Scheduling Agile-fall Best Practices

ICEAA 2023

Professional Development and

Training Workshop

Agenda

- Overview
- Agile vs Waterfall
- IT Box to Traditional Acquisition
- Hybrid Model
- Agile Schedules
- Schedule Construction in a Hybrid Environment
  - Work Breakdown Structure
  - Activities Captured
  - Agile Sequencing
  - Tracking Agile Development in MS Project
  - Schedule Baseline
  - Cost Estimation in Hybrid Model
  - Monitoring Progress in Agile
  - Using Metrics to Monitor Performance
- Summary

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Overview

- Agile acquisitions have become more common
  - Leading methodology with growing adoption
  - In use across DoD and other federal agencies
  - Shift from traditional waterfall development

- High-quality program schedule is still necessary
  - GAO 10 Best Scheduling Practices apply to Agile
    - Including Capturing All Activities, Sequencing All Activities and Verifying that the Schedule can be traced Horizontally/Vertically
  - Best practices can be tailored to maximize value

- An Agile schedule can enable communication

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Major differences?

- Waterfall
  - Starts by developing a plan for all requirements (Fixed Scope)
  - Ends when requirements have been met (Flexible Cost/Schedule)
- Agile
  - Starts by developing a high-level program goal & priority requirements
  - Customer feedback refines requirements (Flexible Scope)
  - Ends when the program goal has been met (Fixed Cost/Schedule)
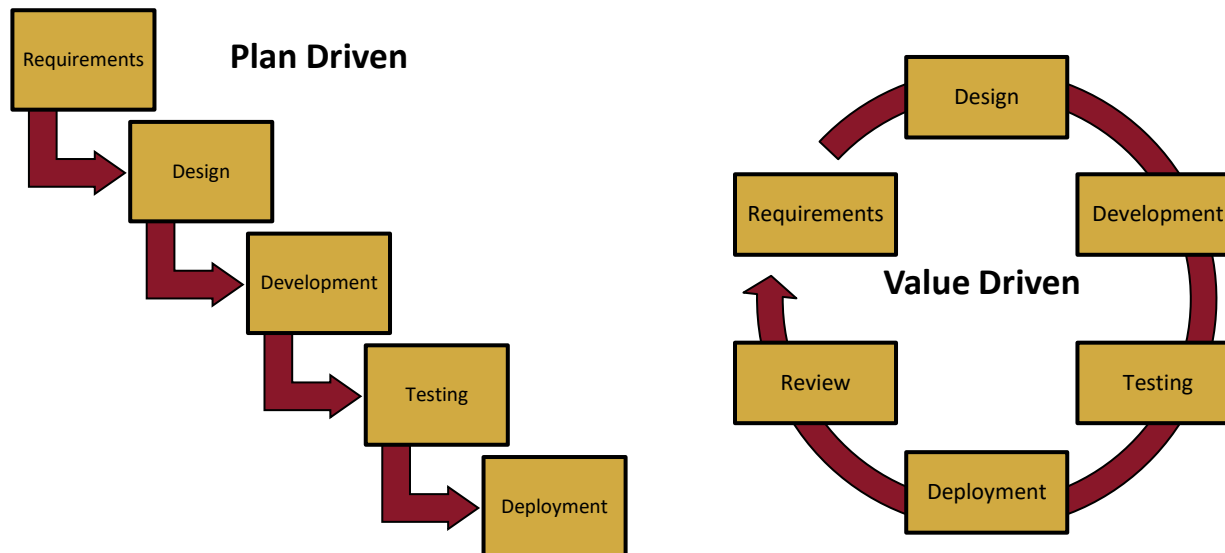
Agile or Waterfall

- Waterfall and Agile each have their own merits
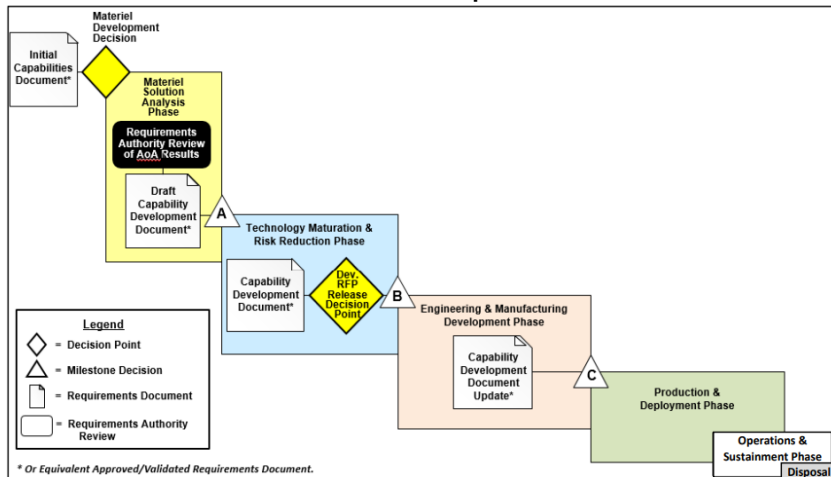- A hybrid model can help capture the benefits of both

- Waterfall
  - Great for projects with well-defined requirements and end states
  - Prioritizes upfront planning; forces commitment
  - Strategy slower to respond to changes/risks

- Agile
  - Great for projects where the end goal or the path/process to achieve an objective is not clearly defined or known
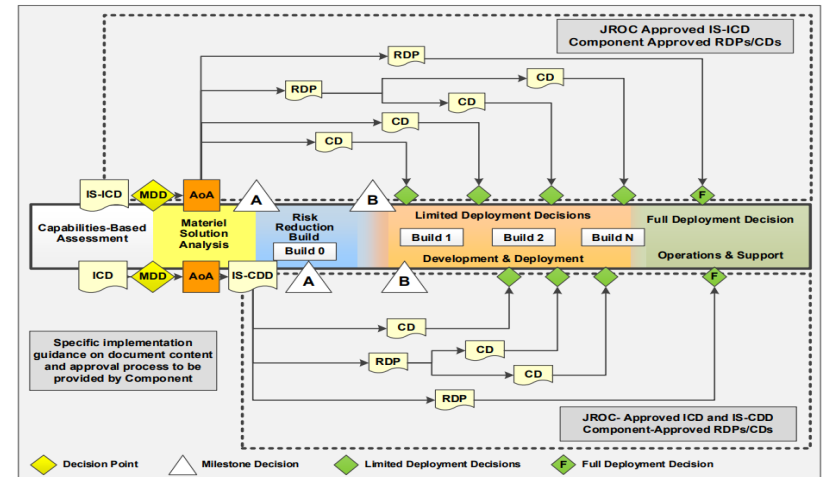 - Gives projects more flexibility to adapt to changing customer needs

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Comparing the IT Box to Traditional Acquisition

- Difficult for federal projects to be "pure" Agile
  - IT Box is a helpful framework
- Traditional Acquisition requirements documents (e.g. CDD)
  - More clearly defined and measurable
  - Discrete phases and milestones for one solution that is delivered and maintained
- IT Box requirements documents (e.g. IS-CDD)
  - Allows for flexibility with evolving capabilities
  - RDPs and CDs are derived, defining requirements at a lower level

Traditional Acquisition

IT Box Process

CHARTER OF THE JOINT REQUIREMENTS OVERSIGHT COUNCIL AND IMPLEMENTATION
OF THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM

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Agile Still Requires Bounding of Requirements

Example

- CDD asks for:
    - Software tool that can extract stored data (PM says "from all sources")
- Agile project asks….are you sure?
    - Every phone, tablet, computer, port, passport (every country), mag strip, ID card, smart card chip, bar code, key fob, etc.


