



March 2021

VETERANS AFFAIRS

Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating

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GAO Highlights

Highlights of [GAO-21-227](#), a report to congressional requesters

March 2021

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Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating

Why GAO Did This Study

VA's core financial system is approximately 30 years old and is not integrated with other relevant IT systems, resulting in inefficient operations and complex work-arounds. The FMBT program is VA's current effort and third attempt to replace its aging financial and acquisition systems with one integrated system. The first two attempts were unsuccessful after years of development and hundreds of millions of dollars in cost.

GAO was asked to review the progress of the FMBT program. This report (1) describes the status of the FMBT program, including steps VA has taken to address challenges it has identified, and (2) examines the extent to which VA has followed certain IT management best practices. GAO summarized FMBT program risks and challenges that VA identified, reviewed FMBT program documentation and compared it with relevant guidance and best practices, and interviewed cognizant VA officials.

What GAO Recommends

GAO is making two recommendations to VA that it help ensure that the FMBT program's cost and schedule estimates are consistent with GAO-identified best practices. VA concurred with the recommendations and described actions the department has taken and plans to take to address them.

View [GAO-21-227](#). For more information, contact Paula M. Rascona at (202) 512-9816 or rasconap@gao.gov and Carol C. Harris at (202) 512-4456 or harriscc@gao.gov.

What GAO Found

The Department of Veterans Affairs (VA) Financial Management Business Transformation (FMBT) program has begun implementing the Integrated Financial and Acquisition Management System (iFAMS), with the first deployment of certain capabilities at the National Cemetery Administration (NCA) on November 9, 2020. FMBT program officials identified various challenges, such as FMBT program funding shortfalls, which represent the difference between VA's original requirement and the President's budget request, and coordination with other major initiatives. VA has taken various steps to address its challenges. For example, because of the COVID-19 pandemic, VA postponed the initial NCA deployment 4 months and converted planning, training, and testing activities to virtual events. In addition, the FMBT program and Veterans Health Administration (VHA) worked together to address the FMBT program funding shortfall by postponing iFAMS implementation at VHA for at least 2 years to coordinate with the implementation of a new logistics system.

Following information technology (IT) management best practices on major transformation efforts, such as the FMBT program, can help build a foundation for ensuring responsibility, accountability, and transparency. VA has generally met such practices for program governance, Agile project management, and testing and defect management. However, it has not fully met certain best practices for developing and managing cost and schedule estimates. As a result, its estimates were not reliable. Specifically, VA's estimates substantially met one, and partially or minimally met three of the four characteristics associated with reliable cost and schedule estimates, respectively. For example, VA minimally met the "credible" characteristic associated with reliable cost estimates, in part, because it did not compare its cost estimate to an independently developed estimate.

GAO Assessment of VA Cost and Schedule Estimates against Best Practice Characteristics

Cost estimate characteristic	Assessment of cost estimate	Schedule estimate characteristic	Assessment of schedule estimate
Comprehensive	Partially met	Comprehensive	Partially met
Well-documented	Substantially met	Well-constructed	Partially met
Accurate	Partially met	Credible	Partially met
Credible	Minimally met	Controlled	Substantially met

Legend: substantially met = VA provided evidence that satisfies a large portion of the criterion; partially met = VA provided evidence that satisfies about one-half of the criterion; minimally met = VA provided evidence that satisfies a small portion of the criterion

Source: GAO assessment of the Department of Veterans Affairs Financial Management Business Transformation program documentation. | [GAO-21-227](#)

Reliable cost and schedule estimates provide a road map for project execution and are critical elements to delivering large-scale IT systems. Without reliable estimates, VA management may not have the information necessary for informed decision-making. Further, following cost and schedule best practices helps minimize the risk of cost overruns and schedule delays and would better position the FMBT program for effective and successful implementation on future deployments.

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Abbreviations

COVID-19	Coronavirus Disease 2019
FLITE	Financial and Logistics Integrated Technology Enterprise program
FMBT	Financial Management Business Transformation
FSC	Financial Services Center
GOE	General Operating Expenses
ICE	independent cost estimate
iFAMS	Integrated Financial and Acquisition Management System
IT	information technology
IV&V	independent verification and validation
NCA	National Cemetery Administration
USDA	U.S. Department of Agriculture
VA	Department of Veterans Affairs
VBA	Veterans Benefits Administration
VHA	Veterans Health Administration
VIP	Veteran-focused Integration Process
WBS	work breakdown structure

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March 24, 2021

Congressional Requesters

For years, the Inspector General of the Department of Veterans Affairs (VA) and GAO have reported that financial management and implementing related systems continue to be major challenges for the department. Weak financial management makes it more difficult for VA to achieve its mission of serving our nation's veterans, as well as meeting requirements for transparent and accurate public reporting of financial information. VA's core financial system is approximately 30 years old and is not integrated with other relevant information technology (IT) systems, which results in inefficient operations and requires complex manual work-arounds and reconciliations to meet the department's needs. This can also lead to payment errors and inadequate financial oversight; continued reliance on VA's outdated system is a major risk to the department's operations.

In 2016, VA established the Financial Management Business Transformation (FMBT) program—its current effort to replace aging financial and acquisition systems with one integrated system, the Integrated Financial and Acquisition Management System (iFAMS). Specifically, this program is intended to increase operational efficiency, flexibility, and scalability using a modern enterprise resource planning solution to provide real-time integration between financial and acquisition information across VA in a single, consolidated system. According to VA officials, full implementation of iFAMS across all of VA is not expected until 2027 at an estimated 10-year life cycle cost of \$2.98 billion. This is VA's third attempt to replace these systems, as the first two attempts failed after years of development and hundreds of millions of dollars in cost. Recognizing these and other IT-related challenges, GAO has designated VA's Management of IT Acquisitions and Operations as a high-risk area since 2015.¹

You asked us to review the progress of the FMBT program. This report (1) describes the status of the FMBT program, including steps VA has taken to address challenges it has identified, and (2) examines the extent to which VA followed certain best practices for IT management. The

¹GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, [GAO-19-157SP](#) (Washington, D.C.: Mar. 6, 2019).

FMBT program is a multiyear program, and we will continue to evaluate and report on its progress over the next several years.

To determine the status of the FMBT program, including steps VA has taken to address identified challenges, we reviewed relevant program documentation, such as program management reviews and decision support materials. We also discussed the program's status and the department's approach to coordination with other multiyear, cross-departmental modernization efforts with FMBT program officials and officials from VA's Office of Enterprise Integration. In addition, we reviewed documentation related to the FMBT program risk management process, including the risk and issue register and risk management framework, independent verification and validation (IV&V) documentation, and lessons learned from prior systems efforts and current efforts. We summarized the risks and issues facing the FMBT program and outstanding IV&V recommendations that VA identified. We also interviewed cognizant VA officials to obtain their views on the challenges facing the FMBT program and their plans and approach to addressing the challenges they identified.

To determine the extent to which VA followed certain IT management best practices, we identified practices that would help the department establish a foundation for the FMBT program and effectively implement the first deployment of iFAMS at the National Cemetery Administration (NCA). These best practices include those related to governance, Agile project management, system testing and defect management, cost estimating, and scheduling.² For governance, we reviewed FMBT program documentation and compared planned or implemented practices to best practices outlined in Project Management Institute guidance.³ For Agile project management, we reviewed the FMBT program's project management approach to implementing Agile practices for the iFAMS implementation at NCA and compared it to best practices identified in GAO's *Agile Assessment Guide* related to team dynamics and activities.⁴

²Agile project management describes an iterative process for managing software projects that focuses on continuous releases and incorporating customer feedback with each iteration.

³Project Management Institute, *The Standard for Program Management, Fourth Edition* (2017).

⁴GAO, *Agile Assessment Guide: Best Practices for Agile Adoption and Implementation*, [GAO-20-590G](#) (Washington, D.C.: September 2020).

For system testing and defect management, we reviewed FMBT program test and defect management plans and reports of testing results for the NCA financial system and compared the program's testing approach to certain best practices for conducting validation and verification of IT systems.⁵ We also discussed the FMBT program's approach to governance, Agile project management, and testing and defect management with cognizant program officials.

For cost estimating and scheduling, we reviewed documentation supporting the FMBT program's cost estimate and schedule. Specifically, we evaluated documentation supporting the program's September 2019 cost estimate against the best practices for developing a comprehensive, accurate, well-documented, and credible cost estimate identified in GAO's *Cost Estimating and Assessment Guide*.⁶ Additionally, we evaluated the FMBT program integrated master schedule, dated April 2020, and related supporting documentation against the best practices for developing a comprehensive, well-constructed, credible, and controlled schedule identified in GAO's *Schedule Assessment Guide*.⁷ We also interviewed FMBT program officials to understand their practices for developing and maintaining the program cost estimate and schedule.

We conducted this performance audit from February 2020 to March 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Appendix I provides additional details on our scope and methodology.

⁵Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration® for Acquisition, Version 1.3* (November 2010).

⁶GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: March 2020).

⁷GAO, *Schedule Assessment Guide: Best Practices for Project Schedules*, [GAO-16-89G](#) (Washington, D.C.: December 2015).

Background

Since fiscal year 2015, financial statement auditors have reported material weaknesses related to VA's financial systems and reporting.⁸ In accordance with Office of Management and Budget guidance, VA selected the U.S. Department of Agriculture (USDA) as its federal shared service provider in 2016 to guide VA's migration to CGI Federal's Momentum application and cloud solution.⁹ However, in 2017 USDA notified VA that it would no longer support the FMBT effort because of internal audit and financial management challenges that USDA needed to address. As a result, USDA transitioned out of the shared service provider role in 2018, with VA taking over sole responsibility for FMBT program support.

The FMBT program is in the process of migrating VA to a cloud-based version of the Momentum software-as-a-service solution configured for VA, referred to as iFAMS.¹⁰ VA awarded a systems integration contract to CGI Federal to support the FMBT program through incremental deployments, referred to as waves, which will deliver capabilities to specific administrations and staff offices within VA.

In November 2018, VA finalized its iFAMS enterprise configuration, which, according to program documentation, is intended to standardize at least 70 percent of the system architecture, business processes, interfaces, and data for use throughout the department using the Momentum application. During each wave, VA will identify additional functional requirements, business processes, workflows, and data uniquely required by each VA administration and staff office beyond the enterprise configuration. Additional work will focus on, among other

⁸A material weakness is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis.

⁹On March 25, 2013, the Office of Management and Budget issued Memorandum M-13-08, *Improving Financial Systems through Shared Services* (Mar. 25, 2013) directing all executive agencies to use a shared services solution for future modernizations of core accounting or mixed systems. Cloud refers to internet-based computing services. M-13-08 was rescinded by Memorandum M-19-16, *Centralized Mission Support Capabilities for the Federal Government* (Apr. 26, 2019).

¹⁰Software-as-a-service is a cloud service model where the service provider delivers one or more applications and all the resources (operating system and programming tools) and underlying infrastructure, which the agency can use on demand.

things, configuring and testing iFAMS to address these additional requirements prior to each wave’s deployment.

The FMBT program is currently working to deploy the financial and acquisition capabilities of iFAMS throughout the department in a series of 26 planned implementation waves starting with NCA, then moving to various staff offices, the Veterans Benefits Administration (VBA), and finally to the Veterans Health Administration (VHA) over the next 7 years. In September 2020, VA estimated the 10-year FMBT program cost at approximately \$2.98 billion. Table 1 shows the timeline for planned full implementation at VA administrations and staff offices as of September 2020.

Table 1: Planned Full Implementation Dates for the Integrated Financial and Acquisition Management System at the Department of Veterans Affairs

	Full implementation dates for financial capabilities	Full implementation dates for acquisition capabilities
National Cemetery Administration	November 2020 ^a	December 2021
Staff offices	February 2023	February 2023
Veterans Benefits Administration	February 2025	February 2025
Veterans Health Administration	July 2027	November 2027

Source: GAO analysis of Financial Management Business Transformation (FMBT) program documentation as of September 2020. | GAO-21-227

^aAccording to FMBT program officials, the financial system capabilities were fully deployed on November 9, 2020, after a 4-month delay.

IT Management Best Practices

IT management covers a broad array of activities, including best practices related to program governance, Agile project management, system testing and defect management, cost estimating, and program scheduling.

Program governance: According to Project Management Institute guidance, program governance establishes practices to support a program, enables and performs program decision-making, and maintains program oversight to meet strategic and operational goals.¹¹ A program governance framework, when well defined and implemented, provides structure and practices for effective decision-making and ensures that the program is managed appropriately. In highly complex environments,

¹¹Project Management Institute, *The Standard for Program Management*.

effective governance also helps a program to respond rapidly to outcomes and information that become available during the course of the program. In addition, program governance endorses reviews of programs at key decision points in the program life cycle. Key decisions may include, for example, reviews that determine whether a program or program component can move from one significant phase to another.

Agile project management: Agile is an iterative approach to software development, which helps project teams deliver value or software in small increments. In addition, Agile emphasizes using collaborative teams and frequent iterations, often referred to as sprints, to respond quickly to feedback on IT requirements from stakeholders, such as product owners that represent the end user community, and continuously measuring progress. Agile practices integrate planning, design, development, and testing into an iterative life cycle to deliver value or software early and often.

In Agile, customer requirements are often described with user stories, which are high-level requirements written in everyday or business language that capture the who, what, and why of a requirement simply and concisely. According to best practices described by our *Agile Assessment Guide*, user stories are assigned a level of effort, referred to as story points, and prioritized and stored in a list referred to as a backlog.¹² Project iterations end with demonstration of software to show that user stories adhere to a previously agreed-upon definition of what constitutes acceptable, completed work, referred to as acceptance criteria.

System testing and defect management: According to Carnegie Mellon Software Engineering Institute guidance, testing ensures that a system meets requirements and will fulfill its intended purpose.¹³ Complete and thorough testing is essential for providing reasonable assurance that new or modified IT systems will perform as intended. To be effective, testing should be planned and structured in a disciplined fashion to verify that components of the system are working properly. In addition, a key element of successful system testing is appropriately analyzing, prioritizing, and resolving defects that are discovered during testing. Comprehensive testing that is effectively planned and conducted can help

¹²[GAO-20-590G](#).

¹³Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration® for Acquisition*.

ensure that a system meets specified requirements and functions as intended.

Cost estimating: A reliable cost estimate is critical to successfully delivering large-scale IT systems. Such an estimate provides the basis for informed investment decision-making, realistic budget formulation, meaningful progress measurement, and accountability for results. According to our *Cost Estimating and Assessment Guide*, a reliable cost estimate is one that is comprehensive, well-documented, accurate, and credible.¹⁴

Program scheduling: The success of a program depends in part on having an integrated and reliable master schedule that defines when and how long work will occur and how each activity is related to the others. The program schedule provides not only a road map for systematic project execution, but also the means by which to gauge progress, identify and resolve potential problems, and promote accountability at all levels of the program. Our *Schedule Assessment Guide* defines a reliable schedule as one that is comprehensive, well-constructed, credible, and controlled.¹⁵

FMBT Program Is Implementing New System Capabilities and Is Taking Steps to Address Various Challenges

VA's FMBT program has begun implementing iFAMS' financial and acquisition management and reporting capabilities. As part of the initial implementation activities, VA has identified and taken steps to address unmitigated risks and issues related to the FMBT program, lessons learned, and recommendations from its IV&V contractor. In addition, the FMBT program identified and plans to address various challenges, including FMBT program funding shortfalls, coordination with other major initiatives, competing needs for personnel with required skill sets, resistance to change, and the impacts from Coronavirus Disease 2019 (COVID-19).

¹⁴[GAO-20-195G](#).

¹⁵[GAO-16-89G](#).

iFAMS Implementation

After nearly 2 years of planning, configuring, testing, and training and a 4-month delay because of COVID-19, the FMBT program deployed the first wave of iFAMS (the NCA wave) beginning on November 9, 2020. Program officials stated that over 600 users logged on to use the new system within the first week after deployment and nearly 17,000 records were migrated from the legacy system to iFAMS with no conversion issues. The NCA wave was implemented for users from NCA and other VA staff offices that support NCA financial operations and are geographically dispersed across 40 states and U.S. territories.

