IT Modernization Evaluation Report

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MEMO

Date February 9, 2021

To Dr. Carla Hayden
Librarian of Congress

From Kurt W. Hyde
Inspector General

Subject *IT Modernization Evaluation,* Report No. 2019-IT-104

This transmits our final report for the Office of the Inspector General's evaluation of the Library of Congress's Information Technology (IT) Modernization effort.

The report contains nine recommendations intended to strengthen executive oversight of the IT modernization effort, improve quality control of project management, and minimize operational and cost inefficiencies.

Based on management's written responses to the draft report, we consider four of the nine recommendations resolved (2.1, 2.3, 3.1, and 4.1). Your response provided an action plan for the implementation for those recommendation, in accordance with LCR 9-160, *Rights and Responsibilities of Employees to the Inspector General*, §6.A.

The Library disagreed with five recommendations for which we responded to each in our Executive Summary. As outlined in LCR 9-160, §7.C., we will contact the Library's audit resolution official within 15 days of the date of this report about the recommendations with which we disagree.

We appreciate the cooperation and courtesies extended by the Office of the Chief Information Officer.

cc Principal Deputy Librarian
Chief Information Officer
Chief Financial Officer
General Counsel

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Summary

The Office of the Inspector General (OIG) engaged an independent contractor, Obsidian Global, LLC, to evaluate the Office of the Chief Information Officer's (OCIO) plan for the Library's information technology (IT) modernization efforts. Specifically, Obsidian was engaged to determine whether the Library's IT modernization plans provide a logical and measurable methodology to ensure its progress towards a modern IT infrastructure. Obsidian compared OCIO's IT modernization efforts with industry and federal best practices for project, schedule, and cost management.

Obsidian's evaluation focused on 14 IT modernization projects defined by OCIO. Obsidian did not review other OCIO activities such as the Data Center Transformation project or the IT modernization efforts of other Library Service Units[1] in this evaluation.

In December 2016, the *Program Management Improvement Accountability Act* (Act) was signed into law to improve government-wide program and project management skills. While the Library is not required to follow this Act, the law mandated that Executive Branch agencies improve government-wide program and project management skills. Based on the results of this evaluation, we believe the Library would also benefit from fully adopting these project management practices.

Obsidian makes recommendations that leverage prior work from OIG and the Government Accountability Office (GAO).[2] GAO issued a report on the Library's IT management six years ago. The Library has closed all but two of the 31 recommendations GAO made in that public report, which is a significant feat for the Library. The open recommendations pertain to the issues we address here, mainly the implementation of policies on cost estimates and project schedules. Although GAO periodically assesses the Library's attempts to close those two recommendations, the Library has not been able to take the necessary steps to satisfy GAO's requirement for appropriate implementation. This report provides a very clear analysis of the gaps that remain for the Library to achieve GAO's approval to close the remaining recommendations. Additionally, Obsidian's evaluation made recommendations that were not duplicative of the two open GAO recommendations

What the Evaluation Found

Obsidian identified several areas in which the OCIO's Project Management Office (PMO) had taken positive steps to better align its IT modernization strategy with project management best practices. While we applaud this progress, Obsidian concluded that further improvement was needed. Most notably, greater executive focus was necessary to achieve proper alignment with industry-promulgated project management practices.

Obsidian also concluded that the Library's lack of a comprehensive IT modernization implementation plan prevented OCIO from employing a well-designed IT infrastructure modernization effort. Additionally, the absence of a comprehensive plan encumbers the Library's executive management in assessing whether its IT modernization effort is on schedule and within budget.

In its report, Obsidian reported six specific findings as follows:

1. **OCIO does not have an implementation plan for IT Modernization** – The IT Directional Plan is used as OCIO's guide for planning and implementation. The IT Directional Plan is a strategic planning document with a scope that is broader than the IT modernization effort and does not provide project-level objectives, milestones, measurable metrics, and success criterion. The absence of these metrics inhibits Library senior management from properly evaluating and managing the outcomes and budget resources dedicated to this effort.

2. **Most Key Project Management Artifacts Were Developed, but 25% Lacked Essential Information or Had Not Been Developed** – Many of the required and supplemental project management documents were missing for each of the

[1] A separate report on the Data Center Transformation project will be released in the first quarter of FY 2021. OIG continues to perform IT modernization audits of the various Service Units.

[2] GAO-15-315, *Strong Leadership Needed to Address Serious Information Technology Weaknesses* (March 2015).

14 IT modernization projects reviewed, which inhibited PMO's ability to properly track performance. Thus, there is insufficient data to support the reports submitted to senior management, which precludes proper evaluation of the IT modernization progress and budget.

3. **Ineffective Management of Cost Estimation and Budget** – Cost estimates could not be correlated to the fiscal year 2020 budget. In addition, numerous cost estimating best practices outlined in GAO's *Cost Estimating and Assessment Guide* were not followed such as developing cost baselines.

4. **Inefficient Project Schedule Management** – Several scheduling best practices outlined in GAO's *Schedule Assessment Guide* were not followed such as developing schedule baselines. In addition, project schedules lacked sufficient detail to accurately track and manage performance, and IT Modernization project efforts were not being managed as a portfolio of projects. As a result, PMO's ability to accurately report the status, risks, and performance of IT Modernization projects to Library senior management was limited.

5. **Lack of Verifiable Goals and Success Criterion** – The OCIO had not defined verifiable goals, measurable metrics, and success criterion for the IT modernization effort. Absence of such information inhibits the ability of project managers to define proper project metrics, schedule milestones, and key performance indicators (KPIs). As such, OCIO is limited in its ability to ensure that actions align with its vision of a successful IT modernization effort.

6. **Inadequate Variance Tracking Methods** – The Library has very limited capability to track and assess project schedule and cost variances. Tracking methods used for project schedule and cost variances are limited to OCIO staff hours, which do not properly reflect cost performance to budgeted targets and performance objectives.

Recommendations

Obsidian made nine recommendations to the Library to address its findings.

Obsidian recommended OCIO make a dedicated effort to develop an IT Implementation Plan for the modernization effort. The IT Implementation Plan should continue to maintain and enhance the consistency of its KPI metrics that are specific, measureable, achievable, relevant, time-bound, and that align with OCIO business and operational objectives against which individual project performance can be measured. PMO should ensure these KPI metrics are incorporated into their processes and procedures using the applicable elements of the Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK)* and GAO guidelines. In accordance with those guidelines, the plan should also be baselined.

Obsidian also recommended OCIO perform a gap analysis to determine the cost and schedule assessment principles and practices the Library still needs to implement and develop guidelines, checklists, and quality assurance process to ensure progress of each IT project can be accurately tracked and managed.

The PMO should also analyze and collectively manage the IT modernization projects with an integrated master schedule consisting of all IT modernization project efforts. This will allow for visibility and transparency into the status of all efforts and allow for the easy identification of interdependencies and how changes to a project affect the overall modernization effort.

Management Comments

In response to the draft report, Library senior management agreed with four of the nine recommendations (see OIG Appendix B and Obsidian's response in Obsidian Appendix D). The Library agreed to 1) perform a gap analysis to determine the PMBOK and GAO cost and schedule assessment principles and practices the Library needs to implement; 2) develop a monitoring and quality assurance process to ensure each IT project complies with PMBOK and GAO cost and scheduling guidelines; 3) develop a formal checklist containing best practices found in the *GAO Cost Estimating Assessment Guide*; and 4) develop

tactical project schedule management processes that align with PMBOK and GAO best practices.

However, the Library disagreed with the remaining five recommendations to 1) develop an IT Implementation Plan to facilitate the implementation of the IT Modernization effort and report outcomes, status, and budget to Library management; 2) implement specific guidelines all IT projects must follow to meet PMBOK and GAO standards such as developing a checklist containing guidelines; 3) analyze and collectively manage the IT modernization projects with an integrated master schedule (IMS) consisting of all IT modernization project efforts; 4) develop IT modernization goals and success criterion to align with the OCIO's business goals and objectives; and 5) track project cost variance in a manner that meets the OCIO's business objectives.

As outlined in LCR 9-160, §7.C., we will contact the Library's audit resolution official within 15 days of the date of this report about the recommendations with which we disagree.

OIG's Response

We are concerned that the Library has disagreed with five of the nine recommendations. Our role is to highlight operational inefficiencies that could also have an impact on cost. Data collected by GAO and PMI has shown that these guidelines are good practices to minimize operational and cost inefficiencies. Additionally, OIG previously stated that the Library's top executives and service unit managers need to develop better programmatic implementation skills that comport to best practices.

In its technical comments to the draft report, the Library disagreed with recommendations 1.1 and 4.2 stating the modernization projects were not related enough to have a separate, overarching, IT implementation plan and that OCIO does not manage IT modernization as one program but as separate IT modernization projects. The Library also disagreed with recommendation 5.1 to develop IT modernization goals and success criterion to align with the OCIO's business goals and objectives in order to ensure the IT modernization effort achieves OCIO's stated objectives. The Library cited it will not implement this recommendation because there is not a single IT modernization effort. We disagree.

GAO's *Schedule Assessment Guide* highlights the usefulness of creating an IMS from individual projects that are within the purview of a single client, share resources, and yet have no logic dependencies between them.[3] Collectively, the projects that make up the Library's IT modernization effort are intended to provide the Library with a nimble, future-focused and modernized IT capability and management that enables the more efficient execution of its mission.

The Library disagreed with recommendation 2.2 to implement specific guidelines that all IT projects must follow to meet PMBOK and GAO standards. The Library stated that this recommendation was duplicative of a prior OIG report on Copyright IT modernization.[4] We disagree. The Copyright IT modernization report was focused on a narrow area of agile software development. This report on the Library's overall IT modernization approach shows the Library needs to have greater leadership and quality assurance over its PMO approach to better achieve its desired results.

The Library also disagreed with recommendation 6.1 that the Financial Service Directorate (FSD) track project cost variance in a manner that meets the OCIO's business objectives—citing it as a duplicative recommendation from the Copyright IT modernization report. We disagree. The scope of the Copyright IT modernization report was limited to the Copyright Office's IT Modernization Plan. FSD stated it is working towards a future state that will allow better cost accounting via a new software implementation that will allow for better cost accounting of IT projects. While we believe this is good

[3] See case study 3 of GAO's *Schedule Assessment Guide*, GAO-16-89G, December 2015.

[4] 2018-IT-107, *Library Working through Agile Delivery Method Challenges for Copyright IT Modernization Project*, August 2019.

progress, the imperative in the interim is to have cost accounting procedures in place that can close the gap while the ideal solution is being designed. For example. FSD can issue policies and procedures on cost identification and collection/recording, as well as using manual solutions in the interim. Currently, FSD does not have good cost information for proper cost variance analysis.

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OIG Appendix A: Obsidian Global, LLC's Report, *IT Modernization Evaluation Report*

IT Modernization Evaluation Report

Request Number: 030ADV19Q0348 – February 08, 2021

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The purpose of this report is solely to describe the scope of our evaluation and alignment with selected provisions of applicable laws, regulations, contracts, and guidelines, and the results of that evaluation, and not to provide an opinion on adherence. This report is intended solely for the information and use of the management of the Library of Congress and the U.S. Congress, and is not intended to be, and should not be used, by anyone other than these specified parties.

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IT Modernization Evaluation Report

Executive Summary

From October 2019 through July 2020, under a contract with the Library of Congress' (Library) Office of the Inspector General (OIG), Obsidian Global, LLC (Obsidian) conducted an evaluation of the Office of the Chief Information Officer's (OCIO) plans for the Library's Information Technology (IT) modernization goals, specifically focused on the Library's methods and processes used to assess progress towards OCIO's IT modernization effort. The Library's IT Modernization effort is an agency-wide endeavor to provide a more reliable and responsive IT service delivery. It is a broad initiative consisting of multiple projects, to include the transitioning from the Library's Tier 1 data facility to more advanced Tier 3 equivalent hosting environments and migrating current production applications to this new facility.

Obsidian was specifically tasked to conduct an assessment of six "Evaluation Objectives" defined by Solicitation: 030ADV19Q0348, July 2019, Statement of Objectives[1] (SOO). The Evaluation Objectives, summarized below, sought to determine if OCIO's plans for the Library's IT modernization were:

1. Assessing progress using a logical and measurable methodology,
2. Following standard project management, schedule development and cost estimating guidelines,
3. Employing proper methods to report progress, and determine cost/budget accountability,
4. Deploying project executions that were according to schedule,
5. Defining expected accomplishments over the short-, mid-, and long-term, and
6. Adhering to Government Accountability Office's (GAO) Cost Estimate and Schedule Assessment guidance

Our assessment was limited to 14 IT modernization projects identified in the OCIO's List of IT Modernization Projects[11] (**Table 1**, *IT Modernization Projects*, page 5) and did not include significant OCIO IT Modernization projects such as the Data Center Transformation and Application Migration efforts. We also note that at the time of our assessment the projects were in various stages of completion.

In our assessment of the six Evaluation Objectives above, Obsidian found three recurring issues with the OCIO's implementation of the IT modernization effort that were common among several of these objectives.

1. There is a gap between the well-defined strategic guidance provided by the OCIO, and the detailed implementation guidance required at the project-level to achieve the effect desired by the objectives. There is also confusion as to what documentation constitutes the OCIO implementation plan (see page 12 – "*1. Gap between Strategic and Implementation Guidance*").
2. There is inconsistent application and enforcement of the OCIO's Program Management Life Cycle (PMLC) Directive[23] across the 14 IT modernization projects we assessed, inhibiting the OCIO's ability to measure project performance and status based on common, repeatable project metrics (see page 13 – "*2. Inconsistent Application and Enforcement of PMLC Directive*").
3. There is inconsistent alignment of OCIO's procedures, processes, and practices with the PMBOK[4, A] and GAO[2, 3] guidelines, resulting in these guidelines being inconsistently applied

[A] The **Project Management Body of Knowledge** (PMBOK) is a set of standard terminology and guidelines for project management. The body of knowledge evolves over time and is a document resulting from work overseen by the Project Management Institute, which offers industry and Federally-recognized Certified Associate in Project Management (CAPM) and Program Management Professional (PMP) certifications. Much of the PMBOK Guide is unique to project management such as critical path method and work breakdown structure. The PMBOK Guide also overlaps with general management regarding planning, organizing, staffing, executing and controlling the operations of an organization. Other management disciplines which

across the IT Modernization projects (see page 13 –"*3. Lack of OCIO Alignment with PMBOK and GAO Guidelines"*).

Summary of Evaluation Objective Assessments:

Obsidian found that of the six Evaluation Objectives listed above, the OCIO is partially meeting two of the objectives, and not achieving the remaining four objectives. Our Evaluation Objectives assessments are summarized below.

1. *Assessing progress using a logical and measurable methodology:*

   The OCIO is not meeting the focus of "*measurable methodology*" of this objective in that the use of the IT Directional Plan[5] as implementation guidance does not define metrics needed to properly "*assess progress towards the goal of a modern IT infrastructure."* (See page 21 – "*Evaluation Objective 1: Logical and Measureable Methodology, Conclusions*").

2. *Following standard project management, schedule development and cost estimating guidelines*:

   While the OCIO has embraced the high-level guidance of the PMBOK[4] and GAO[2, 3] guidelines in its PMLC processes as a part of its planning and execution of the IT modernization effort, this is still a work in progress that needs to be expanded to fully realize the OCIO's project management objectives (see page 22 – "*Evaluation Objective 2: Project Management Methodology, Conclusions*").

3. *Employing proper methods to report progress, and determine cost/budget accountability:*
   The absence of a detailed implementation plan fosters inconsistencies among project management approaches, specifically in the type of information and level of detail collected, severely restricts Project Management Office's (PMO) ability to provide a homogeneous Project Portfolio Report[22] status to Library senior management that is data-driven with consistent metrics (see page 24 – "*Evaluation Objective 3: Well-Designed Plan to Execute, Conclusions*").

4. *Deploying project executions that were according to schedule*:

   We found that OCIO's IT modernization project efforts do not adhere to the best practices outlined in either the GAO Schedule Assessment Guide[2] or the GAO Cost Estimating and Assessment Guide.[3] This issue was a finding in the GAO-15-315 Report: *Strong Leadership Needed to Address Serious Information Technology Management Weaknesses*, March 31, 2015[29] (GAO audit.)[29] related to deficiencies in project schedule and cost estimating processes and is an open issue the OCIO is currently resolving (see page 26 – "*Evaluation Objective 4: Executing to Plan, Conclusions*").

5. *Defining expected accomplishments over the short-, mid-, and long-term*:

   While the OCIO met the requirement to provide a modernization plan that demonstrates what it will accomplish in the short- (1-year), mid- (2-3 years), and long-term (5 years), it did not meet the intent of the objective to explain how these accomplishments will be implemented (see page 27 – "*Evaluation Objective 5: OCIO's IT Program Modernization Plan Goals, Conclusions*").

6. *Adhering to Government Accountability Office's (GAO) Cost Estimating Assessment Guide and Schedule Assessment guidance*:

   The OCIO's IT modernization project efforts do not adhere to the best practices outlined in either the GAO Schedule Assessment Guide[2] or the GAO Cost Estimating and Assessment Guide.[3] This issue was a finding in the GAO audit[29] related to deficiencies in project schedule and cost

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overlap with the PMBOK Guide include financial forecasting, organizational behavior, management science, budgeting and other planning methods.

estimating processes and is an open issue the OCIO is currently resolving (see page 27 – "*Evaluation Objective 6: Schedule and Cost Estimating*").

