

GAO Agile Assessment Guide: Applications for Scheduling

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Outline

- Background (GAO)
- Best Practice Guides
- Agile Guide Overview
- Deep Dive:
 - Work breakdown structure
 - Scheduling
- Case Study
- Conclusions



Background

Overview: About GAO

- GAO is an independent, nonpartisan agency serving the Congress to help improve the performance and ensure the accountability of the federal government.
- Core values are Accountability, Integrity, and Reliability.
- To ensure independence, the Comptroller General (CG) is appointed to a 15-year term by the President. Other than the CG, there are no political appointees at GAO.



Oversight, Insight, Foresight

Overview: About GAO (Our Work)

- GAO work is primarily done at the request of congressional committees or subcommittees or is mandated by public laws or committee reports. We also undertake research under the authority of the Comptroller General.
- Some examples of our work include:
 - Auditing agency operations to determine whether federal funds are being spent efficiently and effectively.
 - Investigating allegations of illegal and improper activities.
 - **Reporting on how well government programs and policies are meeting their objectives.**
 - **Performing policy analyses and outlining options for congressional consideration.**
 - Issuing legal decisions and opinions, such as bid protest rulings and reports on agency rules.
- In 2018, Congress directed the formation of STAA, recognizing that the accelerating pace of innovation has created a need for more and deeper analysis of science and technology.

More information about GAO can be found at www.gao.gov



Best Practice Guides

Overview: Best Practice Guides

Why develop best practice guides?

- Legislators, government officials, and the public want to know whether government programs are achieving their goals and what these programs are expected to cost and when they are expected to be finished.
 - Best practice guides provide clear criteria to establish the quality of program artifacts and whether they provide managers and oversight organizations enough information to make informed decisions.
- Developing reliable program cost and schedule estimates is critical to
 - Effectively using public funds.
 - Meeting OMB's capital programming process.
 - Avoiding cost overruns, missed deadlines, and performance shortfalls.
- The Guides help provide a framework for managing the government's complex acquisition efforts and ensuring the successful development and integration of cutting-edge technologies and their integration into large and complex systems.

Overview: Best Practice Guides

- **Cost Estimating and Assessment Guide**
 - Issued: March 2020, GAO-20-195G
- **Schedule Assessment Guide**
 - Issued: December 2015, GAO-16-89G
- **Technology Readiness Assessment Guide**
 - Issued: January 2020, GAO-20-48G
- **Agile Assessment Guide**
 - Issued: November 2023, GAO-24-105506