According to program documentation, this iFAMS configuration addresses 540 business requirements that span across the following seven end-to-end business processes or value streams:¹⁶

- **Budget formulation to execution:** business processes associated with the budget formulation life cycle, budget distribution and execution, funds control, and reporting.
- **Request to procure:** business processes that describe the good or service to be obtained and encompasses the procurement processes from managing requests/approvals through contract closeout.
- **Procure to pay:** business processes that encompass vendor management, purchasing, receipt of goods and services, invoicing, acceptance, and payment disbursement.
- **Reimbursable agreements:** business processes that describe the actions for producing the agreements, entering agreements into the system through order processing, tracking activities, and automating billing.
- **Bill to collect:** business processes that describe the financial management activities for receivables and debt management.
- **Record to report:** business processes that describe managing general ledger posting models, monitoring spending activity, processing payroll, and generating financial reports.

¹⁶Value streams are end-to-end business processes VA uses to describe its standardized financial and acquisition management processes. The FMBT program organizes configuration and testing efforts around these value streams. For NCA, business requirements also included iFAMS security and system administration.

- **Acquire to dispose:** business processes that describe managing assets through their life cycle, from defining an acquisition to a formal disposal.

The NCA iFAMS wave included 14 custom interfaces and 13 integrations, which allow data to move between iFAMS and other federal and commercial systems. It also included defining the elements of the accounting classification structure for the VA enterprise and NCA-specific data elements. Prior to deploying the NCA wave, iFAMS was subjected to a series of tests, such as integrated end-to-end testing, intended to ensure that the system works as designed, and user acceptance testing, which allows users to test that the system functions as expected.¹⁷

Program officials stated that about 13 percent of active users requested assistance during the transition to the new system, which was within the range expected. According to program documentation, elevated levels of customer support are available for 90 days after the NCA deployment to help end users increase their familiarity with the system and to ensure that critical issues are addressed as the system stabilizes.

As of October 2020, the FMBT program includes two other active iFAMS deployment waves. Specifically:

- *VBA General Operating Expenses (GOE):* Planning for this wave began in February 2019 and includes more than 900 users from VBA and the Financial Services Center across all 50 states. According to its September 2020 notional schedule, the FMBT program plans to deploy the VBA-GOE wave in two stages starting in February and May 2021. Similar to the NCA wave, the VBA-GOE deployment will first focus on the financial operations capabilities and later focus on deploying the acquisition management capabilities in a subsequent wave.
- *Enterprise Acquisition:* This wave focuses on implementing VA enterprise-wide and NCA-specific requirements of the Momentum acquisition management capabilities. The Enterprise Acquisition wave completed enterprise business process revalidation sessions, which are intended to ensure that a current set of requirements has been identified to guide configuration and testing activities. As of October 2020, this wave's project team was working to conduct product configuration activities and perform initial testing. VA expects to make

¹⁷The results of these tests are discussed later in this report.

the decision on whether to proceed with its final deployment of the acquisition system at NCA in November 2021.

In addition, FMBT program officials stated that activities have begun for standardizing the accounting classification structure and data cleansing to prepare for initiation of the VHA waves. These and other pre-initiation activities will continue through 2022, with the first wave to implement iFAMS at VHA to begin in 2023 or later.

Risks and Issues

Risk management has been a core activity of the FMBT program since its inception. As part of its initial implementation activities, VA has identified risks and issues in the FMBT program, and although some have been mitigated, others remain active. VA defines risk as the potential for loss, harm, or missed opportunities in achieving the organization’s mission and strategic objectives because of uncertainty, whereas VA defines an issue as an existing event or condition that is impeding performance and may result from a risk that became an issue. The FMBT program’s risk and issue register is the primary tool for monitoring and reporting program and project risks and issues.

As of August 2020, the FMBT program’s risk and issue register contained 228 risks and issues, including 173 that had been closed. The remaining 55 included one risk that had been identified and added to the register, and 42 risks and 12 issues that were active, meaning VA had a plan to mitigate them, as shown in table 2. Of these 55 identified and active risks and issues, VA assessed eight risks as having a high or very high probability and impact and 11 issues as having a high or very high impact on the program. For additional information on the FMBT program risk management process, including criteria for assigning risk ratings, see appendix II.

Table 2: VA’s FMBT Program Risks and Issues by Status and Impact on Program Schedule and Cost

Status	Total number of risks and issues	High and very high probability and impact risks	High and very high impact issues
Identified risk	1	1	n/a
Active risk	42	7	n/a
Active issue	12	n/a	11
Closed	173	n/a	n/a

Status	Total number of risks and issues	High and very high probability and impact risks	High and very high impact issues
Total	228	8	11

Legend: active = validated and actively managed per the VA response plan; closed = mitigated or managed according to VA; FMBT = Financial Management Business Transformation; identified = submitted in FMBT program's risk and issue register and reviewed by VA risk management team; n/a = not applicable; VA = Department of Veterans Affairs.

Source: GAO analysis of VA's FMBT program risk and issue register as of August 2020. | GAO-21-227

Regarding the 11 active issues with high and very high impact, in October 2020, VA officials told us that four of them had been mitigated and closed and two had been recommended for closure, leaving five issues that were still active. According to the FMBT program's risk register as of October 2020, one of those remaining active issues relates to NCA user readiness where NCA administrative policy prevented NCA field users from attending the iFAMS virtual training on using the system because of the COVID-19 pandemic. To mitigate this issue, NCA is working to put telework agreements in place with field users that will require virtual training. In addition, NCA will transfer some field users' finance-related responsibilities, such as purchase card and reconciliation activities, to NCA headquarters. As a result, the field users will not need virtual training on using the system for purchase cards.

The FMBT program also tracks the high and very high probability and impact risks and high and very high impact issues by risk category. The risk category reflects the risk and issue impact on the various aspects of the program. Of the 19 combined high and very high risks and issues as of August 2020, seven impact project management and six impact technology or systems. The remaining six high and very high risks and issues affect business operations, customer experience, and strategic planning, as shown in table 3.

Table 3: VA's FMBT Program Risks with High and Very High Probability and Impact and Issues with High and Very High Impact on Program Schedule and Cost by Category

FMBT program risk category	Total high and very high risk and issues	High and very high probability and impact risks	High and very high impact issues
Project management	7	3	4
Technology or systems	6	3	3
Business operations	3	1	2
Customer experience	2	n/a	2
Strategic planning	1	1	n/a

FMBT program risk category	Total high and very high risk and issues	High and very high probability and impact risks	High and very high impact issues
Total	19	8	11

Legend: FMBT = Financial Management Business Transformation; n/a = not applicable; VA = Department of Veterans Affairs.

Source: GAO analysis of VA's FMBT program risk and issue register as of August 2020. | GAO-21-227

According to VA officials, the FMBT program made improvements to its risk management process in fiscal year 2020. These improvements include adding a risk response summary field that provides a mitigation plan for each program risk and issue in the risk and issue register. Previously, the register had a response plan description field where program personnel responsible for risks or issues could provide a verifiable and tangible description of steps conducted in response to each, but adding mitigation plans into the register was not required. According to FMBT program risk management documentation, if the remaining high and very high identified and active risks and high and very high impact issues are not mitigated, the FMBT program is at increased risk of schedule delays, cost increases, issues with IT system performance and functionality quality, and regulatory noncompliance.

Lessons Learned

FMBT program officials evaluate lessons learned on an ongoing basis and incorporate them into continuous improvement initiatives. According to VA, the FMBT program expects its project managers to capture lessons learned throughout the course of their work. The FMBT program office maintains a lessons learned log, and leadership at all levels is responsible for identifying and submitting lessons learned for inclusion in the log. In addition to FMBT program leadership, key stakeholders, and team members can view the log at any time.

VA identified lessons learned from its two prior failed attempts to implement a new financial management system. Examples of those lessons learned included the need for a data cleansing process, a sufficient risk management process, and better stakeholder engagement. VA officials told us that those prior lessons learned have all been addressed, the program is no longer actively monitoring them, and actions to be taken to address them have been incorporated in the current program's management and risk management frameworks.

As of September 2020, the FMBT program's lessons learned log contained 205 lessons learned, including 60 from the 2018

implementation of the iFAMS budget formulation module. Another 140 lessons learned were identified throughout 2019, and five were identified in June and September of 2020.

According to the FMBT program’s September 2020 lessons learned log, over one-half of the lessons learned have been closed, implemented, or rejected, and those remaining are new or in progress. Specifically, the reported status of the 205 lessons learned is as follows:

- 25 have been closed (the initiative is no longer being implemented),
- 89 have been implemented (the initiative has been put into effect and is being monitored for success),
- 29 are in progress (the initiative is under review and has not yet been implemented),
- 50 are new (the initiative has been proposed for the first time and has not yet been reviewed), and
- 12 have been rejected (the initiative was reviewed and will not be implemented).

Table 4 shows the number of lessons learned for the FMBT program for which VA reported a status of “in progress” and “new” by category.

Table 4: Department of Veterans Affairs’ (VA) Financial Management Business Transformation (FMBT) Program “in Progress” and “New” Lessons Learned, by Category

Category	Number of lessons learned in progress	Number of new lessons learned	Number of in progress and new lessons learned
Testing	15	7	22
Implementation support	1	7	8
Data cleansing	0	7	7
Business process	0	5	5
Organizational change management	4	1	5
Schedule management and scheduling	2	2	4
Communications	0	3	3
Deliverables	0	3	3
Special Programs Office	0	3	3
Process documentation and flows	0	2	2
Wave implementation	2	0	2
Other categories (each with 1 lesson learned)	5	10	15
Total lessons learned	29	50	79

Source: GAO analysis of VA's FMBT program lessons learned log as of September 2020. | GAO-21-227

Note: Lessons learned in progress represent initiatives that are under review yet not implemented. New lessons learned represent initiatives that have been proposed but not yet reviewed.

Over one-half of the new or in progress lessons learned relate to testing, implementation support, data cleansing, business processes, and organizational change management. Examples of lessons learned in these categories are as follows:

- **Testing:** developing checklists and instructions and clear roles and expectations for testers.
- **Implementation support:** defining system roles and security controls and including appropriate stakeholders in meetings.
- **Data cleansing:** ensuring certain vendor information is valid and consistent with iFAMS data expectations and identifying all outstanding travel advances associated with closed travel authorizations and transforming them into receivables in the financial management system prior to conversion.
- **Business process:** ensuring final payments on capitalized assets are processed as an increase to the original value of the asset rather than a betterment and considering alternatives to posting adjustments in iFAMS manually after conversion.
- **Organizational change management:** tailoring training based on users' backgrounds; updating the stakeholder engagement matrix with roles, responsibilities, and authorities; and using the matrix to identify subject matter experts.

IV&V Recommendations

As we have previously reported, the use of IV&V for large and complex system development involves an independent organization conducting unbiased reviews of processes, products, and results to verify and validate that they meet stated requirements and standards.¹⁸ The FMBT program established an IV&V team consisting of representatives from VA's offices of Quality, Performance, and Risk and Systems Quality Assurance Service, as well as contractor support. VA policy recognizes the importance of addressing IV&V recommendations in a timely manner.

¹⁸GAO, *Information Technology: Actions Needed to Fully Establish Program Management Capability for VA's Financial and Logistics Initiative*, GAO-10-40 (Washington, D.C.: Oct. 26, 2009).

The FMBT program’s IV&V plan defines verification and validation activities as follows:

Verification: The process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase. Verification includes (1) providing objective evidence that the system, software, or hardware and its associated products conform to requirements; (2) satisfying standards, practices, and conventions during life cycle processes; and (3) successfully completing each life cycle activity and satisfying all the criteria for initiating succeeding life cycle activities. Verification of interim work products is essential for proper understanding and assessment of the life cycle phase product(s).

Validation: The process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified requirements. Validation includes providing evidence that the system, software, or hardware and its associated products (1) satisfy requirements allocated to it at the end of each life cycle activity, (2) solve the right problems, and (3) satisfy intended use and user needs.

In March 2019, the FMBT IV&V team began reporting metrics on the IV&V team recommendations in weekly IV&V status reports and communicating appropriate recommendations to the corresponding area of IV&V focus, or workstream, to confirm their validity. The FMBT program used an IV&V contractor to support the program until April 2020 when its contract for IV&V support ended because of a lack of funding. At that time, 430 IV&V recommendations for the FMBT program existed, and the FMBT IV&V team identified resolving them as a challenge to address.

According to the FMBT program’s weekly IV&V status report as of April 3, 2020, only 117 of 430 (27 percent) of the recommendations that the IV&V contractor made had been implemented, as shown in table 5.

Table 5: Status of FMBT Program Recommendations of VA’s IV&V Contractor

Recommendation status	Number of recommendations
Implemented	117
Not implemented	84
Partially implemented	35
Rejected	41
Pending response	143

Recommendation status	Number of recommendations
On hold	10
Total	430

Legend: FMBT = Financial Management Business Transformation; implemented = the recommendations have been fully implemented by the FMBT program; IV&V = independent verification and validation; not implemented = the recommendations have been accepted by the FMBT program but have not yet been implemented; on hold = the workstream is aware of the recommendation and has requested that it be put on hold until it can provide an accepted or rejected status; pending response = the FMBT IV&V team has not had the adjudication session or is awaiting the workstream to respond to meeting requests to discuss and resolve the recommendation; rejected = the recommendations have been rejected by the FMBT program; VA = Department of Veterans Affairs.

Source: FMBT IV&V Weekly Status Report as of April 3, 2020. | GAO-21-227

We further summarized the IV&V recommendations FMBT assigned by workstream. The systems interface workstream had the most recommendations with 149 or 35 percent of the total recommendations, as shown in table 6. Of these 149 recommendations, 112 were pending and five were on hold, representing 76 percent of all pending and on hold recommendations. Eighty-five IV&V recommendations (20 percent) related to the program management workstream, and 69 (16 percent) related to the testing workstream.

Table 6: Status of FMBT Program IV&V Recommendations by Workstream

Workstream	Implemented	Not implemented	Partially implemented	Rejected	Pending response	On hold	Total
Systems interface	4	24	0	4	112	5	149
Program management	35	2	15	6	25	2	85
Testing	28	24	9	7	0	1	69
Requirements	6	23	1	4	0	0	34
Data	10	7	6	3	4	0	30
Organizational change management	11	1	2	3	0	0	17
Schedule	5	0	2	3	0	2	12
Change management	10	0	0	0	0	0	10
Risk	8	0	0	1	0	0	9
Configuration management	0	3	0	6	0	0	9
Technical	0	0	0	4	2	0	6
Total	117	84	35	41	143	10	430

Legend: FMBT = Financial Management Business Transformation; implemented = the recommendations have been fully implemented by the FMBT program; IV&V = independent verification and validation; not implemented = the recommendations have been accepted by the FMBT program but have not yet been implemented; on hold = the workstream is aware of the recommendation and has requested that it be put on hold until it can provide an accepted or rejected status; partially implemented = the recommendations have been accepted by the FMBT program and have not been fully implemented; pending response = the FMBT IV&V team has not had the adjudication session or is awaiting the workstream to respond to meeting

requests to discuss and resolve the recommendation; rejected = the recommendations have been rejected by the FMBT program; VA = Department of Veterans Affairs.

Source: *FMBT Program IV&V Status Report* as of April 3, 2020. | GAO-21-227

According to FMBT IV&V team officials, team members wanted to schedule adjudication sessions and meetings with certain workstream team members to review and discuss their assessment reports and related recommendations. However, FMBT program officials indicated to the FMBT IV&V team that recommendation tracking was not a top priority because FMBT officials were focusing all resources on the Integrated System Testing events. At the end of September 2019, all IV&V assessments were suspended, and the FMBT program office requested that the FMBT IV&V team begin to focus on independent test execution for the NCA wave. Following this, the FMBT IV&V team stopped tracking the status of IV&V recommendations.

In June 2020, according to FMBT IV&V team officials, the team began meeting with the workstream leads to discuss current IV&V activities and the actions required to resolve outstanding IV&V recommendations, including those that have not been implemented. According to the team, the FMBT program agreed to provide full support to the ongoing effort, and the IV&V team has been working since that time to review and address outstanding recommendations. VA officials told us that as of October 2020, the IV&V team was acting on the recommendations that had not yet been addressed.

Implementation Challenges

FMBT program officials and the IV&V contractor identified various challenges and steps that VA is taking to address them. Such challenges include those related to FMBT program funding shortfalls, coordination with other VA enterprise modernization initiatives, competing needs for personnel with required skill sets, resistance to change, and the impacts from COVID-19.

Funding Shortfalls

According to VA officials, funding shortfalls have been a major challenge for the FMBT program, and program managers have had to make adjustments to account for them. These adjustments have included reducing IV&V contractor funding and delaying implementation of the scheduled deployment at VHA. According to VA officials, if funding shortfalls continue, they could further jeopardize the implementation schedule for deploying iFAMS.