Summary of Findings:

In the course of assessing the Evaluation Objectives above, Obsidian developed six key findings. These findings are summarized below.

Finding 1: *The OCIO does not have an implementation plan for IT Modernization*: Obsidian was informed on multiple occasions that the IT Directional Plan[5] is being used by the OCIO as the implementation plan. Obsidian's assessment of the OCIO's IT Directional Plan[5] is that it is a strategic planning document and is inadequate for use as the IT modernization effort's implementation and execution guide. More importantly, the lack of performance metrics inhibits Library senior management's ability to properly evaluate and manage IT modernization projects resources and budgets. (See page 28).

Finding 2: *Some Project Artifacts were Missing Essential Information*: We found that most of the key project management artifacts were developed, but 25% lacked essential information or had not been developed, such as what is discussed below in Finding 3. (See page 29).

Finding 3: *Ineffective Management of Cost Estimation and Budget:* Obsidian found that cost estimates were not provided for all IT Modernization Project efforts, and the cost estimates that were available could not be correlated to the Financial Services Directorate's (FSD) fiscal year 2020 budget reports. We also found that several cost estimating best practices outlined in the GAO Cost Estimating and Assessment Guide were not followed (See page 31).

Finding 4: *Inefficient Project Schedule Management:* We found that several schedule best practices outlined in GAO Schedule Assessment Guide were not followed, project schedules lacked critical path[B] evaluations, and there was insufficient detail to accurately track and manage project performance. We also found that IT Modernization project efforts are not being managed as a portfolio of projects (See page 33).

Finding 5: *Lack of Verifiable Goals and Success Criterion*: Obsidian found that the OCIO has not defined verifiable goals, measurable metrics and success criterion for the IT modernization effort (see page 36).

Finding 6: *Inadequate Variance Tracking Methods*: We found the tracking methods used for assessing project schedule and cost variances are limited to OCIO labor hours and do not assess any other project-related costs (See page 37).

Obsidian's full report follows this Executive Summary.

[B] A **Critical Path** is defined as the longest estimated schedule sequence of interdependent activities that should be accomplished on time to ensure completion of the project on due-date. The critical path activities are performed under the "predecessor-successor" relationship, so that any next activity cannot be started until its predecessor is complete. A critical path is established for each individual project, and aggregated into a program-level master schedule that defines a program-level critical path by linking the "predecessor-successor" interdependencies among projects into a single critical path.

IT Modernization Evaluation Report

Background

The Library of Congress (Library) develops and hosts mission-critical networked applications that provide information and services to Congress, other federal agencies, Library partners, the American public, the copyright community, and the global research and education communities. In addition, its 3,100 staff members rely on the Library's computing facilities to perform their daily work.

The Library's IT challenges include operating legacy components within its technical infrastructure. Its primary data center, which houses the majority of the Library's IT systems was, until recently, located in the Madison Building on Capitol Hill. The Madison Primary Computing Facility (PCF) was built in the late 1970s and cannot provide the level of data center reliability that mission-critical projects are now required to meet the expectations of their constituents. The PCF lacks redundancy in its power and cooling systems; and the building's generators are not capable of supporting the data center power demand during necessary annual electrical power maintenance. At the time of this report, the Madison PCF has been shut down and the new Tier III Data Center 4 (DC4) facility, located in western Virginia, has replaced the Madison facility. However, until the DC4 facility becomes fully operational, the Alternate Computing Facility (ACF), referred to as DC2, is acting as the Library's primary data center.

Modernization encompasses not only critical updates to the Library's IT infrastructure, but also includes internalizing business practices and processes reflecting the latest industry best practices. For the Library to modernize its IT infrastructure and operations, it must continue to mature its IT management processes: governance, financial management, human capital management, and service design and delivery. If these challenges are not addressed, the Library runs the risk of falling behind schedule and missing cost projections.

The Library has begun the process of describing the strategies and plans necessary to ensure meeting mission objectives, the needs and expectations of customers, and the demands of the 21st century. The IT Directional Plan[5] describes broad outlines of activities intended to result in "a nimble, future focused and modernized IT capability and management that enables the more efficient execution of the Library's mission." Linking the aspirations set out in the IT Directional Plan[5] to the everyday tactics needed for its implementation will require the OCIO, the PMO, and the Service Units to carefully consider how the plan will play out over time.

Objective, Scope and Methodology

Objective[7]

Obsidian's objective was to evaluate OCIO's plans for the Library's IT modernization efforts, and to determine if those plans provided a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure. Congress and others within the Library have stated that they are unclear as to timing, progress, and the applicable use of budget resources associated with each modernization effort. It is the objective of the Library's OIG to provide an updated assessment of these concerns.

Scope[8]

The scope of the engagement was to evaluate OCIO's plans for the Library's IT modernization effort and determine if the plans provide a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure. Obsidian's evaluation efforts focused on the 14 projects defined by OCIO in its List of IT Modernization Projects.[11] These projects are identified in **Table 1** – *IT Modernization*

Projects. The OCIO's IT Modernization effort extends beyond the 14 projects identified below to include several Service Unit modernization projects and, more notably, the Data Center Transformation and Application Migration projects. Obsidian's scope of effort was limited to the 14 projects identified in **Table 1** – *IT Modernization Projects*, below.

Table 1 – IT Modernization Projects

Project Name	Status as of June 06, 2020	Project ID	OCIO IT Directional Plan, Section
Congress.gov – FY19	Completed	532	3.1.1
Congress.gov – FY20	Active	619	3.1.1
Loc.gov – FY19	Completed	525	3.1.1
Loc.gov – FY20	Active	612	3.1.1
ServiceNow Change Release Management	Active	579	3.1.1
Concordia Phase 3	Charter Under Review	604	1.1
Service Catalog Upgrade Project *	Completed	533	1.5.1
Oracle 12c Upgrade	Active	259	3.1.1
MySQL Modernization	Active	274	3.1.1
Geospatial Hosting Environment Services Infrastructure	Completed	551	3.1.1
Active Directory Domain Consolidation	Active	566	3.1.1
IT Security Dashboard (Splunk)	Active	597	4.1.1
Windows 10 Migration	Active	492	3.1.1
ServiceNow PPM Implementation	Active	549	1.3.1

** The OCIO has stated that the Service Catalog Upgrade Project is not considered a full project.*

Methodology

In our execution of the Statement of Work (SOW), Obsidian interviewed Library personnel and reviewed documents and artifacts provided by OCIO. We assessed OCIO's methods, processes and practices with respect to its alignment with, and adherence to, the GAO's *Schedule Assessment Guide: Best Practices for Project Schedule*, December 2015, GAO-16-89G, [2] (GAO Schedule Assessment Guide), [2] GAO's *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, March 2009, GAO-09-3SP,[3] (GAO Cost Estimating Guide),[3] and PMBOK[C, 4] guidelines. These documents were specified in the SOW requirements because they collectively represent the industry and federal standards for best practices for project, schedule, and cost management. We then assessed the six OCIO Evaluation Objectives defined in the SOW and noted OCIO's strengths and weaknesses in achieving its objectives. Our evaluation findings are cataloged in this report along with our recommendations for improvement.

Alignment with the GAO Schedule Assessment Guide[2] and the GAO Cost Estimating and Assessment Guide[3] was evaluated by compiling approximately 200 requirements from the best-practice checklists listed in the two documents, and individually assessing if each requirement was being met. This assessment was based on requested project schedules, cost estimates, cost worksheet documentation provided by OCIO, and interviews with OCIO personnel.

Alignment with PMBOK[4] was evaluated by creating a list of the ten PMBOK[4] "Knowledge Areas" and subsequently parsing these Knowledge Areas into their respective 49 total "Process Areas." We used information from documentation provided by OCIO, assessments of PMO's PMLC Directive,[23] and

interviews conducted in November 2019 with OCIO[16] and PMO[9, 10] to determine the level of adherence to each of the 49 Process Areas.

Obsidian assessed OCIO's alignment with the criterion of PMBOK[4] and GAO[2, 3] guidelines, as directed by Evaluation Objectives 2 and 6. However, it should be noted that these documents are *guidelines* and not mandates; each topic must be assessed for applicability to OCIO's environment. There is no expectation that OCIO should align with all of PMBOK[4] or GAO's[2, 3] guidelines. OCIO has stated PMBOK[4] does not cover all of the aspects of project management that OCIO wants to follow. OCIO follows the Library's PMLC, which draws from both PMBOK and GAO's project management guidelines. While the OCIO has made progress in aligning with government and industry guidelines and best practices, there is more work to be done to achieve a proper level of project management.

OIG Project Directive

On August 14, 2019, the Library's OIG awarded Obsidian a contract[1] to evaluate OCIO's plans to modernize the Library's IT infrastructure and determine if these plans provide a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure.

From October 2019 through July 2020, Obsidian conducted an evaluation of OCIO's plans for the Library's IT modernization efforts, specifically focused on the OCIO's methods and processes used to assess progress towards OCIO's IT modernization goals. This evaluation was performed to specifically address the six Evaluation Objectives defined in the SOW:

1. Examine OCIO's plans for the Library's IT modernization to determine if the plans provide a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure.
2. Determine if OCIO has employed a project management methodology such as the Project Management Institute's PMBOK[4] (Project Management Body of Knowledge) Guide as part of its planning and execution of the modernization effort.
3. Determine if OCIO is employing a well-designed plan to execute, report on, and determine accountability for modernization efforts and variances in budget and schedule for its IT infrastructure modernization effort.
4. Assess whether OCIO is executing the modernization effort in accordance with its plan; and ensure it has valid and verifiable mileposts, goals, and metrics to assess progress and variances towards completing the modernization effort on at least a quarterly basis.
5. Assess whether OCIO's IT Program Modernization Plan[13] demonstrates what it will accomplish in the short- (1-year), mid- (2-3 years), and long-term (5 years).
6. Determine if the following criteria are being followed:
   - *GAO Schedule Assessment Guide, December 2015*, GAO-16-89G,[2] and
   - *GAO Cost Estimating and Assessment Guide*, March 2009, GAO-09-3SP.[3]

OCIO's Approach to Program/Project Management

OCIO defines its overall IT modernization objective as an "effort."[35] OCIO uses this term to distinguish its activity from the broader, more formally defined Library programs. OCIO defines programs as large-scale activities–consisting of multiple programs or projects–and projects as activities with a specific delivery objective. This approach is generally aligned with the PMI PMBOK definitions of program and

project, although PMBOK typically refers to projects as being associated with a program.[C] OCIO has stated the Library has very few programs, but numerous projects. OCIO stated the IT modernization effort was a concept with many pieces that were executed in parallel with few, if any, dependencies. Further, OCIO stated the individual projects were designed to deliver specific needs as components of the overall IT modernization effort.

Obsidian found that while OCIO does not consider the overall IT modernization effort a program or project, it is nonetheless defined by the collection of numerous and frequently interconnected projects and activities extending beyond the 14 projects defined by OCIO in its List of IT Modernization Projects.[11] As the OCIO does not consider the IT modernization effort a project (or program), it does not apply thorough program/project management disciplines to the management of the projects that define it. Not addressing the IT modernization effort as a project prevents the IT Modernization effort from having definitive start/end dates and milestones that allow OCIO to accurately report to senior management on the progress of the overall IT modernization effort. The absence of an Integrated Master Schedule[D] (IMS) for the IT modernization effort, even when individual projects do not share interdependencies that require critical path monitoring, requires that Library senior management assess the status of each individual project to determine the progress of the overall IT modernization effort.

As mentioned previously, Obsidian's evaluation activities focused on the 14 projects defined by OCIO in its List of IT Modernization Projects,[11] and our scope did not extend into the other IT activities within the IT modernization efforts such as the Data Center Transformation[E] project or the IT modernization efforts of other Library Service Units.

Evaluations and Findings

Obsidian observed the absence of an IT modernization implementation plan as a systemic issue for the OCIO that impacts, to a varying degree, five of the six Evaluation Objectives previously defined. While the lack of an implementation plan is addressed specifically in each Evaluation Objective response, the discussion that follows is intended to frame for the reader the implementation issue in a broader context to include a brief history of events that led to this situation, and the missing implementation elements that OCIO needs to address.

[C] **PMI** defines program management as the application of knowledge, skills, and principles to a program to achieve the program objectives and to obtain benefits and control not available by managing program components individually. A program component refers to projects and other programs within a program. Project management focuses on interdependencies within a project to determine the optimal approach for managing the project. Program management focuses on the interdependencies between projects and between projects and the program level to determine the optimal approach for managing them. – *PMI PMBOK v.6 Section 1.2.3.2, Program Management*

[D] An **Integrated Master Schedule** (IMS) is a time-based schedule containing the networked, detailed tasks necessary to ensure successful program/contract execution. The IMS is traceable to the Performance Reference Model (PRM), Work Breakdown Structure (WBS), Statement of Work (SOW), and Earn Value Management (EVM) system. The IMS is used to verify the attainability of contract objectives to evaluate progress toward meeting program objectives, and to integrate the program schedule activities with all related components.

[E] The Data Center Transformation project, to include assessment of the Application Migration project, is evaluated in a separate Obsidian report – *Evaluation of Data Center Relocation Report* (030ADV19Q0379) scheduled for release in November 2020.

OCIO Guidance and Direction

Obsidian expected to find OCIO leveraging a plan for IT modernization that was based upon the Federal Enterprise Architecture Framework, (FEAF)[F, 37] or similar guidance, to ensure that all Library IT modernization efforts were delivered and managed under a single Enterprise Architecture (EA) approach. What Obsidian found was that OCIO developed three strategic plans that can be directly traced back to *The Library of Congress Strategic Plan, Fiscal Years 2016-2020*[32] (2016 Library Strategic Plan)[32] released in March 2016. In this plan, the Library mapped out its strategic Technology Goal 6 to "deploy a dynamic, state-of-the-industry technology infrastructure that follows best practices and standards."

In March 2016, OCIO expanded on this Library Technology Goal 6 with OCIO IT Strategic Plan.[14] OCIO structured this key plan with 4 primary goals, 7 strategies, and 10 objectives in order to guide its IT operations, provide governance for its IT investments, protect its hosting environments and customer data, and to respond efficiently to customer needs. The OCIO IT Strategic Plan[14] also emphasized the need for enhanced strategic and project management. This document defined the OCIO's IT strategic goals as:

1. Provide Strategic Direction and Leadership
2. Improve IT Investment Management
3. Deliver Business-Driven Capabilities
4. Strengthen Protection for Systems and Information

In early 2017, OCIO created a centralized IT Project Management Office (PMO), broadening the scope of project reporting to include IT projects Library-wide and implementing a uniform system development methodology for the Library. Under the direction of OCIO, PMO now oversees all agency IT projects throughout the PMLC. Shortly after the centralization of project management activities in the new office, OCIO conducted a review of all IT projects in process across all Service Units providing a baseline for management and oversight of ongoing IT initiatives throughout the Library.[G] During 2017, OCIO developed the *Project Management Life Cycle Information Technology Project Management Office Directive, August 2017*[23] (PMLC Directive)[23] and directed PMO to apply the Project Management Institute's (PMI) *Project Management Body of Knowledge* guidelines,[4] (PMBOK) industry best practices to PMO procedures and processes. As such, Obsidian's evaluation and scoring was conducted using the 49 processes of PMBOK v7, and not against the internal PMLC directives. OCIO assigned PMO specific responsibility for developing and providing PMLC and Systems Development Life Cycle (SDLC) directives for all Service Units.

The following year, OCIO developed the IT Program Modernization Plan,[13] released in March 2018. The IT Program Modernization Plan[13] mirrored the content of the OCIO IT Strategic Plan[14] by aligning to the 4 original strategic goals and expanding the task with 15 Key Modernization Areas. This document also provided a delivery schedule for the 15 Key Modernization Areas by fiscal year. OCIO intended this document to serve as a roadmap for achieving the goals set forth in the OCIO IT Strategic Plan.[14] OCIO advised OIG that the IT Program Modernization Plan[13] would also serve as its program management plan

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[F] The **Federal Enterprise Architecture Framework**, **(FEAF)**, Version 2, is an e-Government initiative of the U.S. Office of Management and Budget (OMB) released in May 2012 as part of the federal CIO's policy guidance and management tools for increasing shared approaches to IT service delivery and presents a comprehensive strategic approach to developing and using enterprise architecture in the Federal Government. The objective of the FEAF is to provide a common approach for IT acquisition in the Federal Government. It is also designed to ease sharing of information and resources across federal agencies, reduce costs, and improve citizen services. This framework provides Federal agencies with the methodologies, approach and artifacts to organize, plan, implement and measure IT enterprise programs and projects.

