



Office of Inspector General
U.S. Government Accountability Office

NEW BLUE

Additional Efforts Could Improve Project
Management Efficiency

January 2021
OIG-21-1



Office of Inspector General U.S. Government Accountability Office Report Highlights

January 26, 2021

NEW BLUE

Additional Efforts Could Improve Project Management Efficiency

Objective

The audit objectives were to evaluate the extent to which GAO has (1) followed leading practices for managing the New Blue project; and (2) tracked the cost and schedule performance of the project.

What OIG Found

GAO established the New Blue project as an effort to publish web-based products in a way that increases automation in report development. The New Blue project integrates three components; Software, Publishing, and Change Management. We assessed GAO's project management of New Blue against leading practices in the Capability Maturity Model Integration for Development (CMMI-DEV) and GAO guidance on project scheduling and cost estimating. While generally consistent with guidance, opportunities for improvement exist. We found that GAO's New Blue project management fully addressed four of seven CMMI-DEV process areas and partially addressed the remaining three process areas. Areas fully addressed were, configuration management, measurement and analysis, process and product quality assurance, and supplier agreement management process areas. However, GAO did not fully implement practices in the project monitoring and control, project planning, and requirements management process areas.

In looking at project monitoring and control, the New Blue Project did not completely align with GAO guidance for all ten scheduling practices. We found that GAO had implemented two scheduling practices; partially implemented six; and did not implement two practices. In terms of project planning, GAO's cost estimates for the New Blue project generally aligned with GAO guidance on cost estimating; however, we identified practices needing improvement to ensure comprehensive, accurate, and credible cost estimates. Finally, requirements management was not consistently implemented across all New Blue Project components. GAO routinely tracked and managed requirements for contractor tasks, but did not use the same approach for in-house activities. Following all recommended practices across all project components would have provided management with key information for decision making.

What OIG Recommends

We recommend that the Comptroller General direct the Chief Administrative Officer to review and update procedures to ensure that a) schedule practices address all key project components; project schedules are baselined and appropriate risk analyses are performed; b) cost estimates fully meet best practices for comprehensiveness, accuracy, and credibility; and c) all project requirements are tracked and managed. In its written comments, GAO agreed with this recommendation and stated that it would be taking steps to address the recommendation.



O I G

Office of Inspector General

United States Government Accountability Office

January 26, 2021

To: Gene L. Dodaro
Comptroller General of the United States

From: Adam R. Trzeciak
Inspector General

Subject: Transmittal of Office of Inspector General's (OIG) Audit Report

Attached for your information is our report, *New Blue: Additional Efforts Could Improve Project Management Efficiency* (OIG-21-1). The audit objectives were to evaluate the extent to which GAO has (1) followed leading practices for managing the New Blue project; and (2) tracked its cost and schedule performance.

The report contains one recommendation aimed at updating procedures to improve project management. In its written comments, GAO concurred with the recommendation. Management comments are included in Appendix II of our report. Actions taken in response to our recommendation are expected to be reported to our office within 60 days.

We are sending copies of this report to the other members of GAO's Executive Committee, GAO's Congressional Oversight Committees, GAO's Audit Advisory Committee, and other GAO managers, as appropriate. The report is also available at <https://www.gao.gov/ig> and <https://www.oversight.gov/reports>

If you have questions about this report, please contact me at (202) 512-5748 or trzeciaka@gao.gov.

cc. Katherine Siggerud
Karl Maschino
Tom Armstrong
Karen Brindle
Orice Williams Brown
Howard Williams
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Attachment

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Abbreviations

CMMI-DEV	Capability Maturity Model Integration for Development
GAO	Government Accountability Office
IGCE	Independent Government Cost Estimate
IMS	Integrated Master Schedule
ISTS	Information Systems and Technology Services
IT	Information Technology
RFP	Request for Proposal

Introduction

GAO has determined that it needs web-based versions of its reports to accommodate the rising demand for content that can be accessed quickly and easily by users on the go and streamline the publishing process. GAO began development on its New Blue Project in 2015 to meet this need. Specifically, New Blue's intended goals are to 1) streamline the publishing process by reducing the number of manual steps in the process and 2) enable consistent and flexible distribution of GAO reports with a responsive web-based design to allow them to be read online with any computer or mobile device.