Agile Guide Overview

GAO Agile Assessment Guide: Chapters

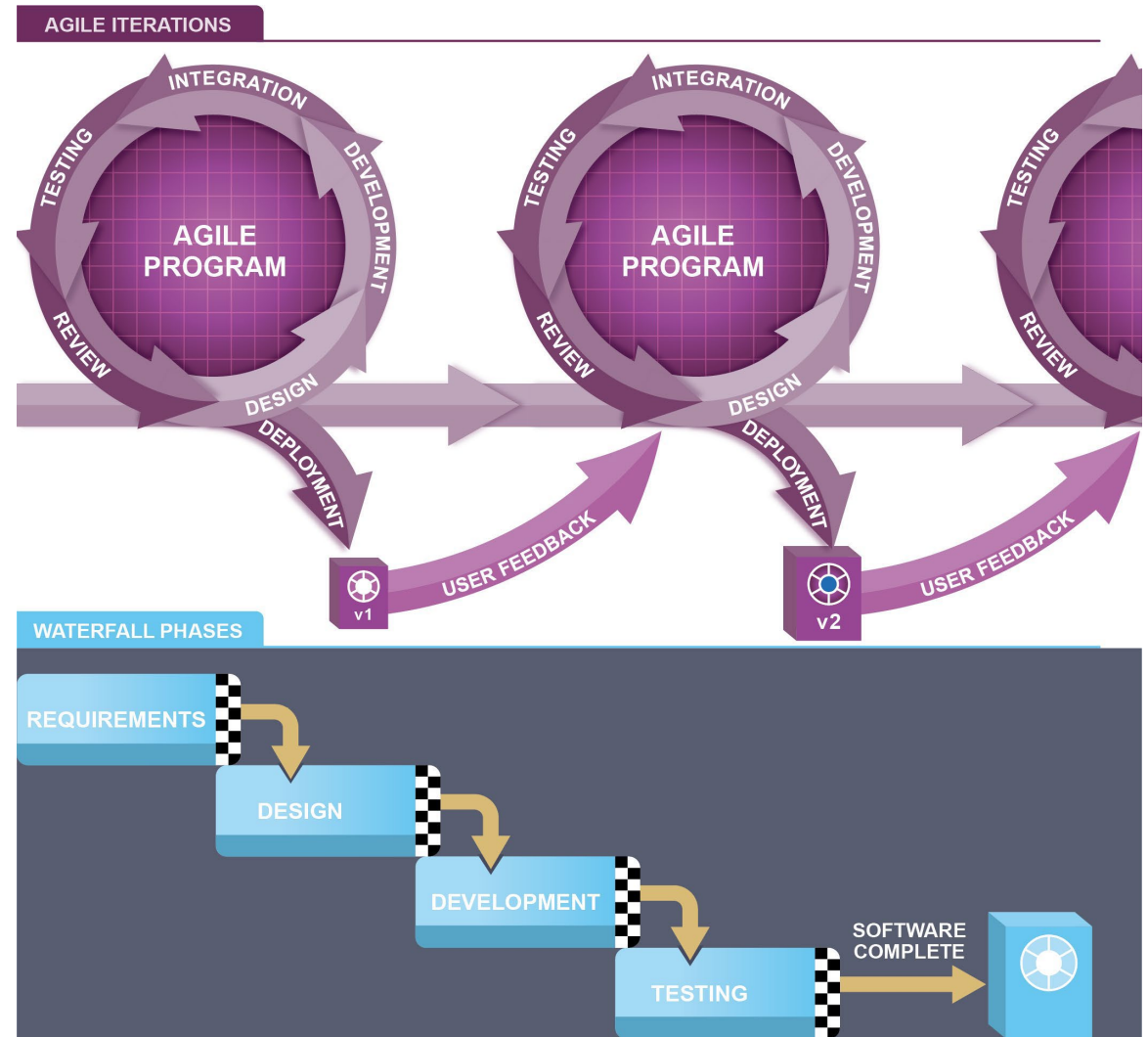
- Chapter 1: Background
- Chapter 2: Agile Adoption Challenges in the Federal Government and Actions Taken in Response
- Chapter 3: Agile Adoption Best Practices
 - Team activities, Program processes, and Agency Environment
- Chapter 4: Overview of Agile Execution and Controls
- Chapter 5: Requirements Development and Management in Agile
- Chapter 6: Agile and the Federal Acquisition Process
- **Chapter 7: Agile Program Monitoring and Control**
 - Work Breakdown Structure, Cost estimating, Scheduling, and Earned Value Management
- Chapter 8: Agile Metrics

GAO Agile Assessment Guide: Appendixes

- Appendix I: Objective, Scope, and Methodology
- Appendix II: Key Terms
- Appendix III: Related Terms
- Appendix IV: Auditor's Key Questions and Effects
- Appendix V: Common Agile Frameworks
- Appendix VI: Debunking Agile Myths
- Appendix VII: Background for Case Studies and Agile in Action
- Appendix VIII: Specialists Who Helped Develop this Guide
- Appendix IX: GAO Contacts and Staff Acknowledgements

GAO Agile Assessment Guide: What is Agile?

- Agile software development is an approach to developing and delivering software that allows stakeholders to validate requirements, processes, and system functionality in increments, and deliver functionality to users in shorter cycles.
- Software development in the government has traditionally followed a “waterfall” approach. This approach typically involves sequential phases, often with delivery of working software years after development begins.



GAO Agile Assessment Guide: Key Terms

- **Road map:** A high level plan that outlines a set of releases and the associated features. The road map is intended to be continuously revised as the plan evolves.
- **Release:** A planning segment of requirements that deploys needed capabilities. The release is a time boxed event that consists of a set number of iterations that are determined by the program. The **release plan** is where different sets of usable functionality or products are scheduled to be delivered to the customer.
- **Backlog:** The backlog is a list of features, user stories, and tasks to be addressed by the team, program or portfolio and is ordered from the highest priority to the lowest priority. A backlog can occur at varying levels; for example, a product backlog is a high-level backlog that contains all the requirements for the entire program.