[G] **OIG Report 2018-SP-102**: *Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment*, page 9, paragraph 3.

for addressing its Top Management Challenge for IT environment.[H] However, in its review of the plan, OIG noted:

> *"As currently structured, the Modernization Plan lacks important categories of details necessary for it to be useful in guiding the tactical activities described on its pages. It does not describe the critical path for the key modernization areas, details of the specific activities, the time needed to complete each activity, and dependencies between activities. The expected deliverables are not stated or are described in terms too general to inform the reader how they will be accomplished. Because the dependencies between the various activities are not described, each activity appears to be an isolated task instead of being a part of a larger, integrated IT environment.* "[I]

Library of Congress Regulation (LCR) 1-610, *Planning and Organizational Performance Management*, defines a Directional Plan as a Service Unit document outlining the Service Unit's strategic priorities, which is aligned to the Library of Congress Strategic Plan. The Directional Plan covers a five-year timeframe, is reviewed and updated annually, and is approved by the Principal Deputy Librarian.[J] In response to the requirement to develop a Directional Plan, OCIO revised and combined the contents of OCIO IT Strategic Plan[14] and the IT Program Modernization Plan[13] into the *OCIO's IT Directional Plan, FY2019-23*[5] (IT Directional Plan)[5] released in May 2019, and was approved in the summer of 2019.

In the March 10, 2020, Mid-Point Progress Meeting,[35] the OCIO stated it was required to abandon its IT Program Modernization Plan[13] and replace it with a five-year directional plan, the format and structure of which was determined by the Strategic Planning and Performance Management Office (SPPM). However, in a May 29, 2020, email from SPPM to OIG, SPPM stated "*OCIO was never required to abandon any type of plan that they felt important or required for the management of the unit and its work and/or communication to stakeholders.*" The email also stated "*OCIO was free to structure and format their plan and include or not include content as desired and helpful for their purpose*."

During interviews with the OCIO in November 2019, [9, 10] Obsidian was informed that the IT Directional Plan[5] is the primary document used to guide the planning, implementation, and execution of the OCIO's IT modernization effort, and OCIO's Confluence website explicitly states that the IT Directional Plan[5] supersedes the IT Strategic Plan[14] and the IT Program Modernization Plan.[13] Appendix E provides diagrams of the document flow and document timeline for the migration of OCIO's Strategic Plan[14] to the current IT Directional Plan.[5]

While the IT Directional Plan[5] is frequently referred to as an "implementation plan" by OCIO, it was largely constructed from its two preceding strategic documents. As such, the IT Directional Plan[5] is similarly strategic and does not have the detail necessary for an implementation plan. Where strategic guidance defines what objectives must be accomplished within certain constraints (e.g., time, budget, deliverables, etc.), implementation guidance defines how the task elements are defined, how task elements will be accomplished, the criterion that defines success, and what is to be measured to validate performance. As discussed in greater detail below, at the core of OCIO's issues with effectively and consistently managing its IT projects is the absence of an implementation plan that provides these details.

[H] **OIG Report 2018-SP-102**: *Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment*, page 7, paragraph 4.

[I] **OIG Report 2018-SP-102**: *Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT* Environment, page 17, paragraph 2

[J] **LC Rules and Regulations LCR 1-610**, *Planning and Organizational Performance Management*

The reason the use of the IT Directional Plan[5] is ineffective as an implementation plan is that it lacks the project-level guidance necessary to ensure PMO can manage individual projects in a manner that aligns with OCIO's goals and objectives. The strategic guidance of the IT Directional Plan[5] should be used to develop an implementation plan that would provide applicable metrics, Key Performance Indicators [K] (KPI), to facilitate consistent implementation and performance tracking methods, which is not reflected in the documentation Obsidian evaluated. The absence of uniform performance and cost tracking metrics will inhibit the Library's senior management from properly evaluating and managing the outcomes and budget resources dedicated to this effort.

The OCIO's IT Directional Plan[5] establishes and aligns the OCIO's strategic and operational goals, objectives, and initiatives with the Library of Congress's FY 2019-2023 Strategic Plan and its companion document, the FY2019-2023 Digital Strategic Plan of the Library of Congress, [38] over the next five years. These documents are in-line with the Library's determined direction forward: user-centered, data-driven, and digitally enabled. They provide the strategic direction to further the Library's four overarching strategic goals:

1. Expand Access
2. Enhance Services
3. Optimize Resources
4. Measure Impact.

The IT Directional Plan[5] states that it will inform overarching Library priorities in the Library's Enterprise Implementation Roadmap, and together, will be reviewed and updated annually in accordance with the Library Strategic Plan. The IT Directional Plan[5] Overview, Strategic Context and Drivers, and Table of Contents are provided in Appendix I of this report.

The OCIO IT Directional Plan[5] identifies 4 goals, 15 objectives, 14 initiatives, and 67 activities for OCIO's IT modernization efforts. It also defines the estimated completion timeframes for each objective activity (by fiscal year), the objective owner, and provides 47 measures to evaluate performance. From this description of the IT Directional Plan, [5] it is reasonable to presume that the content of this document would be suitable as the foundation for the development of a detailed implementation plan. However, OCIO refers to the IT Directional Plan[5] as their implementation plan.

While the IT Directional Plan[5] expands upon the planning detail of its predecessor documents, it is still at a strategic level of detail, not at a level of detail suitable for implementation planning and execution. For example, under the goal, *Provide Strategic Direction and Leadership* to "Improve the effectiveness of OCIO messaging and performance reporting," [L] The activity to accomplish this initiative is to "Develop plan, identify solution, and mitigate backlog of technical writing," and the associated measure is defined as "[v]olume of technical writing backlog." [M] While this is good strategic direction for this specific topic, it does not translate into implementation guidance that a project manager can use to ensure this initiative is met. It does not define the scope of the "OCIO messaging and performance reporting" and does not identify the business/operational elements of the technical writing plan (i.e., the solution that must be addressed, the definition of a backlog, requirements to mitigate a backlog, the frequency of backlog assessments, and metrics or KPIs used to measure the volume of the backlog.)

[K] A **Key Performance Indicator** is a measurable value that demonstrates how effectively a program/project is achieving key business metrics or objectives. Program management structures use KPIs at multiple levels of the work breakdown structure (WBS) and project schedule to evaluate success at reaching performance targets.

[L] **OCIO IT Directional Plan**, Initiative 1.6.1, Page 11

[M] **OCIO IT Directional Plan**, Initiative 1.6.1,5 Page 11

This level of guidance results in broad interpretations of scope, methodology, and metrics used by individual project managers. This makes the reporting across multiple projects a disparate array of performance measurements based on diverse metrics and KPIs. While the OCIO has defined some performance metrics and KPIs, they are not sufficient to consistently and uniformly measure project performance. This situation limits PMO's ability to monitor projects in relationship to each other, and thwarts its ability to use data-driven metrics to aggregate multiple project performances into a Project Portfolio Management [N] (PPM) structure for Library senior management review. Obsidian believes an IT implementation plan document needs to be developed to properly facilitate the IT Modernization effort implementation and OCIO's ability to properly achieve the Evaluation Objectives identified in the SOO, to include adequately reporting outcomes, status, and budget for the use by Library management.

The PMO manages individual IT projects through project management artifacts defined by the PMLC Directive.[23] The PMLC specifies that each project develop a Project Charter, Project Personnel Budget, Cost Estimate, Basis of Estimate, Business Case, Status Report, Project Schedule, Risk Register, Change Requests, and Closeout Report. Additionally, PMO uses the Project Classification Worksheet[19] to augment the baseline project management documentation based upon the project's size (i.e., small, medium, or large) and the complexity of the project. Additional project management documentation, dictated by size and complexity, consists of a Project Management Plan and a Lessons Learned document for medium projects and Risk Management and cost estimating documents for large projects.

Obsidian requested relevant project-level documentation defined in the PMLC Directive[23] and the Project Classification Worksheet[19] for the 14 IT modernization projects identified in the OCIO's List of IT Modernization Projects.[11] Not all requested documentation was provided or complete. We also found the structure and content of the various project management artifacts varied greatly. Subsequently, the OCIO provided additional documentation that allowed a broader assessment of the OCIO's ability for reporting project statuses to senior management to evaluate progress and budget.

Obsidian found that while the OCIO has defined KPIs, they are inconsistent and often inadequate to measure the desired performance or objective. As such, this inhibits the development of PMO procedures, processes, practices and project management artifacts that align with PMBOK[4] and GAO[2, 3] best practice guidelines to achieve OCIO's objective for data-driven performance reporting.

In the course of Obsidian's assessment of the IT Directional Plan,[5] we noted an OCIO Earned Value Management[O] (EVM) implementation objective planned for 2021. OCIO confirmed this observation in the Mid-Point Progress Meeting[35] by stating OCIO will be implementing EVM for projects that meet a specific cost materiality threshold. OCIO plans to deploy an EVM capability to more accurately assess variances in IT project cost/budget performance objectives to schedule performance. EVM capability will allow OCIO project managers to measure the work actually performed on a project beyond the basic review of cost and schedule reports, allowing more accurate assessment of budgeted cost of work performed. This will provide Library senior management with more precise insight as to project status, and an early warning when the project falls behind expectations. However, it is necessary for OCIO to define the project-level cost, budget, and schedule performance metrics input requirements to ensure the expectations of the planned EVM capability are achieved. Obsidian observes that the business value

[N] **Project Portfolio Management** (PPM) is the centralized management of the processes, methods, and technologies used by project managers and project management offices (PMOs) to analyze and collectively manage current or proposed projects based on numerous key characteristics. The objectives of PPM are to determine the optimal resource mix for delivery and to schedule activities to best achieve an organization's operational and financial goals, while honoring constraints imposed by customers, strategic objectives, or external real-world factors.

[O] **Earned Value Management** (EVM) is a project management technique for measuring project performance and progress. It is designed to combine measurements of the project management triangle (scope, schedule, and costs) and analyze these factors into business value results. In a single integrated system, earned value management is able to provide accurate forecasts of project performance problems, and assess cost performance to budgeted targets and performance objectives.

expected by the Library of this pending EVM capability will likely be diminished by the lack of an implementation plan that defines these data elements.

In March 2015, GAO conducted an audit[29]of IT management at the Library and GAO found that:

> "*The Library of Congress has established policies and procedures for managing its information technology (IT) resources, but significant weaknesses across several areas have hindered their effectiveness.*"

Obsidian's Evaluation Objective assessments and findings align with the GAO audit[29] findings. As OCIO has current ongoing efforts to address GAO's findings, our report strives not to replicate these issues and notes areas in which there is overlap.

Obsidian's broad recommendation for OCIO to meet the Evaluation Objectives defined above is to develop a companion document to the IT Directional Plan[5] that provides the tactical level guidance needed to ensure the success of the IT modernization effort. This can be accomplished by revisiting OCIO's concept behind the former IT Program Modernization Plan,[13] addressing the issues identified in the OIG's September 2018 OIG report, "*Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment*"[P] and consider the implementation of recommendations contained in this report.

OCIO Project Implementation

Obsidian determined that OCIO has made strides towards meeting the Library's goal of IT modernization over the past four years. In early 2017, the OCIO formally established a PMO to better formalize project management processes and procedures. The OCIO also established a directive to adhere to the PMBOK[4] and GAO[2, 3] guidelines, as applicable to the Library's goals and business objectives, as the management approach for all OCIO projects.[9]

Obsidian observed three ongoing issues with the OCIO's implementation of the IT modernization projects:

> **Gap between Strategic and Implementation Guidance** – As previously discussed, as a strategic document the IT Directional Plan[5] logically lacks project-level implementation guidance. While it may be the expectation of OCIO management that PMO should interpret the strategic direction of the IT Directional Plan[5] and develop this project-level guidance, PMO methods, procedures, processes and project management artifacts do not provide the project managers with the specificity to effectively manage their IT modernization projects. PMO methods, procedures, processes and project management artifacts do not define the specifics of task scope, elements for performance reporting, critical success factors, task methodologies and artifacts, reporting requirements, or definitions of KPIs and performance metrics to measure performance.
>
> The absence of this guidance inhibits PMO's ability to develop project-level procedures, processes and project management artifacts that manage and monitor project-level activities to ensure OCIO objectives are achieved. Currently, PMO provides guidance to the project managers on the artifacts to employ, with procedures in varying degrees of PMBOK/GAO[2, 3, 4] alignment that provide some direction on how to use these artifacts, but limited guidance is provided on the project KPIs to measure. This creates inconsistencies in project level reporting that thwarts the

[P] **OIG Report 2018-SP-102**: *Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment, Gaps in the Current Modernization Plan*, pages 16-18 – "*Gaps in the Current Modernization Plan*".

ability to monitor either project schedule critical path, or the critical path among multiple projects with interdependencies.

Inconsistent Application and Enforcement of PMLC Directive[23] – As mentioned above, the OCIO follows the Library's PMLC, which is based on the PMBOK and GAO guidelines. The PMLC is under continuous improvement. However, Obsidian found that project management documentation was inconsistent across the 14 IT modernization projects identified by OCIO's List of IT Modernization Projects.[11] The PMO establishes accountability for each project using the Project Charter. This worksheet defines the individual project as small, medium, or large, and assesses some degree of complexity. This determination identifies additional project management documentation required beyond the baseline requirements of the PMLC Directive.[23]

Obsidian could not identify where the PMLC Directive[23] and Project Classification Worksheet[19] methodology was consistently applied to the various IT modernization projects. While the majority of documents specified by the PMLC policy and the PMO practices were made available to Obsidian for evaluation, we found that all of the project artifacts varied greatly in structure and information content, and none of the artifacts contained common metrics for data-driven reporting.

Inconsistencies in which individual project managers implement project management artifacts, level of information detail tracked and reported, and availability of the project artifacts utilized, severely restricts the PMO's ability to provide uniform project status that is based on common project metrics. While the OCIO has stated it does not manage IT Modernization projects as a portfolio, PMO produces a Weekly Project Portfolio Report. [22] This report is an Access database-generated graphical representation of the IT modernization projects providing high-level statuses of active projects to Library senior management. However, the Weekly Project Portfolio Report[22] provides this status based upon narrative information provided by the project managers, and without relationship to other projects. While the expertise of the project managers' narrative assessments do provide valuable project insight, they are by nature subjective and do not to allow quantifiable correlation with other status inputs. This inhibits the Library's executive management capacity to accurately assess whether the overall IT modernization effort is on schedule and within budget when a single project is under-performing.

5. **Lack of OCIO Alignment with PMBOK and GAO Guidelines** – Over the past three years, PMO has worked to combine and refine disparate procedures, processes, and practices in use by PMO project managers to align with PMBOK[4] and GAO[2, 3] guidelines. However, the reworking of PMO's processes and procedures remains a work in progress. This has resulted in PMBOK/GAO[2, 3, 4] guidelines being inconsistently applied across the suite of PMO procedures, possesses and artifacts. Obsidian's assessment of the OCIO's alignment to PMBOK/GAO[2, 3, 4] guidelines is provided in Appendices F, G, and H.

OCIO Implementation Requirements

The PMBOK[4] and GAO[2, 3] documents are guidelines. They are intended to provide best practice guidance that is applicable to the business objectives and requirements of OCIO. Not all PMBOK[4] and GAO[2, 3] guidelines will be applicable to the OCIO's IT modernization effort. OCIO follows the Library's PMLC, which draws from both PMBOK[4] and GAO[2, 3] project management guidelines.

Obsidian recognizes OCIO's approach of using PMLC procedures and practices to manage its IT modernization projects. However, regardless of the adopted management guidelines, an implementation plan should define the OCIO's management objectives, and the metrics and methods that properly measure those objectives. To develop an effective program management/implementation plan, OCIO

must first determine the business metrics to be monitored and measured at the individual project-level that ensures individual projects successfully achieve their contribution to OCIO strategic objectives. Identifying these business metrics allows OCIO to apply the PMBOK,[4] GAO,[2, 3] and their own guidelines that facilitate the monitoring, collecting, managing, and reporting of these business factors consistently and uniformly across all IT modernization projects. Obsidian could not find evidence this activity has been undertaken by OCIO at the IT Modernization portfolio-level, but notes that some projects are collecting some of this detail.

Obsidian reviewed the PMLC Directive[23] and noted the "Phase" and "Deliverable" categories are not fully aligned with PMBOK[4] guidelines. The details of this assessment are provided in Appendices E and H, **Table 3** – *PMO PMBOK Alignment Evaluation Summary*, and **Table 5** – *IT Modernization PBC Documentation Alignment to PMBOK*, respectively. Whether the PMLC Directive[23] directly aligns with the PMBOK[4] structure is of little consequence. However, the artifacts (PMLC Deliverables) and the guidance (PMLC Purpose) for the content of the artifacts defined in the PMLC Directive[23] are too abstract for practical use. This exacerbates PMO's issues of inconsistent initiation, planning, execution monitoring and control, and closing activities across multiple IT modernization projects.

As summarized in **Table 2** - *IT Modernization Projects Documentation Availability Summary*, some of the projects Obsidian evaluated were missing required PMLC documentation. We also noted that the structure and content of the artifacts varied widely. The variability across the project artifacts was observed to be the result of two factors: 1) the inconsistencies in project management documentation among the various projects; and, 2) the lack of common, metric driven, implementation details that guide the project managers as to what to monitor and report.

In our review, we noted that PMLC's Confluence website has several project management artifacts designed to support the project management efforts of the individual project managers. Among these PMLC artifacts are templates and guidance for the project management artifacts discussed below. While it is appropriate to have different templates for the varying sizes and complexity of projects, the variable in these templates should be the level of detail required, and the template structure and format should be relatively consistent. This allows the projects to be monitored and managed in a consistent manner that uses common metrics and reporting methods.