Overall funding for FMBT program. In fiscal years 2019 and 2020, VA reported funding shortfalls of \$15 million and \$69 million, respectively, for the FMBT program.¹⁹ According to VA, the FMBT program mitigated the 2019 funding shortfall by reducing funding for the IV&V contractor and other contract support and pausing the VHA implementation waves. The FMBT program also mitigated the 2020 funding shortfall by (1) reducing contractor support for data cleansing by approximately 50 percent from fiscal year 2019, (2) reducing IT development services (interface work) funding by 30 percent, (3) eliminating funding for the IV&V contract support, and (4) limiting the number of simultaneous implementations to two waves. To further mitigate the IT funding challenge, VA also plans to pursue restoring funding for the FMBT program in fiscal years 2021 and beyond using VA's newly available authority to repurpose expired funds to IT projects.²⁰

IV&V funding. In March 2020, the IV&V contractor was notified that VA would not renew the IV&V contract, which was set to expire in April 2020, in part because of a \$2.2 million fiscal year 2020 IV&V funding shortfall. The FMBT IV&V team noted that this would have a significant impact on the level of support provided at a critical point in the NCA implementation wave as well as on support provided to VBA and other future implementation waves. Further, if the FMBT program does not receive the full funding amount planned for fiscal year 2021, program officials stated that it is highly unlikely the program will be able to fund IV&V contract services.

Implementation delays. To address challenges resulting from the funding shortfall, VA noted that FMBT program officials have been working with stakeholders to adjust the implementation schedule. For example, FMBT program officials postponed all VHA implementation waves for at least 2 years to coordinate with the implementation of the new logistics system. According to VA, this schedule change would (1)

¹⁹According to August 7, 2019, FMBT Executive Steering Committee meeting documentation, the funding shortfall represents the difference between the FMBT program's original requirement (i.e., VA's budget request) and what was included in the President's budget request. In fiscal years 2019 and 2020, VA's budget request was \$89 million and \$135 million, respectively. In fiscal years 2019 and 2020, the President's budget request was \$74 million and \$66 million, respectively.

²⁰The Military Construction and Veterans Affairs, and Related Agencies Appropriations Act, 2016, Pub. L. No. 114-113, div. J, tit. II, § 243, 129 Stat. 2242, 2701-02 (2015), provided authority for VA to retain and use unobligated balances of expired discretionary funds for facilities infrastructure improvement and IT systems improvements and sustainment, subject to Office of Management and Budget and congressional approval.

allow the FMBT program to continue planned implementations with available resources, (2) reduce overall program costs by integrating with the new logistics system once instead of developing multiple interim solutions and integrations with legacy systems, (3) likely result in a shorter time frame for the overall VHA implementation, and (4) minimize the length and number of changes needed at medical centers to adopt modernized systems smoothly.

Coordination with Other Major Initiatives

VA also identified coordination with other VA enterprise modernization initiatives as a challenge because of their potential impact on FMBT program wave deployments. To address this challenge, as part of its efforts to plan wave deployments, the FMBT program coordinates with other priority initiatives at VA, such as the Electronic Health Record Modernization program and the supply chain modernization efforts that the VA Logistics Redesign program manages. For example, the FMBT program participates in various tactical, operational, and strategic discussions organized by VA's Office of Enterprise Integration, which is responsible for enterprise integration governance. These discussions are intended to identify business and integration interdependencies and schedule conflicts among the programs.

Coordination efforts have been informing the FMBT program. For example, as discussed above, the FMBT program worked with VHA to address the funding shortfall. In August 2019, the program recommended and later approved delaying iFAMS implementation at VHA locations as a way to work within available IT resources and reduce overall costs by integrating iFAMS directly with the new logistics system instead of developing interim solutions to work with existing systems.

These changes were also proposed as a means to coordinate and minimize the number of change management activities needed for VA medical centers to adopt the new electronic health record system and the new logistics system along with iFAMS. More recently, in August 2020, representatives from the Office of Enterprise Integration facilitated a 2-day virtual FMBT Roadmap Summit in which all priority initiatives and relevant VA organizations and programs participated. According to FMBT program officials, the purpose of the summit was to exchange ideas on how to best compress the FMBT program's schedule with minimal impact to the mission, operations, and other large VA initiatives. Key outcomes reported from the summit included

- gaining concurrence from stakeholders on a revised timeline;
- establishing a 36-month implementation timeline for VHA and closer coordination between the FMBT program and other VA modernization initiatives; and
- developing a common understanding of constraints within the VA, including dependencies, resource requirements, and subject matter expert availability.

As a result of the summit, in September 2020, the FMBT program revised its planned implementation from 32 waves to 26 waves and reduced the notional timeline by more than 2 years.

VA is also developing additional tools to help priority initiatives coordinate more effectively. For example, an integration team is working with the FMBT program to gather the artifacts needed to develop an integrated master schedule. Specifically, the Office of Enterprise Integration is currently developing an integrated road map, or master schedule. This tool is intended to help synchronize, identify, and present a view of interdependencies, milestones, and program transition points for the priority initiatives and help determine how decisions on one project may subsequently affect other initiatives.

Other Challenges

As of October 2020, VA also identified three other major challenges the FMBT program is facing—competing needs for personnel with required skill sets, resistance to change, and COVID-19—and developed mitigation plans to address them. According to VA, potential delays could occur if sufficient personnel with required skill sets are not available for waves being implemented concurrently. The FMBT program plans to mitigate this challenge by identifying and communicating the personnel skill requirements for each wave to the VA administrations and other support organizations as early as possible. VA also noted that resistance to change is a challenge and user adoption of iFAMS could be negatively affected if the FMBT program does not gain stakeholder engagement and buy-in. The FMBT program plans to mitigate this challenge through robust stakeholder engagement at varying levels across VA administrations and staff offices and by implementing enterprise service help desk operations. In addition, to mitigate impacts from COVID-19–related challenges, VA converted planning, training, and testing activities to virtual events.

FMBT Program Has Generally Followed Certain IT Management Best Practices, Except Those Related to Cost and Schedule Estimation

Following IT management best practices can help build a foundation necessary for ensuring responsibility, accountability, and transparency for major financial management transformation efforts. The FMBT program has generally met certain IT management best practices related to defining and implementing program governance, employing effective Agile project management, and instituting procedures for and performing testing on the system to be delivered. However, the FMBT program did not fully or substantially meet all characteristics for ensuring a reliable cost estimate and integrated master schedule. Without reliable cost and schedule estimates, VA management may not have the information necessary for informed decision-making. Therefore, effective and successful implementation of the FMBT program is at risk of being over budget or behind schedule on future deployments.

The FMBT Program Defined and Implemented a Program Governance Structure and Processes Consistent with Best Practices

According to project management guidance from the Project Management Institute, program governance establishes practices to support a program, enables and performs program decision-making, and maintains program oversight in order to meet strategic and operational goals.²¹ This governance is performed through the actions of a review and decision-making group that is charged with endorsing or approving recommendations for a program under its authority. Program governance best practices include, for example, defining the structure and composition of the group of governance participants and their roles and responsibilities; assuming responsibility for monitoring, reporting, and controlling program progress; and endorsing reviews at key decision

²¹Project Management Institute, Inc., *The Standard for Program Management, Fourth Edition*.

points in the program life cycle and approving any required program changes.

The FMBT program has defined and implemented a program governance structure and related processes consistent with best practices. Specifically, the FMBT program’s governance structure is organized into five tiers, which are intended to encourage decision-making at the lowest level possible and enable project managers to operate autonomously to the maximum extent possible. The various governance tiers assume responsibility for monitoring, controlling, and reporting program progress. For example, Tier 1 and 2 decisions regarding configuration of the system are captured in the FMBT program’s work management tool, and monitoring of day-to-day status at the project and work stream levels is captured in Agile documentation of team progress reported across multiple work streams. Tier 3 monitors the program and controls budget and functional decisions. Tier 4 oversees and advises the FMBT program and is provided program status updates regularly, for example, in the form of management briefings. Table 7 further describes the composition, responsibilities, and decision-making authority at each tier of the FMBT program’s governance structure.

Table 7: Governance Structure for the Department of Veterans Affairs (VA) Financial Management Business Transformation (FMBT) Program

	Participants	Responsibility	Authority
Tier 5 – Executive sponsors	<ul style="list-style-type: none"> Chief Financial Officer Chief Information Officer Chief Acquisition Officer 	<ul style="list-style-type: none"> Build and sustain VA organizational commitment and remove organizational obstacles Maintain link to VA’s overall strategy Empower the Executive Steering Committee 	Tier 5 is the highest level decision authority for the FMBT program
Tier 4 – Executive Steering Committee	Executive Steering Committee is a chartered organization comprising voting and nonvoting representatives from VA administrations and staff offices, including affected agencies (customers)	<ul style="list-style-type: none"> Oversees and advises the FMBT program and overall modernization effort Provides strategic direction and vision for the program Identifies and accepts controls requiring executive action and visibility within VA Meets at least quarterly Approve key program documents 	Tier 4 decisions involve FMBT program strategic direction, mission delivery impacts, and approvals to move from one life cycle phase to another

	Participants	Responsibility	Authority
Tier 3 – Deputy Assistant Secretary	FMBT Deputy Assistant Secretary	<ul style="list-style-type: none"> Oversees the strategic mission, visions, goals, and objectives of the FMBT program Communicates with all governance levels on strategic direction and program decisions Reviews readiness assessment for decisions to move from one life cycle phase to another 	Tier 3 decisions include financial and functional decisions for the program and decisions over items escalated from Tier 2
Tier 2 – Integrated Program Leadership	Integrated program leadership comprises leaders from the following: <ul style="list-style-type: none"> Enterprise Program Management Office Customer Experience Business Office Financial Services Center Office of Acquisitions, Logistics and Construction Technology Solutions Delivery 	<ul style="list-style-type: none"> Oversees specific components of the FMBT program Provides operational oversight of the FMBT program Directs project integration and program implementation strategy and approach Reviews readiness decisions to move from one life cycle phase to another prior to escalation to Tier 3 	Tier 2 decisions affect multiple programs or affect project scope, implementation, performance, or strategy
Tier 1 – Project Management	<ul style="list-style-type: none"> Wave project managers Implementation leads Program advisors 	<ul style="list-style-type: none"> Coordinate teams and activities related to day-to-day operational management Provide input and feedback on FMBT program plans, configuration, and implementation planning Report status and risks to the FMBT program office 	Tier 1 decisions affect a single project only (e.g., National Cemetery Administration wave) and may include changes in scope, schedule, and cost that do not exceed change control thresholds

Source: GAO analysis of VA's FMBT program documentation. | GAO-21-227

Decisions are to be escalated through the tiers of governance only when impacts to schedule, cost, or to another project (e.g., the VBA-GOE or the Enterprise Acquisition waves) are identified, or when decision-making authority at the next tier is required for changes to FMBT program scope, strategy, schedule, or risk. Program documentation describes the control categories (i.e., cost, schedule, or performance) used in the decision escalation and management process and the officials assigned to specific decisions. In addition, FMBT program governance documentation describes the change control process used to manage and document changes to the program baseline. For example, the decision to change the proposed initial deployment for NCA from July 2020 to November 2020 because of COVID-19 was recommended by the lower governance tiers and approved by the Executive Steering Committee. Decisions are to be formally documented in the FMBT program's decision log.

As part of the FMBT program's governance structure, VA guidance states that all VA IT projects must also follow the Veteran-focused Integration Process (VIP), which defines a phased project life cycle, assigns authority for critical decisions, and employs Agile project management methodology capable of delivering frequent results to the maximum extent possible.²² Further, the FMBT program employs the FMBT Project Delivery Framework, a life cycle used for phased implementation that identifies the key decision points consistent with VIP. The framework comprises four phases (initiation, planning, product, and deployment) and five check points aligned to critical decision points and documentation described in VIP guidance.

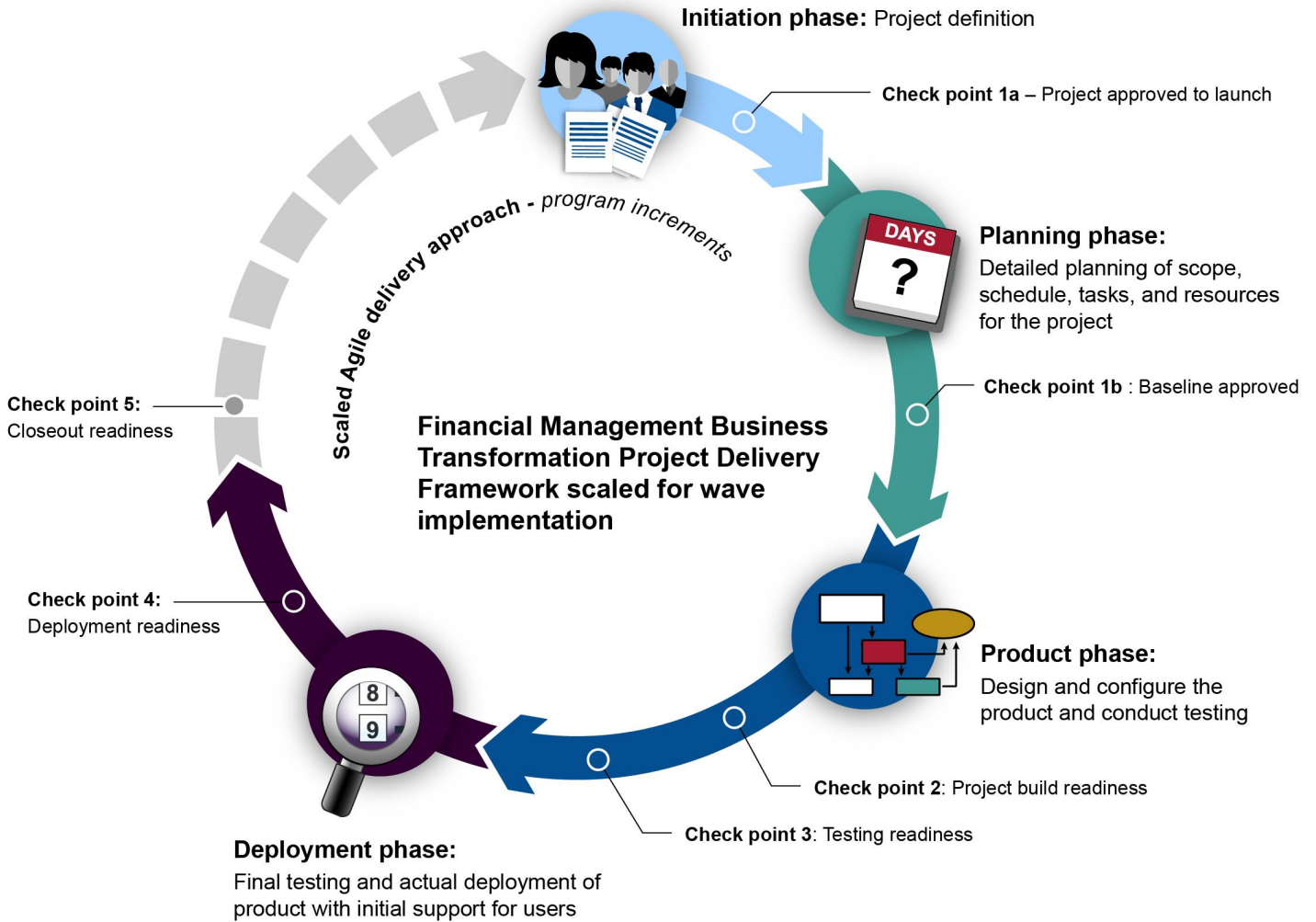
The FMBT program life cycle also adheres to an Agile project management methodology capable of delivering frequent releases consistent with VIP guidance.²³ Specifically, according to program documentation, the FMBT program began implementing the basic tools of Scrum (i.e., defining user stories and working to demonstrate completed work at the end of 3-week iterations called sprints).²⁴ It later matured the program to use a Scaled Agile Delivery approach that includes practices (i.e., program increments and alignment of activities across all wave work levels) that are adapted, when necessary, to the needs of a large-scale enterprise-wide implementation. The FMBT program's incremental deployment in waves is an example of the implemented scaled delivery approach. Each wave (e.g., NCA) within the program must move through the project delivery framework and pass all checkpoints, which are the decision points for moving into the next phase of delivery. Key aspects of the FMBT project delivery framework are illustrated in figure 1.