For more terms and definitions see the Agile Guide's Appendix II: Key Terms
It is important to define the terms with the program early because terms can vary

Deep Dive: WBS and Schedule

Work Breakdown Structure

Pre-release/iteration planning			Post-release/iteration planning		
WBS	Title	Release	WBS	Title	Release
1.1	Prime mission product		1.1	Prime mission product	
1.1.1	Epic 1	R1	1.1.1	Epic 1	R1
			★ 1.1.1.1	Feature 1.1	R1
			★ 1.1.1.2	Feature 1.2	R1
1.1.2	Epic 2	R1/R2	1.1.2	Epic 2	R1/R2
			★ 1.1.2.1	Feature 2.1	R1
			★ 1.1.2.2	Feature 2.2	R2
			★ 1.1.2.3	Feature 2.3	R2
1.2	Program management	All	1.2	Program management	All
1.3	Hardware	R1	1.3	Hardware	R1
1.4	Software licenses	R2	1.4	Software licenses	R2

Source: GAO. | GAO-24-105506

- A work breakdown structure (WBS) can be used by management and Agile teams to provide a clear structure of the total scope of work necessary to meet a program's vision and requirements.
- WBS can also show the relationship between Agile development effort and other parts of the program.
- The figure shows that as more information is learned, additional detail can be added to the WBS. In this case, as the epics are decomposed, feature detail is added to the WBS.
 - Updating the WBS with additional information and tying it to Agile documents as more information is discovered helps provide additional traceability through Agile artifacts and program control files.

Debunking Agile Myths (Appendix 6)

- **Myth:** A schedule baseline cannot be reliably developed or used for an Agile software development effort.
 - A central tenet of Agile is to welcome change. As part of this, teams practice rolling wave planning. This helps to minimize the cost of changing plans, but frequent changes can appear to be in conflict with the concept of adhering to a baseline.
 - However, welcoming change does not mean that software is developed and delivered in an undisciplined or ad hoc manner.
 - A baseline should be created and approved in concert with the rolling wave planning process and it should contain enough detail to enable a collaborative agreement between product owners and developers without making schedule updates overly frequent or cumbersome.

Recall: 10 Scheduling Best Practices

1. Capturing all activities
2. Sequencing all activities
3. Assigning resources to all activities
4. Establishing the duration of all activities
5. Verifying that the schedule can be traced horizontally and vertically
6. Confirming the critical path is valid
7. Ensuring that total float is valid
8. Conducting a schedule risk analysis
9. Updating the schedule using actual progress and logic
10. Maintaining a baseline schedule

Agile Examples: Scheduling Best Practices (Table 13)

Schedule best practice	Agile environment	Examples of artifacts and documentation
Capture all activities	During planning, work on the road map should be prioritized with input from stakeholders and subject matter experts. The schedule should include epics and features from the road map that are linked to the contract, the backlog, and all organization-specific tasks.	Road map, WBS, prioritized backlog
Sequence all activities	The program schedule should reflect work at the epic and feature levels. The order of work should align with the prioritization included in the road map and backlog. Additionally, any key dependencies between features should be identified, where applicable.	Kanban board (or similar), government oversight documents, road map, prioritized backlog
Assign resources to all activities	During release planning, each team member should assess their availability for development activities with respect to other commitments (e.g. vacations, holidays, and other leave). Additionally, those assessments should account for team facilitator and other subject matter experts that could be needed to complete the planned work.	Kanban board (or similar), team calendars, project management software tailored for Agile to track user stories and resources

Characteristics of a Reliable Schedule

Comprehensive

- Captures all activities
- Assigns resources to all activities
- Establishes the duration of activities

Well-Constructed

- Sequences all activities
- Confirms the critical path is valid
- Ensures reasonable total float