While OCIO has developed procedures and practices that use PMBOK and GAO guidelines as a basis, the absence of an implementation plan that provides the detailed project metrics and KPIs limits PMO's ability to craft procedures and practices that guide the project manager as to what to measure, and the methods and frequency for doing so. The paragraphs that follow provide an overview of key project management artifacts.

Project Charter

PMBOK[4] defines a Project Charter as, "…a document issued by the project sponsor that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities"[Q]

The PMLC Directive[23] provides Project Charter guidance that aligns with PMBOK[4] guidance in that it states "Obtain and document approval to initiate project – formally authorizes the existence of a project and provides the PM with the authority to apply organizational resources to project activities." The Project Charter template provided on the PMLC Confluence website is a well-structured document that requires definitions for project scope, purpose, technical approach, expected outcomes, deliverables, and

[Q] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 4.1, Page 75

potential impacts to other systems. The template also identifies stakeholders, schedule and milestones, and estimates project costs.

Obsidian believes the OCIO Project Charter should also include associations with other programs/projects, a definition of the project success criteria, and identify/define the business factors or metrics the project should address to validate the success criteria.

Project Classification

PMBOK[4] does not define Project Classification. This is an OCIO procedure to assess the size and complexity of a given project, the results (small, medium, or large) dictating the project management artifacts and level of project discipline required. The PMLC Directive[23] provides Project Classification guidance as "Classify project size for the purpose of determining the level of project management rigor and identify the project management deliverables to be produced."

Obsidian noted the additional requirement for a Project Management Plan and a Lessons Learned document at the medium-size project level, and the addition of Risk Management and cost estimating document for the large projects. However, the PMLC does not define the "level of project management rigor" to be employed by the project managers for the common artifacts as the size/complexity increases. OCIO should define both the artifacts required and the level of content for the artifact based upon project complexity. For example, a three-level work breakdown structure (WBS) or only a Full Time Equivalent (FTE) headcount cost estimate might be required for a medium project, where a six to nine level WBS and a full Basis of Estimate (BOE) might be required for a large project. OCIO needs to define the requirements for differing levels of detail within the same artifact based upon the project size/complexity.

Cost Baseline

PMBOK[4] defines Cost Estimating as, "…cost baseline is the approved version of the time-phased project budget, excluding any management reserves, which can only be changed through formal change control procedures."[R]

The PMLC Directive[23] provides cost estimating guidance as "Cost Estimating Spreadsheet - Determine specific project costs categorized by types of IT expenditures; and, Cost Estimating Document - Describes the process and assumptions."

Obsidian believes the OCIO's Project Personnel Budget worksheet template is a well formatted document that provides for proper accounting of labor hours and indirect costs. However, the estimating template provides only limited metrics or KPIs that would be consistently applied across all projects. Guidance on cost definitions and structures for labor estimates, material costs and other direct costs that establish the total capital investment and operating expense for the project, should align with OCIO's EVM cost management and reporting objectives. Examples of cost assumptions, business tenets, and cost source identification and citing should be provided. OCIO should define the cost estimating process and the cost elements employed to allow the project manager to develop a project costs baseline. Cost baselines should directly map to the WBS and project schedule to allow PMO to monitor a time-phased assessment of project performance to the cost baseline. OCIO should identify the cost elements that must be tracked across all projects in the PMO Project Portfolio. The cost elements in the BOE should align with the schedule and budget variance requirements for Library senior management reporting and/or EVM system requirements. To ensure that all applicable costs are identified and estimated properly, the PMLC cost estimating templates should be expanded to provide the detailed framework to ensure cost estimating meets the requirements for budget and schedule variance tracking. The Library's Financial Services

[R] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 7.3.3.1, Page 254

Directorate (FSD) and the OCIO should define the cost elements required to develop the underlying premises, business factors, and assumptions for the basis of estimating project costs.

Project Schedule

PMBOK[4] defines a Project Schedule as, "the output of a schedule model that presents linked activities with planned dates, durations, milestones, and resources"[S] (The PMLC Directive[23] states, "Serves as the primary planning calendar and schedule baseline for the project. It includes both PM and technical tasks and subtasks needed to complete the project."

OCIO should define the elements of a project schedule based upon project size and complexity. Obsidian found that current PMLC procedures only require a single milestone, which is effectively the end of the project and is not an effective project management process. At a minimum, OCIO should mandate the use of a uniform set of schedule milestones for all project sizes that allow for the establishment of a critical path and the linking of individual project schedules in the PMO project portfolio. Variance analysis should be conducted to assess planned versus actual start and finish dates, planned versus actual durations, and to monitor schedule performance. Project schedules should be baselined (a process of locking the schedule at an approve point in time to track schedule changes and deviations) and resourced.

The PMLC Confluence website provides project schedule templates for use by the project managers. While full-featured project scheduling tools might not be applicable for smaller projects, the templates used for these projects should use the same metrics and KPIs as the large and more complex efforts. For larger and more complex projects, OCIO should specify a common project management scheduling tool to establish and maintain a Project Portfolio Management (PPM) IMS. This ensures that project schedules can be managed within a single IMS, using consistent milestones and event data, across all IT modernization projects and can be accurately aggregated into portfolio reports to provide a portfolio-level critical path for Library senior management review.

A common set of schedule metrics and milestones should be established for all projects to ensure variances between budget and schedule can be tracked, and that all project activities are directly traceable to other projects, the Performance Reference Model (PRM), WBS, SOW, and EVM components, as applicable.

Project Management Plan

PMBOK[4] defines a Project Management Plan as "[t]he process of defining, preparing, and coordinating all plan components and consolidating them into an integrated project management plan"[T].

The PMLC Directive[23] guidance for Project Management Plan describes "…the project is to be executed, monitored, and controlled including assumptions, constraints, dependencies, stakeholders, milestones, and development methodology (e.g., agile or waterfall) if applicable."

The PMBOK guidance defines the purpose of the Project Management Plan as outlining all the components of a project that provide for proper planning, executing, controlling, and closing the work of the project to achieve specific goals and meet specific success criteria within the specified time and budget. Obsidian believes the Project Management Plan should be a direct extension of the Project Charter. As such, there is a great deal of latitude in the structure and content of the Project Management Plan. The PMLC has a Project Management Plan template available to project managers that is populated to varying degrees based upon project size and complexity. The Project Management Plan template can

[S] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 6.5.3.2, Page 217
[T] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 4.2, Page 82

either incorporate, or reference, associated project plans such as Risk Management Plan (Risk Register), Quality Plan, and Communications Plan.

Status Reports

PMBOK[4] defines a Status Report as "[w]ork performance information. The performance data collected from various controlling processes, analyzed in context and integrated based on relationships across areas. Examples of performance information are status of deliverables, implementation status for change requests, and forecast estimates to complete."[U]

The PMLC Directive[23] states a Status Report "[p]rovides a project update format to be submitted to the Library's IT Project Management Office."

The OCIO currently collects project status from the project managers and enters this information into an Access database to normalize the reporting format. Schedule performance is based on the initial schedule dates to the current target completion date without reference to actual workload or cost burn rates beyond FTE hours worked. Obsidian believes the OCIO should develop consistent project metrics for schedule and budget/cost performance reporting. All status reports should have a performance period and delivery schedule, or be identified as ad hoc/event driven. This ensures the status data is consistent across all IT modernization projects and can be accurately aggregated into portfolio reports for Library senior management review.

Risk Register

PMBOK[4] explains a Risk Register "…captures details of identified individual project risks. The results of Perform Qualitative Risk Analysis, Plan Risk Responses, Implement Risk Responses, and Monitor Risks are recorded in the risk register as those processes are conducted throughout the project."[V]

The PMLC Directive[23] guidance states a Risk Register "[p]rovides a record of risks, with assessment of impact and probability, mitigation strategy, contingency plan, and resolution for each risk."

The PMLC Confluence website has a very good risk management template available to the project managers. When properly populated, the OCIO Project Risk Register identifies potential risks, risk owner, and provides an assessment of the risk probability and impact. This template is also well-positioned to track risks at both the project and IT modernization effort management levels.

Issue Log

PMBOK[4] defines an Issue Log as "…a project document where all the issues are recorded and tracked."[W]

The PMLC Directive[23] states the Issue Log "[p]rovides a record of issues and resolutions throughout the project life cycle."

The PMLC Confluence website has an Issue Log template available to the project managers. The OCIO Issue Log template provides a consistent framework for Issue Logs for uniform reporting of project issues.

[U] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 1.2.4.7, Page 26

[V] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, 11.2.3.1, Page 417

[W] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, 4.3.3.3, Page 96

Change Request

PMBOK[4] defines a Change Request as a "formal proposal to modify any document, deliverable, or baseline."[X]

The PMLC Directive[23] Change Request guidance states it is "[u]sed to formally document and track project change requests."

The PMLC website has a Project Change Request Form template. This template is very thorough and requires the change description and justification, revision links back to the project charter, cost/budget estimates, and impacts to the schedule and cost baselines. In addition, the OCIO Project Charter document lists "Change Request" as a deliverable.

Close Project

PMBOK[4] defines Close Project or Phase as "…the process of finalizing all activities for the project, phase, or contract."[Y]

The PMLC Directive[23] states a Closeout Report "[s]erves as a final report to management on the status and results of the project and formally releases project resources."

The PMLC Confluence website has project closeout templates available to the project managers. Obsidian found the templates do not have a formalized checklist that document all aspects of the project being finalized, and assuring the project is declared complete under a specified authority. OCIO should define the process for closing the project budget and accounting for variances. The Project Closeout Checklist should be established for the project to ensure project documentation, to include project deliverables acceptance, as-built drawings, and other project documentation are closed and properly archived. OCIO should define the project closeout practices and policies in a manner that meets their business objectives and Library culture.

Lessons Learned Register

PMBOK[4] defines Lessons Learned as "The lessons learned register can include the category and description of the situation. The lessons learned register may also include the impact, recommendations, and proposed actions associated with the situation. The lessons learned register may record challenges, problems, realized risks and opportunities, or other content as appropriate."[Z]

The PMLC Directive[23] provides Lessons Learned guidance as "*Captures the results of the project team's lessons learned discussion to be submitted to the OCIO's PMO for reference by other project teams*."

The PMLC Confluence website has lessons learned templates available to the project managers. Obsidian assumes this information is being incorporated into the OCIO's Continuous Improvement Process to continually enhance OCIO procedures and processes.

[X] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, 4.3.3.4, Page 96

[Y] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 4.7, Page 121

[Z] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 4.4.3.1, page 104

Work Breakdown Structure

PMBOK[4] defines a WBS as "…a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. The process of subdividing project deliverables and project work into smaller, more manageable components."[AA]

The PMLC Directive[23] does not specifically require a WBS, as PMO procedures seemingly use WBS and schedule interchangeably. However, the development of a WBS for medium and large projects significantly helps to organize the project work efforts into manageable sections that align with cost estimates and resource allocation. This ensures the proper development of both the project budget and schedule. OCIO should provide guidance on the WBS hierarchical decomposition of the project scope of work, and the deliverables needed to ensure project objectives are achieved. OCIO should also establish a policy when a project WBS should not be developed.

Communications Plan

PMBOK[4] defines a Communications Plan as "…a component of the project management plan that describes how project communications will be planned, structured, implemented, and monitored for effectiveness."[BB]

The PMLC Directive[23] does not specifically require a Communications Plan, however the PMLC Confluence website provides a well-defined Communications Management Plan template that identifies communication types, frequency and stakeholders.

Obsidian believes the OCIO Communications Plan should also define the channels of communication and distribution media(s) within and among projects, PMO, OCIO and Library organizations and stakeholders.

Key Performance Indicators

PMBOK[4] defines "metrics" as "the measures to be used to show benefits realized, direct measures, and indirect measures."[CC] KPI is a generally-accepted industry concept defined as a performance measurement that evaluates the success of an organization or of a particular activity (such as projects, programs, products and other initiatives) in which it engages.[DD] KPIs provide a focus for strategic and operational improvement, create an analytical basis for decision making and establish uniform metrics for consistent reporting across the enterprise. The use of KPIs includes setting targets (the desired level of performance) and tracking progress against that target.

The use of KPIs is a long established executive management tool and practice within government and business, and their application and use should be expanded upon within the OCIO. While the OCIO has developed some KPI's as project guidance, project performance metrics are largely established by the individual project managers, if they are employed at all. This situation creates project reporting inconsistencies that do not allow the PMO to develop statuses, assessments or comparable performance baselines across their multiple IT modernization projects. Moreover, the absence of consistent KPIs in the

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[AA] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 5.4, Page 156 and Section 5.4.3.1, Page 161

[BB] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 10.1.3.1, Page 377

[CC] **Project Management Institute** (PMI) *Project Management Body of Knowledge ® (PMBOK) Guidelines*, 6th edition – 2017, Section 1.2.6.2, page 33

[DD] **Information Technology Infrastructure Library** (ITIL) Version 3, 2011

project schedules inhibits the PMO from establishing either a project-level critical path, or an overall Project Portfolio critical path.

Obsidian believes the OCIO should identify specific KPIs that reflect actual project performance and represent OCIO business value. These project-level KPIs should be consistently measureable, meaningful in terms of accurately reflecting current project conditions, time-bounded in terms of schedule and delivery, relevant to the project's contribution to the overall IT modernization effort, and support the OCIO's business goals and objectives.

These KPIs should be incorporated into the PMO procedures, processes and practices using PMBOK[4] and GAO[2, 3] guidelines as appropriate. This allows the PMO to effectively monitor and report the extent a project is achieving its performance objectives and delivering OCIO business value.

Observed OCIO PMO Strengths

In a meeting with the OCIO,[20] it was stated that PMO recognizes the need to better align with PMBOK[4] practices and procedures, and is working to do so. In the course of our evaluation, we found several areas where the PMO has taken positive steps toward that objective. Nevertheless, further improvement is greatly needed and this will require more executive focus to timely achieve the proper alignment to good project management practices. Of the several project management approach efforts the PMO is undertaking, the most notable strengths we observed were:

1. OCIO has recognized the need for formal project management processes and in 2017 formally established a PMO responsible for overseeing all Library projects.[35]
2. PMO is aware of many existing deficiencies related to project management processes and has established internal timelines to implement processes to more effectively manage cost, schedule and scope. Recognizing the scale of this task, PMO has made steady progress since its inception.
3. PMO has begun to implement limited capabilities for tracking and evaluating cost and schedule variances of OCIO Full Time Equivalent[EE] (FTE) hours by project.
4. PMO uses a procedure to assign managers, owners, and sponsors to projects to facilitate a level of responsibility and accountability[9, 20, 22] based upon the project complexity and size[22] and reports this status in the PMO Weekly Project Portfolio Report.[22]
5. The PMO Weekly Project Portfolio Report status[22] has been established to give visibility into ongoing projects which includes insight into project health, upcoming project tasks, and issue status.
6. OCIO uses its Project Classification Worksheet[19] – which is a spreadsheet with small, medium and large criterion applied to each project–to identify the overall complexity and level of risk of a new project. While there are some issues with this worksheet establishing project accountability, it does determine the level of risk and complexity. A matrix is used to categorize the project as either small, medium or large, and a list of documents is then required to be created for the project based on its size. The Project Classification Worksheet[19] provides a level of process and artifact standardization for all projects to adhere.
7. OCIO recognizes the value of assessing cost performance to budgeted targets and performance objectives for the proper project management. Accordingly, the OCIO has plans to deploy an EVM capability in 2021.[35] The OCIO has noted that its intention is not to deploy EVM across all

[EE] A **Full Time Equivalent** (FTE) is the measure of a worker's involvement in an IT modernization project. FTE is defined by the GAO as the number of total hours worked divided by the maximum number of compensable hours in a full-time schedule as defined by law.

IT projects, but will conduct a future assessment to determine the level of projects for which EVM will be deployed.

Evaluation Objectives:

A summary statement of our evaluation findings are provide below for each of the six OCIO Evaluation Objectives defined in the SOW.

Evaluation Objective 1: Logical and Measureable Methodology

Examination of OCIO's plans for the Library's IT modernization to determine if the plans provide a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure.

Evaluation Finding:[17] As discussed above, the OCIO does not have an IT modernization implementation plan that guides program-level objectives and metrics in the execution of IT project-level activities. In meetings with OCIO, [15, 33] and discussed above in an earlier section, Obsidian was informed that the IT Program Modernization Plan[13] had been replaced with the current IT Directional Plan.[5] There was no rationale provided by the OCIO as to why the concept of the IT Program Modernization Plan,[13] initially designed to provide implementation guidance, had been discarded with the exception of a comment in the Mid-Point Progress Meeting[35] where the OCIO stated it abandoned its IT Program Modernization Plan[13] and replaced it with a Directional Plan,[5] for which the format and structure was determined by SPPM. As mentioned previously, this was not the direction that was given OCIO by the SPPM. However, neither the current IT Directional Plan[5] nor the former IT Program Modernization Plan[13] are effective implementation planning documents.

Obsidian evaluated the PMO's processes and procedures for evidence of application of generally accepted industry standard project-level KPIs. We found that project metrics were not being monitored or collected in a consistent manner on any of the OCIO IT modernization projects, and therefore were not providing a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure. The absence of common performance metrics and KPIs results in inadequate mechanisms for top executive management to measure and assess project progress within the IT modernization effort portfolio. This situation limits Library senior management visibility of project schedule/budget overruns that have the potential to impact the overall IT modernization effort. OCIO stated that they were unaware of any requirement to have portfolio documentation. However, OCIO does produce a weekly report entitled Weekly Project Portfolio Report[22] to Library senior management, suggesting the IT modernization projects are being managed as a portfolio of projects.