²²Department of Veterans Affairs, *Veteran-focused Integration Process Guide 3.2* (December 2018).

²³A framework is used to provide a basic structure to guide Agile implementation.

²⁴Scrum is the most common Agile framework. The Scaled Agile Framework is a governance model used to align and collaborate product delivery for modest-to-large numbers of Agile software development teams. The framework provides guidance for roles, inputs, and processes for teams, programs, large solutions, and portfolios. It is also intended to provide a scalable and flexible governance framework that defines roles, artifacts, and processes for Agile software development across all levels of an organization.

Figure 1: Financial Management Business Transformation (FMBT) Project Delivery Framework



Source: GAO analysis of FMBT program documentation. | GAO-21-227

Text of Figure 1: Financial Management Business Transformation (FMBT) Project Delivery Framework (Scaled Agile delivery approach – program increments)

- 1) Initiation phase. Project definition
 - a) Check point 1a-Project approved to launch
- 2) Planning phase. Detailed planning of scope, schedule, tasks, and resources for the project.

- a) Check point 1b – Baseline approved.
- 3) Product phase. Design and configure the product, conduct testing.
 - a) Check point 2 – Project build readiness
 - b) Check point 3 – Testing readiness
- 4) Deployment phase. Final testing and actual deployment of product with initial support for users.
 - a) Check point 4 – Deployment readiness
 - b) Checkpoint 5 – Closeout readiness

A program governance framework, when well designed, ensures that the program is managed appropriately. In highly complex environments, governance also helps a program to respond rapidly to information that becomes available during the course of the program. Because the FMBT program has defined and implemented its governance consistent with IT and program management best practices, the program should be positioned to make decisions effectively and help ensure that efforts are managed appropriately.

FMBT Program Substantially or Partially Met Four Best Practices for Effective Agile Project Management and Has Taken Steps to Make Improvements

According to our *Agile Assessment Guide*, among other things, best practices for effectively implementing Agile practices related to team dynamics and activities include (1) ensuring that team composition supports Agile methods and includes a product owner that is the authoritative customer representative, (2) prioritizing work through the definition and prioritization of user stories in a backlog to maximize value for the customer, (3) establishing repeatable processes to demonstrate progress, and (4) establishing an appropriate set of Agile metrics and associated processes to be used to measure their performance goals early in the development cycle.²⁵ Effective teams in an Agile environment

²⁵[GAO-20-590G](#).

promote collaboration and commitment and help an organization better manage iterative requirements.

The FMBT program developed an *FMBT Agile Best Practices Playbook* to guide its Agile practices.²⁶ The playbook includes guidance consistent with effective Agile practices and provides detail for how FMBT program Agile teams should apply best practices.²⁷ For example, it calls for a product owner, definition and prioritization of user stories in a backlog, and demonstrations at the end of each sprint and program increment. The playbook also notes that Agile metrics, such as velocity, should be identified and used as forecasting parameters.

For the NCA wave, the FMBT program substantially met two Agile best practices related to team composition and demonstrating progress.²⁸ However, the program only partially met the remaining two practices for prioritizing user stories and establishing metrics. Our assessment of the FMBT program's adherence to its *FMBT Agile Best Practices Playbook*, and to team dynamics and activities best practices in our *Agile Assessment Guide*, is detailed in table 8.

²⁶Department of Veterans Affairs, *FMBT Agile Best Practices Playbook*, Version 1.3 (August 2019).

²⁷According to FMBT program officials, the core of the iFAMS solution is a commercial-off-the-shelf product and thus the program did not use continuous integration for the VA-specific implementation. Therefore, two best practices, to employ continuous integration and to put mechanisms in place to ensure the quality of code being developed, were not included in the program's Agile guidance.

²⁸Based on available evidence, we assessed whether best practices were as follows: Met: VA provided complete evidence that satisfies the entire criterion. Substantially met: VA provided evidence that satisfies a large portion of the criterion. Partially met: VA provided evidence that satisfies about one-half of the criterion. Minimally met: VA provided evidence that satisfies a small portion of the criterion. Not met: VA provided no evidence that satisfies any of the criterion. See app. I for more details on the rating scale and how we determined the overall assessment for each characteristic.

Table 8: Financial Management Business Transformation (FMBT) Program Adherence to Agile Team Dynamics and Activities Best Practices

Agile best practice	FMBT program guidance	GAO assessment	Summary
<p>Ensure that team composition supports Agile methods and the Agile team is empowered to decide how work will be done. The team should include a product owner that is the authoritative customer representative</p>	<p>According to FMBT Agile guidance, Agile teams should consist of a dedicated Scrum master (i.e., team facilitator for Agile processes), a dedicated product owner, and dedicated team members. The Agile team should be semi-independent and self-organizing, focusing on common goals that are aligned to business objectives. Additionally, FMBT Agile guidance states that the product owner represents the voice of the customer; performs key functions, such as conveying the needs of the end user; prioritizes backlog items; and sets clear expectations for what work is to be accepted.</p>	<p>Substantially met</p>	<p>FMBT Agile team meeting slides listed teams that were made up of a Scrum master, product owner, and team members. The program provided a notional example for one team showing that it decided on goals and how work would be done; however, it did not provide documentation demonstrating that it fully met this practice during the National Cemetery Administration (NCA) wave. In addition, according to FMBT program officials, product owners were selected from the Financial Services Center for the NCA. The Deputy Director for the program stated that product owners typically had the expertise and authority to make decisions, prioritize the work, and ultimately accept the work at completion. The product owners were subject matter experts from the Financial Services Center and the Office of Management, who knew the process flows in the existing system and who decided how business processes should work in the future system.</p>
<p>Prioritize work through the definition and prioritization of user stories in a backlog to maximize value for the customer</p>	<p>FMBT's Agile guidance notes that user stories are the primary means by which the program describes the scope of work in the context of those it will affect most. According to the guidance, all user stories selected for a sprint should have clearly defined acceptance criteria as well as an estimate of complexity from the Agile team prior to the start of the sprint. In addition, product owners should prioritize user stories based on organizational needs to maximize the value delivered.</p>	<p>Partially met</p>	<p>As of August 2020, the FMBT program identified 2,470 user stories. According to FMBT program product owners, user stories were prioritized during deep dive reviews of business processes, and they provided input in prioritizing user stories as necessary through the Agile team planning processes. The program had defined acceptance criteria for about 73 percent (1,811 of 2,470) of the user stories and estimated story points for about 60 percent (1,473 of 2,470) of the user stories. However, the FMBT program had not developed acceptance criteria and estimated story points for the remaining user stories.</p>

Agile best practice	FMBT program guidance	GAO assessment	Summary
Establish repeatable processes to demonstrate progress	FMBT’s Agile guidance called for repeatable processes, such as daily meetings to support synchronization and impediment escalation. Additionally, according to program guidance, teams should hold sprint reviews at the end of each sprint to demonstrate tangible outcomes (i.e., working software). Further, sprint retrospectives should be held to identify opportunities for improvement.	Substantially met	FMBT program officials and product owners described repeatable processes, such as daily meetings, product demonstrations, and retrospectives that they held. The program provided documentation of examples of synchronization meetings and an end-to-end product demonstration but did not provide documentation to demonstrate that the program fully met this practice. According to FMBT program officials, the system integrator’s team conducted sprint retrospectives for the NCA wave internally, but teams also held regular office hours with product owners and managers to address issues and adjustments needed during the sprinting process.
Establish an appropriate set of Agile metrics and associated processes for measuring their performance goals early in the development cycle	According to FMBT’s Agile guidance, metrics such as velocity, or the measure of the amount of work a team has completed during a sprint, should be maintained as basic forecasting parameters. This metric can help ensure that the team is committing to an amount of work that does not exceed its bandwidth for delivery.	Partially met	While the program noted that it used metrics, such as sprint burn down charts and velocity reports based on backlog information via its Agile management tool, it did not maintain documentation of these metrics for each sprint outside of its tool. ^a

Legend: met: VA provided complete evidence that satisfies the entire criterion; substantially met: VA provided evidence that satisfies a large portion of the criterion; partially met: VA provided evidence that satisfies about one-half of the criterion; minimally met: VA provided evidence that satisfies a small portion of the criterion; not met: VA provided no evidence that satisfies any of the criterion.

Source: GAO analysis of Department of Veterans Affairs FMBT program documentation. | GAO-21-227

Note: Best practices are derived from GAO, *Agile Assessment Guide: Best Practices for Agile Adoption and Implementation*, GAO-20-590G (Washington, D.C.: September 2020).

^aA burn down chart is a visual Agile tool or metric used to track the progress of remaining work against the time until project completion. It shows where the team stands regarding completing the tasks that make up the backlog items.

According to program officials, the FMBT program had only partially met Agile practices for prioritizing work and establishing metrics because the Agile teams in the NCA wave were not all operating at the same level of maturity and the majority of the teams involved in the wave were new teams that did not have prior experience with Agile. In addition, the first wave of teams was not consistently entering values such as acceptance criteria and user story estimates into its work management tool and using them to forecast future work efforts for the NCA wave.

FMBT program officials have taken steps to ensure that all four Agile team activities best practices are being met in subsequent waves. For example, FMBT program officials said that they are incorporating Agile lessons learned and updated Agile guidance to reflect maturing practices

to improve Agile team practices for subsequent waves. Specifically, during the course of our review, the program released a new Agile project management tool guide in September 2020 to require acceptance criteria and story points to be populated before a user story is ready to be worked on. Further, for the establishing metrics best practice, the program updated its Agile guidance in June 2020 to describe additional metrics, such as velocity and burn down charts for wave features, which would be used to help measure and report on progress.²⁹ Based on slides from March 2020, teams were beginning to include metrics related to velocity and burn down charts for VBA-GOE sprints. If consistently executed as described, these actions will help to ensure that the FMBT program has practices to define and prioritize work and metrics adequately to measure progress. Because the FMBT program substantially met two of the four Agile team best practices and is taking steps in future waves to improve the two other team practices, which we assessed as partially met, the program will increase the likelihood that it will maximize the value in the system it is delivering.

The FMBT Program Planned and Performed Testing and Is Addressing Issues Identified Consistent with IT Management Best Practices

IT management best practices also include instituting procedures and performing testing to ensure that a system meets requirements and fulfills its intended purpose.³⁰ Test plans should be developed to outline the program's testing approach and establish the testing environment. In addition, a key element of successful system testing is appropriately analyzing, prioritizing, and resolving defects that are discovered during testing.

FMBT Program Testing Approach

The FMBT program established an approach for testing the iFAMS system that it developed for the NCA wave; the approach was generally consistent with best practices. Specifically, the FMBT program developed

²⁹A burn down chart is a visual Agile tool or metric used to track the progress of remaining work against the time until project completion. It shows where the team stands regarding completing the tasks that make up the backlog items.

³⁰Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration® for Acquisition, Version 1.3*.

test plans to outline the program’s test approach, including a progression of tests from unit testing, system testing, functional system testing, integrated system testing (for end-to-end business processes or value streams), and user acceptance testing.³¹ According to the test plans, functionality within each of seven business process areas, or value streams, was scheduled to be tested during unit testing to verify that individual units worked according to specifications. The program’s subsequent test events were to integrate testing of the configuration, data conversion, and interfaces for end-to-end value streams and include end users. The plans, which include the *FMBT Test Plan*, *NCA Wave and Enterprise User Acceptance Test Plan*, and the *NCA Wave and Enterprise Functional System Test Plan*, also outlined establishing a dedicated testing environment and scheduling when testing would occur. The testing environment was designed to be used to simulate the production system and to ensure that the end-to-end solution for a value stream worked properly.

The FMBT program also established a defect management strategy to manage, track, and report defects. According to the FMBT program’s *Defect Management Strategy*, the program is to identify defects as early in the testing process as possible and minimize the impact of defects on system implementation. To manage defects, the program established levels for categorizing the degree to which each defect affects the system, process, or user and indicating the level of threat it can cause, as shown in table 9.

Table 9: Financial Management Business Transformation System Testing Defect Category Levels

Defect category level	Definition
Blocker	The software does not operate as specified, as designed, or both, and no work-around is possible.
Critical	Crashes, severe loss of data or corruption, or severe memory leaks occur, or some application component or function does not or will not work. No work-around is available.
Major	There is major loss of function or a feature is disabled or incorrect. The defect causes a severe degradation in service. A work-around is possible, but additional problems could result in critical failure.
Normal	Test result is not as expected or there is corruption of a noncritical component. However, a work-around is available.

³¹As part of this approach, unit testing is conducted within Agile sprints; other testing activities are conducted following a waterfall approach. A traditional waterfall approach typically consists of long, sequential phases for requirements planning, design, development, and testing. Agile practices integrate planning, design, development, and testing into an iterative life cycle to deliver software early and often. Value streams reflect the end-to-end financial or acquisition processes that will be affected by the new system.

Defect category level	Definition
Minor	There is minor loss of function. There may be some inconvenience for users, but there is an easily identifiable work-around solution.
Trivial	There is a superficial error or design aesthetic that has no effect on operation.

Source: Department of Veterans Affairs Financial Management Business Transformation program documentation. | GAO-21-227

Test Results and Defect Management Efforts

Consistent with best practices, the FMBT program performed its planned testing according to its established approach. Test events were conducted on components over a period of time to validate the system’s functionality within specific Momentum test environments containing the latest version of the iFAMS configuration. FMBT program test events are summarized in table 10.

Table 10: Summary of Financial Management Business Transformation (FMBT) Program Testing Events and Reported Results

FMBT program test events	Objective	National Cemetery Administration wave test dates	FMBT-reported results
Unit testing	Verify that individual or integrated units of functionality are working according to specifications.	Preliminary tests and retests within sprints as necessary	The FMBT program reports results reflected as individual accepted user stories
System testing	Validate, through preliminary testing, that the configuration of all units/components within a functional or technical area function as designed.	June 2019 – August 2019	1,067 of 1,089 planned tests passed (98 percent pass rate)
Functional system testing	Verify functionality is correctly configured by value streams.	June 2019 – September 2019	1,594 of 1,721 planned tests passed (92.6 percent pass rate)
Integrated system testing	Verify that all system components, including functional configuration, interfaces, converted data, and business intelligence reporting, can function as an integrated end-to-end business process.	October 2019 – February 2020 (Regression testing, to verify functionality of the system after defect fixes, continued until July 2020)	Initial: 648 of 780 planned tests passed (83.1 percent initial pass rate) Additional testing of any blocked or failed test cases after bug (or issue) fixes: 804 of 811 planned tests passed (99.1 percent pass rate)
Business Testing and Quality Assurance Division user acceptance testing	Validate that system functionality works as expected through end-to-end testing by the FMBT test group.	January 2020 –May 2020 (Post–user acceptance testing continued until June 2020)	1,249 of 1,251 planned tests passed (99.8 percent pass rate)
User acceptance testing	Validate that end-to-end business processes function as expected (enterprise and administration) through testing by system users.	March 2020 – April 2020	3,273 of 3,401 planned tests passed (96.2 percent pass rate)

Sources: GAO analysis of Department of Veterans Affairs FMBT program documentation and officials. | GAO-21-227