- Nonsense! This is a boundless requirement
    - Define the MVP (e.g. 3 most common phones being utilized "in x")
    - List your backlog items, prioritize

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Signs That an "Agile" Project is really Hybrid

- Features lack usage metrics

- There are few/no releases during development

- Features are only ever added during a release

- Backlog items are never reprioritized

- Features are never removed after they are released

- All User stories have detailed estimates and requirements

- "Productivity" is valued over business outcomes

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Hybrid Model

- In complex hybrid environments, adequate tooling becomes a necessity to maintain traceability
  - A schedule is often thought of as a planning tool, but acts as a common denominator linking together the complexities of a program
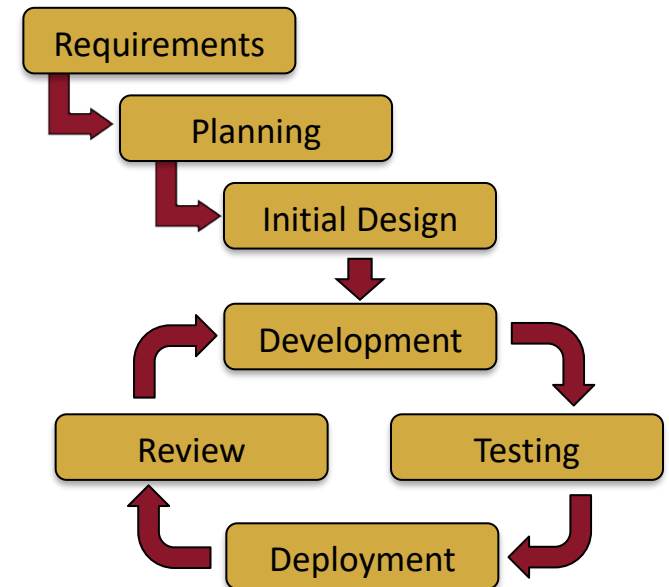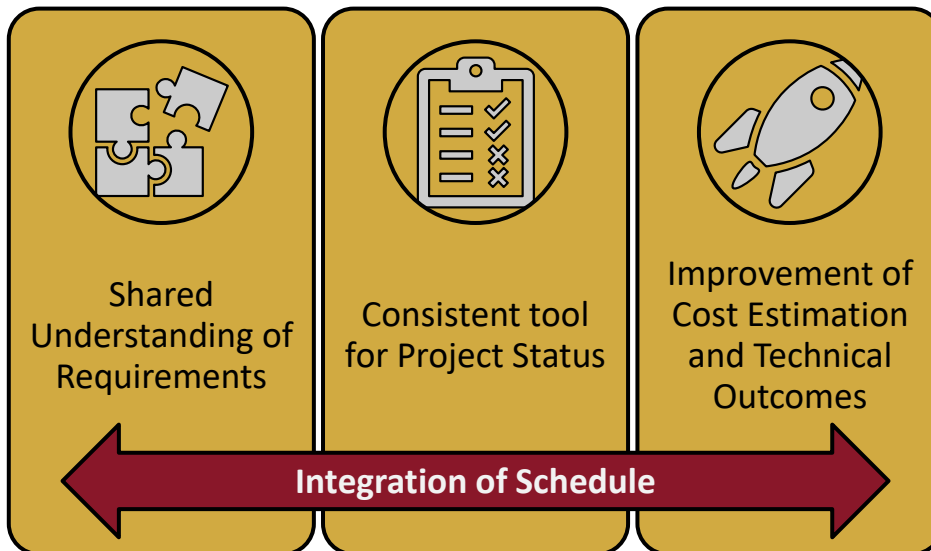
Agile Schedules

- High-quality program schedules are still needed in Agile
- The GAO Scheduling 10 Best Practices still relevant
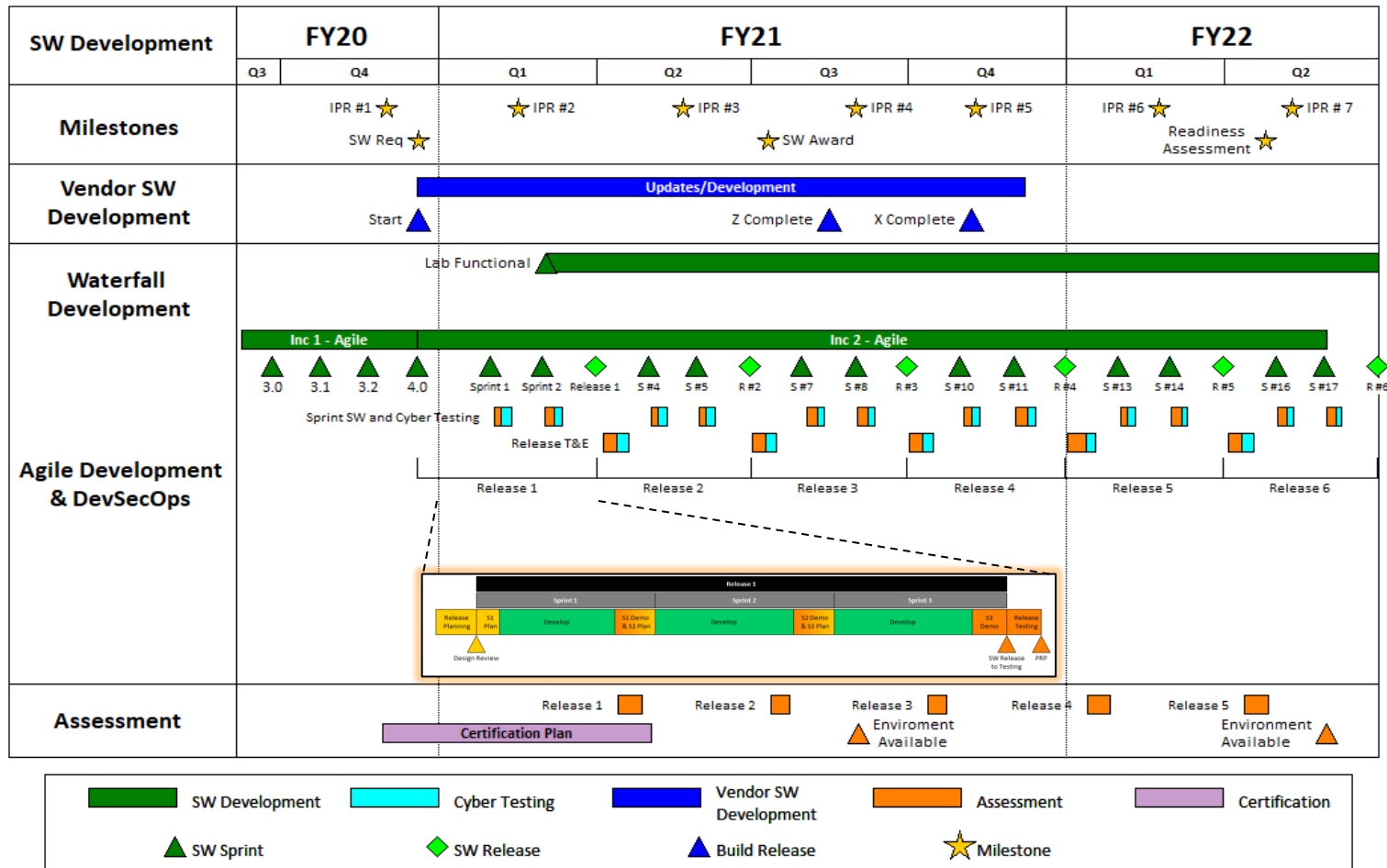
The Benefits of a Project Schedule