Credible

- The schedule is traceable horizontally and vertically
- Schedule risk analysis

Controlled

- Updated with actual progress and logic
- Maintains a baseline schedule

Scheduling Considerations

- **Planning for all activities**
 - While Agile emphasizes that only near-term work is planned in detail, programs need to define their overall goal in a vision and plan the releases needed to satisfy that vision.
- **Minimizing the use of schedule constraints**
 - Constraints may appear to provide a straightforward way to model the fixed start and end dates of iterations, however, using constraints reduces the utility of the schedule as a coordination tool among Agile teams, management and others.
- **Assigning resources**
 - The amount of available resources affects estimates of work and duration, so the schedule should include the labor and non-labor resources needed to accomplish the work. The level of detail used in assigning resources should be commensurate with the level of detail of activities in the schedule.
- **Conducting a schedule risk analysis**
 - A schedule risk analysis should be conducted throughout an Agile development program's iterative process to identify the risks, paths, and activities most likely to delay the program and to serve as a basis for determining schedule risk contingencies.
- **Developing and using a schedule baseline**
 - In creating a baseline using the rolling wave planning process, updates should contain enough detail to enable a collaborative agreement between product owners and developers without making schedule updates overly frequent or cumbersome.

Case Study

FEMA Grants Modernization: Improvements Needed to Strengthen Program Management and Cybersecurity
(GAO-19-164)



GAO | www.gao.gov

Background

- FEMA's mission is to help people before, during, and after disasters. FEMA accomplishes a large part of its mission through awarding grants to state, local, and tribal governments and nongovernmental entities to help communities prevent, prepare for, protect against, and mitigate the effects of, respond to, and recover from disasters and terrorist attacks.
- The current FEMA grants management environment is highly complex with many stakeholders, IT systems, and users.
- FEMA initiated GMM in 2015 to modernize the agency's grants management environment. The program is intended to modernize and streamline the agency's grants management environment.
- GAO was asked to
 - Determine the extent to which FEMA is implementing leading practices for reengineering its grants management processes and incorporating needs into IT requirements.
 - **Assess the reliability of the program's estimated cost and schedule.**
 - Determine the extent to which FEMA is addressing key cybersecurity practices.

Findings

Characteristic	Rating/Summary
Comprehensive	Minimally Met: While the schedule contained both government and contractor activities, it did not align with the program's WBS. Further, it did not include resources and many activities were missing durations.
Well-Constructed	Not Met: Approximately 82% of the schedule's activities were not sequenced; that is, they were missing schedule logic. As a result of the missing schedule logic, there was not a valid critical path and the schedule had unreasonable total float values.
Credible	Minimally Met: The schedule was not horizontally or vertically traceable. The program office stated that they were assessing risks facing the program and mitigating them in real time as part of their Agile development process. However, they did not develop a formal schedule risk analysis to see how uncertainty and key risks affect activities in the schedule.
Controlled	Minimally Met: Officials cited ways that the status of activities were tracked and updated weekly and daily, such as by examining impediments that slow down Agile development processes. However, the schedule was not updated as part of those reviews and they did not establish a baseline schedule to measure, monitor, and report progress.

Recommendations

- We recommended that the FEMA Administrator ensures that the GMM program management office updates the program schedule to address the leading practices for a reliable schedule.
- The GMM program management office updated the schedule:
 - In February 2020, FEMA provided us with a demonstration of their new schedule
 - The program also updated the Program Management Plan to describe GMM's revised schedule management process.
 - Based on the demo and the updated documents provided, we concluded that the quality of the schedule had largely improved since our last review.
 - While GMM did not address all leading practices, we found that the program had made substantial improvements to the schedule to empower leadership to make more informed resource decisions.
 - This recommendation was closed as implemented.



Conclusions

Conclusions

- Best practice guides help establish a consistent methodology that can be used across the federal government.
- Best practices established in earlier guides are still applicable to Agile projects and programs.
- It is possible to develop a reliable IMS for Agile projects and programs.