Additional benefits of New Blue include (1) improved quality assurance, such as confirming compliance with requirements and ensuring that all revisions are fact-checked and included in the final report, and (2) improved efficiency, such as reduced time to manage revisions and multiple report versions. Effective project management is key to ensuring that such large scale projects meet agency needs and meet cost and schedule targets.

Objectives, Scope, and Methodology

This report addresses the extent to which GAO has (1) followed leading practices for managing the New Blue project; and (2) tracked the cost and schedule performance of the project.

To assess the extent to which GAO followed leading practices for managing the project, we reviewed GAO's efforts using the Capability Maturity Model Integration for Development (CMMI-DEV),¹ which comprises collections of best practices that are intended to help organizations to improve project management. The seven key CMMI-DEV process areas we focused on are those that an organization should have in place at a basic level to ensure success, specifically: (1) configuration management, (2) measurement and analysis, (3) project monitoring and control, (4) project planning, (5) process and product quality assurance, (6) requirements management, and (7) supplier agreement management. We assessed GAO's project management efforts for three New Blue project components against these process areas for maturity level 2—a threshold at which project processes would be planned and executed in accordance with policy.²

We assessed GAO's efforts on New Blue Project cost using GAO's Cost Estimating Guide that details four characteristics comprising 18 best practices for a reliable cost estimate.³ We reviewed relevant program documentation such as cost estimates presented to management, communications to Congress on program status, and project contract data.

¹CMMI Development is an integrated set of best practices that improves performance and key capabilities for organizations that develop products, components, and services. <https://cmmiinstitute.com/cmmi/dev> Carnegie Mellon Software Engineering Institute, Capability Maturity Model® Integration for Development (CMMI-DEV), Version 1.3 (November 2010);

²All CMMI-DEV process areas are assigned a maturity level, a plateau describing an organization's implementation level as measured by the achievement of process related goals.

³GAO, Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs, [GAO-20-195G](#) (Washington, D.C.: March 2020).

To assess GAO's efforts on New Blue scheduling, we used GAO's Schedule Assessment Guide that defines ten best practices for a reliable and high-quality schedule.⁴ We reviewed program documentation such as milestones, requirements scheduling documentation, and reports to management.

We determined the data we obtained were sufficiently reliable for the purposes of our review. For a full description of our scope and methodology, see appendix I.

We conducted this performance audit from December 2019 through December 2020 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.

Background

GAO established the New Blue project as an effort to publish web-based products in a way that increases automation in report development. The project targets production of GAO mission team engagement reports, which comprise an estimated 80 percent of publicly available products but do not include products such as testimonies, legal opinions, and congressional correspondence. Additionally, the New Blue system will not handle restricted or classified reports, which have different production and distribution requirements.

The New Blue project began development in 2015 and is a commercial off the shelf software solution customized to address project goals and integrate with established GAO processes and systems. The original schedule and cost estimate for the project was 5 years and \$11.8 million.

The New Blue project integrates three components; Software, Publishing, and Change Management.

Software is the main system component that GAO staff use for writing reports, including fact checking report content through a new web-based interface. Software development was funded through a Cost Plus Fixed Fee Price contract issued in 2015 and ended August 31, 2020.

Publishing is the backend software and hardware component that interfaces with other GAO systems for the report publishing process as well as post-report issuance activities, such as recommendation follow-up. Publishing has been executed through GAO's Information Technology (IT) Operations and Maintenance contracts.

The *Change Management* component is composed of in-house tasks that GAO must complete for the system to be deployed, such as training, development, bargaining unit negotiations, and communication with staff and other key stakeholders.

⁴GAO, Schedule Assessment Guide: Best Practices for Project Schedules, [GAO-16-89G](#) (Washington, D.C.: December 2015).

The Software and Publishing components were developed using an Agile development methodology.⁵

GAO Report Development Process

GAO’s report development process starts as engagement team members begin collaborating on a draft report detailing their findings, conclusions, and recommendations. The engagement team then conducts an exit conference where the team confirms that critical facts used to formulate GAO’s findings are accurate and complete. After this, the team works with internal stakeholders to reach concurrence on the draft report. The team also fact checks the draft report, a key step in GAO’s quality assurance process, then sends the report to the audited agency for comment. When the agency responds, the engagement team addresses the comments, approves the product for issuance, and distributes the product to requesters and stakeholders, as appropriate.