- ## Customer Benefits:
  - Status data
  - Ability to track schedule to help predict costs
  - Actionable mitigation planning ability (what-if scenarios)
  - Relevant information to provide forecasting and deconflict project timelines
  - Pertinent information to chain of command and data deliveries
  - Knowledge of critical path for trade-off analysis

- ## Vendor Benefits:
  - Maintain and continue business viability
  - Meet contractual deadlines and deliverables
  - Deliver high quality product
  - Solve issues before they become problems
  - Minimize extraneous work

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Communication

- A schedule is often thought of as a planning tool, but it also enables communication

  - Common denominator linking together complexities across a program

  - Ensures common understanding of scope, deliveries, and timelines

- Challenge:

  - Agile frameworks/methodologies can vary

  - Teams may use different terminology to refer to the same concepts

    - e.g. Epic can be referred to as a Theme or High-level requirement

    - Members of an Agile program should use the same terminology to avoid confusion

- An integrated master schedule (IMS) ensures consistent understanding of program status and path forward

Schedule Construction
in a Hybrid Agile Environment

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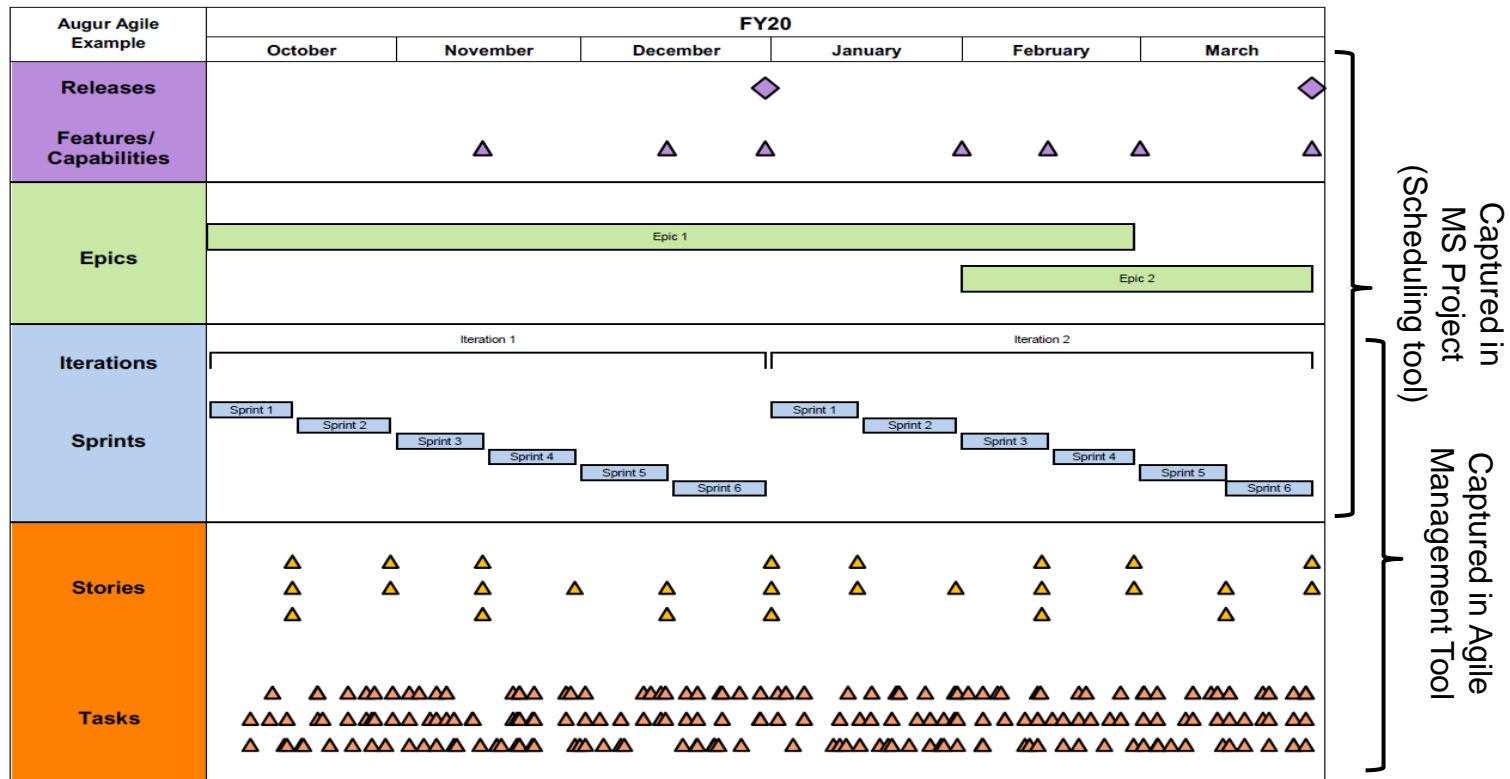# Work Breakdown Structure (WBS)

- Work is broken down into successive levels of effort
  - Epic, Feature, and User story
  - User story should only be added to the WBS after release or iteration planning and be traceable to the prioritized backlog
- A work breakdown structure (WBS) links cost, schedule, and performance along common reporting structure
- Majority of monitoring and control maintained at the Epic or Feature level

Prior to Release/ Iteration Planning		
WBS	**Title**	**Release**
1.1	Prime Mission Product	
1.1.1	Epic 1	
1.1.1.1	Feature 1X	A
1.1.1.2	Feature 1Y	A
1.1.2	Epic 2	
1.1.2.1	Feature 2X	A
1.1.2.2	Feature 2Y	B
1.1.2.3	Feature 2Z	B
1.2	Program Management	All
1.3	Hardware	A
1.4	Software Licenses	B

