Adopting AGILE and the Scaled Agile Framework (SAFe) for the Federal Government:
A case study application for a satellite ground system acquisition program

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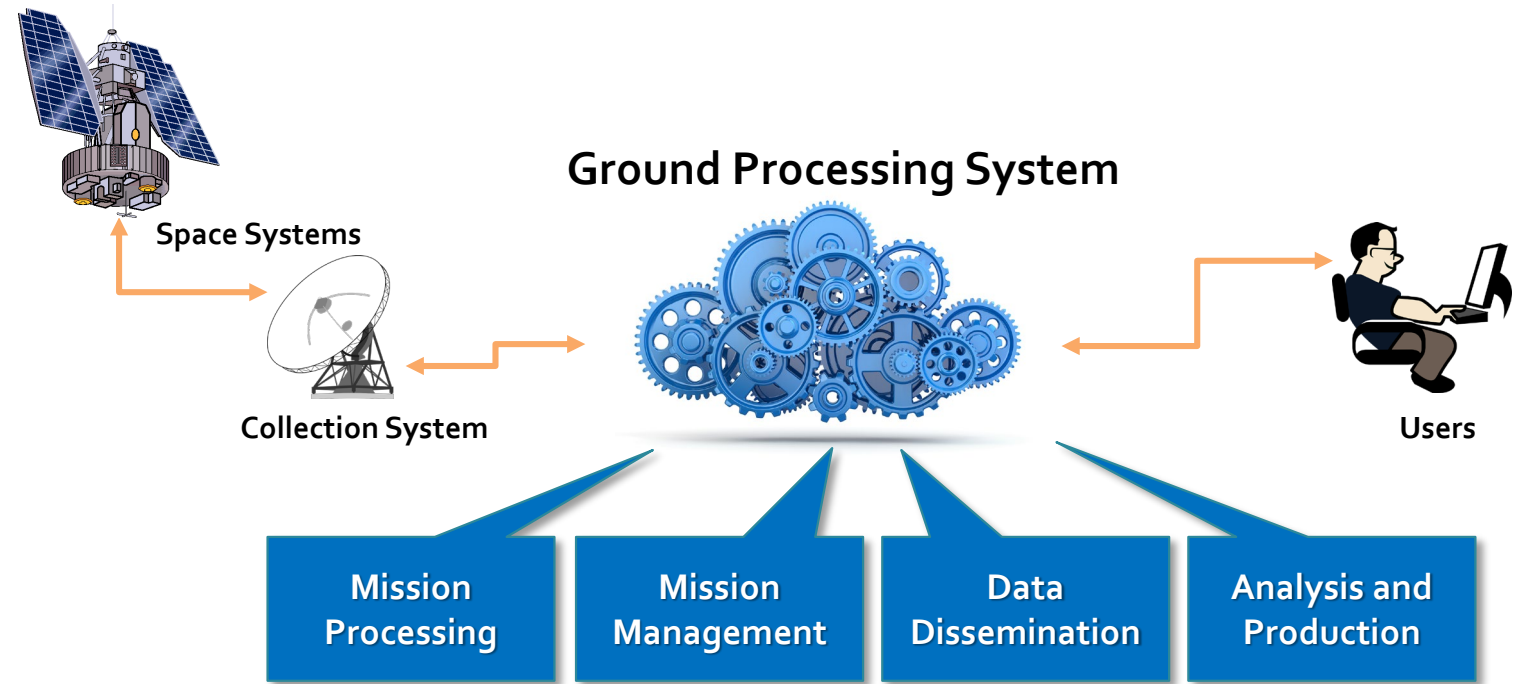
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Presentation Topics

- A case for adopting AGILE and SAFe – The Systems Program Office

- Defining the challenge

- Adopting Agile and the Scaled Agile Framework (SAFe)

- Lessons Learned and observations – How Federal "constraints" impacted the ability to be "Agile"

- Onward and beyond for the program office

Intent is to provide individuals and organizations key lessons learned for implementing the Agile and Scaled Agile approach within the constraints of the federal government

* Assumption – familiarity with Agile, Scaled Agile Framework (SAFe), and Continuous Integration concepts