GAO’s report development process is largely manual and the New Blue project was intended to assist the agency during the report drafting, review and approval, and distribution processes. The goal was to allow analysts to use New Blue to draft the report, distribute to stakeholders and collect their comments, conduct the fact checking process, and ultimately publish the report on the agency website in a format that is friendly to a variety of mobile and non-mobile users. Additionally, the New Blue Software facilitates the updating of various agency systems, such as the recommendation follow-up system, to reduce the amount of analyst data entry.

New Blue Chronology

Market research among vendors began in 2012 for the New Blue project. GAO’s 2014 Request for Proposals (RFP) did not result in any acceptable bids. According to project officials this was because the vendors found the RFP too restrictive. GAO incorporated this feedback and issued a second RFP resulting in a contract award in September of 2015 for the Software component. The New Blue project team prepared a proof of concept⁶ in late 2015 through early 2016 which was provided to stakeholders, whose feedback, was incorporated in the development phase.

Figure 1: New Blue Project Timeline

Year									
2012	2013	2014	2015	2016	2017	2018	2019	2020	2021+
Market Research		Acquisition		Prototype	Development	Pilot and Development			Deployment and O&M
<ul style="list-style-type: none"> - Conduct Industry research - In-house build and industry demos 		<ul style="list-style-type: none"> - Developed and released Requests for Proposal - Awarded contract 		<ul style="list-style-type: none"> - Proof of concept 	<ul style="list-style-type: none"> - Brought technology into GAO’s environment - Started feature development 	<ul style="list-style-type: none"> - Pilot teams using system - Development ongoing 			<ul style="list-style-type: none"> - Begin full deployment - Operations and Maintenance (O&M)

New Blue Timeline of Events
Source: GAO

⁵Agile project management is an iterative approach that allows organizations to break large projects down into more manageable tasks tackled in short iterations called sprints. The frequent iterations of Agile development are intended to effectively measure progress, reduce technical and programmatic risk, and respond to feedback from stakeholders more quickly than traditional methods.

⁶A proof of concept is evidence that shows that a proposed design will work, usually based on an experiment or a pilot project

Following the Prototype and Development phases, GAO began a pilot of the New Blue Software in October 2017, and worked to address the feedback it received while also finishing development tasks that were still outstanding. GAO issued its first report using the New Blue system in August, 2018.⁷ GAO began the subsequent round of pilot projects in 2019, with a broader pool of pilot engagements in GAO. Due to Coronavirus Disease 2019 (COVID-19), GAO has experienced delays in the pilot programs but stated that major development tasks were completed in August 2020, one month in advance of development contract's end-date. Tasks to deploy New Blue, especially those under the Change Management component, are expected to be scheduled given GAO plans to roll-out the system in fiscal year 2021 and beyond.

Additional Efforts Could Improve Project Management Efficiency

We assessed GAO's project management of New Blue against leading practices in CMMI-DEV and GAO guidance on project scheduling⁸ and cost estimating.⁹ While generally consistent with guidance, opportunities for improvement exist.

We found that GAO's project management fully addressed four of seven CMMI-DEV process areas and partially addressed the remaining three process areas. Areas fully addressed were, configuration management, measurement and analysis, process and product quality assurance, and supplier agreement management process areas. However, GAO did not fully implement practices in the project monitoring and control, project planning, and requirements management process areas. In looking at project monitoring and control, the New Blue Project did not completely align with GAO guidance for all ten scheduling practices. We found that GAO had implemented two scheduling practices; partially implemented six; and did not implement two practices. In terms of project planning, GAO's cost estimates generally aligned with GAO guidance on cost estimating; however, we identified practices needing improvement to ensure comprehensive, accurate, and credible cost estimates. Finally, requirements management was not consistently implemented across all New Blue Project components.

Table 1 shows the process areas we reviewed and a summary of our assessment at a project level, given not all process areas apply to all three New Blue Project components.

⁷GAO, Community Banks: Effect of Regulations on Small Business Lending and Institutions Appears Modest, but Lending Data Could be Improved, [GAO-18-312](#) (Washington, D.C. August 2018)

⁸GAO, Schedule Assessment Guide: Best Practices for Project Schedules, [GAO-16-89G](#) (Washington, D.C.: December 2015).

⁹GAO, Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs, [GAO-20-195G](#) (Washington, D.C.: March 2020).