Evaluation:

Without common project-level performance metrics and KPIs, the Library does not have a logical and measurable methodology to assess its IT modernization projects. The inability to monitor and collect these metrics, using PMBOK[4] and GAO[2, 3] guidelines, precludes the PMO from being able to determine progress toward its goals, measureable by data-driven elements.

As mentioned previously, the OCIO's IT Program Modernization Plan[13] was not an effective implementation plan when it existed, and the OCIO has not been replaced with a more current and appropriate implementation plan that defines program-level objectives and metrics. OCIO's use of the IT Directional Plan[5] as an implementation plan is ineffective in providing guidance on the types of logical and measurable metrics for the IT modernization project to monitor and manage. Logical and measurable metrics are defined as information elements that can be correlated to produce meaningful business value, and measureable means they can be repeatedly and accurately measured to track the performance of the project to those business objectives. Common KPIs should be defined across all projects that will

correlate interrelationships and interdependencies among the projects in the PMO IT modernization project portfolio.

PMO collects project status based upon available project artifacts and assessments from the project managers. PMO aggregates this information into an Access database which generates the Weekly Project Portfolio Report.[22] While this approach meets the current need to provide Library senior management with IT project status, the reports are based on narrative information and not data-driven by metrics common across all projects.

After reviewing the IT Directional Plan[5] and the project specific documents listed in **Table 2** - *IT Modernization Projects Documentation Availability Summary*, we determined that the PMLC artifacts did not define KPIs to facilitate a logical and measurable methodology to assess progress across any of the IT modernization projects. The lack of consistent KPI/metrics inhibits the PMO's ability to develop processes and procedures aligned with industry and GAO guidelines[2, 3, 4] that define how projects are managed, monitored, tracked, executed and reported.

Conclusions:

The use of the IT Directional Plan[5] as the project implementation guidance does not provide a logical and measurable methodology to assess progress towards the goal of a modern IT infrastructure. While the PMO does regularly collect project status and aggregates this information into each Weekly Project Portfolio Report, [22] this report is based upon subjectively correlated information from available project artifacts and assessments by the project managers.

Evaluation Objective 2: Project Management Methodology

Determine if the OCIO has employed a project management methodology such as the Project Management Institute's PMBOK[4] Guide as part of its planning and execution of the modernization effort.

Evaluation Finding:[18] Obsidian's examination of OCIO documents, and corroborated in discussions with the PMO staff[20, 25] determined that while the PMO's procedures and practices are aligned with PMBOK[4] guidelines, there are still several areas where the addition of performance metrics, KPIs and practices more consistently aligned to PMBOK[4] guidelines would better achieve the OCIO's objective of logical and measureable data-driven performance. The details of where the OCIO could apply PMBOK aligned metrics are provided in Appendices E and H, **Table 3** – *PMO PMBOK Alignment Evaluation Summary*, and **Table 5** – *IT Modernization PBC Documentation Alignment to PMBOK*, respectively.

Evaluation:

In discussions with Enterprise Architecture (EA) and the PMO teams in November 2019,[9, 10] it was stated that the OCIO has an ongoing effort that is attempting to align its procedures and practices to follow PMBOK[4] as part of its cost estimation and planning for the IT modernization effort. Because Evaluation Objective 2 specifically requires the alignment to a project methodology, such as the PMBOK[4] practices, Obsidian requested all of the available OCIO project management documents for each of the projects on the OCIO's List of IT Modernization Projects[11] which were evaluated for PMBOK[4] alignment.

While the OCIO's Confluence website provides several templates for various project management requirements, the content of a project management artifact determines the level of GAO or PMBOK alignment. Therefore, the unpopulated OCIO templates and artifacts were not reviewed as they could not be properly assessed. Obsidian evaluated only the active projects identified in the OCIO's List of IT Modernization Projects,[11] and only those documents being used to actually manage the individual projects. The assessment was conducted by critically comparing the PMI PMBOK guidance descriptions

to what was contained in the project artifacts. As meeting minutes are not considered a structural knowledge archival standard by PMBOK, project notes and meeting minutes were not evaluated. **Table 3** – *PMO PMBOK Alignment Evaluation Summary* (see Appendix F), summarizes Obsidian's assessment in reviewing these 28 documents for alignment with PMBOK[4] Project Management Processes. **Table 5** – *IT Modernization PBC Documentation Alignment to PMBOK* (see Appendix H), shows OCIO provided artifacts and their alignment to the PMBOK[4] Knowledge Management Areas.

Conclusions:

PMO has employed a project management methodology, specifically the PMBOK[4] and GAO[2, 3] guidelines, as a high-level guidance as part of its planning and execution of the IT modernization effort. However, PMO's efforts to align its procedures, processes and practices with the PMBOK[4] project management methodology is an ongoing work in progress and needs greater executive oversight and established KPIs to ensure more timely compliance with PMBOK and GAO practices. Obsidian concluded that the PMO has completed preliminary work in aligning its processes and procedures to the PMBOK[4] and GAO[2, 3] guidelines, but in several areas this work needs to be expanded to fully realize the OCIO's project management objectives.

A summary of our findings is presented in **Table 3–** *PMO PMBOK Alignment Evaluation Summary* (see Appendix F), and GAO guidance is provided in **Table 4** – *Alignment to the GAO Guidelines* (see Appendix G), and in **Table 5** – *IT Modernization PBC Documentation Alignment to PMBOK* (see Appendix H).

Evaluation Objective 3: Well-Designed Plan to Execute

Determine if OCIO is employing a well-designed plan to execute, report on, and determine accountability for modernization efforts and variances in budget and schedule for its IT infrastructure modernization effort.

Evaluation Finding:[21] The OCIO's lack of an implementation plan prevents achieving the Evaluation Objective 3 intent of employing a well-designed plan to execute and report on its IT modernization effort. Obsidian found that PMO does assign ownership in the form of a project manager, owner, and sponsor for each project. However, even if responsible parties were assigned, the absence of properly baselined schedules and KPIs to track performance metrics and variances in budget and schedule inhibits the PMO's ability to establish substantive project accountability for variances in budget and schedule.

Evaluation:

In discussions with PMO and OCIO staff,[9] and as shown in earlier sections of this report, Obsidian was informed OCIO's IT Strategic Plan[14] and IT Program Modernization Plan[13] were superseded by the IT Directional Plan[5] and that the IT Directional Plan[5] is the only document used to provide implementation guidance for the IT modernization effort. The OCIO's decision to rely upon the IT Directional Plan, [5] as crafted, as its implementation plan has significant repercussions that prohibit efficient project management. As discussed above, the OCIO staff informed Obsidian,[9] the IT Directional Plan[5] is the implementation planning document for the IT modernization effort. However, the IT Directional Plan[5] is not an efficient implementation plan. Subsequently, based on requests provided in congressional report language, OCIO released its *Integrated Master Schedules Core Information Technology Infrastructure Modernization* plan in March 2020 (IMS IT Infrastructure Modernization).[40] This document provided an overview of OCIO funding and milestone achievements for the Data Center Transformation (DCT) project. The IMS provided in this document applied to the DCT, IT Security Enhancement and IT

Network Modernization projects, is not baselined, and shows no critical path. The IMS IT Infrastructure Modernization[40] plan is a strategic-level status report and has no value as an implementation plan.

As discussed in detail above, Obsidian found PMO is inconsistent in the application and enforcement of PMLC Directive[23] for the use of project artifacts. Obsidian expected to see a consistent suite of project documents for each of the projects (e.g., project charter, deliverable documents, cost estimates, project schedule, risk registers, and variances in budget and schedule). Obsidian found that while only one project had all of the documentation, the OCIO project documentation is relatively complete in that only 16 percent of the required documentation for the 14 projects Obsidian evaluated were unavailable. Obsidian found that available project management artifacts varied widely among the active projects and were inconsistent in approach and content. **Table 2 –** *IT Modernization Projects Documentation Availability Summary* shows the availability of artifacts defined by the OCIO's PMLC Directive.[23]

Budget and schedule are two sides of what is commonly referred to as the project management triangle – the third is scope. As budget shortages create resource issues that impact schedule performance, schedule delays, perhaps caused by expanded scope, extend resource demands and create budget overruns. In conversations with OCIO and PMO,[20, 25] we found, with the exception of tracking OCIO FTE average labor rate hours by project, costs measurement data used to measure and track variances in budget and schedule in the Weekly Project Portfolio Report[22] was not collected. In our meetings, OCIO and PMO[15, 25, 35] stated that no other project costs, such as capital investments, operating costs, and other direct costs (e.g., contracted labor, travel, etc.) were collected. Further, FTE labor costs were not tracked as a variance to budget and schedule. PMO establishes accountability for each project with the Project Charter, which lists the individuals as designated Project Sponsor, Project Owner, and Project Manager. The PMLC Directive[23] provides a RACI chart[23] (Responsible, Accountable, Consulted, and Informed) that defines roles of the project manager, project management team, OCIO Tower Owners, members of the project team, and stakeholders. Service Unit deliverables and roles were not included in the RACI matrix. The inability of PMO to establish baselined schedules and the lack of KPIs to track cost and schedule, prevent accurate project accountability in terms of variances in budget and schedule for OCIO's IT infrastructure modernization effort.

Conclusions:

As discussed, the absence of an effective implementation plan is preventing OCIO from employing a well-designed plan for its IT infrastructure modernization effort. While the PMO's Project Charter establishes project ownership and accountability by assigning individuals to the project, and provides a high-level status of project activities, the application of project management disciplines across, the 14 IT modernization effort projects is inconsistent. Inconsistencies in which the individual project managers implement their project management approach, the level of information detail tracked and reported, and the availability of the project artifacts utilized, severely restricts PMO's ability to provide a homogeneous Project Portfolio Report[22] status to Library senior management that is data-driven with consistent metrics. Obsidian found this encumbers the Library's executive management capacity to accurately assess whether the overall IT modernization effort is on schedule and within budget when a single project is under-performing.

Evaluation Objective 4: Executing to Plan

Assess whether OCIO is executing the modernization effort in accordance with its plan; and ensure it has valid and verifiable mileposts, goals, and metrics to assess progress and variances towards completing the modernization effort on at least a quarterly basis.

Evaluation Finding:[24] OCIO is executing its IT modernization to the IT Directional Plan.[5] Because the IT Directional Plan[5] is a strategic-level document, mileposts (milestones), goals, and metrics to assess progress and variances towards completing the modernization effort can only be assessed at the strategic level. This devolves to very broad milestones expressed in fiscal year references and performance objectives that are not measureable or quantifiable. The Weekly Project Portfolio Report[22] provides status updates at the project level to Library senior management that provides some insight to progress and variances towards completing the modernization effort, but only at the individual project level and that data is not sufficient for a comprehensive project level picture for management to assess. This severely limited Obsidian's ability to assess whether OCIO is executing the modernization effort in accordance with its plan. Because of the lack of a detailed implementation plan, there are no specific valid and verifiable mileposts (milestones), goals (tactical objectives), and metrics being used to assess progress and variances, towards completing the modernization effort over any given reporting period. As such, Obsidian found that the OCIO was not meeting this objective.

Evaluation:

OCIO is not executing its IT modernization effort to an implementation plan that allows for the accurate tracking of project performance. This is because, as stated above in an earlier section, the IT Directional Plan[5] is being used as the implementation guidance, but is inadequate for the reasons discussed above. In accordance with the PMI, GAO and FEAF[A] guidelines and practices, Obsidian believes a proper implementation plan for the OCIO's IT Modernization effort is an essential requirement and should be created for the remainder of the execution of the IT Modernization.

During interviews with OCIO,[25] it was stated that OCIO develops a "target statement" that defines mileposts (milestones) and goals, which the Strategic Planning and Performance Management Office (SPPM) enters those into the COMPASS system. SPPM uses the COMPASS system to report on progress of the scheduled milestone performance. Obsidian finds that absent project-level KPIs and schedule tracking metrics, the ability to monitor critical path at either the project-level or at the OCIO Project Portfolio level is not based on measureable factors. As such, executive management visibility of the critical path for the overall IT modernization effort is not data-driven. As shown in **Table 4** –*Alignment to the GAO Guidelines* in Appendix G, of the approximate 150 best practices outlined in the GAO Schedule Assessment Guide[2] and GAO Cost Estimating and Assessment Guide,[3] we found that only 15 percent of these practices were fully adhered to.

Library of Congress Directive (LCD) 5-310.2, *Systems Development Life Cycle (SDLC)* states:

> "…project management is the application of knowledge, skills, tools and techniques to project activities to ensure projects are executed effectively and efficiently. The Library accomplishes this through the PMLC which is based on the PMBOK[4] and Federal government guidance. The PMLC is intended to utilize industry best practices across all IT projects and thereby improve project results."

In addition, in interview discussions with PMO and OCIO staff,[9] Obsidian was informed that the Library is following the requirements of the GAO Schedule Assessment Guide[2] and GAO Cost Estimating and Assessment Guide.[3] OCIO provided IT modernization documentation, which Obsidian reviewed for alignment to both of these GAO guidelines.[2, 3] Subsequently, the OCIO clarified this statement to "*…the PMO is working towards addressing findings from the 2015 GAO report which focused on aligning the PMLC against the GAO Schedule Assessment Guide and the GAO Cost Estimating and Assessment Guide and that work [is] ongoing.*" This clarification better aligns with our findings, and the results of our findings should be considered the current status of the PMO ongoing effort.

Conclusions:

Obsidian reviewed the findings of the GAO report of March 2015[29] that conducted a review of IT management at the Library. We found that OCIO's IT modernization project efforts do not adhere to the best practices outlined in either the GAO Schedule Assessment Guide[2] or the GAO Cost Estimating and Assessment Guide.[3] Per the GAO audit[29] several of the findings related to deficiencies in project schedule and cost estimating processes are open issues the OCIO is currently resolving. **Table 2 -** *IT Modernization Projects Documentation Availability Summary* and **Table 3** – *PMO PMBOK Alignment Evaluation Summary*, provide the supporting detail for these findings.

Evaluation Objective 5: OCIO's IT Program Modernization Plan Goals

Assess whether OCIO's modernization plan demonstrates what it will accomplish in the short-term (1-year), mid-term (2-3 years), and long-term (5 years).

Evaluation Finding:[28] As discussed above, the OCIO IT Strategic Plan[14] and the OCIO's IT Program Modernization Plan[13] were subsumed into the IT Directional Plan[5] in 2019. As the replacement document for the OCIO's IT Program Modernization Plan,[13] the IT Directional Plan[5] identifies four goals, 15 objectives, 14 initiatives and 67 activities to be accomplished over the FY 2019 through FY 2023 period. It also defines the estimated completion timeframes for each objective activity (by fiscal year), the objective owner, and provides 47 measures to evaluate performance.

Within each strategic objective the OCIO identified a series of activities and measures. Each of the activities has a projected fiscal year(s) targets for completion. The IT Directional Plan[5] clearly demonstrates what it will accomplish in the short, mid and long-term performance periods. However, while the OCIO met the stated requirement of Evaluation Objective 5 as to how their "modernization plan [IT Directional Plan[5]] demonstrates what it will accomplish in the short- (1-year), mid- (2-3 years), and long-term (5 years)", it did not meet the intent of Evaluation Objective 5 to explain how these accomplishments will be implemented.

Evaluation:

In interview discussions with PMO and OCIO staff,[9] Obsidian was informed the IT Directional Plan[5] is the only OCIO implementation planning document for FY 2019 through FY 2023. We were also informed that the IT Directional Plan[5] document is broader in scope than the 14 IT modernization effort projects identified in the OCIO's List of IT Modernization Projects[11] in that the IT Directional Plan[5] encompasses efforts beyond the IT modernization activities discussed in this report, such as the Data Center Transformation initiative.

The absence of baselined project schedules that monitor critical path, and an IMS that monitors project interdependencies and project performance toward the overall IT modernization effort, that define how the IT Directional Plan[5] goals, objectives, initiatives, and activities will be accomplished relegate the OCIO's projected short-, mid-, and long-term accomplishment to target objectives without credible assurances of success.

Conclusions:

Our evaluation determined, based upon the IT Directional Plan[5] defining OCIO goals, objectives, and activities to be accomplished over the FY2019 through FY2023 period, the OCIO has demonstrated what IT modernization efforts the OCIO will accomplish in the short-term (1-year), mid-term (2-3 years), and long-term (5 years).

Obsidian determined that while the OCIO met the stated requirement of Evaluation Objective 5 as to how its "modernization plan [IT Directional Plan[5]] demonstrates what it will accomplish in the short- (1-year),

mid- (2-3 years), and long-term (5 years)", the absence of implementation planning that provides creditable project schedule management did not support Evaluation Objective 5's intent to explain how these accomplishments will be implemented.

Evaluation Objective 6: Schedule and Cost Estimating

Determine if the GAO Schedule Assessment Guide[2] and Cost Estimating and Assessment Guide[3] criterion are being followed:

Evaluation Finding:[30] As shown in Appendix G, **Table 4** –*Alignment to GAO Guidelines*., OCIO is fully meeting approximately 15 percent of the best practices outlined in the GAO Schedule Assessment Guide[2] and Cost Estimating and Assessment Guide[3] criterion.