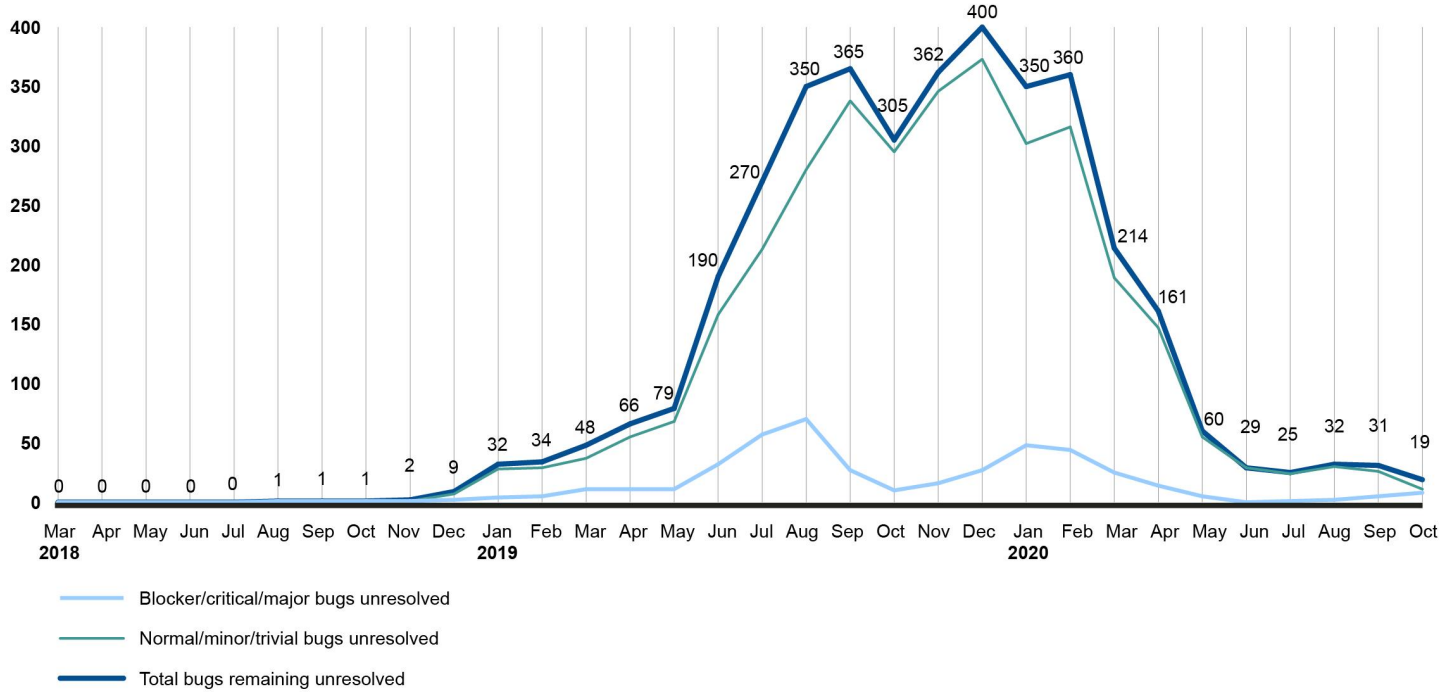
With regard to test results, as of October 2020, the program had identified a total of 2,457 issues (or bugs) during the NCA wave testing, including 11 bugs that remained open (i.e., unresolved and not closed).³² Of the open bugs, the FMBT program categorized three as major, seven as normal, and one as minor. According to FMBT program officials, any bugs categorized as major or higher must be resolved, and the three remaining major bugs had been resolved before the NCA iFAMS deployment. In addition, as of September 2020, the FMBT program had deferred the resolution of 46 bugs (30 normal and 16 minor) that the program deemed not critical to be fixed before the NCA wave deployment. Meeting minutes from the program's deployment readiness review at the end of September 2020 showed that while the program was continuing to conduct regression testing to verify that the system continued to function as expected after bugs were fixed and configuration updates were made, according to one of the testing leads, the system was ready for deployment at NCA. Figure 2 shows the number of unresolved bugs for the NCA wave from March 2018 through October 2020.³³

³²The FMBT program refers to issues identified during testing as bugs. All bugs are to be analyzed and addressed based on this analysis. Bugs that require changes to the Momentum configuration are recognized as defects.

³³In a few instances, closed bugs could be labeled as unresolved if the work to resolve the bug was completed but required validation before it could be marked as completed or resolved.

Figure 2: Number of Unresolved Bugs for the Financial Management Business Transformation (FMBT) Program National Cemetery Administration (NCA) Wave from March 2018 to October 2020

Number of cumulative unresolved bugs by month



Source: GAO analysis of Department of Veterans Affairs FMBT program data. | GAO-21-227

Data table for Figure 2: Number of Unresolved Bugs for the Financial Management Business Transformation (FMBT) Program National Cemetery Administration (NCA) Wave from March 2018 to October 2020

	Blocker / critical / major bugs unresolved	Normal / minor / trivial bugs unresolved	Total Bugs unresolved
Apr 2018	0	0	0
May 2018	0	0	0
Jun 2018	0	0	0
Jul 2018	0	0	0
Aug 2018	1	0	1
Sep 2018	1	0	1
Oct 2018	1	0	1
Nov 2018	1	1	2
Dec 2018	2	7	9
Jan 2019	4	28	32

	Blocker / critical / major bugs unresolved	Normal / minor / trivial bugs unresolved	Total Bugs unresolved
Feb 2019	5	29	34
Mar 2019	11	37	48
Apr 2019	11	55	66
May 2019	11	68	79
Jun 2019	32	158	190
Jul 2019	57	213	270
Aug 2019	70	280	350
Sep 2019	27	338	365
Oct 2019	10	295	305
Nov 2019	16	346	362
Dec 2019	27	373	400
Jan 2020	48	302	350
Feb 2020	44	316	360
Mar 2020	25	189	214
Apr 2020	14	147	161
May 2020	5	55	60
Jun 2020	0	29	29
Jul 2020	1	24	25
Aug 2020	2	30	32
Sep 2020	5	26	31
Oct 2020	8	11	19

Note: The FMBT program refers to issues identified during testing as bugs. The program established levels for categorizing the degree to which a bug affects the system, process, or user and indicating the level of threat it can cause (i.e., blocker, critical, and major bugs have a greater impact than normal, minor, or trivial bugs). In a few instances, closed bugs could be labeled as unresolved if the work to resolve the bug was completed but required validation before it could be marked as completed or resolved. As of October 2020, the FMBT program had closed eight bugs that were not yet resolved.

By establishing test plans and executing its testing approach consistent with best practices and planning to address issues, including all blocker, critical, and major bugs, prior to system implementation, the program has increased the likelihood that the iFAMS system deployed for the NCA wave will perform as intended. If the FMBT program conducts effective testing practices across future wave implementations, the program will be positioned to ensure that the system meets the needs of its end users.

The FMBT Program Cost Estimate Did Not Fully Meet Best Practices

We analyzed VA's 2019 FMBT program cost estimate—the most recent cost estimate at the time of our review—and determined that the estimate was not reliable because it did not fully or substantially meet all characteristics associated with a reliable cost estimate. We have identified 18 best practices associated with a high-quality, reliable cost estimate, which are summarized into four characteristics—comprehensive, well-documented, accurate, and credible.³⁴ Of the four characteristics of a reliable cost estimate, the FMBT program's cost estimate substantially met one characteristic, partially met two characteristics, and minimally met one of the four characteristics.³⁵ Without a reliable cost estimate, management may not have the necessary information for informed decision-making. Further, a reliable cost estimate can help management minimize the risk of cost overruns and unmet performance targets. The four characteristics of a reliable cost estimate, their associated best practices, and the results of our assessment are summarized in table 11.

³⁴[GAO-20-195G](#).

³⁵Based on available evidence, we assessed whether best practices were as follows: Met: VA provided complete evidence that satisfies the entire criterion. Substantially met: VA provided evidence that satisfies a large portion of the criterion. Partially met: VA provided evidence that satisfies about one-half of the criterion. Minimally met: VA provided evidence that satisfies a small portion of the criterion. Not met: VA provided no evidence that satisfies any of the criterion. See app. I for more details on the rating scale and how the overall assessment for each characteristic was determined.

Table 11: GAO Assessment of the Extent to Which the Department of Veterans Affairs' (VA) Cost Estimate for the Financial Management Business Transformation Program Met Best Practices

Cost characteristic	GAO overall assessment	Best practice for each characteristic	GAO assessment
<p>Comprehensive. Cost estimates completely define the program and reflect the current schedule and technical baseline. They are structured with sufficient detail to ensure that cost elements are neither omitted nor double counted. Where information is limited and judgments must be made, assumptions and exclusions on which the estimate is based are reasonable, clearly identified, explained, and documented.</p>	Partially met	The cost estimate includes all life cycle costs	Partially met
		The technical baseline description completely defines the program, reflects the current schedule, and is technically reasonable	Partially met
		The cost estimate work breakdown structure is product-oriented, traceable to the statement of work, and at an appropriate level of detail to ensure that cost elements are neither omitted nor double-counted	Partially met
		The cost estimate documents all cost-influencing ground rules and assumptions	Partially met
<p>Well-documented. Cost estimates can easily be repeated or updated and can be traced to original sources through auditing. Thorough documentation explicitly identifies the primary methods, calculations, results, rationales or assumptions, and sources of the data used to generate each cost element's estimate.</p>	Substantially met	The documentation shows the source data used, the reliability of the data, and the estimating methodology used to derive each element's cost	Substantially met
		The documentation describes how the estimate was developed so that a cost analyst unfamiliar with the program could understand what was done and replicate it	Substantially met
		The documentation discusses the technical baseline description and the data in the technical baseline are consistent with the cost estimate	Partially met
		The documentation provides evidence that the cost estimate was reviewed and accepted by management	Partially met
<p>Accurate. Cost estimates are developed by estimating each cost element using the best methodology from the data collected. Accurate estimates are based on appropriate adjustments for inflation. Their underlying mathematical formulas, databases, and inputs are validated, and the resulting estimates contain few, if any, minor mathematical mistakes. Accurate estimates are based on a historical record of cost estimating and actual experiences from comparable programs. Finally, they are updated regularly to reflect significant changes in the program. Any variances between estimated and actual costs are documented, explained, and reviewed.</p>	Partially met	The cost model is developed by estimating each work breakdown structure element using the best methodology from the data collected	Partially met
		The estimate is adjusted properly for inflation	Minimally met
		The estimate contains few, if any, minor mistakes	Partially met
		The cost estimate is regularly updated to ensure it reflects program changes and actual costs	Substantially met

Cost characteristic	GAO overall assessment	Best practice for each characteristic	GAO assessment
		Variations between planned and actual costs are documented, explained, and reviewed	Partially met
		The estimate is based on a historical record of cost estimating and actual experiences from other comparable programs	Partially met
Credible. Cost estimates discuss and document any limitations of the analysis, including uncertainty or bias surrounding source data and assumptions. The estimate's major assumptions are varied to determine how sensitive it is to changes. Credible cost estimates include a risk and uncertainty analysis that determines the level of confidence associated with the estimate. In addition, high-value cost elements are cross-checked with alternative estimating methodologies to validate results. Finally, the estimate is compared with an independent cost estimate conducted by a group outside the acquiring organization.	Minimally met	The cost estimate includes a sensitivity analysis that identifies a range of possible costs based on varying major assumptions and parameters	Minimally met
		A risk and uncertainty analysis is conducted that quantifies the imperfectly understood risks and identifies the effects of changing key cost driver assumptions and factors	Minimally met
		Major cost elements are cross-checked to see if results are similar	Not met
		An independent cost estimate is conducted by a group outside the acquiring organization to determine whether other estimating methods produce similar results	Not met

Legend: met = VA provided complete evidence that satisfies the entire criterion; substantially met = VA provided evidence that satisfies a large portion of the criterion; partially met = VA provided evidence that satisfies about one-half of the criterion; minimally met = VA provided evidence that satisfies a small portion of the criterion; not met = VA provided no evidence that satisfies the criterion.

Source: GAO assessment of VA's Financial Management Business Transformation program documentation as of September 2019. | GAO-21-227

Note: Characteristics and best practices are derived from GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, GAO-20-195G (Washington, D.C.: March 2020).

Additional details on our overall assessments of each of the four characteristics, and selected best practices associated with them, are summarized below.

Comprehensive. The FMBT program's cost estimate partially met the comprehensive characteristic. The estimate contains costs for development, modernization, and enhancements; implementation; and operations and support; which covers establishing the FMBT program in 2016 through 2029—10 years past the date of the estimate. Government and contractor costs are also included. Additionally, excluded items (i.e., cost elements) are noted in the estimate. However, the estimate does not include some life cycle costs because of lack of data, lack of funding, and uncertain requirements. Without fully accounting for all life cycle costs, management will have difficulty successfully planning program resource requirements and making informed decisions.

The cost estimate is based on a technical baseline description; however, technical requirements are contained in multiple documents, many of which are not signed by approving authorities, and some discrepancies exist between the technical documents.³⁶ VA officials stated the technical baseline description is in its early stages and remains a work in progress. The cost estimate did not reflect all items contained in the technical documents or their updates. Without an adequate understanding of the acquisition program—such as the technical definition, characteristics, system design features, and included technologies—the cost estimator will not be able to identify the technical and program parameters that underpin the cost estimate and the quality of the cost estimate will be compromised.

The FMBT program cost estimating structure is sufficiently detailed in most places but does not provide enough detail on certain high-cost elements. In addition, it does not match the schedule work breakdown structure and does not have a work breakdown structure dictionary that fully defines all work associated with the elements. VA officials stated that the cost estimating structure continues to be refined as additional information arises. Without a standard structure for tracking resource allocations and expenditures, an organization may have difficulties sharing data among programs, comparing and reconciling costs between contractors, and updating the cost estimate with actual costs.

Ground rules and assumptions and associated rationales and data are contained in the cost estimate report and in the supporting cost models. However, not all assumptions and supporting rationales are documented, and risks associated with assumptions are not identified. If management is not fully informed of cost estimating ground rules, assumptions, and risks, it will not have a full understanding of all the conditions on which the estimate was structured.

Well-documented. The FMBT program's cost estimate substantially met the well-documented characteristic. Cost estimate documentation that VA provided contains the data sources used to inform the estimate and

³⁶The technical baseline description should completely define the program, reflect the current schedule, and be technically reasonable. The technical baseline should also include sufficient detail of technical, program, and schedule characteristics based on the best available information at the time, and this information should be updated as changes occur. Further, the technical baseline should be developed by qualified personnel, such as system engineers; should be approved by management; and should reside in one central location. The technical baseline can be a single document or several documents stored in one location.

identifies the methodologies used to develop the estimate. In addition, documentation contains information on inflation indexes, data sources, sensitivity analysis, and risk analysis, as well as access to electronic copies of the cost models. VA officials described various aspects of management review of the cost estimate, but senior leadership did not document their review by signing the cost estimate. In addition, an assessment of the accuracy and reliability of the underlying data was not provided, and certain requirements contained in technical documentation were not found in the cost estimate. Unless cost estimation data and information are documented and archived for future use, cost estimate updates and estimates for future programs may not benefit from the research and analysis already conducted.

Accurate. The FMBT program's cost estimate partially met the accurate characteristic. We found several errors in the cost estimate such that it is not clear the cost model underwent a quality control process. For example, some cost model inputs were inconsistent with their data sources, some data used were not normalized—made consistent and comparable to other data in the estimate—prior to use in the cost model, and there were some instances in which the cost model did not model stated assumptions. We also found that the cost estimate did not clearly indicate the base year and was missing a year of escalation for several elements. Validating that a cost estimate is accurate requires thoroughly understanding and investigating how the cost model was constructed. VA officials stated that the estimate is updated to reflect changes in technical or programmatic assumptions; however, it is difficult to determine where the model is updated to reflect such changes or how the cost estimate is affected by those changes.

Actual costs for the FMBT program from inception in fiscal year 2016 through fiscal year 2018 were collected and incorporated into the cost model. However, the estimate did not include a variance analysis between planned and actual fiscal year 2018 costs to help inform the fiscal year 2019 cost estimate development. Without a documented comparison between the prior estimate and actual costs for the same period of time, the cost estimators cannot determine how well they are estimating the impacts of program changes over time.

Credible. The FMBT program's cost estimate minimally met the credible characteristic. A sensitivity analysis—an analysis of the effects of changing assumptions and ground rules on a cost estimate—was performed that examined what VA officials considered to be the top three program costs and the effects of increasing pay and nonpay escalation

rates. However, degrees of uncertainty were defined by hypothetical plus or minus percentages, and the escalation variability range was an unlikely amount. For management to make informed decisions, there should be a clear link between the technical baseline parameters, assumptions, and cost model inputs that cost estimators examine in the sensitivity analysis.

VA officials analyzed the impacts of a theoretical program budget cut to the 2018 baseline estimate for the 2019 update; however, a cost risk and uncertainty analysis was not conducted on the 2019 estimate itself. VA officials noted that a lack of resources, cost database, and cost data hinders a statistical analysis at this time. Without a current risk and uncertainty analysis, the program estimate will not reflect the degree of uncertainty, a level of confidence cannot be made about the estimate, and management may not determine a defensible level of contingency resources necessary to cover increased costs resulting from unexpected design complexity, incomplete requirements, technology uncertainty, and other uncertainties.

In addition, it is not evident from the documentation that VA provided that cross-checks—alternate cost estimating methodologies used to validate cost estimating results—were performed. Unless an estimator employs cross-checks, the estimate will have less credibility because stakeholders will have no assurance that alternative estimating methodologies produce similar results.