A case for adopting AGILE and SAFe

The Systems Program Office

Space Systems

Collection System

Ground Processing System

Users

Mission Processing

Mission Management

Data Dissemination

Analysis and Production

- Systems Program Office (SPO) - joint program office between multiple federal agencies and strategic organizations

- System-of-Systems (SoS) construct to provide ground station functionalities for space systems.
  - Remove stovepipe dependencies for various space system capabilities

A case for adopting AGILE and SAFe

The Systems Program Office

- Major Systems Acquisition (ACAT- I equivalent) program office responsible for the acquisition of a ground processing system

- "Government-As-The-Integrator" (GATI) – serve as the primary integrator for legacy and emerging ground station capabilities in support of NTM

- Software intensive development effort – multiple vendors, multiple sub-systems

- Primarily software development effort provided by >20 vendors with multiple contract lines and types.

- Program Office composed of Military, Government, Contractor-support

- Future Year Defense Program (FYDP) budget – FY 19-25 > $1.0B

Defining the Challenge

- Implement Agile methodology to software development in order to enable rapid software delivery (capability) to the users

- Scale the Agile process to enable enterprise integration activities

- Adopt cloud environments where applicable

- Enable organizational processes to allow iterative activities

- Align resource skillsets to enable Agile processes and integration capabilities

- Federal Agency Organizational focus – Acquisition-centric approach
  - DoDI 5000.02 – Operation of the Defense Acquisition System
  - Traditional Waterfall approach
  - Significant top-down System Engineering mindset
  - Systematic oversight from Congress and other federal organizations

Program Office

Drive to adopt Agile and SAFe

- Decision to implement Agile and Scaled Agile (2015/16)
- Focused and deliberate activity
  - Allow/direct component development to utilize Agile development approach – Scrum
  - Adopt Scaled Agile Framework (SAFe) – early iteration of SAFe, tailored approach
  - Re-organize according to SAFe approach
  - Adoption of Agile and SAFe lexicon
- Initial emphasis on component developers to adopt Agile approach – tempo, delivery cycle, and scale where appropriate, within the component efforts
- Develop and migrate into the cloud environment as appropriate
- Establish a cyclic planning cycle – Increment planning
  - Organizational focused with stakeholder expansion

Program Office

Case Study Results

Successes

- Adoption of Scrum as the preferred Agile approach for developers
  - Cycle of activities around the iterative approach

- Established quarterly incremental planning cycle

- Established a dynamic, iterative approach that went beyond software development and deliveries – redefined organizational activities

- Provided a means for cross-component collaboration and interaction

- Led agency approach to address iterative (Agile) activities and overall adoption