Evaluation:

LCD 5-310.2, *Systems Development Life Cycle (SDLC)* states:

> "*…project management is the application of knowledge, skills, tools and techniques to project activities to ensure projects are executed effectively and efficiently. The Library accomplishes this through the PMLC which is based on the PMBOK[4] and Federal government guidance. The PMLC is intended to utilize industry best practices across all IT projects and thereby improve project results."*

In interview discussions with PMO and OCIO staff,[9] Obsidian was informed that the Library is following the requirements of the GAO Schedule Assessment Guide[2] and GAO Cost Estimating and Assessment Guide.[3] OCIO provided IT modernization documentation, which was reviewed for alignment to both of these GAO guidelines.[2, 3]

Of the approximate 150 best practices outlined in the GAO Schedule Assessment Guide[2] and GAO Cost Estimating and Assessment Guide,[3] we found that only 15 percent of these practices were followed. These findings are documented in Appendix G, *Alignment to the GAO Guidelines*, to this report related to the GAO audit[29] deficiencies in project schedule and cost estimating processes as still open issues.

Conclusions:

Obsidian reviewed the findings of the GAO report of March 2015[29] that conducted an audit of IT management at the Library. We found that OCIO's IT modernization project efforts do not adhere to the best practices outlined in either the GAO Schedule Assessment Guide[2] or the GAO Cost Estimating and Assessment Guide.[3] Per the GAO audit,[29] several of the findings related to deficiencies in project schedule and cost estimating processes are open issues the OCIO is currently resolving.

Findings

The following findings are weaknesses that were discovered during the course of our assessment through interviews with OCIO personnel and reviews of OCIO-provided documentation. Our basis for these findings is derived from the Evaluation Objectives defined by the SOW, PMI PMBOK[4] project management best practices, the GAO Schedule Assessment Guide,[2] and the GAO Cost Estimating and Assessment Guide.[3]

Finding 1: OCIO does not have an implementation plan for IT Modernization

As a strategic planning document, the 2019 OCIO IT Directional Plan[5] is inadequate for use as the IT modernization effort's implementation and execution guide.

Background:

Obsidian was provided with an OCIO publication entitled IT Program Modernization Plan[13] (March 2018), but was informed this document, along with the OCIO IT Strategic Plan[14] (March 2016), are now superseded and have been merged into the IT Directional Plan[5] (May 2019). In conversations with the OCIO,[9, 16] the IT Directional Plan[5] is used as the basis for planning and implementation of OCIO's IT modernization efforts. During interviews with the OCIO in November 2019,[9, 10] the IT Directional Plan,[5] FY2019-23, May 2019,[5] was identified as the sole document in use for planning and execution of the IT modernization effort (the OCIO IT Strategic Plan[14] goals and objectives having been subsumed into the IT Directional Plan).[5] The IT Directional Plan[5] is strategic in nature, identifying OCIO goals, initiatives and activities for FY 2019 through FY 2023, and includes efforts beyond the IT modernization effort.

Condition:

OCIO does not have a current IT modernization plan for the implementation and management of the IT modernization effort. In interview discussions with PMO and OCIO staff[9] Obsidian was informed the IT Directional Plan[5] is used as OCIO's guide for planning and implementation. The IT Directional Plan[5] is a strategic planning document with a scope that is broader than IT modernization effort, and encompasses OCIO strategic efforts beyond the IT Modernization. As a strategic document, the IT Directional Plan[5] does not provide project-level objectives, milestones, measurable metrics, and success criterion. The absence of an IT modernization plan creates a gap in the OCIO's management direction and guidance between the strategic level and the project implementation level of the IT modernization efforts. This results in PMO processes and procedures that are not managing and tracking the project-level metrics that ensure the OCIO's strategic goals are achieved. No other documents provided by OCIO contained substantive information for the planning, execution and tracking of IT modernization at the effort level. *

Criteria:

The OCIO and PMO[10, 25]stated that the Library follows PMBOK[4] guidelines and the GAO Schedule Assessment Guide. Specific areas of non-adherence in the PMBOK[4] include: Project Integration Management (Section 4.3.2.2, page 95; Section 4.5.1.5, page 109 and Project Scope Management (section 5.2.2.3, page 143). Specific areas of non-adherence in the GAO Schedule Assessment Guide[2] include: Concepts, and Best Practices (Section 1.10, page 4. Section 1, page 7, Table 1, page 10). All of these references highlight the importance of using KPIs as a means of tracking performance across interrelated projects to systematically measure how the project portfolio is achieving business objectives and delivering business value.

Cause:

The project management document developed to facilitate the implementation of the IT modernization effort is the IT Directional Plan.[5] The IT Directional Plan[5] incorporated the content of the earlier IT Program Modernization Plan[13] and OCIO IT Strategic Plan,[14] both of which were strategic-level documents. As a strategic-level document, the IT Directional Plan[5] is not designed to provide detailed procedures, performance metrics and schedule disciplines, as such it is inappropriate for the execution and tracking of project level activities.

The absence of an IT modernization plan creates a gap in the OCIO's management direction and guidance between the strategic level and the project implementation level of the IT modernization effort. This

results in PMO processes and procedures that are not consistently aligned to the applicable elements of the PMBOK[4] and GAO[2, 3] guidelines and do not properly manage and track project-level performance that ensures the OCIO's strategic goals are achieved.

Effect:

Obsidian found that managing the IT modernization effort at a strategic-level does not permit sufficient monitoring and management oversight of project performance. The absence of an IT Modernization implementation plan that defines success criterion, and establishes KPI metrics that are aligned with the OCIO's strategic goals and objectives, is inhibiting PMO's ability to develop project-level processes and procedures that provide logical and measurable methodologies to ensure OCIO's goals are achieved.

Recommendation:

1.1. OCIO should make a dedicated effort to develop an IT Implementation Plan for the modernization effort. The IT Implementation Plan should continue to maintain and enhance the consistency of its KPI metrics that are specific, measureable, achievable, relevant, time-bound, and that align with OCIO business and operational objectives against which individual project performance can be measured. PMO should ensure these KPI metrics are incorporated into their processes and procedures using the applicable elements of the PMBOK[4] and GAO[2, 3] guidelines. In accordance with those guidelines, the plan should also be baselined.

Finding 2: Some Projects Artifacts were Missing Essential Information

PMO lacks a Quality Assurance function to ensure project management artifacts are developed in accordance with the PMLC guidelines.

Background:

Obsidian found that the PMO lacks a quality assurance functions to ensure project management artifacts are developed in accordance with the PMLC guidelines. The PMLC Directive[23] procedures require a baseline suite of documentation for each chartered project based upon the project's size as determined by the PMO's Project Classification Worksheet.[19] The determination of project size is based on an aggregate of two factors: complexity and risk. The baseline documents for all projects include: Project Charter, Project Personnel Budget, Cost Estimate, Basis of Estimate, Business Case, Status Report, Project Schedule, Risk Register, Change Requests, and Closeout Report.

Beyond these baseline requirements, the Project Classification Worksheet[19] assessment identifies additional required project documentation depending on the small, medium or large size determination by the worksheet. As an example, large projects require additional documents such as Cost Estimating Spreadsheet, Cost Estimating Document, Project Management Plan, Issue Logs, and Lessons Learned documents, whereas projects designated as small do not required these documents.

Condition:

Over the course of our assessment, Obsidian found that most of the required and supplemental project management documents defined by the PMO's Project Classification Worksheet[19] were developed, but 25% lacked essential information or had not been developed. Using the OCIO-provided List of IT Modernization Projects,[11] Obsidian requested the PMO baseline documentation and supplemental documentation required by the Project Classification Worksheet[19] assessment for each of the 14 PMO projects. Obsidian received the requested documentation for the IT Modernization projects as shown in **Table 2 -** *IT Modernization Projects Documentation Availability Summary* below. None of the 14 IT

modernization projects had signed Change Requests nor was completed Project Close-Out documentation provided for completed projects.

Table 2 - IT Modernization Projects Documentation Availability Summary

Project Name	Project No.	Start Date	Cost Estimates and BOE	Project Schedule	Project Charter	Business Case	Comm. Plan	Project. Mgmt. Plan	Risk Register
Library of Congress PBC No.	-	-	040/ 041	042	043	044	045	046	-
Active Directory Domain Consolidation	566	09 Dec 19	●	●	●	n/a[1]	⊘	⊘	●
Concordia Phase 3	604	Pending [2]	●	n/a	n/a	●	n/a	n/a	n/a
Congress.gov - FY19	532	07 Dec 18	●	●	●	●	○[3]	⊘	●
Congress.gov - FY20	619	02 Dec 19	●	●	●	●	○[3]	⊘	●
Geospatial Host Environ. Scvs. Infrastructure	551	01 Jun 19	●	●	●	●	⊘	⊘	●
IT Security Dashboard (Splunk)	597	30 Oct 19	●	●	●	n/a[1]	⊘	●	●
Loc.gov - FY19	525	16 Oct 18	●	⊘[5]	○[4]	●[6]	●	○[4]	●
Loc.gov - FY20	612	04 Nov 19	●	⊘[5]	●	○[6]	●	●	●
MySQL Modernization	274	17 Aug 16	●	●	●	n/a[1]	●	●	●
Oracle 12c Upgrade	259	05 Feb 16	●	●	●	n/a[1]	●	⊘	●
Service Catalog Upgrade Project [8]	533	03 Jan 19	●	●	○[4]	●	n/a	n/a	●
ServiceNow Change Release Management	579	30 Jan 20	●	●	●	○[9]	⊘	⊘	⊘[10]
ServiceNow PPM Implementation	549	14 Jan 20	●	●	●	⊘	●	●	●
Windows 10 Migration	492	16 Jul 18	●	●	●	n/a[1]	●	⊘[11]	●
Data Center Transformation	464	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]
Application Migration	529	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]	n/a[12]

Compliance	● Artifact developed and contained essential information ○ Artifact developed but lacked essential information ⊘ Artifact not developed

Table 2 Notes

1	OCIO states that a Business Case is not required for Operations and Maintenance (O&M) projects.
2	Project is in the Initiation Phase.
3	The OCIO-provided documents, "*532_CDG-Communications-190220-0840-960.pdf,*" and "*619-Communication Plan.pdf,"* are identical documents that are not specifically titled for the Congress.gov FY2019 project. The content of this document consists of five sample problem notification emails.
4	Document provided and contained appropriate information, however, the document was not signed or approved as required.
5	Document submitted as "*LOC.GOV FY2020 Project Schedule*" was a document titled "*Web Services Forecast*" with dates shown as "TBD".
6	The Document provided – "*R&D Business Proposals All Business Proposals - 2018*" does not reference any specific project numbers. As the document is dated 2018 it is assumed the document was applicable to the LOC.gov FY2019 (Project 525), and does not apply to the LOC.gov FT2020 (Project 619)
7	The document – 259_Oracle 12c_Project_Management_Plan.doc – was provided , however, the Project Management Plan template was only partially filled out
8	The OCIO has stated that the Service Catalog Upgrade Project is not considered a full project.
9	The document "*Business Case R&D Business Proposals All Business Proposals 2018-04-26.pdf*" references "Service Now" in one bulleted paragraph in the "Platform Support" paragraph of the document, but there is no reference to the ServiceNow Change Release Management project title or project number (579).

10	Document submitted was a blank template.
11	The "*492-Project Management Plan.xlsx"* document provided is a worksheet that has no titles or definition of the information it contains. It also does not contain any elements of the Project Management Plan template used by the OCIO. The worksheet also does not provide any apparent project management information.
12	Not included in the Obsidian contract scope of work.

Obsidian noted that the OCIO Cost Estimate Worksheet has a section that is used for building the Basis of Estimate. For that reason we considered the Cost Estimates[40] and BOEs[41] as the same document and combined the assessment into a single Cost Estimates and BOE category.

Obsidian found the available documentation did not align with the applicable PMBOK[4] and GAO[2, 3] guidelines to support efficient project management. The PMBOK[4] Process Areas most substantially lacking in alignment were: Integration Management, Project Scope Management, Schedule Management Quality Management, Resource Management, and Procurement Management. **Table 5** - *IT Modernization PBC Documentation Alignment to PMBOK* (see Appendix H) shows OCIO provided artifacts and their alignment to the PMBOK[4] Knowledge Management Areas.

Criteria:

The criterion Obsidian used to determine the appropriate project management documentation was the PMO's Project Classification Worksheet.[19] Per the PMLC Directive,[23] PMO procedures and practices require each project to have the suite of documentation commensurate with the project's size and complexity, as determined by the PMO's Project Classification Worksheet.[19]

Cause:

As discussed previously, in a meeting with the CIO and Deputy CIO[35] it was stated that when the Library's IT modernization effort was begun in 2017 the PMO was not established. Over the past three years the PMO has endeavored to build out PMO's project management capability, to include alignment to the PMBOK[4]/GAO[2, 3] practices and procedures. However, the current state and application of these practices and procedures are inadequate across several PMBOK[4] Knowledge Areas, and are inconsistently implemented across the 14 projects identified in the List of IT Modernization Projects.[11] Of the 49 PMBOK Management Practices, Obsidian found that the OCIO documentation complied with, 12 (24 percent), partially complied with 26 (54 percent) and did not comply with 11 (22 percent) of these management practices.

Effect:

Obsidian believes the current state of project management processes and procedures and the inconsistent application of PMO required project documentation significantly complicates the PMO's management by inhibiting their ability to properly track performance across the 14 identified IT Modernization projects.

Recommendation:

OCIO executive management should ensure that the PMO mandates the creation of all required project documentation as stipulated in its Project Classification Worksheet.[19]

2.1. The OCIO should perform a gap analysis to determine the PMBOK and GAO cost and schedule assessment principles and practices the Library still needs to implement.

2.2. The OCIO should implement specific guidelines that all IT projects must follow to meet PMBOK and GAO standards. For example, the Library could require that each project complete a checklist containing the specified guidelines.

2.3. The OCIO should develop a monitoring and quality assurance process to ensure that each IT project complies with PMBOK and GAO cost and scheduling guidelines, as adopted by the Library.

Finding 3: Ineffective Management of Cost Estimation and Budget

While individual project costs estimates were provided for all IT Modernization Project efforts, the estimates could not be correlated to the OCIO fiscal year 2020 budget. Numerous cost estimating best practices outlined in the GAO Cost Estimating and Assessment Guide were not followed.

Background:

For OCIO to properly forecast budgetary needs for the IT modernization effort, cost estimates for all projects, and the basis for those estimates, need to be developed and tracked. To determine if OCIO was tracking program cost estimates against the annual IT modernization budget for FY 2020,[36] Obsidian requested documentation of all project cost estimates, the basis for those estimates, and the FY 2020 Finance Plan.[36] The FY 2020 Finance Plan[36] had not been approved prior to the conclusion of the IT Modernization Evaluation on March 15, 2020.

The GAO Cost Estimating and Assessment Guide[3] provides a best practices methodology to develop, manage, and evaluate capital project cost estimates. The methodology outlined in the Cost Estimating and Assessment Guide is a compilation of best practices that federal cost estimating organizations and industry use to develop and maintain reliable cost estimates throughout the life of an acquisition project. One of the objectives for evaluation for the assessment involved determining OCIO adherence to the GAO Cost Estimating Assessment Guide.[3] The GAO Cost Estimating and Assessment Guide[3] outlines a rigorous checklist of practices for cost estimation that should be followed for all project efforts.

Condition:

Obsidian's assessment of the IT modernization project cost estimates provided by OCIO did not map to the cost structure of the Library's Draft FY 20 IT Finance Plan July 2019 v6.[36] The Draft FY 20 IT Finance Plan[36] presents the entire Library of Congress IT Modernization Plan in three segments: 1) Agency-wide FY 2020 IT Non-Pay; 2) FY 2020 IT Staffing; and, 3) NLS IT Modernization. None of these funding categories delineate the individual IT modernization projects. These findings were corroborated in a meeting with the Library's Finance Office personnel on March 12, 2020. We met again with the FSD on July 20, 2020, and the Chief Financial Officer and her staff acknowledged the reporting methods and format used by the Financial Services Directorate (FSD) in the FY 2020 budget reports were not aligned with OCIO project budget reporting. As such, Obsidian was unable to map the IT Modernization project costs to the Draft FY20 IT Finance Plan[36] with any certainty, nor could the accuracy of the cost of the OCIO's overall IT modernization effort be determined.

Through interviews and document reviews it was determined that the majority of practices outlined for schedule in GAO Cost Estimating and Assessment Guide[3] were not followed. We found that only a portion of the actual project labor hours from the active projects was being collected and tracked. While planned for 2021,[35] EVM is not being leveraged. A full list of findings has been documented in Appendix G, *Alignment to GAO Guidelines.*

Obsidian findings align with the GAO audit[29] findings that the OCIO's IT modernization project efforts are not adhering to the best practices outlined in the GAO Cost Estimating and Assessment Guide:[3] Best Practices for Managing Capital Program Costs.

Criteria:

Obsidian applied the guidance from the GAO Cost Estimating Assessment Guide,[2] [FF] to determine the OCIO's alignment with cost estimate best practices and evaluate the adequacy of cost estimates that were provided for the IT modernization effort.