Post Release/ Iteration Planning		
WBS	**Title**	**Release**
1.1	Prime Mission Product	
1.1.1	Epic 1	
1.1.1.1	Feature 1X	A
1.1.1.1.1	User Story 1Xa	A
1.1.1.1.2	User Story 1Xb	A
1.1.1.2	Feature 1Y	A
1.1.1.2.1	User Story 1Ya	A
1.1.1.2.2	User Story 1Yb	A
1.1.2	Epic 2	A/B
1.1.2.1	Feature 2X	A
1.1.2.1.1	User Story 2Xa	A
1.1.2.2	Feature 2Y	B
1.1.2.3	Feature 2Z	B
1.2	Program Management	All
1.3	Hardware	A
1.4	Software Licenses	B

Activities Captured

- The two major hierarchies used in Agile are "Product" and "Time"
    - Product: Applicable to WBS and measuring performance
    - Time: The cadence for planning and work execution
- Both must be captured in the IMS to effectively monitor progress

Tracking Agile Development in MS Project

Create a Hammock Tasks for Capabilities

Sprint and Release dates should be planned ahead of time

Connect Capabilities to Starting Sprint and Projected Release. Update if necessary

| ID	Task Name	Duration	Start	Finish	Predecessors	Successors
1	**Capabilities**	**150 days**	**Mon 6/1/20**	**Mon 12/28/20**		
2	**Capability A**	**50 days**	**Mon 6/1/20**	**Mon 8/10/20**		
3	Capability A Start	0 days	Mon 6/1/20	Mon 6/1/20	19SS	
4	Capability A Finish	0 days	Mon 8/10/20	Mon 8/10/20	23FF	
5	**Capability B**	**100 days**	**Mon 6/1/20**	**Mon 10/19/20**		
6	Capability B Start	0 days	Mon 6/1/20	Mon 6/1/20	19SS	
7	Capability B Finish	0 days	Mon 10/19/20	Mon 10/19/20	29FF	
8	**Capability C**	**120 days**	**Mon 7/13/20**	**Mon 12/28/20**		
9	Capability C Start	0 days	Mon 7/13/20	Mon 7/13/20	22SS	
10	Capability C Finish	0 days	Mon 12/28/20	Mon 12/28/20	35FF	
11	**Capability D**	**100 days**	**Mon 8/10/20**	**Mon 12/28/20**		
12	Capability D Start	0 days	Mon 8/10/20	Mon 8/10/20	25SS	
13	Capability D Finish	0 days	Mon 12/28/20	Mon 12/28/20	35FF	
14	**Capability E**	**70 days**	**Mon 9/21/20**	**Mon 12/28/20**		
15	Capability E Start	0 days	Mon 9/21/20	Mon 9/21/20	28SS	
16	Capability E Finish	0 days	Mon 12/28/20	Mon 12/28/20	35FF	
17	**Releases**	**150 days**	**Mon 6/1/20**	**Mon 12/28/20**		
18	**Release 1**	**50 days**	**Mon 6/1/20**	**Mon 8/10/20**		
19	Sprint 1	14 edays	Mon 6/1/20	Mon 6/15/20		20,3SS,6SS
20	Sprint 2	14 edays	Mon 6/15/20	Mon 6/29/20	19	21
21	Sprint 3	14 edays	Mon 6/29/20	Mon 7/13/20	20	22
22	Sprint 4	14 edays	Mon 7/13/20	Mon 7/27/20	21	23,9SS
23	Sprint 5 (T&E)	14 edays	Mon 7/27/20	Mon 8/10/20	22	25,4FF
24	**Release 2**	**50 days**	**Mon 8/10/20**	**Mon 10/19/20**		
25	Sprint 1	14 edays	Mon 8/10/20	Mon 8/24/20	23	26,12SS
26	Sprint 2	14 edays	Mon 8/24/20	Mon 9/7/20	25	27
27	Sprint 3	14 edays	Mon 9/7/20	Mon 9/21/20	26	28
28	Sprint 4	14 edays	Mon 9/21/20	Mon 10/5/20	27	29,15SS
29	Sprint 5 (T&E)	14 edays	Mon 10/5/20	Mon 10/19/20	28	31,7FF
30	**Release 3**	**50 days**	**Mon 10/19/20**	**Mon 12/28/20**		
31	Sprint 1	14 edays	Mon 10/19/20	Mon 11/2/20	29	32
32	Sprint 2	14 edays	Mon 11/2/20	Mon 11/16/20	31	33
33	Sprint 3	14 edays	Mon 11/16/20	Mon 11/30/20	32	34
34	Sprint 4	14 edays	Mon 11/30/20	Mon 12/14/20	33	35
35	Sprint 5 (T&E)	14 edays	Mon 12/14/20	Mon 12/28/20	34	10FF,16FF,13FF

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Stories

- Tracked in an Agile management tool
- Assigned to Sprints in the Agile management tool
- Stories should be vertically traceable to Features in the IMS
    - WBS, Control Account Number, Work Package Number
    - Stories are more detailed and subject to change
    - Tracking performance & trends in the IMS may support better cost estimates
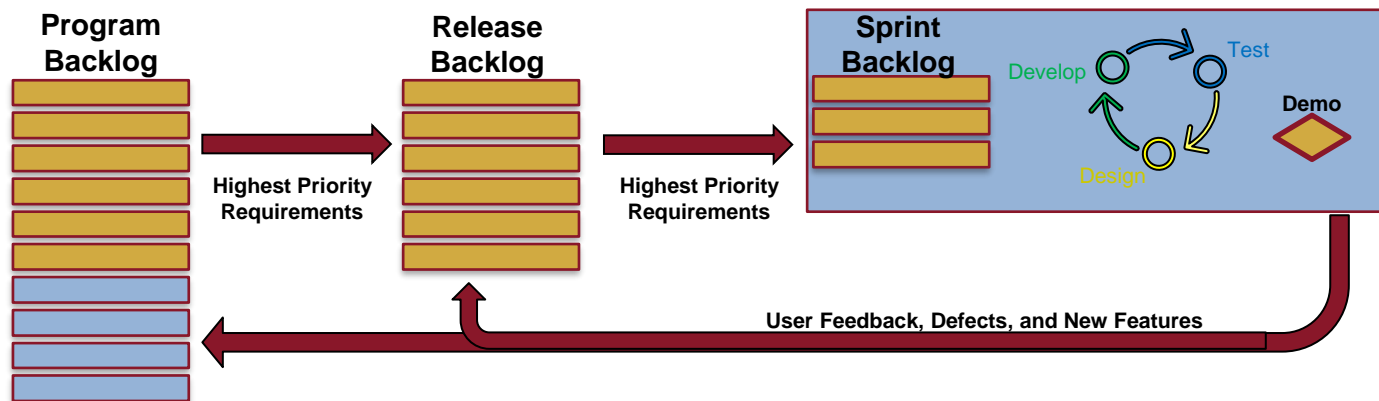
Agile Sequencing

- Provides a focus on deadlines for specific goals
- Identifies predecessor and successor relationships to ensure that planned sequence is executable
- Provides an estimate of time required to complete each activity, these timelines provide a basis to estimate costs
- All programs need to establish a valid critical path