- Pathfinder for additional framework activities

- **Effective component deliveries that addressed mission or user demands to the stakeholders**
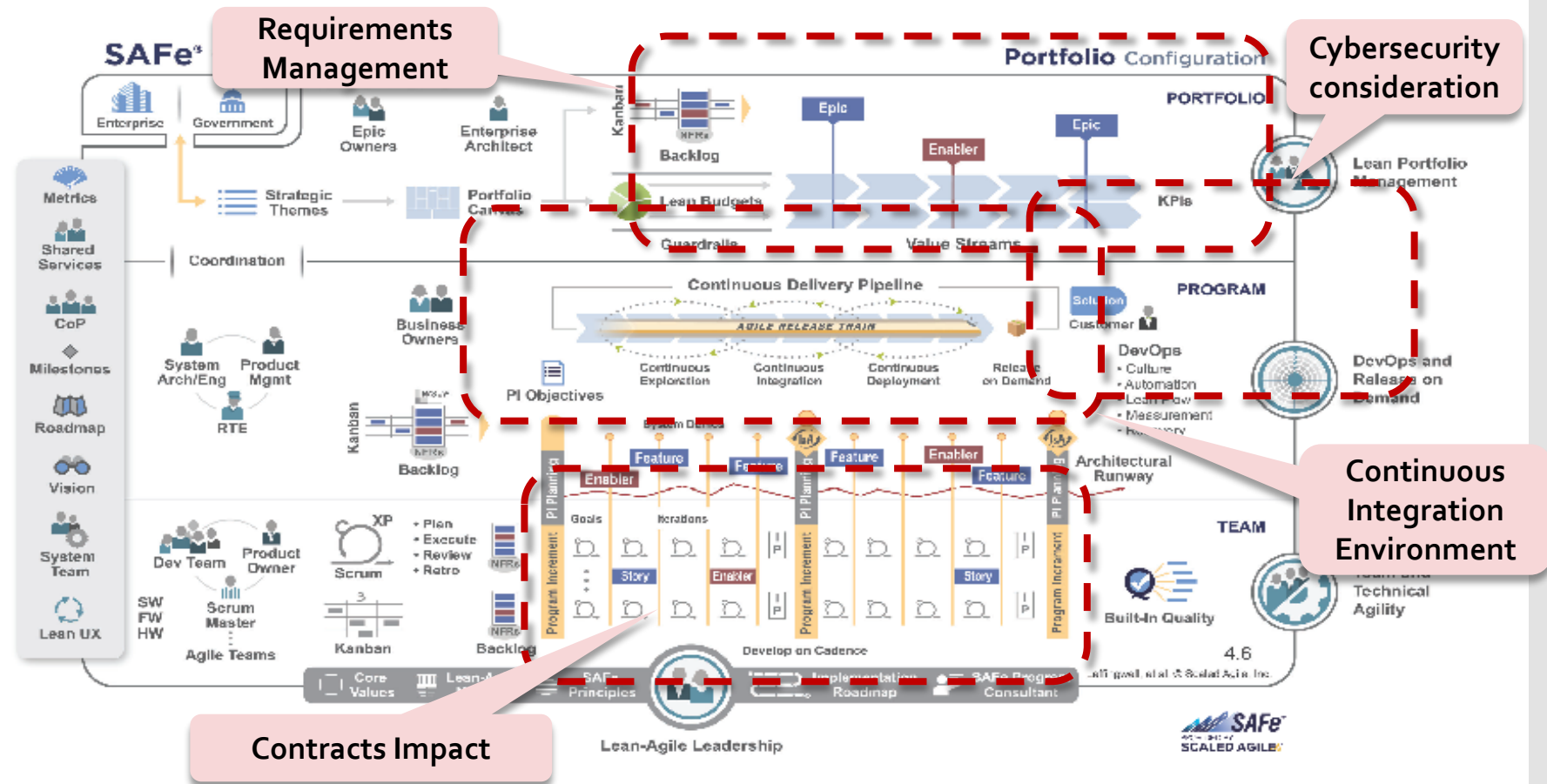
Program Office

Case Study Results

Challenges

- Scaling of activities remains a challenge
  - Initial concept to adopt Minimum Value Threads was not successful

- Relegated systems engineering activities to supporting events
  - Program Office is responsible for translating Agile and SAFe "speak" to oversight and higher agency reporting

- Additional resources did not alleviate the challenges
  - Financial and human resources did not resolve difficulties

- Processes did not translate to effective tools and environment
  - Agile and SAFe came first; supporting structure was not ready

