have you excluded, included / tailored for your Agile program?
  - *Program Management, Subcontractor Management Plan*
  - *System Engineering Management Plan, Software and System Measurements Report*
  - *Integrated Master Schedule, Product Roadmap, Work Breakdown Structure*
  - *Software Development Plan*
  - *Quality Assurance Program Plan, Configuration Management Plan, Data Management Plan, Accreditation Plan*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Requirement CDRLs

- Which CDRLs have you excluded / tailored, or added for your Agile program?
  - *System/Subsystem Specification, Software Requirements Specification*
  - *Technical Requirements Document*
  - *Requirements Traceability Matrix*
  - *Product Backlog*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Architecture CDRLs

- Which CDRLs have you excluded / tailored, or added for your Agile program?
    - *Software Architecture Description, MBE models*
    - *Interface Control Document*
    - *System/Subsystem Design Description, Software Design Description*
    - ***Pros:***
    - ***Cons:***
    - ***Challenges:***

Testing CDRLs

- Which CDRLs have you excluded / tailored, or added for your Agile program?
  - *System Test Plan, System Integration and Test Plan*
  - *Software Test Plan, Software Test Description, Software Test Report*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

When and How?

- When are CDRLs delivered for your Agile program?
  - *Draft until final "As-built"*
  - *Align on battle rhythm (Release, Program Increment, …..)*
  - *Include in the "Definition of Done" for Build, Program Increment, Epic, Feature*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

- How are CDRLs delivered to the Government?
  - *Streamlined format (e.g.,tailored DID for Agile)*
  - *Auto-generated by Contractor from project tools (e.g., Modeling tool, Confluence)*
  - *Hard Copy*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

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Continuous integration, verification, and testing

- How often do you integrate at the system-level on an Agile program?
  - *Every day (nightly build)*
  - *Every Sprint / Iteration (1-4 weeks)*
  - *Every Release / Build (1-4 months)*
  - *Every year (6 -12 months)*
  - *One time at the end of the development*
  - *Others?*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Just-in-time certification and accreditation

- Do any of these suggestions from last year's session work for an Agile program?
  - *Design for certification*
    - Microservice architecture
    - Use containers for accreditation scope
    - Artificial Intelligence (AI) driven 24 hour certification by DARPA
    - Automated compliance monitoring
  - *Stakeholders involvement*
    - Include accreditors, Authorizing Official (AO) as part of Agile team
      - *Accreditors need to know what they're accrediting*

- Any new experiences regarding Continuous Authorization to Operate (ATO)?

Smarter and faster data-driven metrics

- Are any of these common metrics unsuitable for an Agile program?
  - *Progress*: Velocity, burndown / burnup chart, cumulative workflow, Features delivered
  - *Size*: Production SLOC, Test SLOC, Backlog items
  - *Quality*: Defect size / type / age/ severity, Technical Debt, Test results
  - *Schedule*: EVM, Features Completed (planned vs actual)
  - *DevOps*: #build pass, deployment frequency, lead time

- What other metrics have you found suitable?

- Are you monitoring metrics in real-time? If so, how?

Agile & Model Based Engineering (MBE)

- How do you incorporate MBE in an Agile program?
  - *Top-down modeling*
    - System engineers develop models / diagrams then provide to Development team
    - **Pros:**
    - **Cons:**
    - **Challenges:**

  - *Bottom-up modeling*
    - Development team draws rough models/ diagrams then provide to Modeling team
    - **Pros:**
    - **Cons:**
    - **Challenges:**

  - *Other techniques?*

Agile & MBE

- What are the MBE deliverables in an Agile program?
  - *Executable models, diagrams, design documents*

- How often are they delivered?
  - *Every Sprint / Iteration*
  - *Every Release / Build*
  - *ATP + 6 months*
  - *One time at the end of the program*
  - *Others?*
  - ***Pros:***
  - ***Cons:***
  - ***Challenges:***

Transparency and Openness

- How can Agile increase transparency between the Government team and the Contractor?
  - *Pros:*
  - *Cons:*
  - *Challenges:*

- What should the Government team do to get project visibility and not step on the Contractor's toes?
  - *Pros:*
  - *Cons:*
  - *Challenges:*

Transparency and Openness

- What would the Contractor expect from the Government for an Agile program?
  - *Pros:*
  - *Cons:*
  - *Challenges:*

- What would the Government expect from the Contractor for an Agile program?
  - *Pros:*
  - *Cons:*
  - *Challenges:*

Thank you for participating!