Each Feature may be completed with an Agile process.
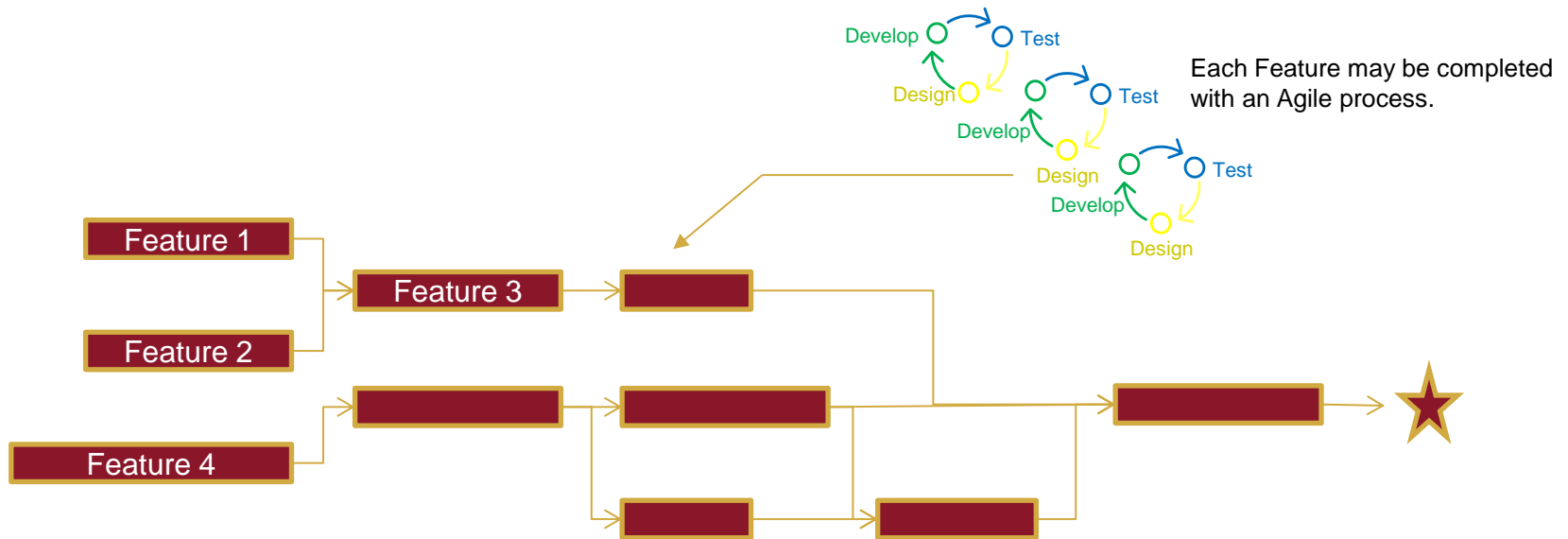
Cost Estimation in a Hybrid Model

- Hybrid IMS improves fidelity of cost estimates
  - Links effort to requirements & creates traceability
  - Facilitates shared understanding of scope
  - Estimates improve over time as feedback is received (Analogy Library)
- Still bound by GAO cost estimating best practices
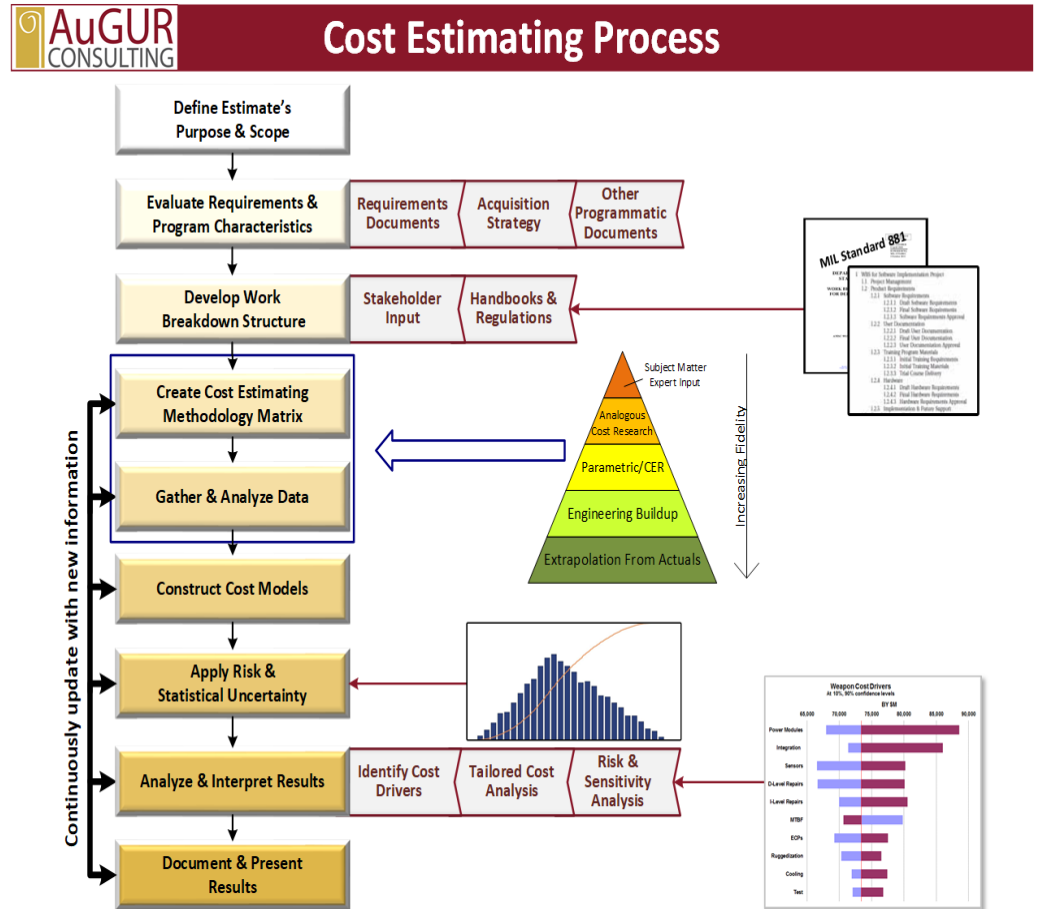
Agile Approach to Requirements Definition

"Defend the Network Using Big Data Analytics"

What's an Analytic?

It's an Algorithm

An Algorithm that does what?