- Critical lessons learned obtained in four areas:
  - Requirements management
  - Contracts management
  - Continuous Integration Environment
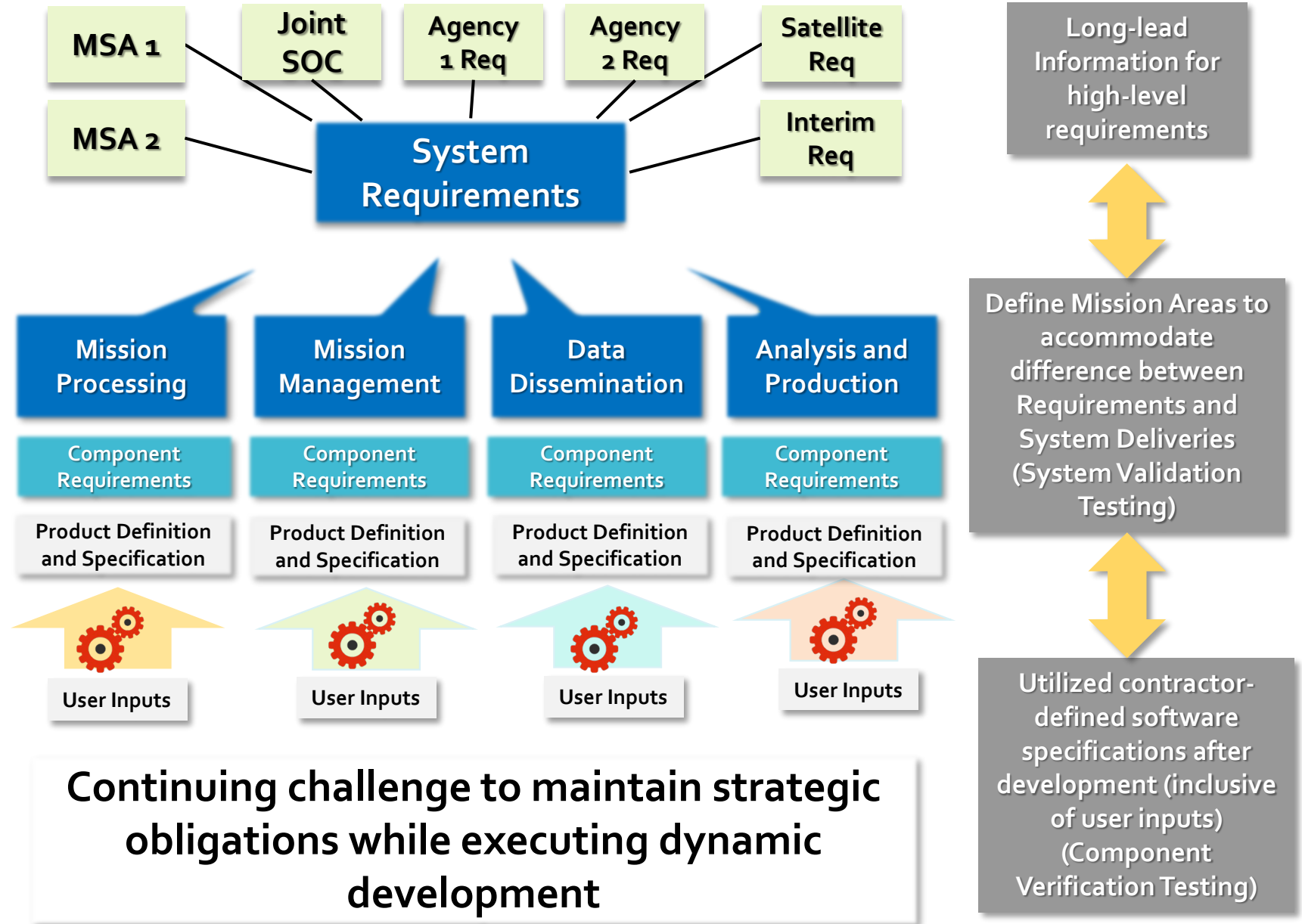 - Cybersecurity considerations

Scaled Agile Framework

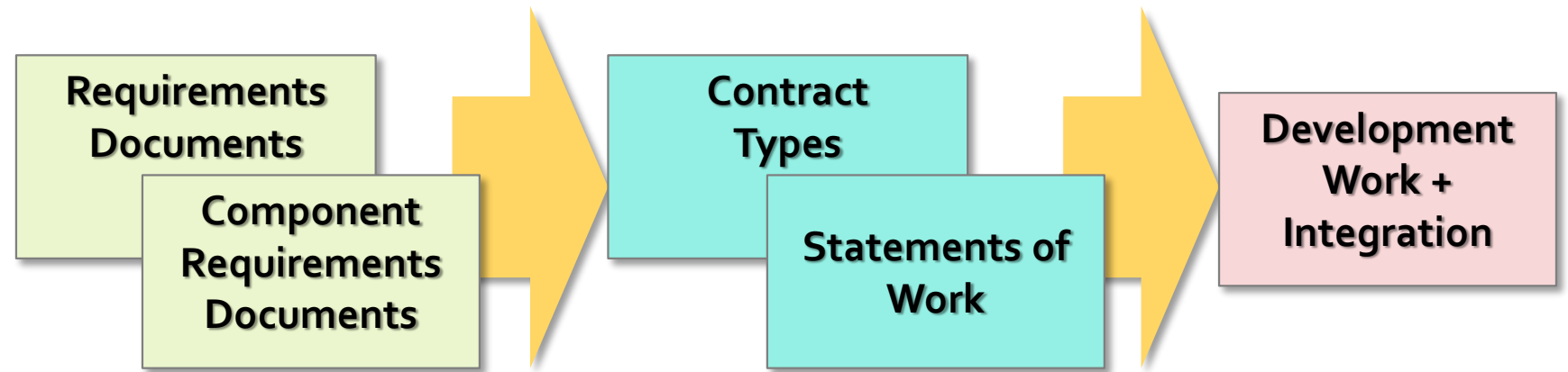# Scaling Agile activities to support integration