Table 1: New Blue Progress on Project Management, Assessed against CMMI-DEV Process Areas at Maturity Level 2

Process Area	Description	OIG Assessment
1. Configuration Management	The purpose of Configuration Management is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.	●
2. Measurement and Analysis	The purpose of Measurement and Analysis is to develop and sustain a measurement capability used to support management information needs.	●
3. Project Monitoring and Control	The purpose of Project Monitoring and Control (PMC) is to provide an understanding of the project's progress so that appropriate corrective actions can be taken when the project's performance deviates significantly from the plan.	◐
4. Project Planning	The purpose of Project Planning is to establish and maintain plans that define project activities.	◐
5. Process and Product Quality Assurance	Process and Product Quality Assurance supports the delivery of high quality products and services by providing the project staff and all levels of management with appropriate visibility into, and feedback on, the processes and associated work products throughout the life of the project.	●
6. Requirements Management	The purpose of Requirements Development is to elicit, analyze, and establish customer, product, and product component requirements.	◐
7. Supplier Agreement Management	The purpose of Supplier Agreement Management is to manage the acquisition of products and services from suppliers.	●

● – Met ◐ - Partially Met ○ - Not Met
 Source: OIG analysis of GAO data

GAO's project management satisfied criteria in the process areas of configuration management, measurement and analysis, process and product quality assurance, and supplier agreement management process areas. For example, GAO's use of a requirements tracking system and document management system helped to ensure the integrity of the project data under configuration management. Further, regular reports to project and executive management on the progress were key in measurement and analysis of the project's objectives and product and process quality and assurance. For supplier agreement management, GAO's vendor contracts laid out deliverables and the steps GAO would take to accept deliverables.

On the other hand, GAO's project management did not fully address recommended practices in three process areas of project monitoring and control (#3), project planning (#4), and requirements management (#6). Improvements to these areas would provide greater alignment with project management best practices as discussed in separate sections of the report below.

New Blue Project Did Not Completely Align With All Ten Recommended Scheduling Practices

While GAO has generally met its goal for finishing the development of the New Blue Project, deployment of the system is still unclear. We reviewed GAO's management of requirements and scheduling tasks for the New Blue project and found that GAO did not fully implement all ten practices. GAO had implemented two scheduling practices; partially implemented six; and did not implement two practices. For the two practices that were fully met, confirming the critical path and updating the schedule using actuals, GAO was able to demonstrate that it had a plan for activities which were critical to the project and that it provided status updates to management. According to GAO, in early 2018 they moved the project to a scheduling methodology for the Software and Publishing components which focused on delivering products in 3 month intervals over the course of a year.

All of the partial assessments were due to the Change Management component not being managed the same as the Software and Publishing components. For example, while high-level scheduling for Change Management tasks was captured in milestones, there were no records of the lower level component tasks needed to accomplish those milestones. The Information Systems and Technology Services (ISTS) application development methodology states that requirements should drive the release schedule. For two components, Software and Publishing, requirements were used to plan sprints and releases. However, without clearly defined and captured requirements for Change Management, there was no way to create a release schedule in the same way. Further, GAO still has ongoing pilot projects and has not completed a detailed schedule for the rollout of the New Blue system. Until a comprehensive schedule is developed and monitored it will be unclear when the system will be in full use at GAO so that the agency can achieve its project goals. Good scheduling practices help to ensure that key tasks are planned, tracked, and reported on so that project leadership and management can make informed decisions.

Table 2 below shows how we assessed GAO's New Blue project against each of the recommended scheduling practices.

Table 2: OIG Assessment of New Blue Scheduling Practices Against GAO Recommended Practices