Thank you

Guides Available Online and Downloadable in PDF:

GAO Cost Estimating and Assessment Guide:

<https://www.gao.gov/products/gao-20-195g>

GAO Schedule Assessment Guide:

<https://www.gao.gov/products/gao-16-89g>

GAO Technical Readiness Assessment Guide:

<https://www.gao.gov/products/gao-20-48g>

GAO Agile Assessment Guide:

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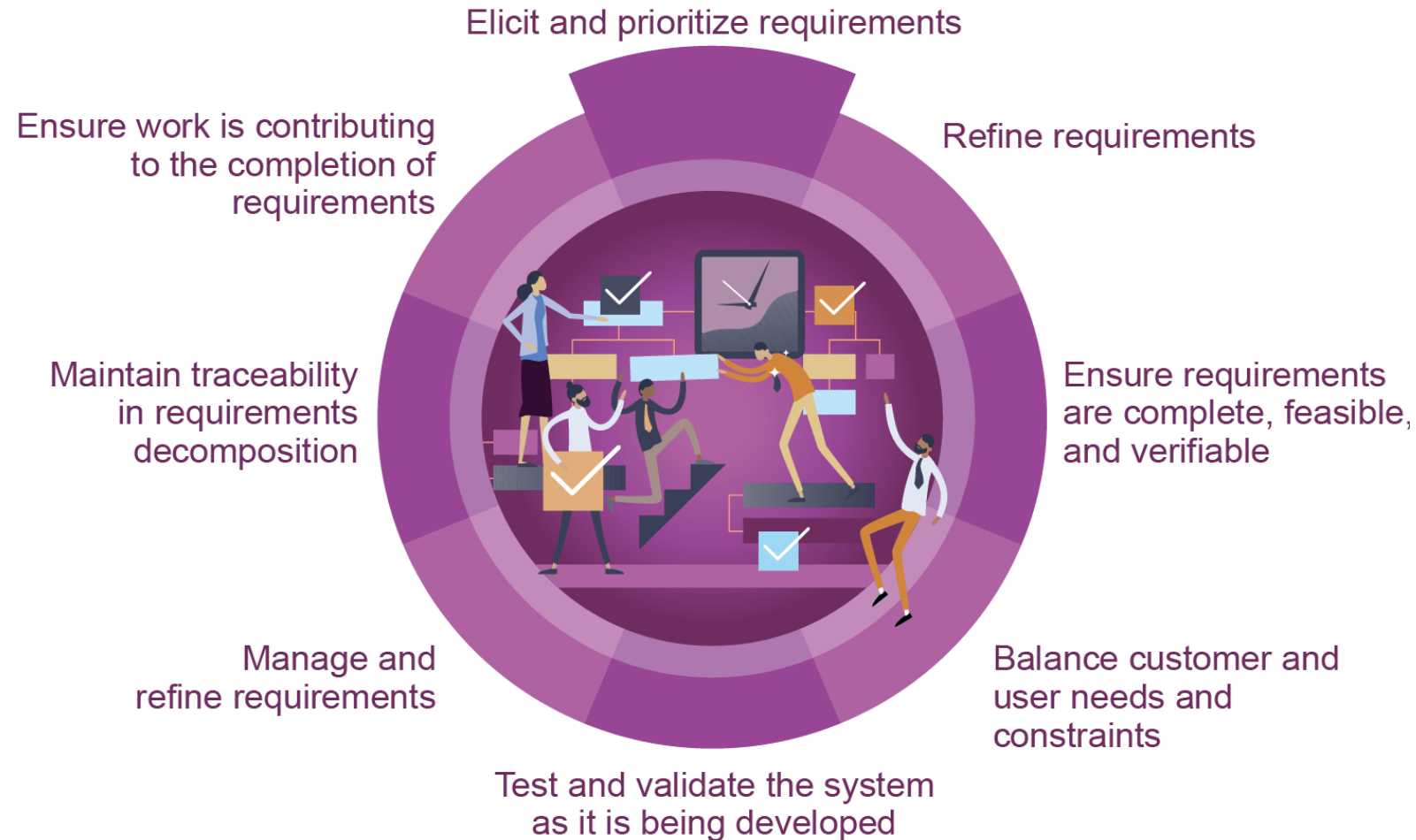
Back Up

Best Practices: Agile Adoption



Source: GAO analysis of agency and private sector information (data); Vectormine/stock.adobe.com (images). | GAO-24-105506

Best Practices: Requirements Development and Management



Source: GAO analysis of CMMI v. 1.3, PMI and SEI documentation (data); Vectormine/stock.adobe.com (images). | GAO-24-105506