An independent cost estimate was not performed for the 2019 estimate because an independent cost analysis office does not exist within VA, and VA has not obtained an outside independent cost estimate. A program estimate that has not been reconciled with an independent cost estimate has an increased risk of proceeding over- or underfunded because an independent cost estimate provides an objective and unbiased assessment of whether the program estimate can be achieved.

The FMBT Program Schedule Did Not Fully Meet Best Practices

We analyzed VA's April 2020 FMBT program schedule—the most recent schedule at the time of our review—and determined that the schedule was not reliable because it did not fully or substantially meet all characteristics associated with a reliable program schedule. The success of a program depends, in part, on having an integrated and reliable master schedule that defines when the program's set of work activities

and milestone events are to occur, how long they will take, and how they are related to one another. Among other things, a reliable schedule provides a road map for systematic execution of a program and the means to gauge progress, identify and address potential problems, and promote accountability. We have identified 10 best practices associated with a high-quality, reliable schedule, which are summarized into four characteristics—comprehensive, well-constructed, credible, and controlled.³⁷ Of the four characteristics of a reliable schedule, the FMBT program’s schedule substantially met one characteristic and partially met three of the four characteristics.³⁸ The four characteristics of a reliable schedule, their associated best practices, and the results of our assessment are summarized in table 12.

Table 12: GAO Assessment of Extent to Which the Department of Veterans Affairs’ (VA) Master Schedule for the Financial Management Business Transformation Program Met Best Practices

Schedule characteristic	GAO overall assessment	Best practice for each characteristic	GAO assessment
Comprehensive – reflects all activities in the work breakdown structure, which details the work necessary to accomplish a project’s objectives, including activities both the owner and the contractors are to perform and how long each activity will take, allowing for discrete progress measurement, and the resources needed to do the work and whether the resources will be available when needed	Partially met	Capturing all activities	Partially met
		Establishing the durations of all activities	Substantially met
		Assigning resources to all activities	Minimally met
Well-constructed – reflects all activities logically sequenced, with limited and justified use of unusual or complicated logic; float (slack) that accurately reflects the schedule’s flexibility; and a critical path that represents the activities that drive the program’s earliest completion date	Partially met	Sequencing all activities	Partially met
		Ensuring reasonable total float	Partially met
		Confirming that the critical path is valid	Partially met
Credible – accounts for necessary schedule contingency and prioritized risks based on a robust schedule risk analysis and the interdependence (horizontal and vertical traceability) of detailed activities at various levels of the schedule	Partially met	Conducting a schedule risk analysis	Minimally met
		Verifying that the schedule can be traced horizontally and vertically	Partially met

³⁷GAO-16-89G.

³⁸Based on available evidence, we assessed whether best practices were as follows: Met: VA provided complete evidence that satisfies the entire criterion. Substantially met: VA provided evidence that satisfies a large portion of the criterion. Partially met: VA provided evidence that satisfies about one-half of the criterion. Minimally met: VA provided evidence that satisfies a small portion of the criterion. Not met: VA provided no evidence that satisfies any of the criterion. See app. I for more details on the rating scale and how the overall assessment for each characteristic was determined.

Schedule characteristic	GAO overall assessment	Best practice for each characteristic	GAO assessment
Controlled – updated regularly by trained schedulers using actual progress and logic to realistically forecast dates, accompanied by documents that describe updates and define assumptions and unique features, and compared against a baseline to determine variances	Substantially met	Updating the schedule using actual progress and logic	Substantially met
		Maintaining a baseline schedule	Substantially met

Legend: met = VA provided complete evidence that satisfies the entire criterion; substantially met = VA provided evidence that satisfies a large portion of the criterion; partially met = VA provided evidence that satisfies about one-half of the criterion; minimally met = VA provided evidence that satisfies a small portion of the criterion; not met = VA provided no evidence that satisfies the criterion.

Source: GAO analysis of VA Financial Management Business Transformation program documentation as of April 2020. | GAO-21-227

Note: Characteristics and best practices are derived from GAO, *Schedule Assessment Guide: Best Practices for Project Schedules*, GAO-16-89G (Washington, D.C.: December 2015).

Additional details on our overall assessments of each of the four characteristics, and selected best practices associated with them, are summarized below.

Comprehensive. VA’s schedule for the FMBT program partially met the comprehensive characteristic. Our analysis found that the FMBT program’s master schedule includes government and contractor tasks and that level of effort tasks are clearly marked so that an analyst unfamiliar with the program can easily distinguish them. Activities in the integrated master schedule adhere to a hierarchical work breakdown structure, but the structure is not consistent across project documentation and does not align with the cost estimate. Aligning the schedule activities to a well-defined program work breakdown structure helps ensure that the total scope of work is accounted for within the schedule. In addition, the work breakdown structure did not have an associated dictionary describing the details of the work in each component or element of the work breakdown structure.

The FMBT program’s master schedule generally reflected activities with reasonable amounts of time for how long each activity was expected to take, allowing for discrete progress measurement, and appeared to be based on realistic calendar assignments.

The schedule is not resource loaded. VA officials stated that the integrated master schedule is not resource loaded by traditional means within the schedule software; rather, they manage resources with a separate system. However, we were not provided evidence of how resources are assigned or monitored, or how status is reconciled with activities in the schedule. According to GAO’s *Schedule Assessment Guide*, if resource information is stored and maintained outside the schedule, how information is integrated between the schedule and the

resource management software must be clear. Specifically, managing resources outside the schedule requires a procedure in which resource assignments are fed back into the schedule to reflect the separate resolution of any identified resource issues. Resources must be considered in creating a schedule because their availability directly affects an activity's duration, and a schedule without identified resources implies an unlimited supply and availability of resources.

Well-constructed. VA's schedule for the FMBT program partially met the well-constructed characteristic. We found that 27 percent of the project's remaining activities are not logically sequenced with links to other activities or milestones. Generally, every activity within a schedule should have at least one predecessor and one successor. We also found that the schedule contains date constraints for 20 percent of the project's remaining activities and milestones. These date constraints confine the schedule by preventing tasks from starting earlier even if predecessor activities are completed ahead of schedule. Constraints should be minimized and justified in documentation because they override the schedule's logic and restrict how planned dates respond to accomplished effort.

The FMBT program's master schedule partially met the best practice of a valid critical path. We evaluated each subproject's critical path and determined that while some paths are valid for managing the subproject, others may not be reliable. For example, the Enterprise Support and Financial Services Center (FSC) Readiness subproject critical paths are straightforward but may benefit from increased detail needed to track and ensure progress. The FSC Readiness and NCA Wave subproject paths are not continuous because there are no in-progress critical activities. Lastly, the VBA-GOE wave subproject path is hampered by convergence issues and level of effort driving activities.³⁹ In addition, we were not able to confirm the validity of the FMBT program-level critical path that would define the sequence of activities driving the key program finish date. According to best practices, when an integrated master schedule is constructed from multiple subprojects, two levels of critical paths need to be managed: the FMBT program's master schedule critical path (i.e., the FMBT program-level critical path) and the individual subproject critical paths (e.g., the FSC Readiness, NCA, and VBA wave subproject paths).

³⁹Convergence issues mean there are an unrealistic number of activities that must be completed for key milestones to occur on time. Level of effort activities cannot drive finish milestones because, by definition, these activities do not result in any product or deliverable.

Unless the schedule can produce true critical paths, the program office will not be able to provide reliable timeline estimates or identify when problems or changes may occur and their effects on downstream work.

Our analysis found that the schedule does not identify reasonable amounts of total float—that is, the amount of time by which an activity can slip before the delay affects the program’s estimated finish date so that a schedule’s flexibility can be determined. For example, 70 percent of remaining activities had unreasonable amounts of total float (slack) greater than 2 standard working months, with the average being over 1,000 days. In other words, 70 percent of activities and milestones are able to slip more than 2 working months before affecting a finish milestone. The logical sequencing of events is directly related to float calculations and the critical path.⁴⁰ If the schedule is missing dependencies or if activities are linked incorrectly, float estimates will be miscalculated.⁴¹ Incorrect float estimates may result in an invalid critical path and thus will not reliably indicate where resources can be shifted to support delayed critical activities. According to VA officials, based on our analysis they are developing a plan to manage total float in the FMBT program schedule; however, VA officials did not provide a time frame for completing the plan.

Credible. VA’s schedule for the FMBT program partially met the credible characteristic. The schedule should be horizontally traceable, meaning that it should link products and outcomes associated with other sequenced activities. Our analysis found that the schedule responded appropriately when significant delays were introduced into the planned activities; however, given the unreasonable total float values and issues related to the sequencing of activities in the FMBT program schedule, it cannot be considered fully traceable horizontally. The schedule should also be vertically traceable—that is, the activities in varying levels of the schedule map to one another and key dates presented to management in periodic briefings are in sync with the schedule. However, we found inconsistencies in the number of waves and key finish dates between the

⁴⁰Logical sequencing of events—listing activities in the order in which they are to be carried out—is directly related to float calculations, because total float is calculated from activities’ early and late dates. The critical path is directly related to the logical sequencing of events and float calculations because generally activities along the critical path have the least float.

⁴¹Having all interdependencies between tasks identified is necessary for the schedule to calculate dates and predict changes properly. Without the right links, tasks that slip early in the schedule do not transmit delays to tasks that should depend on them.

FMBT program schedule and published road maps and individual project charters. For example, the FMBT program schedule did not reflect an increase from 24 to 32 waves as outlined in the revised iFAMS Implementation Roadmap dated February 19, 2020. Vertical traceability ensures that the representation of the schedule to different audiences is consistent and accurate.

Although risk was considered in developing the schedule, VA did not analyze schedule risk for the FMBT program schedule because officials are conducting daily assessments of program risks and how to mitigate those risks as part of their Agile development process. A schedule risk analysis uses statistical techniques to predict a level of confidence in meeting a program's completion date. As each activity has an uncertain duration that depends in part on uncertainties about effort and resources, the entire duration of the overall program schedule is also uncertain. While the FMBT program identifies and continues to track risks, without a schedule risk analysis, the program may not be able to determine the likelihood of meeting its completion date.

Controlled. VA's schedule for the FMBT program substantially met the controlled characteristic. Our analysis found that the schedule is updated periodically. However, the schedule provided to us—the latest updated schedule at the time of our review—contained some date anomalies, such as forecasted dates that reside in the past relative to the date of the updated schedule. While a schedule narrative did not accompany the current integrated master schedule (as of April 10, 2020), we reviewed a status analysis document (for the integrated master schedule as of March 13, 2020) that included aspects of a schedule narrative, such as status of key milestone dates and deliverables.

The majority of activities and milestones within the schedule have associated baseline start and finish dates, which align to a baseline date of August 7, 2019. The schedule documentation did not include information relating to some project elements, such as the assumptions the project team made when creating the baseline schedule. A corresponding basis document is important because it explains assumptions used in developing the schedule and is essential for validating and defending a baseline schedule.

Concerning the reasons for the shortfalls in VA efforts to adhere to these best practices, program officials stated that the FMBT program aligns with Agile methods. However, VA did not take sufficient steps to ensure that the program adhered to GAO's scheduling best practices as called for by

GAO's *Agile Assessment Guide*.⁴² While the Agile software development approach is different from that of waterfall development methods, the need for a high-quality program schedule—which provides for accountability in delivering a value-based outcome—is still applicable to all federal programs.⁴³

Conclusions

To address its aging and outdated financial management systems, VA established the FMBT program with the goal of modernizing outdated financial and acquisition systems and replacing them with a single integrated system. The FMBT program is VA's third effort to address its aging and outdated financial management systems, after two prior efforts failed to achieve the department's modernization goal. VA has begun implementing its new financial system under the FMBT program and is taking steps to address ongoing challenges that it has identified, through its program risk management process, lessons learned, and IV&V activities. Continuing to identify and address new and existing risks and challenges in future deployments of financial and acquisition management capabilities at VA's remaining administrations and staff offices will be key to successful implementation.

Additionally, following IT management best practices is critical to building a strong foundation for VA's modernization efforts. VA has generally met certain IT management best practices for its FMBT program that we assessed and is taking steps to improve the Agile best practices that we assessed as only partially met. However, the FMBT cost and schedule estimates were not reliable because they did not fully or substantially meet all characteristics associated with reliable estimates. Without reliable cost and schedule estimates, VA management may not have the information necessary for informed decision-making. Further, following cost and schedule best practices helps minimize the risk of cost overruns and schedule delays and would better position the FMBT program for effective and successful implementation on future deployments.

⁴²[GAO-20-590G](#) and [GAO-16-89G](#).

⁴³In an Agile approach to software development, requirements, design, and testing are performed concurrently in small iterations, while they are performed sequentially in a waterfall approach.

Recommendations for Executive Action

We are making the following two recommendations to VA:

The FMBT Deputy Assistant Secretary should take steps to help ensure that the FMBT program develops a reliable cost estimate using best practices described in GAO's *Cost Estimating and Assessment Guide*, in particular, by addressing those cost characteristics that were partially or minimally met. (Recommendation 1)

The FMBT Deputy Assistant Secretary should take steps to help ensure that the FMBT program develops a reliable schedule using best practices described in GAO's *Schedule Assessment Guide*, in particular, by addressing those schedule characteristics that were partially or minimally met. (Recommendation 2)

Agency Comments and Our Evaluation

We provided a draft of this report to VA for review and comment. In written comments, reproduced in appendix III, the department concurred with our recommendations to follow best practices in cost and schedule estimating. The comment letter also described actions the department has taken and plans to take to address the recommendations. The actions taken with respect to our first recommendation should address those cost characteristics that were partially or minimally met. The actions taken with respect to our second recommendation should address some of the issues we found but not all of them. In particular, we continue to believe that VA should conduct a schedule risk analysis, as described in this report. The department also provided general and technical comments on our report that we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to relevant congressional committees, the Secretary of Veterans Affairs, and other interested parties. In addition, the report will be available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact Paula M. Rascona at (202) 512-9816 or rasconap@gao.gov or Carol C. Harris at (202) 512-4456 or harriscc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Paula M. Rascona
Director
Financial Management and Assurance



Carol C. Harris
Director
Information Technology and Cybersecurity

List of Requesters

The Honorable Jerry Moran
Ranking Member
Committee on Veterans' Affairs
United States Senate

The Honorable Chris Pappas
Chairman
The Honorable Tracey Mann
Ranking Member
Subcommittee on Oversight and Investigations
Committee on Veterans' Affairs
House of Representatives

The Honorable Frank Mrvan
Chairman
The Honorable Matt Rosendale
Ranking Member
Subcommittee on Technology Modernization
Committee on Veterans' Affairs
House of Representatives

The Honorable Jim Banks
House of Representatives

The Honorable Jack Bergman
House of Representatives

The Honorable Susie Lee
House of Representatives

Appendix I: Objectives, Scope, and Methodology

The objectives of this report are to (1) describe the status of the Financial Management Business Transformation (FMBT) program, including any steps the Department of Veterans Affairs (VA) has taken to address challenges it has identified and (2) examine the extent to which VA followed certain information technology (IT) management best practices.

To determine the status of the FMBT program, including any steps VA has taken to address challenges it has identified, we reviewed relevant FMBT program documentation, including program management reviews and decision support materials, to describe the program's current status. We also reviewed documentation related to the FMBT program's risk management process, including the risk and issue register and risk management framework, independent verification and validation (IV&V) documentation, lessons learned from prior systems efforts and current efforts, and other relevant FMBT program documentation. We summarized the risks and issues facing the FMBT program and outstanding IV&V recommendations, as identified by VA. We also interviewed cognizant VA officials to obtain their views on the challenges facing the FMBT program and their plans and approach to address challenges they identified.

We reviewed the FMBT program's risk management process and documentation supporting VA-identified risks and issues in order to summarize (1) active issues and challenges currently facing the National Cemetery Administration (NCA) wave and the overall FMBT program, (2) the high and very high probability risks and impact of the risks, (3) the status of the risks, and (4) how the FMBT program assigns a rating to the risks and issues in the risk and issue register. We reviewed IV&V weekly status reports to summarize the status of IV&V recommendations and current IV&V activities. We also reviewed and summarized VA-identified lessons learned from previous attempts to modernize VA's financial management systems and current lessons learned for the FMBT program to determine (1) whether the current lessons learned, which the IV&V contractor identified, were included in the Lessons Learned Log and (2) the status of those lessons learned. We also made inquiries of cognizant officials from the FMBT program and VA's offices of Quality, Performance, and Risk and the Systems Quality Assurance Service to

obtain their views on the lessons learned and challenges facing the program.