- Fundamentally, the decision to the adopt the Agile approach is to also implement the Scaled Agile Framework (SAFe)
- Mindset to go "faster in delivering capabilities" and "scaling faster delivery"

Requirements Management

MSA 1
Joint SOC
Agency 1 Req
Agency 2 Req
Satellite Req

MSA 2
Interim Req

System Requirements

Mission Processing
Mission Management
Data Dissemination
Analysis and Production

Component Requirements
Component Requirements
Component Requirements
Component Requirements

Product Definition and Specification
Product Definition and Specification
Product Definition and Specification
Product Definition and Specification

User Inputs
User Inputs
User Inputs
User Inputs

Continuing challenge to maintain strategic obligations while executing dynamic development

Long-lead Information for high-level requirements

Define Mission Areas to accommodate difference between Requirements and System Deliveries (System Validation Testing)

Utilized contractor-defined software specifications after development (inclusive of user inputs) (Component Verification Testing)

Contract Impacts and Consideration

Requirements Documents / Component Requirements Documents	→	Contract Types / Statements of Work	→	Development Work + Integration

- Can be viewed as the PMO's "span of control" – defines type of work that developers and contractors can legally execute
- Done incorrectly, this will disable ability to become Agile or integrate effectively
  - Ensure contract language exists for scaling and integration activities
  - Ensure contract language exists for product delivery
- Contract types will be a factor in determining flexibility – for the Program Office, Cost-plus award and incentive fee were particularly successful
- **Contract definition (i.e. Statements of Work, contract deliverables, etc.) will be critical in defining work and ability to accommodate changes per the Agile doctrine**
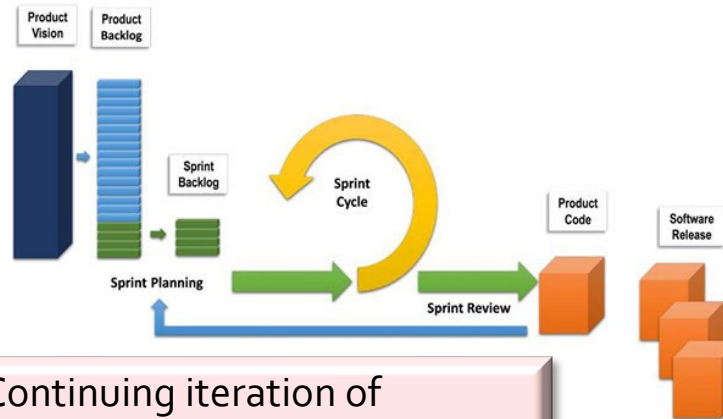
Continuous Integration Environment

- Key enabler for utilizing scaling and integration activities – tied to strategic vision of overall effort

- DEVOPS pipeline – strategic design – How can the user utilize the system?

- Provide the necessary environment for deployment for user access to software

- Align use of software development toolkits

- Lack of common environment will negate key advantages of what Agile and SAFE can offer (i.e. automated testing, etc.)

- **Significant driver for cost increase and cyber security activities; schedules and performance very close second**

Migrate → Develop | Integrate and Test → Deploy → Production

Continuous Integration

Cybersecurity Considerations

The Agile way.