Cause:

The Library's FSD does not manage the project financials for OCIO's IT modernization effort. Project-level financial management is conducted by PMO. PMO has not implemented sufficient processes, procedures and practice guidance to ensure that costing is adequately planned, implemented and tracked. OIG has stated that FSD needs to take a greater role in project cost management across the Library.[GG] OCIO may not have the appropriate skillsets to comprehensively and appropriately institute the necessary cost accounting.[HH]

PMO has not integrated the GAO Cost Estimating Assessment Guide[2] best practices into its cost-based project management process. Currently, the OCIO lacks a defined cost estimate processes and the supporting procedures and documentation for its IT modernization project efforts.

Effect:

Without IT modernization project estimates and the accurate basis for those estimates, it is not possible to forecast needed funding or to account for project costs. Additionally, without a direct mapping of IT modernization project costs to the FY 2020 IT Finance Plan, it is impossible to validate the accuracy of budgetary forecasts for the IT modernization effort. The FY 2020 IT Finance Plan, inclusive of the budget for IT Modernization, cannot be validated for accuracy and completeness.

Inadequate cost estimate practices can result in cost overruns and over/under allocated Library funds for IT modernization.

Recommendation:

3.1. Obsidian recommends developing a formal checklist that contains the GAO Cost Estimating Assessment Guide's best practices for Project Managers to follow when developing, executing and maintaining project costs.

Finding 4: Inefficient Project Schedule Management

Several schedule best practices outlined in GAO Schedule Assessment Guide were not followed, project schedules lacked sufficient detail to accurately track and manage performance, and IT Modernization project efforts are not being managed as a portfolio of projects.

Background:

Schedule management is one of the most important aspects of project management. The PMBOK[4] guidelines highlight this fact in its most comprehensive Knowledge Area – *Project Time Management*. Similarly, the GAO Schedule Assessment Guide[2] devotes 240 pages to proper project schedule

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[FF] **GAO Cost Estimating Assessment Guide**[2], Best Practices for Cost Estimating Team and Best Practices Checklist Cost Estimating Team, page 56

[GG] **OIG report 2019-SP-101**, *The Library Continues to Face Challenges Ensuring Effective Financial Management and Reporting*, May 2020.

[HH] **OIG memorandum**, *Conceptual framework for the IT Governance Structure*, January 18, 2019.

development. The project schedule is an essential element in managing cost performance to budgeted targets, and achieving performance objectives. The GAO Cost Estimating and Assessment Guide[3] is a companion guide to the Schedule Assessment Guide[2] as project cost performance cannot be considered credible if it does not account for the cost impacts of schedule slippage. These industry and federal best practice guidelines provide an effective methodology for scheduling the necessary work to a timeline and developing, managing, and evaluating capital project cost estimates.

PMO is currently managing 14 IT modernization projects,[11] all of which share a common end goal in facilitating the overall OCIO IT modernization effort. OCIO and PMO have repeatedly stated that IT modernization is an "effort" and not a program[35] that has a specific Library connotation. Obsidian agrees with OCIO in its assessment in that the IT modernization effort, as defined in the OCIO's document, is a strategy that is executed over the long-term and an ongoing effort with beginning and ending dates defined by the 14 individual IT modernization projects that it currently manages. The success of the IT modernization effort is defined by achieving the strategic objectives defined by the IT Directional Plan.[5] Therefore, assuring the successful achievement of the IT modernization effort relies upon monitoring and managing the 14 individual projects that achieve those objectives. It is for this reason that developing common scheduling practices and monitoring the interdependencies and critical paths among the individual IT projects is essential in assuring the overall IT modernization effort can be achieved within the performance periods defined by the IT Directional Plan.[5] Obsidian observes that the 14 projects identified in the OCIO's List of IT Modernization Projects[11] does not constitute the entire IT modernization effort.

Condition:

PMO's management of the 14 IT Modernization projects does not align with the best practices of the PMBOK[4] guidelines, or the GAO Schedule Assessment Guide[2] and GAO Cost Estimating and Assessment Guide.[3] We found that many of the schedule best practices in these guides were not followed. While our assessments of the individual projects varied, common issues we observed consisted of, project schedule task outlines used in place of an actual WBS, the Project Schedule pseudo WBS's were lacking insufficient detail, WBS dictionaries[II] were not created, resources were not assigned to project schedules, schedules were not baselined, critical paths were not defined, schedule activity duration estimate logic were incomplete, schedule activities and float days were not defined, and schedule risk analysis were not conducted.

PMO project schedules do not align with the industry and federal practices outlined in PMBOK[4] and GAO[2, 3] guidelines. Notably, PMO schedule procedures and practices do not define a schedule structure, alignment to the WBS,[JJ] use of schedule milestones, KPI, for metrics that allow the project schedule to be consistently monitored and accurately tracked.

From interviews with the OCIO and PMO[10, 25, 35] and confirmed with the list of defined IT modernization projects,[11] the IT modernization effort as depicted in the IT Directional Plan[5] consists of 14 unique projects. All of these projects share a common end goal in facilitating the overall Library IT

[II] A **Work Breakdown Structure (WBS) Dictionary** is a table developed from the WBS that correlates the WBS work tasks to the Statement of Work (SOW) and the Cost Breakdown Structure (CBS). The WBS Dictionary links the WBS element name, a description of the work in that element, the SOW paragraphs that define the requirements, and the CBS references that define costs and resources.

[JJ] A **Work Breakdown Structure** (WBS) in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The Project Management Body of Knowledge (PMBOK v6) defines the work-breakdown structure as "A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables."

modernization effort. Obsidian requested the project schedules for each of these 14 projects, and the OCIO provided Project Schedules[27] for 12 of the 14 projects during the course of the evaluation. We found a broad inconsistency as to the use and level of detail within the available project schedules. The nine project schedules we evaluated were inconsistent in structure and application of milestones as a result of using differing scheduling approaches, more specifically there were minimal to no milestones defined across most projects. The WBS associated with the project schedules did not define work tasks to a logical level of resource utilization to identify and track cost elements, KPIs were not identified, and WBS dictionaries were not completed. In our assessment we noted that within the available project schedules, resources were not assigned, critical paths were not defined, schedule activity duration estimate logic was incomplete, schedule activity float was not defined, and schedule risk analysis were not conducted.

PMO produces a Weekly Project Portfolio Report[22] that provides a high-level status of active projects, but as individual projects without relationship to each other. Project schedule tracking elements are not defined by the PMO in terms of milestones, KPIs or any other tracking metrics that correlate time, resources, skills, and budgets consistently across all IT Modernization projects. While some PMO projects track schedule performance to multiple milestones, PMLC Directive[23] policy requires only a single milestone for projects less than six months in duration,[25] which effectively becomes the project end date. This schedule reporting inconsistency across the 14 IT Modernization projects does not allow the PMO to uniformly monitor or report status across the multiple IT Modernization projects.

The absence of an IMS for the IT modernization effort inhibits PMO's ability to monitor and manage the 14 IT modernization projects as a portfolio of projects. PMO currently tracks and reports the overall status and schedule performance for each of the 14 projects individually as a stand-alone effort. This creates a schedule management issue when the individual projects have interdependencies among them that potentially impact the overall IT modernization effort schedule and deliverables. While not all projects have such interrelationships, those that do have interdependencies do not share milestones or KPIs to determine potential impacts to the critical path of the overall IT modernization effort.

Obsidian concurs with the GAO Assessment[29] findings that the Library's IT modernization project efforts are not adhering to the best practices outlined in the GAO Schedule Assessment Guide.[2] A full list of findings has been documented in Appendix G, *Alignment to GAO Guidelines.*

Criteria:

Obsidian referenced the best practices for project schedule management as outlined in PMBOK[4] Knowledge Area – *Project Time Management,* and the GAO Schedule Assessment Guide,[2] *Best Practice 1: Capturing All Activities,* (page 25) to determine if the IT Modernization project schedules provided sufficient detail to accurately track and manage performance. These guidelines established our criterion for capturing project activities, sequencing work activities, estimating work durations, assessing the IMS for critical path, analyzing risks, validating traceability and establishing schedule baselines. We referenced the GAO Cost Estimating and Assessment Guide,[3] *Chapter 19 – Managing Program Costs: Execution* to assess EVM KPI metrics. OCIO IT Modernization projects were identified from the IT Modernization projects[11] document.

Cause:

The PMO's ability to accurately track and manage IT Modernization project performance is hindered by the inconsistent application of project schedules across all projects, and the lack of project-level guidance on schedule structure, alignment to the WBS, use of schedule milestones, and application of KPI's for measuring cost. We found that the OCIO does not follow PMBOK's[4] Knowledge Area – *Project Time Management,* and the GAO Schedule Assessment Guide,[2] *Best Practice 1: Capturing All Activities,*(page

25) to determine if the IT Modernization project schedules provided sufficient detail to accurately track and manage performance.

The PMO has yet to develop a comprehensive approach to Project Performance Management (PPM) that incorporates industry standard methodologies for project level IMS' with measureable milestones or KPIs that monitor project critical path performance. The current degree of project level schedule management is masking Library senior management's oversight of schedule performance for the majority of the IT Modernization projects, and provides only notional insight to the overall IT Modernization critical path.

Effect:

The PMO's management processes are not aligned with PMBOK[4] and GAO[2, 3] best practices and guidelines which is impairing proper schedule management for IT Modernization projects. In addition, the inconsistent application of PMO processes across the multiple projects is compromising the integrity of project schedule accuracy and completeness. This is inhibiting the PMO's ability to accurately report the status, risks and performance of IT Modernization projects to Library senior management.

The absence of an IMS for the individual IT modernization efforts inhibits the PMO's ability to monitor and manage the 14 IT Modernization projects as a portfolio of projects. The Weekly Project Portfolio Report[22] provides a high level status of active projects, but without relationship to each other. This results in the potential for interdependencies among projects to impact the overall IT modernization effort schedule and deliverables.

Recommendation:

4.1. OCIO should undertake a dedicated effort to develop tactical project schedule management processes that align with the best practices for project schedule management as outlined in the PMBOK Knowledge Area – Project Time Management, and the GAO Schedule Assessment Guide to determine if the IT modernization project schedules provided sufficient detail to accurately track and manage performance.

4.2 The PMO should analyze and collectively manage the IT modernization projects with an IMS consisting of all IT modernization project efforts. This will allow for visibility and transparency into the status of all efforts and allow for the easy identification of interdependencies and how changes to a project affect the overall modernization effort.

Finding 5: Lack of Verifiable Goals and Success Criterion

The OCIO has not defined verifiable goals, measurable metrics and success criterion for the IT modernization effort.

Background:

The IT Directional Plan[5] is a strategic document encompassing the entirety of OCIO strategy as it relates to all Library IT efforts. As such, the majority of IT Directional Plan[5] goals and objectives do not directly relate to the individual IT modernization projects with the exception of Objective 3.3 Infrastructure Transformation. However, Objective 3.3 simply states the desire to "Transform the Library's IT operations to deliver modern, reliable, secure, and high performance digital enterprise services" without references to KPI metrics or success criterion that will ensure this objective is achieved at the project level.

Condition:

The IT Directional Plan[5] does not define verifiable goals for the individual projects that constitute the IT modernization effort. Well defined KPI, metrics, and quantifiable success criterion at the project management level have not been defined for IT modernization efforts.

Criteria:

Obsidian's evaluation criteria for proper goals and objectives was the PMBOK[4] guidance for strategic planning that defines project goals and objectives, project constraints and the process for establishing performance metrics that are achievable and measurable. We also assessed whether the OCIO's modernization effort had valid and verifiable milestones (mileposts), goals, and metrics to assess progress and variances based upon the requirements in the Library's IT Modernization Evaluation Report Objective 4.

Cause:

Obsidian found that OCIO goals, metrics and success criterion were not defined prior to starting any of the IT modernization project efforts.

Effect:

Absence of detailed measureable goals, objectives and success criterion inhibits the ability of project managers to define proper project metrics, schedule milestones and KPIs that align with the OCIO vision for a successful IT modernization effort. The absence of these criterion increases the potential for the individual projects to be managed in a manner that does not achieve the OCIO's overall IT modernization effort goals and objectives.

Recommendation:

5.1. OCIO IT modernization goals and success criterion should be developed to align with the OCIO's business goals and objectives to ensure the IT modernization effort achieves OCIO's stated objectives.

Finding 6: Inadequate Variance Tracking Methods

Tracking methods used for project schedule and cost variances are limited to OCIO FTE hours, which do not properly reflect cost performance to budgeted targets and performance objectives.

Background:

Project management is a balance of project scope, schedule, and costs to achieve a desired business result. The ability to accurately forecast project performance problems, and assess cost performance to budgeted targets and performance objectives is highly dependent upon the ability of the OCIO to track cost and schedule variances. Currently, OCIO tracks only OCIO FTE average labor rate hours. This metric is only a partial aspect of cost measurement as it does not address cost elements such as contractor hours (if applicable), indirect costs or material costs.

In interviews with OCIO and PMO[9] it was stated that the Library has plans to deploy an EVM capability in 2021.[35] EVM is a project management technique to manage project progress and performance. It integrates project scope, schedule and cost to establish a performance measurement baseline that allows for the comparison of projected values to actual values at any point in time during the project. EVM allows for the easy identification of where a project currently stands relative to its baseline and also

enables the early identification of project issues. However, the full benefits of the EVM capability the Library intends to deploy will only come to fruition if the proper project management metrics, schedule milestones and KPIs are enabled.

Condition:

Obsidian observed that the Library has very limited capabilities in places to track and assess project schedule and cost variances. What cost collection mechanisms do exist are limited to tracking OCIO FTE average labor rate hours expended on the project, which only partially reflects the full cost performance to budgeted targets and assessment of performance objectives.

Criteria:

Obsidian referenced the best practices of the GAO Cost Estimating and Assessment Guide,[3] *Chapter 19 – Managing Program Costs: Execution* (page 243) to assess EVM KPI metrics for tracking methods used for project schedule and cost variances. Project schedule management best practices were identified in the PMBOK[4] knowledge area Project Time Management, and the GAO Schedule Assessment Guide,[2] *Best Practice 1: Capturing All Activities,* (page 25) to determine if the IT Modernization project schedules provided sufficient detail to accurately track and manage performance. These guidelines established our criterion for capturing project activities, sequencing work activities, estimating work durations, assessing the IMS for critical path, analyzing risks, validating traceability and establishing schedule baselines.

Cause:

PMO has not implemented project scope, schedule, and costs metrics and KPIs within their project management processes that are consistent with PMBOK[4] and GAO[2, 3] guidelines to properly assess and monitor the IT modernization projects progress toward achieving OCIO business objectives. Currently, the OCIO tracks only the OCIO FTE average labor rate hours by project. This metric is only a partial aspect of cost measurement as it does not address cost elements such as contractor hours, if applicable, indirect costs or material costs.

Effect:

The absence of fundamental project management scheduling, performance metrics and KPIs is inhibiting the ability of OCIO to properly track IT Modernization project cost and schedule variances, which has a direct impact on the accurate forecasting of project performance problems, and assessment cost performance to budgeted targets. This situation creates the potential for project cost overruns, missed performance objectives and schedule delays. Further, absence of the capabilities that provide the performance metrics to the EVM analytical ability will significantly impair the expected IT modernization effort management benefits of the Library's planned EVM deployment.