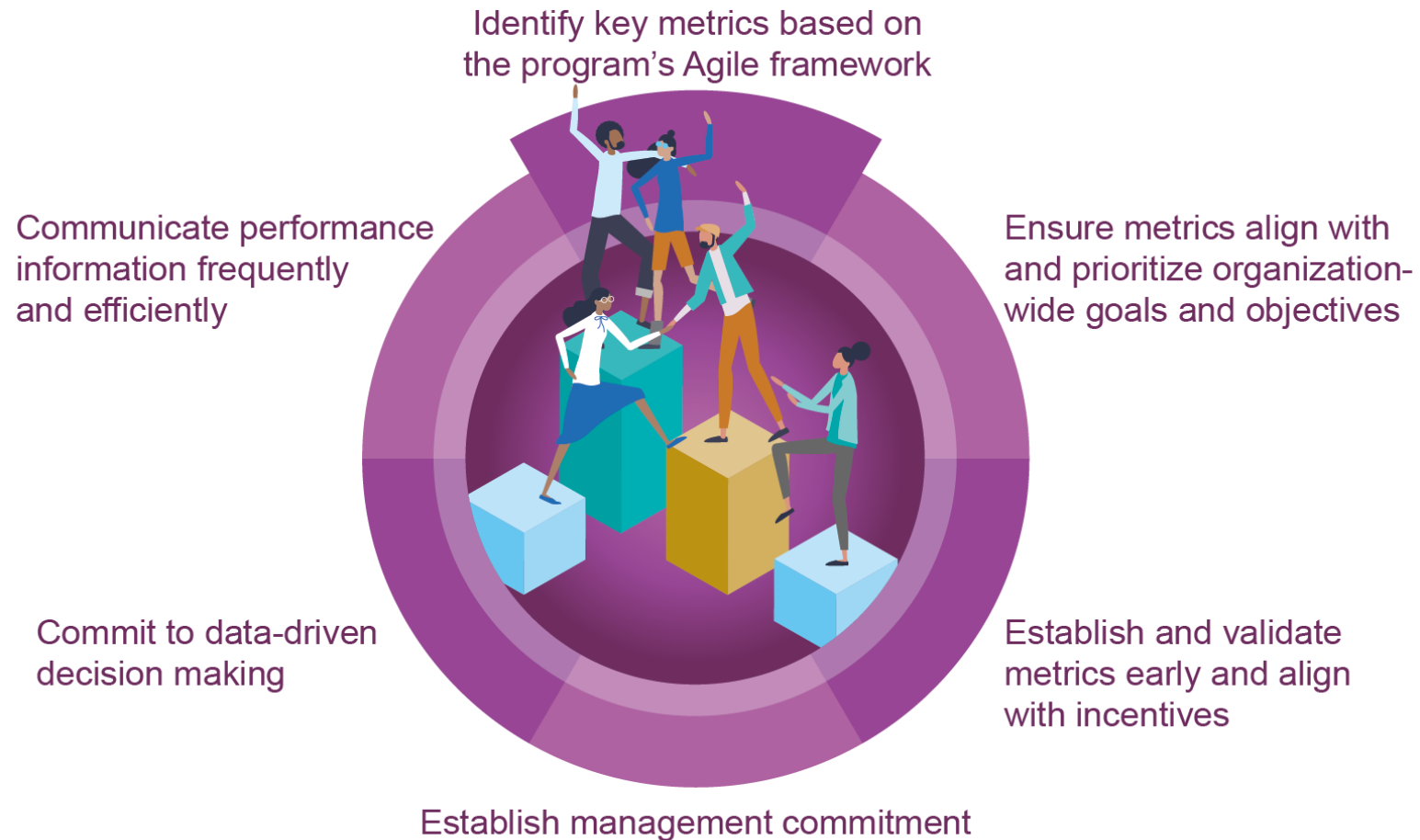
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Best Practices: Federal Acquisition Process

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Source: GAO analysis of agency and private sector information (data); Vectormine/stock.adobe.com (images). | GAO-24-105506

Best Practices: Metrics



Source: GAO analysis of agency and private sector information (data); Vectormine/stock.adobe.com (images). | GAO-24-105506