Search for Analogies and Estimate Here

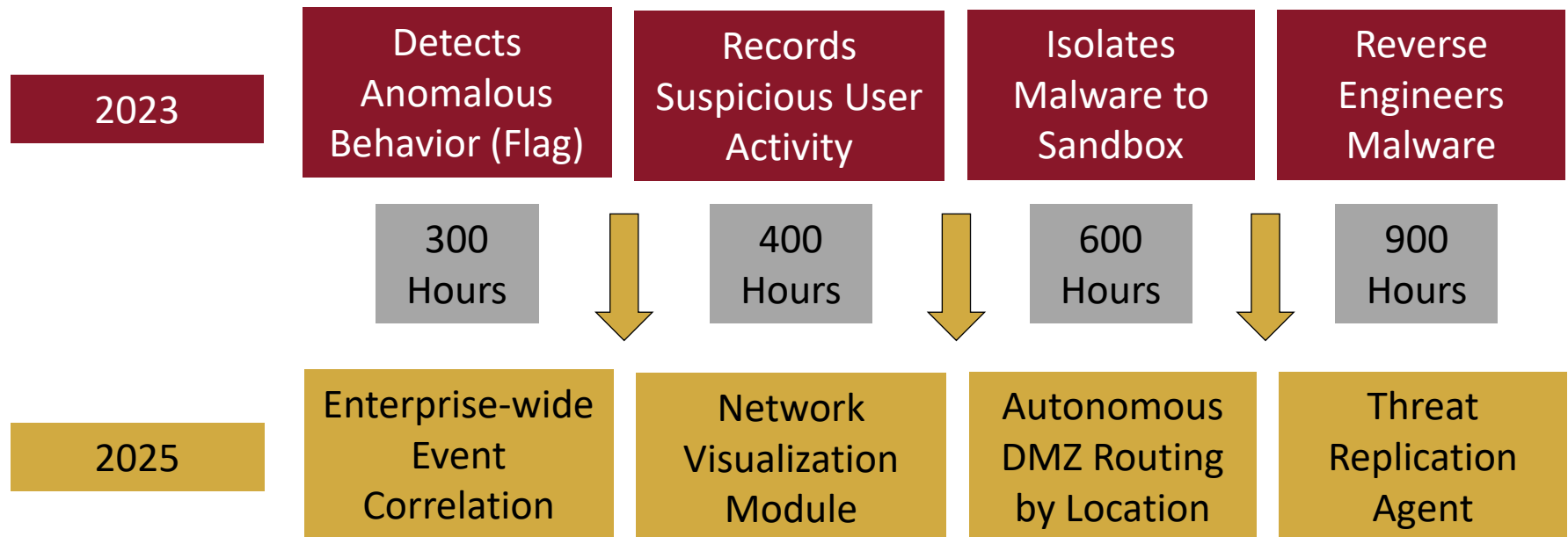| Detects Anomalous Behavior (Flag) | Records Suspicious User Activity | Isolates Malware to Sandbox | Reverse Engineers Malware |

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Become Your Own Database

- Over time, become a CER and analogies factory
- What is the cost of a User story, Feature, Epic?
  - No universal answer
- What is the cost of a Feature on this project with this team?
  - You can answer this later if you are embedded now

| 2023	Detects Anomalous Behavior (Flag)	Records Suspicious User Activity	Isolates Malware to Sandbox	Reverse Engineers Malware
	300 Hours	400 Hours	600 Hours	900 Hours
2025	Enterprise-wide Event Correlation	Network Visualization Module	Autonomous DMZ Routing by Location	Threat Replication Agent

Monitoring Progress in Agile

- The primary measure of progress is working software
- Progress of Features is updated after each iteration
    - Quantifiable back-up data tracking completion of user stories should inform feature progress and be used to refine cost estimates
    - Agile management tools are used to capture QBD & progress
- To monitor in Agile, review all level of deliveries
    - Use lower-level deliveries for forecasting
    - Analyze features to determine progress toward user requirements
    - Iterative cycle creates opportunity to continuously refine customer priorities
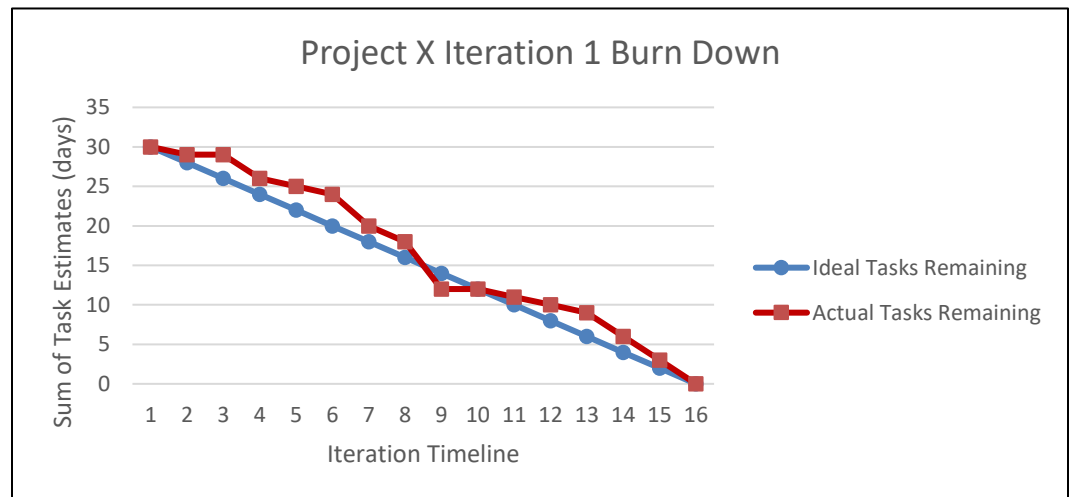
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Utilizing Agile Metrics in Program Management

- Use Agile framework to collect key metrics
- Validate that metrics align with objectives and incentives
- Establish management commitment to data-driven decisions
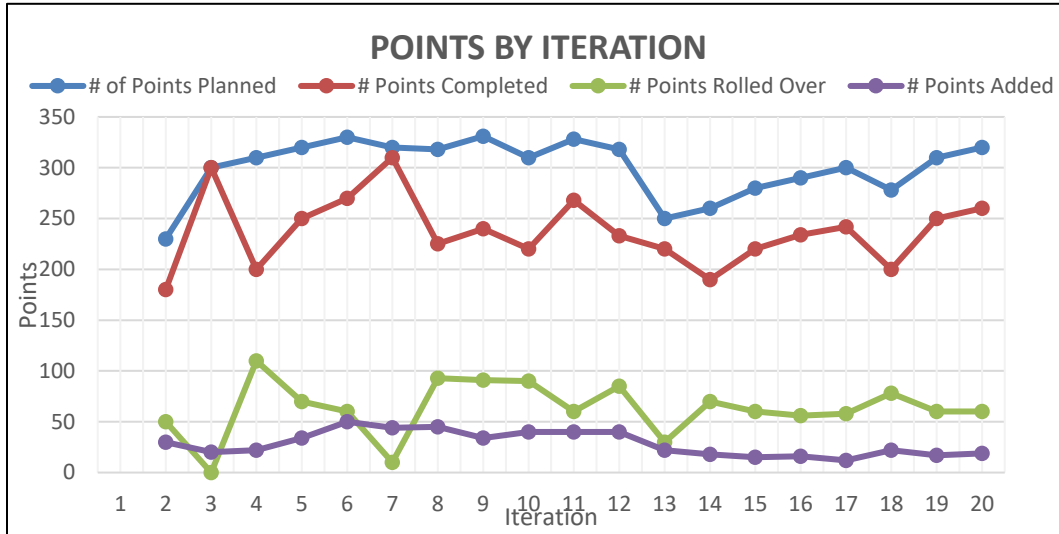- Communicate performance information frequently and efficiently