#	Characteristic	GAO Description of Characteristic	OIG Assessment
1	Capturing all activities	The schedule should reflect all activities including activities both the owner and contractors are to perform.	●
2	Sequencing all activities	The schedule should be planned so that critical program dates can be met. To do this, activities must be logically sequenced and linked—that is, listed in the order in which they are to be carried out and joined with logic.	●
3	Assigning resources to all activities	The schedule should reflect the resources (labor, materials, travel, facilities, equipment, and the like) needed to do the work, whether they will be available when needed, and any funding or time constraints.	●
4	Establishing the duration of all activities	The schedule should realistically reflect how long each activity will take. Durations should be reasonably short and meaningful and should allow for discrete progress measurement.	●
5	Verifying schedule traceability	The schedule should be traceable, meaning that it should link products and outcomes associated with other sequenced activities.	●
6	Confirming the critical path	The schedule should identify the program’s critical path—the path of longest duration through the sequence of activities. Establishing a valid critical path is necessary for examining the effects of any activity’s slipping along this path.	●
7	Ensuring reasonable float	The schedule should identify reasonable total float (or slack), the amount of time a predecessor activity can slip before the delay affects the program’s estimated finish date, so that the schedule’s flexibility can be determined.	●
8	Conducting a schedule risk analysis	A schedule risk analysis starts with a good critical path method schedule. Data about program schedule risks are incorporated into a statistical simulation to predict the level of confidence in meeting a program’s completion date; to determine the contingency, or reserve of time, needed for a level of confidence; and to identify high-priority risks.	○
9	Updating the schedule using actuals	Project schedules should be updated using progress updates to provide a realistic forecast of start and completion dates for program activities.	●
10	Maintaining a baseline schedule	A baseline schedule is the basis for managing the program scope the time period for accomplishing it, and the required resources. The baseline schedule is designated the target schedule and is subjected to a configuration management control process. Program performance is measured, monitored, and reported against the baseline schedule.	○

● – Met ● - Partially Met ○ - Not Met
 Source: IG analysis of GAO data

GAO did not create schedule baselines and risk analyses for New Blue, which makes it difficult to assess the timeliness of the project, and determine appropriate levels of contingency that should be built into the schedule. Although, GAO was able to complete the New Blue development efforts on the Software and Publishing components within the 5 year term of the Software contract, it cannot determine if the project met original goals without a schedule baseline. A baseline also helps to track any shift in deliverable dates so that management may have a clear picture of how much dates may have changed over time, and mitigate the effects of unfavorable schedule performance. Establishing a

baseline can also trigger project reassessment. Without a risk analysis, calculating the completion date from schedule logic and duration estimates may lead to underestimating total time it will take to complete all project tasks. Until GAO ensures that all requirements are scheduled and tracked in alignment with recommended practices management will not have full visibility over project progress.

Improvements Needed to Project Cost Estimating Process

GAO’s cost estimating process for the New Blue project generally aligned with recommended practices, however we identified areas needing improvement to ensure full alignment with all practices. GAO guidance outlines four characteristics for developing and maintaining a high-quality, reliable cost estimate: (1) comprehensive, (2) well-documented, (3) accurate, and (4) credible. Based on our review, GAO met all criteria for being well-documented, but did not fully address all criteria for a comprehensive, accurate, and credible cost estimate. We also noted that GAO did not include the cost of GAO staff time in developing cost estimates and that project cost estimates increased significantly over the course of the New Blue project.

Table 3: OIG Summary Assessment of New Blue Cost Estimating Practices with GAO Recommended Practices

	GAO Recommended Practices	Met	Partially Met	Not Met	Not Applicable
Comprehensive	4	1	2	0	1
Well-Documented	4	4	0	0	0
Accurate	6	4	1	0	1
Credible	4	1	3	0	0
	18	10	6	0	2

Source: OIG analysis of GAO data

Note: Two practices were judged to be not applicable because New Blue did not use a Work Breakdown Structure for project management and it was therefore unavailable for cost estimating.

Comprehensive. GAO included most, but not all lifecycle costs in the cost estimate presented to management and also did not fully document cost-influencing ground rules and assumptions. We noted that New Blue cost estimates did not include GAO staff time spent working on the New Blue project. GAO tracking of New Blue staffing costs from January 2015 to March 2020 were approximately \$2.9 million, which would increase the total project cost to almost \$20 million as of March 2020. According to the project team these costs were not included because the oversight board is primarily concerned with contract costs and GAO staff costs are available if requested. According to GAO cost estimating guidance it is important to include all labor costs in the estimate as labor is a major cost driver for IT acquisitions. Examples of typical labor categories that should be included in cost estimates are project stakeholder, management, analyst,

technician, and training. GAO Cost estimating guidance states that cost estimate should include both government and contractor costs of the program over its full life cycle and any items excluded from the estimate should be documented and justified. This guidance also states that the cost estimate documentation should include all defined ground rules and assumptions as well as the rationale and historical data needed to support the assumptions. While there was no need to document this information for the Software component because development costs were fixed, Publishing and Change Management were not fixed, and could have had more significant variance in their costs and benefited from having such information documented.