To assess the reliability of information and data from VA's risk and issue register and risk management framework, IV&V documentation, lessons learned from prior systems efforts and current efforts, and other relevant FMBT program documentation, we did the following:

- (1) Analyzed the program's risk and issue register to determine whether each risk and issue in the register contained the relevant column fields and had complete data and recalculated the status and aging of IV&V recommendations.
- (2) Determined the process for adding lessons learned to the Lessons Learned Log and how the FMBT program team ensures quality of the data.
- (3) Assessed the IV&V consolidated assessment recommendations tracking schedule to determine whether the data were complete and accurate.

We also obtained written responses to our data reliability questions from VA officials. We determined that data elements we assessed are sufficiently reliable for the purpose of our reporting objective.

We also examined VA and FMBT program-specific documentation, such as meeting minutes, briefing slides, and department memorandums regarding the FMBT program's coordination with other priority initiatives at VA, such as the Electronic Health Record Modernization and the VA Logistics Redesign initiatives. We discussed the program's status and the department's approach to coordination with FMBT program officials and officials from VA's Office of Enterprise Integration.

To determine the extent to which VA followed certain IT management best practices, we identified practices that would help VA establish a foundation for the program and effectively implement the first deployment of its new financial system at NCA. Specifically, we reviewed FMBT program documentation and interviewed cognizant officials on practices related to program governance, Agile project management, system testing results and defect management, cost estimating, and scheduling and compared the results to certain best practices identified in relevant guidance.

- We determined that the control environment component of internal control was significant to our review of the FMBT program's governance, along with the underlying principle that management should establish an organizational structure, assign responsibility, and delegate authority to achieve the entity's objectives.¹ To evaluate the program's governance structure and implementation, we reviewed FMBT program documentation related to governance, such as charters and program plans; the FMBT program decision log; and program management reviews and Executive Steering Committee briefing slides and meeting minutes to determine the extent to which governance had been defined and implemented. We discussed program governance practices with cognizant FMBT program officials and compared the results of our review to governance best practices outlined in Project Management Institute guidance and VA guidance for IT programs.² These practices focused on program governance as a defined structure and composition
 - describing the participants and their roles and responsibilities;
 - monitoring, reporting, and controlling program progress;
 - endorsing reviews at key decision points in the program life cycle and approving any required changes to the program;
 - employing a life cycle aligned to the Veteran-focused Integration Process that defines a phased project life cycle and critical decision points; and
 - using an Agile project management methodology capable of delivering frequent releases.
- For Agile project management, we reviewed the FMBT program's and NCA project's management approach to implementing certain Agile practices for the first implementation of the financial system at NCA and compared their approach to best practices identified in our *Agile Assessment Guide*.³ We focused on Agile team dynamics and activities best practices that would allow the program to assess its

¹GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: September 2014).

²Project Management Institute, *The Standard for Program Management, Fourth Edition* (2017), and Department of Veterans Affairs, *Veteran-focused Integration Process Guide 3.2* (December 2018).

³GAO, *Agile Assessment Guide: Best Practices for Agile Adoption and Implementation*, [GAO-20-590G](#) (Washington, D.C.: September 2020).

progress in delivering value, follow repeatable processes intended to increase the likelihood of success in using Agile delivery methods, and collect and use Agile performance data to help inform and measure the program's progress.⁴ Specifically, we reviewed available guidance, job aids, planning documentation, and briefing slides from the NCA wave and interviewed program officials to understand how work was planned, executed, and approved within sprints. We met with officials from the FMBT program, NCA, and VA's Financial Services Center to discuss their roles in Agile team activities for developing or configuring functionality for the Integrated Financial and Acquisition Management System for the NCA wave.

We also observed a demonstration of the program's use of its Agile project management tool, AgileIQ, to define user stories, estimate relative complexity, and prioritize work based on value. We obtained and reviewed reports from AgileIQ to determine whether the program had developed user stories, estimated story points, and developed acceptance criteria for user stories. We assessed the reliability of data on user stories through electronic testing for missing or duplicate data, and obvious errors, and noted any limitations found, accordingly.⁵ We also reviewed FMBT program metrics tracked and reported via AgileIQ for the NCA wave and discussed planned and ongoing updates to the FMBT program's Agile implementation for future waves with cognizant program officials and contractor subject matter experts. Based on available evidence, we assessed the extent to which each of the best practices were met. That is, we rated each practice as being either met, substantially met, partially met, minimally met, or not met as follows:

- Met: VA provided complete evidence that satisfies the entire criterion.
- Substantially met: VA provided evidence that satisfies a large portion of the criterion.

⁴According to FMBT program officials, the core of the Integrated Financial and Acquisition Management System solution is a commercial-off-the-shelf product and thus the program did not use continuous integration for the VA-specific implementation. Therefore, two best practices were not included in the program's Agile guidance and excluded from our review.

⁵For example, we noted that the FMBT program had not defined acceptance criteria for about 27 percent (659 of 2,470) of NCA user stories and had not assigned story points to about 40 percent (997 of 2,470) of the user stories.

- Partially met: VA provided evidence that satisfies about one-half of the criterion.
 - Minimally met: VA provided evidence that satisfies a small portion of the criterion.
 - Not met: VA provided no evidence that satisfies any of the criterion.
- For system testing and defect management, we reviewed FMBT program test and defect management plans and summary reports of test results for the NCA financial system to identify the planned approach to testing, determine if tests were executed as planned, and summarize the actual results from the tests performed. We compared the program's testing approach to industry best practices for conducting validation and verification of IT systems.⁶ Further, we analyzed trends in identifying and resolving defects during the NCA wave to determine whether program practices were consistent with processes identified in VA's test and defect management plans.⁷ To assess the reliability of FMBT program data on defects, we reviewed the data from the program's AgileIQ reports to determine their completeness. For any data anomalies, we followed up with FMBT program officials. We also obtained written responses from officials responsible for entering and reviewing the data about the accuracy and reliability of defect data. Based on these steps, we determined that the data were sufficiently reliable for the purposes of our reporting objective. We discussed program documentation and the results of our analysis with FMBT program and VA officials and related contractors as appropriate.
 - For cost estimating, we reviewed documentation on the FMBT program's September 2019 cost estimate. The initial cost estimate for the FMBT program, released in May 2017, was the result of a joint effort by the United States Department of Agriculture (USDA) and VA's FMBT Program Management Office. The program underwent significant change when VA assumed sole control following USDA's departure in December 2017; therefore, the 2018 cost estimate is

⁶Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration® for Acquisition, Version 1.3* (November 2010).

⁷The FMBT program refers to issues identified during testing as bugs. All bugs are to be analyzed and addressed based on this analysis. Bugs that require changes to the Momentum configuration are recognized as defects. For the purposes of analyzing how the FMBT program manages issues identified during testing, we used the number of bugs. FMBT program officials said the program's defect management plan covers both bugs and defects.

considered the initial baseline effort. Our analysis focused on the reliability of the September 2019 update to the FMBT program cost estimate. The risk assessment component of internal control was significant to our review of the estimate, along with the underlying principle that management should identify, analyze, and respond to risks related to achieving the defined objectives. To assess the reliability of the September 2019 cost estimate, we evaluated documentation supporting the estimate, such as the cost estimating models; various technical documents; the program's September 16, 2019, cost estimate report; and briefings provided to VA management regarding the cost estimate. We assessed the cost estimate, including methodologies, assumptions, and results, against best practices for developing a comprehensive, accurate, well-documented, and credible cost estimate identified in GAO's *Cost Estimating and Assessment Guide*.⁸ We also interviewed program officials responsible for developing and reviewing the cost estimate to understand their methodology, data, and approach for developing the estimate. As noted in our report, we found that the cost estimate was not reliable.

- For scheduling, we reviewed documentation on the FMBT program's schedule, dated April 2020. To assess the reliability of the April 2020 FMBT program schedule, we evaluated documentation supporting the schedule, such as the integrated project schedules, program baseline, and Agile artifacts. We assessed the schedule documentation against best practices for developing a comprehensive, well-constructed, credible, and controlled schedule identified in GAO's *Schedule Assessment Guide*.⁹ We also interviewed FMBT program officials responsible for developing and managing the program schedule to understand their practices for creating and maintaining the schedule. We noted in our report the instances where the quality of the schedule data affected the reliability of the program's schedule.

For both the cost estimate and program schedule, we assessed each best practice as follows:

- Met: VA provided complete evidence that satisfies the entire criterion.

⁸GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: March 2020).

⁹GAO, *Schedule Assessment Guide: Best Practices for Project Schedules*, [GAO-16-89G](#) (Washington, D.C.: December 2015).

- Substantially met: VA provided evidence that satisfies a large portion of the criterion.
- Partially met: VA provided evidence that satisfies about one-half of the criterion.
- Minimally met: VA provided evidence that satisfies a small portion of the criterion.
- Not met: VA provided no evidence that satisfies any of the criterion.

Then, to determine the overall assessment for each of the four characteristics, we assigned each best practice assessment a score based on a 5-point scale: not met = 1, minimally met = 2, partially met = 3, substantially met = 4, and met = 5. We calculated the average of the individual best practice assessment scores to determine the overall assessment rating for each of the four characteristics as follows: not met = 1.0 to 1.4, minimally met = 1.5 to 2.4, partially met = 2.5 to 3.4, substantially met = 3.5 to 4.4, and met = 4.5 to 5.0.

Finally, we provided VA with draft versions of our detailed analyses of the FMBT program's cost estimate and schedule so that VA officials could verify the information on which we based our findings.

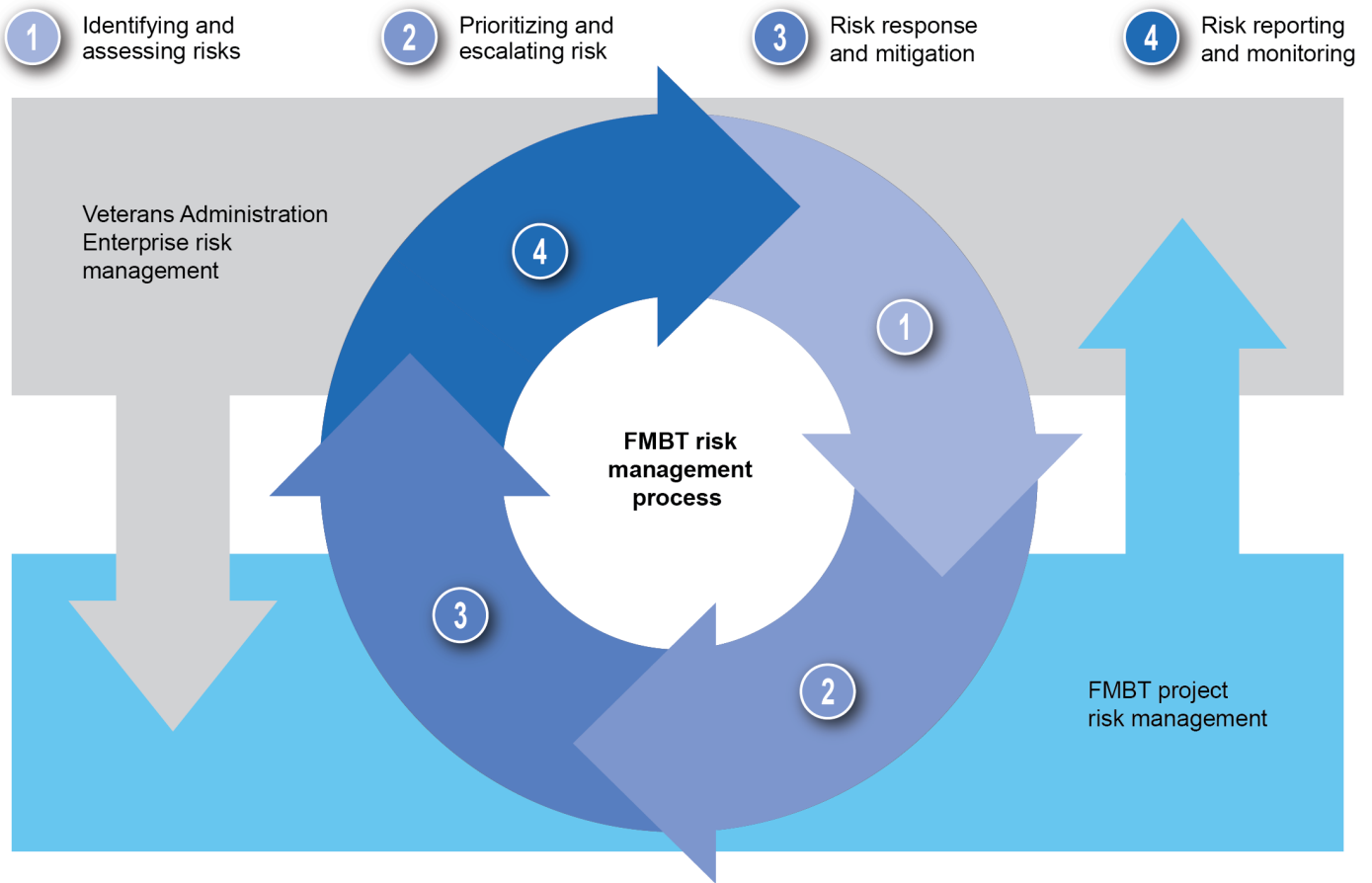
We conducted this performance audit from February 2020 to March 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: The FMBT Program's Risk Management Process

The Department of Veterans Affairs' (VA) Financial Management Business Transformation (FMBT) program included risk management as a core activity since its inception in 2016. The risk management process is intended to prioritize the most urgent risks to the program and the Integrated Financial and Acquisition Management System implementation and to facilitate developing strategic decisions and prioritizing actions necessary to mitigate them. At the same time, it ensures that lower priority and project risks are still identified and managed early and often, to prevent them from growing into bigger risks. In addition, throughout the risk management process, FMBT program officials identify lessons learned and add them to a FMBT program Lessons Learned Log. Further, the risk management process identifies the risk and issue register as the primary tool for monitoring and reporting program and project risks.

The FMBT program's risk management process includes identifying and assessing risks, prioritizing and escalating risk, responding to and mitigating risk, and reporting and monitoring risk, as shown in figure 3. According to VA officials, the same process is used for identifying, assessing, and monitoring issues. VA defines risk as the potential for loss, harm, or missed opportunities in achieving the organization's mission and strategic objectives because of uncertainty, whereas VA defines an issue as an existing event or condition that is impeding performance and may result from a risk that became an issue.

Figure 3: The Department of Veterans Affairs (VA) Financial Management Business Transformation (FMBT) Program Integrated Risk Management Process Cycle



Source: VA's FMBT program Integrated Risk Management Framework. | GAO-21-227

Text of Figure 3: The Department of Veterans Affairs (VA) Financial Management Business Transformation (FMBT) Program Integrated Risk Management Process Cycle

1. Identifying and assessing risks
2. Prioritizing and escalating risk
3. Risk response and mitigation
4. Risk reporting and monitoring.

The FMBT risk management process draws from a diverse and evolving list of sources of risk information from across the program and its respective projects, so that the program maintains a comprehensive view

Appendix II: The FMBT Program's Risk Management Process

of risks, at all levels and in all categories. Examples of these sources include self-identified and reported risks from the FMBT program, Financial Services Center, or Office of Information and Technology enterprise risk register; independent verification and validation reports and program health assessments; internal or external audit reports, findings, or recommendations; and independent analysis and assessment by the FMBT program risk lead.

According to VA officials, all potential risks and issues identified are entered into the central repository risk and issue register. Anyone on the program can submit risks, but the project managers, workstream leads, or their contract support primarily submit risks. The risk team occasionally submits risks. VA officials stated that the risk submitters are responsible for conducting preliminary analysis on newly identified risks, including assessing risk occurrence probability, risk impact on the program, and risk trigger date prior to submission. The risk submitters use specific criteria to assess identified risks, as shown in table 13.