BURN-UP CHART

Total | Completed

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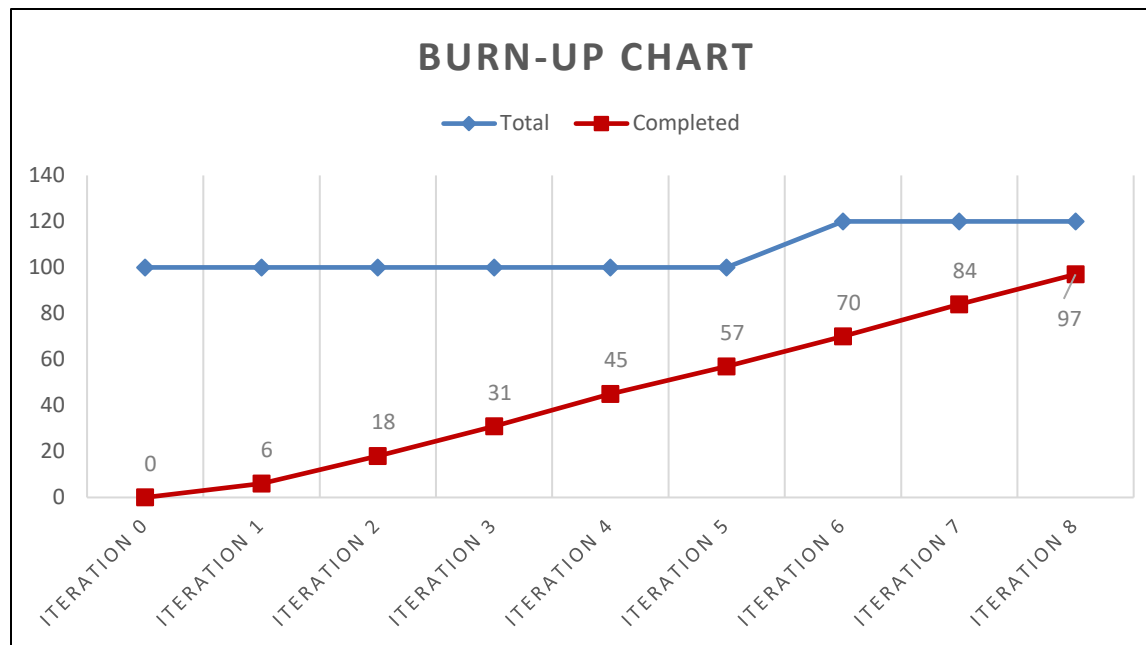
Agile Metric Examples

- Velocity
  - Work (usually in story points) completed in a given sprint/release
- Sprint burndown
  - Used to estimate a team's pace of work accomplished daily
- Release burnup
  - Work completed for a release relative to work planned for the release
- Cost per point (established on a team basis)
- Qty of Features, User stories, etc. delivered
- Qty of defects or bugs

Project X Iteration 1 Burn Down

Using Metrics to Monitor Performance

POINTS BY ITERATION

Legend: # of Points Planned, # Points Completed, # Points Rolled Over, # Points Added

- Catch over-committing
  - Flag: significant scope consistently shifting from one cycle to the next
- Use Issue Points to identify quality concerns

- Features delivered can be more meaningful to leadership
- Show changes to scope (scope could grow faster than the team can absorb it)

FEATURE DEVELOPMENT (CUMULATIVE)

Legend: Original Plan, Current Plan, Development Complete
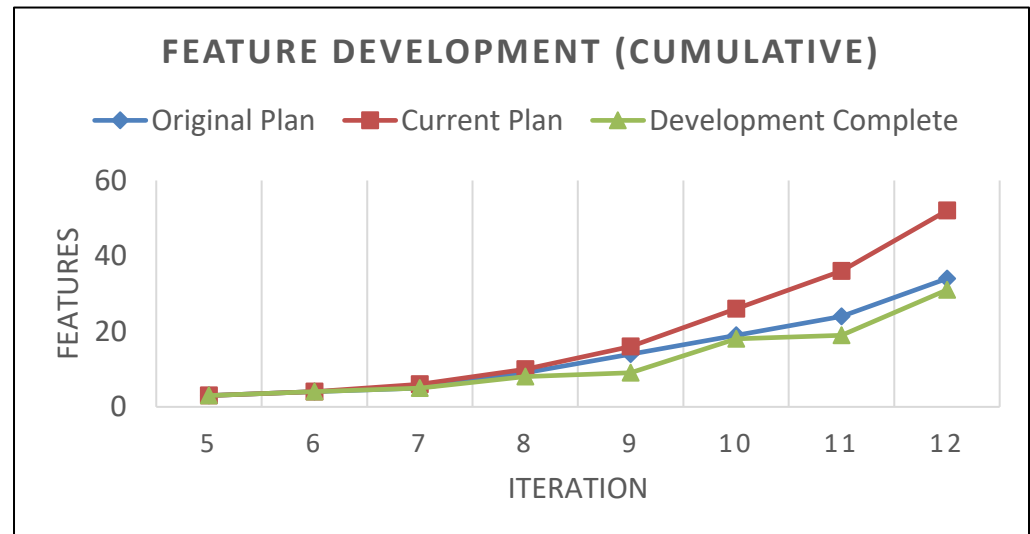
Summary

- Few government acquisitions are truly agile
  - An Agile-fall hybrid is more common
  - Links structured requirements with dynamism of Agile
- Agile projects need an IMS despite rapid pace of change
  - Enables communication
  - IMS organizes effort linking work to outcomes
  - Facilitates better cost estimation in a hybrid environment
- Activities must be captured at appropriate level of detail
- Agile metrics improve management insights