Well-documented. GAO's New Blue cost estimate practices were generally aligned with best practices for documentation. Sources of data used to create the estimate were generally documented. According to GAO staff responsible for preparing the estimate, New Blue cost estimates were based on actual expenditures, therefore the estimate relied on invoices as a data source. Further, the estimate documented a technical baseline for the program which outlined the parameters for the project and what the scope of the estimate included. Finally, the estimates were reviewed and accepted by management at regular intervals during management briefings where GAO leadership is updated on project progress.

Accurate. GAO's New Blue project partially met cost estimate criteria by basing practices on a historical record of cost estimating and actual experiences from other comparable programs. The Software component had largely fixed costs and relied on a cost estimate developed during the contract's request for proposal process. However, the Publishing and Change Management components used a different process that did not document how or whether it took into account historical records of similar programs. According to GAO's cost estimating guidance, history shows that program managers tend to be too optimistic. Future estimates can benefit from the knowledge generated in each project. For example, cost or schedule variances resulting from incorrect assumptions should always be thoroughly documented to prevent them from reoccurring.

Credible. GAO did not have a process for independently reviewing the estimates to ensure that the assumptions and estimates were reasonable. Cost estimating guidance from GAO states that agencies should ensure that cost estimates are independently reviewed to ensure that the estimates account for all costs and that they are not overly optimistic. The March 2020 cost estimate that we reviewed was presented to GAO's Information Technology Investment Committee and, according to project officials, was put together using project actual and short term expected expenditures. As a result, we assessed the practice as being partially met. According to GAO staff responsible for the cost estimate, a sensitivity analysis¹⁰ was not performed, and cost elements were not cross checked with other major programs. While the Software component had fixed development costs, which would have mitigated the need for analyses to assure that the costs were accurately estimated, Publishing and Change Management were not fixed price and could have had more significant variance in their costs, so we assessed these

¹⁰A sensitivity analysis involves recalculating the cost estimate with different quantitative values for selected inputs to compare the results with the original estimate. If a small change in the value of a factor yields a large change in the overall cost estimate, the results are considered sensitive to that factor.

two practices as being partially met. Without taking steps to increase the credibility of cost estimates, GAO increases the risk that cost estimates will not clearly identify limitations resulting from uncertainty or bias surrounding the data or assumptions and will not reflect risks to project cost.

By not fully following recommended cost estimating practices, project managers missed the opportunity to better inform decision making and understanding of the project's progress. GAO made significant changes to development plans early in the product lifecycle to better accommodate user needs resulting in project cost estimate increases. The initial cost estimate for New Blue in 2015 projected the total cost of the project to be almost \$11.8 million. In 2017 GAO expanded the scope of the Software and Publishing components to better integrate the software with existing GAO systems and to deal with unanticipated development complexities, which added approximately \$4.2 million to the project cost. An additional \$0.9 million increase occurred in 2019 resulting from an agency decision to prepare the system for an eventual move to a cloud-based architecture. As of July 2020, near the end of project development, GAO listed the project cost estimate at \$17.1 million, an increase of \$5.3 million over the initial estimate. These program cost updates were not comprehensive in that they did not include estimated costs for GAO staff time. They also did not fully meet the recommended practices for accuracy or credibility as they did not include cost sensitivity analyses, or comparison to previous project estimates.

Requirements Management Was Not Consistently Implemented Across All Blue Project Components

For requirements management, GAO routinely tracked and managed contractor tasks but did not use the same approach for in-house project activities. Specifically, GAO managed requirements effectively for the Software and Publishing components, but the Change Management component was not managed in the same way. For this component, we found that GAO met the criteria to ensure alignment between project work and requirements only; the other four of the five CMMI-DEV practices pertaining to requirements management were not met. For example, while granular Software and Publishing development tasks were captured in the system used to track and manage requirements, Change Management requirements were only captured in milestone reports. Table 4 shows how we assessed New Blue against the five CMMI-DEV characteristics for requirements management.