Product Vision
Product Backlog
Sprint Backlog
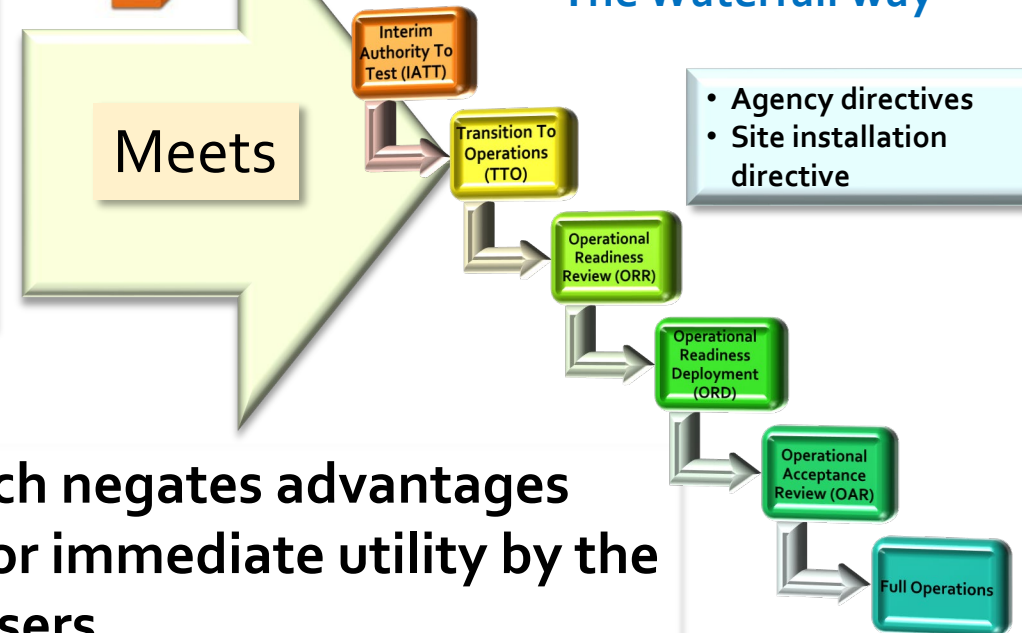Sprint Cycle
Sprint Planning
Sprint Review
Product Code
Software Release

- Continuing iteration of software development and deployment
- Ability to ingest user changes and adapt to changing environment
- Dynamic changes and tempo

Meets

- Deliberate and systematic linear activities
- Cybersecurity and site installation policies go hand-in-hand
- Process and document intensive

The Waterfall way

Interim Authority To Test (IATT)
Transition To Operations (TTO)
Operational Readiness Review (ORR)
Operational Readiness Deployment (ORD)
Operational Acceptance Review (OAR)
Full Operations

- Agency directives
- Site installation directive

Mismatch in approach negates advantages achieved in using Agile or immediate utility by the users

Key Lessons Learned / Observations

1) "Digital Engineering" is an agency approach; Agile and Scaled Agile will influence a significant portion of how the organization conducts business

2) <u>Agile and SAFe does NOT replace good Systems Engineering processes</u>
   - They are process tools to implement Systems Engineering
   - Adopt and tailor Agile and SAFE processes to maximize efforts

3) Federal ecosystem will continue to have challenges ahead
   - Most agency activities are still simply too entrenched in the traditional mindset of "waterfall"

4) Challenge in understanding the "Tools of Agile" – consistency and control of these tools are essential

5) The "Cloud" environment will exacerbate challenges of Agile
   - Highly recommend to understand the environment first, develop it, and prepare the environment, to fully maximize agility and integration

Key Lessons Learned / Observations

6) Mapping of lexicon and terminology is essential to organization success
   - Recommend that organizations implement a top-down approach for consistency

7) Establish the strategic implementation plan at the agency level – don't forget data design and considerations

8) Highly recommend a common "digital environment" at the highest level possible (i.e. common environments, common platforms, common toolsets) – minimize duplicity in approach and redundancy in activity

9) Cybersecurity will be an exponential factor as you scale integration activities

10) Basics of Systems Engineering cannot be over-emphasized

Onward and beyond for the Program Office

- All component development activities are utilizing the Agile methodology

- Adopted SAFe construct for cross-component coordination
  - Increment Planning construct (quarterly coordination)

- Entering next phase of system-of-system integration
  - Multi-environment integration and testing (Distributed Test approach)
  - Common testing toolset
  - Rolling integration and test windows – adopted Agile process to system-of-system integration
  - Continuing requirements management process (component verification testing)
  - Aligning integration testing to Mission Areas per user inputs (system test validation)

- Re-defining agency Systems Engineering process to adapt to Agile and Scaled Agile approach

- Preparing for higher Enterprise integration activities

Questions