QUESTIONS?
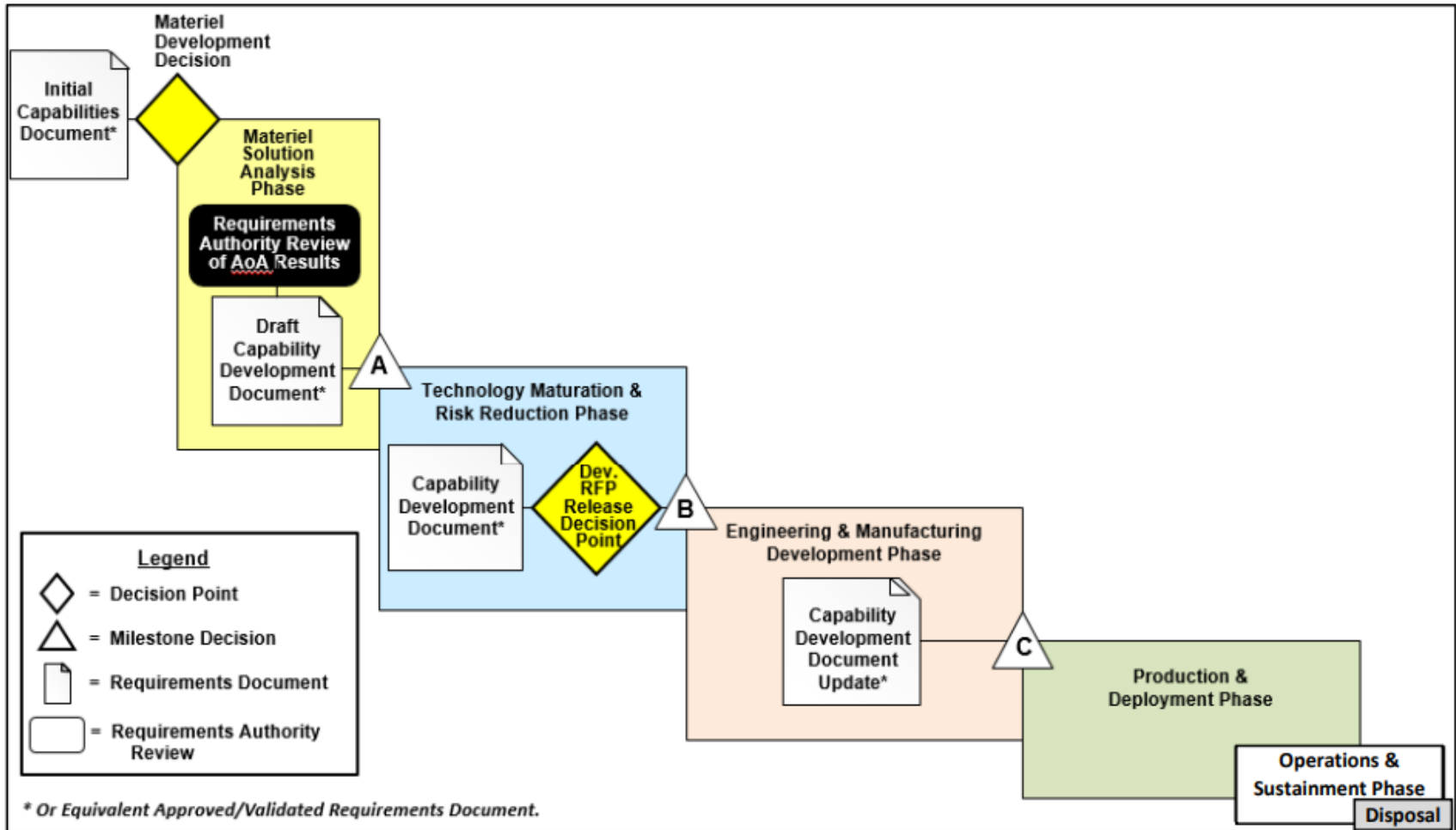
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Traditional Acquisition

CHARTER OF THE JOINT REQUIREMENTS OVERSIGHT COUNCIL AND
IMPLEMENTATION OF THE JOINT CAPABILITIES INTEGRATION AND
DEVELOPMENT SYSTEM

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IT Box Process

CHARTER OF THE JOINT REQUIREMENTS OVERSIGHT COUNCIL AND
IMPLEMENTATION OF THE JOINT CAPABILITIES INTEGRATION AND
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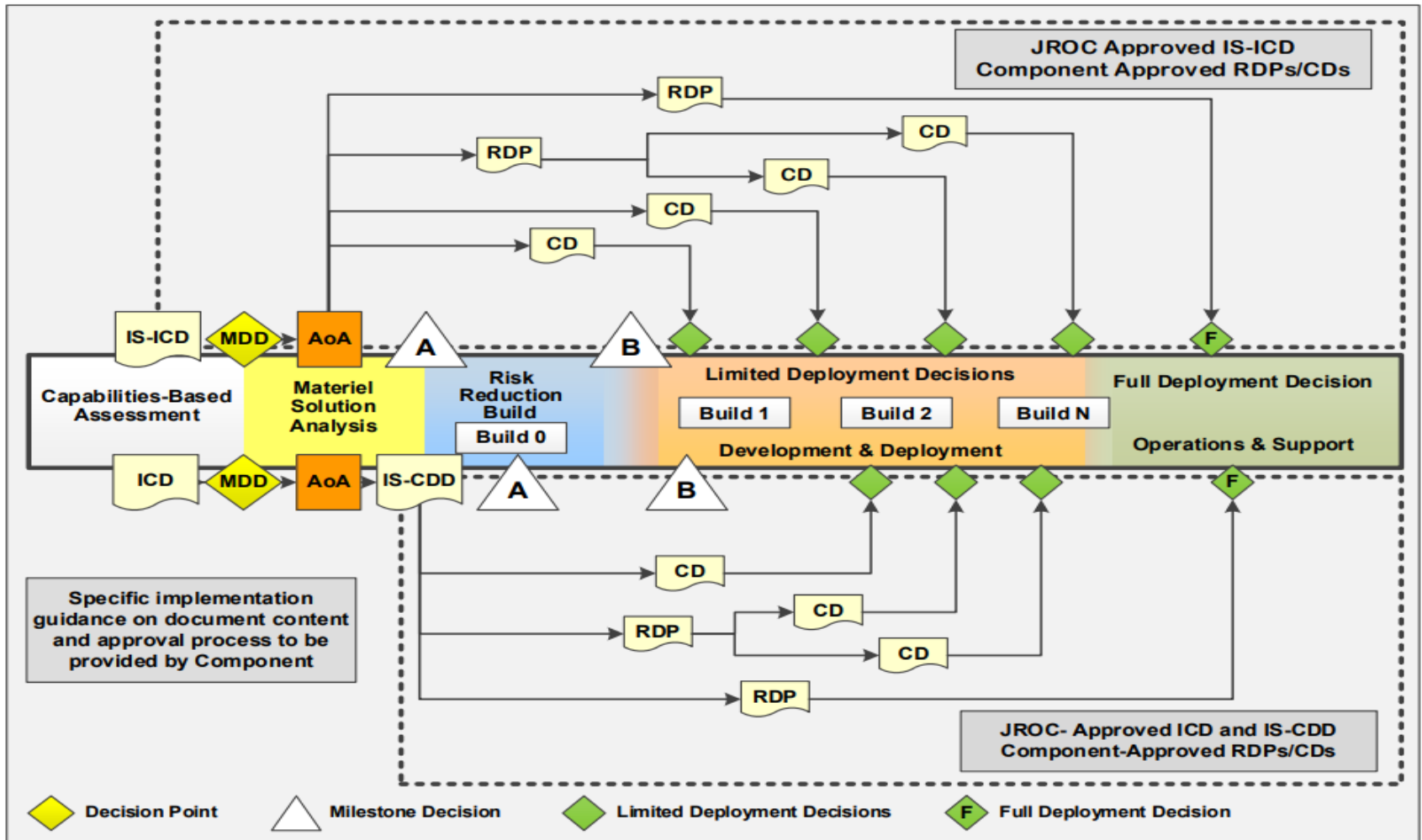
Schedule Baseline in Agile

- Frequent changes can appear to conflict with the concept of adhering to a baseline
- Features can identify the program's schedule baseline
  - Product owners can reprioritize work in accordance with the Vision level at the end of each iteration
  - Any changes to baseline must be documented
- Baseline is used to show schedule deviations
  - Understand the need for changes
  - Show if program execution is realistic
  - Basis for measuring
  - Maintaining accountability