Table 4: OIG Assessment of GAO's New Blue Requirements Management Practices

Characteristic	Description	OIG Assessment
1. Understand Requirements	CMMI-DEV recommends that projects develop an understanding on the meaning of the requirements. The guidance states that as the project matures to avoid requirements creep, criteria are established to designate appropriate channels or official sources from which to receive requirements.	●
2. Obtain Commitment to Requirements	CMMI-DEV recommends that projects obtain commitment to requirements from project participants. As requirements evolve, project participants should commit to the current and approved requirements and the resulting changes in project plans, activities, and work products.	●
3. Manage Requirements Changes	Requirements change for a variety of reasons. As needs change and as work proceeds, changes may have to be made to existing requirements. It is essential to manage these additions and changes efficiently and effectively.	●
4. Maintain Bi-directional Traceability of Requirements	The intent of this specific practice is to maintain the traceability of requirements. When requirements are managed well, traceability can be established from a source requirement to its lower level requirements and from those lower level requirements back to their source requirements.	●
5. Ensure Alignment Between Project Work and Requirements	This practice finds inconsistencies between requirements and project plans and work products and initiates corrective actions to resolve them.	●

● – Met ● - Partially Met ○ - Not Met

Source: IG analysis of GAO data

GAO's ISTS application development methodology¹¹ states that requirements management in an Agile project is an ongoing activity and that whenever a requirement is identified it should be added to the collection of requirements. This approach seemed generally effective for the Software and Publishing components, however, requirements for the Change Management component comprising in-house activities, were not managed in the same way. This increases the risk that project deployment will not occur in a timely manner.

Conclusions

GAO has developed a system that, when deployed, should assist the report production and distribution processes. While developing this system, GAO's practices largely met CMMI-DEV recommended practices and the agency's own cost estimating and scheduling guidance. Specifically, GAO took steps to fully implement recommended practices in the configuration management, measurement and analysis, process and product quality assurance, and supplier agreement management process areas. For the remaining three areas—project planning, project monitoring and control, and requirements management—GAO generally implemented practices consistent with guidance but some areas could be improved. While development on the system is functionally complete, the rollout of the system is expected to continue for the foreseeable future. GAO did not implement

¹¹Information System and Technology Services (ISTS) Application Development Methodology, version 1.1.2

recommended scheduling practices in two areas, partially implemented them in six areas and implemented them in the final two areas.

GAO took steps to ensure that its cost estimates were comprehensive, well-documented, accurate, and credible, but we noted several areas for potential improvement. A more comprehensive cost estimate would include all costs and document all cost-influencing ground rules and assumptions. The accuracy of the cost estimate could be improved by basing it on historical experience. Finally, full credibility for a cost estimate is achieved by including a cost sensitivity analysis, cross-checking major cost elements to other programs, and conducting an independent review. Following such practices would have provided management with key information for decision making.

For requirements management, GAO routinely tracked and managed contractor tasks but did not use the same approach for in-house project activities. Not tracking all requirements increases the risk that key activities, such as project planning, will not reflect the true extent of work to be done.

GAO is already planning other large projects that could benefit from lessons learned during the New Blue project. It is important that GAO capture these lessons and take steps to ensure that future projects benefit from enhanced practices. While the risk of cost overruns and schedule delays can never be completely eliminated, taking actions on lessons learned can lessen those risks.

Recommendation for Executive Action

1. We recommend that the Comptroller General direct the Chief Administrative Officer to review and update procedures to ensure that:
 - a. schedule practices address all key project components; project schedules are baselined and appropriate risk analyses are performed;
 - b. cost estimates fully meet best practices for comprehensiveness, accuracy, and credibility; and
 - c. all project requirements are tracked and managed.

Agency Comments and Our Evaluation

The Inspector General provided GAO with a draft of this report for review and comment. In its written comments, reprinted in appendix II, GAO concurred with the findings and recommendation, indicating that it would be taking steps to review and update related procedures, noting that the revised procedures would also document when adherence to all recommended cost and schedule practices may not be applicable, for example based on project size or scale.

Appendix I: Objective, Scope, and Methodology

This report addresses the extent to which GAO has (1) followed leading practices for managing the project; and (2) tracked the cost and schedule performance of the New Blue project.

To achieve the audit objectives, we identified and reviewed applicable policies, procedures, laws, and regulations. We interviewed New Blue project managers and staff. In addition, we met with the project's executive sponsors to obtain their perspectives on GAO implementation of New Blue.