Table 13: Department of Veterans Affairs' (VA) Financial Management Business Transformation Program Risk Assessment Criteria

Rating	Probability	Impact
5: Very high	The risk is almost certain to occur (more than 90 percent).	<ul style="list-style-type: none"> Impacts will create schedule delays of milestones by more than 30 days across more than one project or workstream. Impacts will lead to cost increases of 10 percent or greater, issues of quality, or other adverse events that would be so severe as to exceed available resources within the program. Impacts will lead to regulatory noncompliance.
4: High	The risk is likely to occur (65 to 90 percent).	<ul style="list-style-type: none"> Impacts will create schedule delays of milestones for a project by 30 days or more. Impacts are likely to lead to cost increases of 10 percent or greater, issues of quality, or other adverse events that require additional mitigating resources from the program level. Impacts may lead to regulatory noncompliance.
3: Medium	The risk has a moderate chance of occurring (35 to 65 percent).	<ul style="list-style-type: none"> Impacts will create schedule delays of milestones for a project by 10 to 30 days. Impacts are likely to lead to cost increases of 5 to 10 percent, issues of quality, or other adverse events that may require additional mitigating resources from the program level. Impacts are unlikely to lead to regulatory noncompliance.
2: Low	The risk has a slight chance of occurring (10 to 35 percent).	<ul style="list-style-type: none"> Impacts may cause a schedule delay that delays a milestone of a project by fewer than 10 days. Impacts are likely to lead to cost increases of 2 to 5 percent, defects in quality, or adverse events that can be absorbed at the project level. Impacts are unlikely to lead to regulatory noncompliance.

Appendix II: The FMBT Program's Risk Management Process

Rating	Probability	Impact
1: Very low	The risk has a very slight chance of occurring (less than 10 percent).	<ul style="list-style-type: none"> Impacts are almost certain to not cause schedule delays or lead to a missed milestone. Impacts are likely to lead to cost increases below 2 percent, defects in quality, or adverse events that can be absorbed at the project level. Impacts are unlikely to lead to regulatory noncompliance.

Source: VA Financial Management Business Transformation (FMBT) program *Risk Management Process Guide*. | GAO-21-227

Note: According to VA's FMBT program risk management framework, "project" refers to the Integrated Financial and Acquisition Management System wave implementation, but each wave can have multiple projects.

According to VA officials, newly submitted risks in the FMBT program's risk and issue register trigger workflow notifications to the risk management team. The risk management team reviews and provides feedback to the risk owners and submitters to ensure that all relevant data (probability and impact ratings, trigger dates, risk response plans, etc.) are captured. The risk team uses a checklist of quality control measures in its review.

The risk team prioritizes and escalates risks based on probability, impact, and response status. The team also completes an initial analysis of the FMBT program's risk and issue register to apply risk categories and evaluate risk tiers against escalation criteria (the same criteria as in table 13). It also coordinates with the FMBT program internal controls team to determine whether internal controls should be included in risk mitigation, if applicable. The risk team escalates a high risk to an issue or to senior leadership for visibility and oversight.

Risk owners develop and implement risk response strategies for risks that originate from their areas of responsibility and report on the risk response status. Project or wave manager(s) work with the FMBT program risk manager to develop alternative risk response and mitigation options for risks that will have crosscutting impacts, dependencies, or other second-order effects on the program. Program executives review and decide whether the response strategies are suitable and effective for high-priority risks.

In addition, risk owners update their risks in the risk register on an ongoing basis and provide updates on risks at risk review meetings, risk review boards, program integration and status meetings, or other relevant meetings and status reports. The risk team updates the risk reporting dashboard and risk profile based on the outcomes of the risk review meetings and disseminates them to the program executive director.

Appendix III: Comments from the Department of Veterans Affairs



THE SECRETARY OF VETERANS AFFAIRS
WASHINGTON

March 2, 2021

Ms. Paula M. Rascona
Director
Financial Management and Assurance
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Rascona:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office (GAO) draft report: ***Veterans Affairs: Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating*** (GAO-21-227).

The enclosure contains general and technical comments and the actions to be taken to address the draft report recommendations. VA appreciates the opportunity to comment on your draft report.

Sincerely,

A handwritten signature in black ink, appearing to read "Dehis McDonough".

Dehis McDonough

Enclosure

Appendix III: Comments from the Department
of Veterans Affairs



THE SECRETARY OF VETERANS AFFAIRS
WASHINGTON

March 2, 2021

Ms. Carol C. Harris
Director
Information Technology and Cybersecurity
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Harris:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office (GAO) draft report: ***Veterans Affairs: Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating*** (GAO-21-227).

The enclosure contains general and technical comments and the actions to be taken to address the draft report recommendations. VA appreciates the opportunity to comment on your draft report.

Sincerely,

A handwritten signature in black ink, appearing to read "DMcDonough".

Denis McDonough

Enclosure

**Appendix III: Comments from the Department
of Veterans Affairs**

Enclosure

Department of Veterans Affairs (VA) Response to
Government Accountability Office (GAO) Draft Report
***Veterans Affairs: Ongoing Financial Management System Modernization
Program Would Benefit from Improved Cost and Schedule Estimating***
(GAO-21-227)

**The Financial Management Business Transformation (FMBT) Deputy Assistant
Secretary (DAS) should:**

**Recommendation 1: Take steps to help ensure the FMBT program develops a
reliable cost estimate using best practices described in GAO's *Cost Estimating
and Assessment Guide*, in particular, by assessing those costs characteristics
that were partially or minimally met.**

VA Response: Concur: GAO indicated the FMBT Life Cycle Cost Estimate (LCCE)
substantially met the cost estimate characteristic of "well-documented". VA's FMBT
DAS also notes GAO's recommendations and has taken the following steps to address
items identified by the GAO audit team:

Credibility of the LCCE

- **LCCE Correction:** The program identified the inflation values for the years applicable to the LCCE, corrected the inflation index per guidance in the GAO Cost Estimating and Assessment Guide to bring Then-Year Dollars into Constant-Year Dollars, established a programmatic Base-Year of 2018 to correspond with the first VA FMBT LCCE, and updated the Base-Year Dollar cost analysis to 2018.

Accuracy of the LCCE

- **Modeling Corrections:** GAO found three items within the model that were hard-coded numbers, rather than traceable links to original data sources. The updated modeling data applied to Training, Other License, and a selection of Contract Support costs. The LCCE team corrected these hard-coded numbers, updated the model, and linked the model to data sources, thereby improving the model's traceability and transparency. This correction further supports and confirms the model does not double count specific cost elements.
- **Sensitivity Analysis:** Per guidance in the GAO Schedule Assessment Guide, the LCCE team identified key cost drivers for which to apply the sensitivity analysis. The total cost was reevaluated by varying each cost driver independently. Additionally, the sensitivity analysis conducted applied and was reported with respect to the impact of these cost drivers on the total cost of the program.

Enclosure

Department of Veterans Affairs (VA) Response to
Government Accountability Office (GAO) Draft Report
***Veterans Affairs: Ongoing Financial Management System Modernization
Program Would Benefit from Improved Cost and Schedule Estimating***
(GAO-21-227)

Comprehensiveness of the LCCE

- Interface Cost Corrections: GAO identified a lack of interface costs pertaining to other programs and legacy systems. The FMBT LCCE team partnered with the Office of Information and Technology and other legacy system program offices to research, gather data, and model 13 legacy systems that are actively coordinating and interfacing with FMBT's end state solution. Per guidance in the GAO Cost Estimating and Assessment Guide to account for all possible costs, these costs were previously recognized by the FMBT LCCE team in earlier efforts as unknown costs. Through this partnered effort with the Office of Information Technology, FMBT included these costs in the fiscal year 2020 LCCE.

Recommendation 2: Take steps to help ensure the FMBT program develops a reliable schedule using best practices described in GAO's *Schedule Assessment Guide*, in particular, by addressing those schedule characteristics that were partially or minimally met.

VA Response: Concur: GAO indicated the FMBT LCCE substantially met the schedule estimate characteristic of controlled. The FMBT program has reviewed the GAO Schedule Assessment Guide and continues to refine schedule management techniques in concert with the implementation of the Scaled Agile Framework. The adoption of those combined tenets meets the current 2020 GAO recommendations for Agile Schedule Management. VA's FMBT DAS has taken the following steps to address items identified by the GAO audit team:

- Comprehensiveness of the schedule
 - Resource Loading: The FMBT is conducting resource loading at the workstream level and has been leveraging custom fields: Workstream, Vendor Lead, and VA Lead within the schedule. These fields reflect metadata of specific accountable parties per unique lower level activity. The accountable parties utilize AgileIQ to ensure their respective teams can meet delivery timelines or revise forecasts as necessary. AgileIQ was discussed with and demonstrations provided to GAO staff that detailed the individual assignment of lower level activity within the tool.
- Well-constructed characteristic of the schedule
 - Schedule Float: The FMBT utilizes Agile rolling wave planning to define the features for current and upcoming waves as part of the FMBT project

Enclosure

Department of Veterans Affairs (VA) Response to
Government Accountability Office (GAO) Draft Report
***Veterans Affairs: Ongoing Financial Management System Modernization
Program Would Benefit from Improved Cost and Schedule Estimating***
(GAO-21-227)

delivery framework; however, the program must tie the future waves to the roadmap by date to ensure that the Program Critical Path is maintained. As the dependencies within those future waves are defined, those features will be added to the schedule. The float (or slack) is managed and reported weekly to program officials.

- Credibility of the schedule
 - Schedule Risk Analysis: The FMBT is using Scaled Agile Methodology and the Critical Path Method (CPM) to manage risk within the program. The critical path method of risk analysis is the most common technique used currently within software implementations. The technique for using this method is to construct a model of the project schedule using a list of all the project activities, the duration of each activity, and the dependencies of each activity. The critical path method uses these values to calculate the longest path of planned activities that are required to complete the project. It also calculates the earliest and latest that each activity can start and finish without delaying the project. This method determines which activities are on the “critical path”, the sequence of activities that add up to the longest overall project duration and if delayed would add risk to the program. Detailed risk for the program is tracked, reviewed, mitigated, and reported to stakeholders as per the program risk framework.
- The FMBT program also assigned a new Governance Lead who coordinates across project teams and workstreams to ensure the Scaled Agile Framework and methodologies adopted by the FMBT program are consistently applied.

Text of Appendix III: Comments from the Department of Veterans Affairs

Page 1

March 2, 2021

Ms. Paula M. Rascona Director

Financial Management and Assurance

U.S. Government Accountability Office

441 G Street, NW Washington, DC 20548

Dear Ms. Rascona:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office (GAO) draft report: Veterans Affairs: Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating (GAO-21-227).

The enclosure contains general and technical comments and the actions to be taken to address the draft report recommendations. VA appreciates the opportunity to comment on your draft report.

Sincerely,

Dennis McDonough

Enclosure

Page 2

March 2, 2021

Ms. Carol C. Harris Director

Information Technology and Cybersecurity

U.S. Government Accountability Office 441 G Street, NW

Washington, DC 20548 Dear Ms. Harris:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office (GAO) draft report: Veterans Affairs: Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating (GAO-21-227).

The enclosure contains general and technical comments and the actions to be taken to address the draft report recommendations. VA appreciates the opportunity to comment on your draft report.

Sincerely,

Dennis McDonough

Enclosure

Page 3

Department of Veterans Affairs (VA) Response to Government Accountability Office (GAO) Draft Report Veterans Affairs: Ongoing Financial Management System Modernization Program Would Benefit from Improved Cost and Schedule Estimating (GAO-21-227)

The Financial Management Business Transformation (FMBT) Deputy Assistant Secretary (DAS) should:

Recommendation 1: Take steps to help ensure the FMBT program develops a reliable cost estimate using best practices described in GAO's Cost Estimating and Assessment Guide, in particular, by assessing those costs characteristics that were partially or minimally met.

VA Response: Concur: GAO indicated the FMBT Life Cycle Cost Estimate (LCCE) substantially met the cost estimate characteristic of "well-documented". VA's FMBT DAS also notes GAO's recommendations and has taken the following steps to address items identified by the GAO audit team: Credibility of the LCCE

- LCCE Correction: The program identified the inflation values for the years applicable to the LCCE, corrected the inflation index per guidance in the GAO Cost Estimating and Assessment Guide to bring Then-Year Dollars into Constant-Year Dollars, established a programmatic Base-Year of 2018 to

correspond with the first VA FMBT LCCE, and updated the Base-Year Dollar cost analysis to 2018.

Accuracy of the LCCE

- **Modeling Corrections:** GAO found three items within the model that were hard-coded numbers, rather than traceable links to original data sources. The updated modeling data applied to Training, Other License, and a selection of Contract Support costs. The LCCE team corrected these hard-coded numbers, updated the model, and linked the model to data sources, thereby improving the model's traceability and transparency. This correction further supports and confirms the model does not double count specific cost elements.
- **Sensitivity Analysis:** Per guidance in the GAO Schedule Assessment Guide, the LCCE team identified key cost drivers for which to apply the sensitivity analysis. The total cost was reevaluated by varying each cost driver independently. Additionally, the sensitivity analysis conducted applied and was reported with respect to the impact of these cost drivers on the total cost of the program.

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Comprehensiveness of the LCCE

- **Interface Cost Corrections:** GAO identified a lack of interface costs pertaining to other programs and legacy systems. The FMBT LCCE team partnered with the Office of Information and Technology and other legacy system program offices to research, gather data, and model 13 legacy systems that are actively coordinating and interfacing with FMBT's end state solution. Per guidance in the GAO Cost Estimating and Assessment Guide to account for all possible costs, these costs were previously recognized by the FMBT LCCE team in earlier efforts as unknown costs. Through this partnered effort with the Office of Information Technology, FMBT included these costs in the fiscal year 2020 LCCE.

Recommendation 2: Take steps to help ensure the FMBT program develops a reliable schedule using best practices described in GAO's Schedule Assessment Guide, in particular, by addressing those schedule characteristics that were partially or minimally met.

VA Response: Concur: GAO indicated the FMBT LCCE substantially met the schedule estimate characteristic of controlled. The FMBT program has reviewed the GAO Schedule Assessment Guide and continues to refine schedule management techniques in concert with the implementation of the Scaled Agile Framework. The adoption of those combined tenets meets the

current 2020 GAO recommendations for Agile Schedule Management. VA's FMBT DAS has taken the following steps to address items identified by the GAO audit team:

- Comprehensiveness of the schedule
 - Resource Loading: The FMBT is conducting resource loading at the workstream level and has been leveraging custom fields: Workstream, Vendor Lead, and VA Lead within the schedule. These fields reflect metadata of specific accountable parties per unique lower level activity. The accountable parties utilize AgileIQ to ensure their respective teams can meet delivery timelines or revise forecasts as necessary. AgileIQ was discussed with and demonstrations provided to GAO staff that detailed the individual assignment of lower level activity within the tool.
- Well-constructed characteristic of the schedule
 - Schedule Float: The FMBT utilizes Agile rolling wave planning to define the features for current and upcoming waves as part of the FMBT project

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delivery framework; however, the program must tie the future waves to the roadmap by date to ensure that the Program Critical Path is maintained.

As the dependencies within those future waves are defined, those features will be added to the schedule. The float (or slack) is managed and reported weekly to program officials.

- Credibility of the schedule
 - Schedule Risk Analysis: The FMBT is using Scaled Agile Methodology and the Critical Path Method (CPM) to manage risk within the program. The critical path method of risk analysis is the most common technique used currently within software implementations. The technique for using this method is to construct a model of the project schedule using a list of all the project activities, the duration of each activity, and the dependencies of each activity. The critical path method uses these values to calculate the longest path of planned activities that are required to complete the project. It also calculates the earliest and latest that each activity can start and finish without delaying the project. This method determines which activities are on the "critical path", the sequence of activities that add up to the longest overall project duration and if delayed would add risk to the program. Detailed risk for the program is tracked, reviewed, mitigated, and reported to stakeholders as per the program risk framework.

**Appendix III: Comments from the Department
of Veterans Affairs**

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- The FMBT program also assigned a new Governance Lead who coordinates across project teams and workstreams to ensure the Scaled Agile Framework and methodologies adopted by the FMBT program are consistently applied.

Appendix IV: GAO Contacts and Staff Acknowledgments

GAO Contacts

Paula M. Rascona, (202) 512-9816 or rasconap@gao.gov

Carol C. Harris, (202) 512-4456 or harriscc@gao.gov

Staff Acknowledgments

In addition to the contacts named above, Mark Bird (Assistant Director), Michael LaForge (Assistant Director), Jason Lee (Assistant Director), Juvy Chaney, Dennis Clarke, Valerie Freeman, Yvette Gutierrez, Hama Halay, Nateé Himmons, Diane Morris, Lisa Rowland, Jennifer Stavros-Turner, Mary Weiland, and Merry Woo made key contributions to this report.

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Strategic Planning and External Liaison

Stephen J. Sanford, Acting Managing Director, spel@gao.gov, (202) 512-4707
U.S. Government Accountability Office, 441 G Street NW, Room 7814,
Washington, DC 20548