To assess the extent to which GAO followed leading practices for managing the project, we reviewed GAO's effort using the Capability Maturity Model Integration for Development (CMMI-DEV), which represents collections of best practices that are intended to help organizations to improve their processes. We assessed GAO efforts against seven key processes an organization should have in place at a basic level to ensure success, based on the (CMMI-DEV) guidance. All CMMI-DEV process areas are assigned a maturity level linked to related goals aimed at improving an organization's overall performance. We selected CMMI-DEV maturity level 2 as a reasonable foundational plateau where an organization could be expected to have processes that are planned and executed in accordance with policy. Maturity level 2 processes include:

- Configuration Management
- Measurement and Analysis
- Project Monitoring and Control
- Project Planning
- Process and Product Quality Assurance
- Requirements Management
- Supplier Agreement Management

We reviewed GAO reports that were provided to management on project measurements and spoke with knowledgeable officials on how New Blue metrics were reported and tracked. We reviewed New Blue risk management policies and procedures, risk reports to management, and interviewed project leadership. We also spoke with relevant officials to assess planning, reviewed project schedules, milestone documents, and New Blue practices against Agile requirements. For process and product quality assurance, we reviewed New Blue policies, procedures, and practices for the acceptance of deliverables. Specifically, we reviewed the New Blue user stories, requirements, and communications with management. We compared New Blue project requirements policies, procedures and activities to CMMI-DEV recommended practices. We reviewed the New Blue Software contract to look at supplier agreement management and GAO's acceptance of deliverables.

To assess GAO's efforts on cost and schedule performance for the New Blue Project, we used GAO's Cost Estimating Guide and GAO's Schedule Assessment Guide. In its cost estimating guidance GAO details four characteristics comprised of 18 best practices for a reliable cost estimate. To assess against these characteristics we reviewed relevant program documentation such as cost estimates presented to management, GAO correspondence to Congress on program status, and project contract data. In its

scheduling guidance, GAO defines 10 best practices for a reliable and high-quality schedule. To assess GAO's scheduling performance against these 10 practices we reviewed program documentation such as milestones, requirements scheduling documentation, and reports to management

To assess the reliability of the data we collected in determining GAO's implementation of project requirements management and scheduling practices, we reviewed relevant documentation and consulted knowledgeable GAO officials. We also tested the data to ensure that data was being populated consistent with procedures by reviewing key fields related to closure of requirements, assignment of requirements to development intervals, and traceability of requirements. In order to assess the reliability of data collected to estimate staff resources expended on the New Blue Project, we tested the data across multiple iterations for consistency by comparing multiple data pulls to identify any discrepancies that may be present in different reports, and consulted knowledgeable GAO officials. We determined that the data we obtained were sufficiently reliable for the purposes of our review.

We conducted this performance audit from December 2019 through December 2020 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: Comments from the U.S. Government Accountability Office



Memorandum

Date: January 15, 2021

To: Inspector General – Adam Trzeciak

From: Controller – William Anderson *William Anderson*

Subject: Report on GAO's New Blue software development project (OIG-21-01)

Thank you for the opportunity to comment on the draft report of your review of GAO's New Blue software development project. As the report concludes, "GAO has developed a system that, when deployed, should assist the report production and distribution processes. While developing this system, GAO's practices largely met CMMI-DEV recommended practices and the agency's own cost estimating and scheduling guidance."

While we do not take issue with the OIG's findings overall, we would like to add additional context to the project costs discussion to avoid possible confusion. As the report accurately notes, the cost increases resulted from combining two separate projects, *report content creation* (original New Blue) and *report publishing*. Recognizing the need to integrate the publishing enhancements, which had been funded and managed as a separate project, into New Blue, the project leadership team integrated all the components into a single project to improve project effectiveness and efficiency in 2017. It also better informed decision making by having all components tracked and managed collectively. And as you note, the scope was later expanded to prepare for a cloud-based architecture.

Regarding the recommendation made by the OIG, the CAO will review and update existing procedures to ensure that large projects adhere to schedule practices and adhere to all relevant key project components including that cost estimates scale projects, baselining project schedules, and conducting appropriate risk analyses. While not all project components are appropriate for every project, adhering to such practices for large scale projects would be beneficial and procedures will be updated to document when they do not.

cc: Karl Maschino, CAO/CFO
Orice Williams Brown, CA
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Karen Brindle, CPIO
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Appendix III: OIG Contact and Staff Acknowledgments

OIG Contact

Adam R. Trzeciak, (202) 512-5748 or trzeciaka@gao.gov.

Staff Acknowledgments

In addition to the contact named above, Mary Arnold Mohiyuddin (Assistant Inspector General for Audit), Thomas J. Johnson (Engagement Manager), and Adriana Pukalski (Legal Counsel) made major contributions to this report. Other key contributors include Melanie H. P. Fallow and Cynthia Taylor.

Appendix IV: Report Distribution

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