Recommendation:

6.1. FSD, working with OCIO, should track project cost variance in a manner that meets the OCIO's business objectives.

Appendix A – PBC References

PBC	Document Title
1	Solicitation 030ADV19Q0348, 26 Jul 19, Attachment J-1, Statement of Objectives, Section 4.0 – Performance Objectives
2	GAO Schedule Assessment Guide: *Best Practices for Project Schedule*, December 2015, GAO-16-89G
3	GAO Cost Estimating and Assessment Guide: *Best Practices for Developing and Managing Capital Program Costs*, March 2009, GAO-09-3SP
4	Project Management Institute's (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition - 2017
5	PBC# 002; IT Directional Plan, May 2019 - Final.pdf
6	Solicitation 030ADV19Q0348, 26 Jul 19, Attachment J-1, Statement of Objectives, Section 1.0 – Introduction
7	Solicitation 030ADV19Q0348, 26 Jul 19, Attachment J-1, Statement of Objectives, Section 2.0 – Purpose
8	Solicitation 030ADV19Q0348, 26 Jul 19, Attachment J-1, Statement of Objectives, Section 3.0 – Scope
9	11-07-19 PMO Interview Meeting Minutes and Action Items;
10	11-12-19 CIO and DCIO Interview Meeting Minutes and Action Items.
11	PBC# 019 & 036; List of Modernization Projects
12	Solicitation 030ADV19Q0348, 26 Jul 19, Attachment J-1, Statement of Objectives
13	PBC# 001; IT Program Modernization Plan.pdf (11.1.2.0.3)
14	PBC# 010; The Library of Congress Information Technology (IT) Strategic Plan. Fiscal Years 2016 - 2020
15	Library Meeting Minutes, 03 Feb 20, PMO meeting on the IT Directional Plan; Email from Dina Najia to G. Jay Nelson on 09 Mar 20, entitled Meeting Follow-Up Questions
16	11-12-19 CIO and DCIO Interview Meeting Minutes and Action Items.doc
17	LOC IT Modernization Evaluation Work Paper Objective #1.docx
18	LOC IT Modernization Evaluation Work Paper Objective #2.docx
19	PBC# 020: Project Classification Worksheet.xlsx
20	11-07-19 EA Interview Meeting Minutes and Action Items.docx
21	LOC IT Modernization Evaluation Work Paper Objective #3.docx
22	PBC# 018 and 021; PMO Weekly Project Portfolio Report-FINAL-11152019.pdf.
23	PBC# 022 Project Management Life Cycle (PMLC) Directive, August 2017
24	LOC IT Modernization Evaluation Work Paper Objective #4.docx

PBC	Document Title
25	03-05-20 OCIO Interview Meeting Minutes and Action Items
26	PBC# 036 and 019 IT-Modernization-projects - KLAU PBC 36_12.19.19_2.pdf
27	PBC# 037 IT Modernization Project Schedules v02.xlsx
28	LOC IT Modernization Evaluation Work Paper Objective #5.docx
29	GAO 15-315 Report Strong Leadership Needed to Address Serious Information Technology Management Weaknesses
30	LOC IT Modernization Evaluation Work Paper Objective #6.docx
31	LOC GAO-09-3SP & GAO-16-89G Summary Findings
32	The Library of Congress Strategic Plan, Fiscal Years 2016-2020
33	Library Meeting Minutes, 03 Feb 20, PMO meeting on the IT Directional Plan;
34	PBC#_048 Email from Dina Najia to G. Jay Nelson on 09 Mar 20, entitled Meeting Follow-Up Questions
35	03-05-20 OCIO Interview Meeting Minutes and Action Items.docx; Mid-Term OCIO Report Meeting Minutes and Action Items - 10 Mar 20.docx
36	Draft FY20 IT Finance Plan July 2019 v6.pdf
37	Federal Enterprise Architecture Framework, Version 2
38	FY2019-2023 Digital Strategic Plan of the Library of Congress
39	Senate Committee on Appropriations report (116-124), September 2019
40	OCIO Integrated Master Schedules Core Information Technology Infrastructure Modernization, March 2020

Appendix B - Acronyms

Acronym	Definition
BOE	Basis of Estimate
CAPM	Certified Associate in Project Management
CCB	Change Control Board
CR	Change Request
DCT	Data Center Transformation
EA	Enterprise Architecture
EVM	Earned Value Management
FEAF	Federal Enterprise Architecture Framework
FSD	Financial Services Directorate
FTE	Full-Time Equivalent
FY	Fiscal Year
GAO	Government Accountability Office
IBR	Integrated Baseline Reviews
IMS	Integrated Master Schedule
IT	Information Technology
ITIL	Information Technology Infrastructure Library
KPI	Key Performance Indicators
LCD	Library of Congress Directive
LCR	Library of Congress Regulation
OCIO	Office of the Chief Information Officer
OIG	Office of the Inspector General
PBC	Provided By Client
PCF	Primary Computing Facility
PMBOK	(PMI) Project Management Body of Knowledge ®
PM	Project Manager
PMI	Program Management Institute
PMLC	Project Management Life Cycle
PMO	Project Management Office
PMP	Program Management Professional

Acronym	Definition
PPM	Project Portfolio Management
PRM	Performance Reference Model
RACI	Responsible, Accountable, Consulted, and Informed
SDLC	Systems Development Life Cycle
SOO	Statement of Objectives
SOW	Statement of Work
SPPM	Strategic Planning and Performance Management Office
TBM	Technology Business Model
TSB	Technology Strategy Board
WBS	Work Breakdown Structure

Appendix C – Document Footnotes

Ref	Footnote
A	The **Project Management Body of Knowledge** is a set of standard terminology and guidelines for project management. The body of knowledge evolves over time and is a document resulting from work overseen by the Project Management Institute, which offers industry and Federally-recognized Certified Associate in Project Management (CAPM) and Program Management Professional (PMP) certifications. Much of the PMBOK Guide is unique to project management such as critical path method and work breakdown structure. The PMBOK Guide also overlaps with general management regarding planning, organizing, staffing, executing and controlling the operations of an organization. Other management disciplines which overlap with the PMBOK Guide include financial forecasting, organizational behavior, management science, budgeting and other planning methods.
B	A **Critical Path** is defined as the longest estimated schedule sequence of interdependent activities that should be accomplished on time to ensure completion of the project on due-date. The critical path activities are performed under the "predecessor-successor" relationship, so that any next activity cannot be started until its predecessor is complete. A critical path is established for each individual project, and aggregated into a program-level master schedule that defines a program-level critical path by linking the "predecessor-successor" interdependencies among projects into a single critical path.
C	PMI defines program management is defined as the application of knowledge, skills, and principles to a program to achieve the program objectives and to obtain benefits and control not available by managing program components individually. A program component refers to projects and other programs within a program. Project management focuses on interdependencies within a project to determine the optimal approach for managing the project. Program management focuses on the interdependencies between projects and between projects and the program level to determine the optimal approach for managing them. – *PMI PMBOK v.6 Section 1.2.3.2, Program Management*
D	An **Integrated Master Schedule** (IMS) is a time-based schedule containing the networked, detailed tasks necessary to ensure successful program/contract execution. The IMS is traceable to the Performance Reference Model (PRM), Work Breakdown Structure (WBS), Statement of Work (SOW), and Earn Value Management (EVM) system. The IMS is used to verify attainability contract objectives, to evaluate progress toward meeting program objectives, and to integrate the program schedule activities with all related components.
E	The Data Center Transformation project, to include assessment of the Application Migration project, is evaluated in a separate Obsidian report – Evaluation of Data Center Relocation Report (030ADV19Q0379) scheduled for release in November 2020.
F	The **Federal Enterprise Architecture Framework**, Version 2, is an e-Government initiative of the U.S. Office of Management and Budget (OMB) released in May 2012 as part of the federal CIO's policy guidance and management tools for increasing shared approaches to IT service delivery, presents a comprehensive strategic approach to developing and using enterprise architecture in the Federal Government. The objective of the FEAF is to provide a common approach for IT acquisition in the Federal Government. It is also designed to ease sharing of information and resources across federal agencies, reduce costs, and improve citizen services. This framework provides Federal agencies with the methodologies, approach and artifacts to organize, plan, implement and measure IT enterprise programs and projects.
G	**OIG Report 2018-SP-102**: Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment, page 9, paragraph 3.
H	**OIG Report 2018-SP-102**: Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment, page 7, paragraph 4.
I	**OIG Report 2018-SP-102**: Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment, page 17, paragraph 2

Ref	Footnote
J	**LC Rules and Regulations LCR 1-610**, Planning and Organizational Performance Management
K	A **Key Performance Indicator** is a measurable value that demonstrates how effectively a program/project is achieving key business metric or objective. Program management structures use KPIs at multiple levels of the work breakdown structure (WBS) and project schedule to evaluate success at reaching performance targets.
L	**OCIO IT Directional Plan**, Initiative 1.6.1, Page 11
M	**OCIO IT Directional Plan**, Initiative 1.6.1,5 Page 11
N	**Project Portfolio Management** (PPM) is the centralized management of the processes, methods, and technologies used by project managers and project management offices (PMOs) to analyze and collectively manage current or proposed projects based on numerous key characteristics. The objectives of PPM are to determine the optimal resource mix for delivery and to schedule activities to best achieve an organization's operational and financial goals, while honoring constraints imposed by customers, strategic objectives, or external real-world factors.
O	**Earned Value Management** (EVM) is a project management technique for measuring project performance and progress. It is deigned to combine measurements of the project management triangle (scope, schedule, and costs) and analyze these factors into business value results. In a single integrated system, earned value management is able to provide accurate forecasts of project performance problems, and assess cost performance to budgeted targets and performance objectives.
P	**OIG Report 2018-SP-102**: Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment, Gaps in the Current Modernization Plan, pages 16-18.
Q	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 4.1, Page 75
R	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 7.3.3.1, Page 254
S	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 6.5.3.2, Page 217
T	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 4.2, Page 82
U	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 1.2.4.7, Page 26
V	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, 11.2.3.1, Page 417
W	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, 4.3.3.3, Page 96
X	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, 4.3.3.4, Page 96
Y	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 4.7, Page 121
Z	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) Guidelines, 6th edition – 2017, Section 4.4.3.1, page 104
AA	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 5.4, Page 156 and Section 5.4.3.1, Page 161
BB	**Project Management Institute** (PMI) Project Management Body of Knowledge ® (PMBOK) guidelines, 6th edition – 2017, Section 10.1.3.1, Page 377
CC	Project Management Institute (PMI) Project Management Body of Knowledge ® (PMBOK) Guidelines, 6th edition – 2017, Section 1.2.6.2, page 33
DD	**Information Technology Infrastructure Library** (ITIL) Version 3, 2011

Ref	Footnote
EE	A **Full Time Equivalent** (FTE) is the measure a worker's involvement in an IT modernization project. FTE is defined by the GAO as the number of total hours worked divided by the maximum number of compensable hours in a full-time schedule as defined by law.
FF	**GAO Cost Estimating Assessment Guide,**[2] Best Practices for Cost Estimating Team and Best Practices Checklist Cost Estimating Team, page 56)
GG	**OIG report 2019-SP-101**, The Library Continues to Face Challenges Ensuring Effective Financial Management and Reporting, May 2020.
HH	**OIG memorandum**, Conceptual framework for the IT Governance Structure, January 18, 2019.
II	A **Work Breakdown Structure (WBS) Dictionary** is table developed from the WBS that correlates the WBS work tasks to the Statement of Work (SOW) and the Cost Breakdown Structure (CBS). The WBS Dictionary links the WBS element name, a description of the work in that element, the SOW paragraphs that define the requirements, and the CBS references that define costs and resources.
JJ	A **WBS** in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The Project Management Body of Knowledge (PMBOK v6) defines the work-breakdown structure "A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables."

Appendix D – Addendum to the Library of Congress, OCIO Comments to the IT Modernization Evaluation Draft Report

Addendum

to the

Library of Congress, OCIO Comments

on the

IT Modernization Evaluation Draft Report

Executive Summary

From October 2019 through July 2020, under a contract with the Library of Congress' (Library) Office of the Inspector General (OIG), Obsidian Global, LLC (Obsidian) conducted an evaluation of the Office of the Chief Information Officer's (OCIO) plans for the Library's Information Technology (IT) modernization goals, specifically focused on the Library's methods and processes used to assess progress towards OCIO's IT modernization effort. The Library's IT Modernization effort is an agency-wide endeavor to provide a more reliable and responsive IT service delivery.

In the course of Obsidian's evaluation of the OCIO's IT Modernization effort we observed that the OCIO has made significant progress in aligning Library's IT modernization project management procedures and practices with the guidelines of the Government Accountability Office's (GAO) *Schedule Assessment Guide: Best Practices for Project Schedule, December 2015, GAO-16-89G,*the GAO *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs, March 2009, GAO-09-3SP*, and the Program Management Institute (PMI), *Program Management Body of Knowledge (PMBOK)*. While our report may appear critical of the OCIO's current compliance, Obsidian observes that the majority of the OCIO's Project Management Lifecycle (PMLC) directives and processes, to include well-developed PMLC templates and artifacts, clearly define processes and procedures OCIO project managers should follow, and these project artifacts are readily available on the PMLC/Confluence website.

On November 2, 2020, the OIG provided the OCIO with the *IT Modernization Evaluation, Draft Report* No. 2019-IT-104, requesting the OCIO's written comments in accordance with Library of Congress Regulation (LCR) 9-160, *Rights and Responsibilities of Library Employees to the Inspector General.*

The OCIO responded to this request, providing 217 technical comments to the November 2020 draft report, and subsequently, repeated this effort on a December 22, 2020 version of the draft report with 156 technical comments. Many of the OCIO's comments were duplicates between these two documents. Obsidian has reviewed each comment, and in consultation with the OIG, provided a response that either passed on the comment (disagreed), or agreed with the comment and made specific changes to the *IT Modernization Evaluation, Final Report.*

There are three areas of disagreement in fundamental tenets between the OCIO's current IT Modernization effort management approach and the recommendations being made by Obsidian. These disagreement in tenets were the source of many of the OCIO's comments. The tenets of disagreement between the OCIO and Obsidian are:

- The need for an IT Modernization effort implementation plan,
- The need for an IT Modernization effort Integrated Master Schedule, and
- The application of GAO and/or PMBOK guidelines on OCIO projects.

These three issues are discussed below.

The Need for an IT Modernization Effort Implementation Plan

In March of 2018 the OCIO published the *IT Modernization Plan, The Office of the Chief Information Officer (OCIO)* as the implementation plan for the IT Modernization effort. In meetings with the OCIO in November 2019, Obsidian was informed this plan was the OCIO's initial implementation plan and, among other things, provided "business-driven capabilities" guidance for project managers. This plan, along with the *Library of Congress Information Technology (IT) Strategic Plan, Fiscal Years 2016-2020,* was incorporated into the *IT Directional Plan, FY2019-23, The Office of the Chief Information Officer (OCIO).* As the *IT Modernization Plan* (the OCIO's initial implementation plan) was abandoned, Obsidian asked for the current implementation plan. In several meetings with OCIO and Project Management Office (PMO) personnel, Obsidian was informed that the IT Directional plan was the current IT Modernization effort implementation plan.

Obsidian's assessment of the OCIO's IT Directional Plan is that it is a strategic planning document, and is inadequate for use as the implementation and execution guide for the IT Modernization effort. More specifically, the IT Directional Plan does not identify success criterion or define repeatable and measurable Key Performance Indicators (KPI), common performance metrics or uniform reporting elements for the project managers to incorporate into their project management artifacts. This absence of top-down implementation guidance inhibits Library senior management's ability to properly evaluate and manage IT modernization projects schedule, resources and budgets. Variants of this observation appear throughout the report.

When this observation was presented to the CIO and the Deputy CIO in the March 2020 Mid-Term Review meeting, Obsidian was informed that the IT Directional Plan was not the OCIO's implementation plan, and that the IT Modernization effort does not have an overall implementation plan. The OCIO stated that implementation plans are created and monitored only at the project level. This change in the OCIO's position occurred after the initial report was written, and references to the IT Directional Plan not being an adequate implementation plan may appear out of context.

The OCIO's position is that *"[t]he modernization projects are not related enough to have a separate IT Implementation plan. This takes place through the strategic planning and budget processes. The Library does not manage IT Modernization as one program but instead separate IT modernization projects*." This position is reiterated in OCIO comments throughout the report.

Obsidian's position is that an implementation plan for the OCIO's IT Modernization effort is an essential requirement, and should be created for the remainder of the Library's IT Modernization effort execution. Obsidian believes that the gap between the strategic guidance of the IT Directional Plan, and the individual project-level interpretation of that strategic direction, creates inconsistencies in the methods project managers use, and the KPIs and performance metrics they measure and report, among the IT modernization projects. This data inconsistency inhibits the OCIO's ability to uniformly correlate data-driven project performance information into IT Modernization portfolio status and performance assessments. It also significantly complicates the Library's intended deployment of an Earned Value Management (EVM) system that relies on data multi- source data that can be correlated to assess project schedule and cost variance performance.

The Need for an IT Modernization Integrated Master Schedule

The IT Modernization effort consists of numerous projects and activities. However, the Obsidian tasking was limited to assessing the compliance to the stated Objectives for the 14 IT modernization projects identified in the contract scope of work. Therefore, our recommendations in this report is based upon these 14 projects.

The OCIO's position is that the "*OCIO does not consider the IT modernization effort as one large project or program but instead separate IT modernization projects. No Integrated Master Schedule was developed as a result. Tracking the IT modernization effort takes place through the strategic planning and budget processes. The* [14] *modernization projects referenced in this audit do follow thorough project management disciplines via the Library's PMLC.*"

A similar position statement was provided by the OCIO of, "*The modernization projects are part of the OCIO portfolio of projects. The Library does not manage IT Modernization as one program with a single integrated master schedule because there is insufficient inter-dependencies between the projects.*"

The OCIO also stated, "*…not every section of the IT Directional Plan is a "project" to be managed as part of a "program," nor would it be appropriate to "projectize" ongoing management work.*"

Obsidian's position is that to properly track the overall performance of the IT Modernization effort, the 14 identified projects, and potentially other IT modernization project being managed by the OCIO under the overall IT Modernization effort, should be managed under an Integrated Master Schedule (IMS). Individual project schedules should directly link to the IMS to track the overall IT Modernization effort performance.

While the individual projects do develop project schedules, they are widely inconsistent in terms of milestones, critical events, project interdependencies, resource loading and level of task detail. None of the projects have any interdependencies linked to other project milestones, critical events, or major IT Modernization effort objectives (It should be noted that the OCIO does not believe there are such interdependencies). Finally, the individual project schedules vary greatly in execution discipline, in that none provide critical path assessments and only a few were baselined to track schedule changes.

The schedule content and performance/tracking metrics for each project schedule should be specified by the IT Modernization effort implementation plan (discussed above). This establishes reporting consistency among the project schedules, allowing the IT Modernization IMS to monitor and track individual project status, performance and interdependencies as a portfolio of projects.

An IT Modernization effort IMS is also required to correlate the project statuses reflected the Weekly Project Portfolio Report in relationship to each other, provide a baselined critical path for the overall IT Modernization effort, and provide the scheduling component for the Library's planned EVM deployment.

The Application of GAO and/or PMBOK Guidelines on OCIO Projects

As part of Obsidian's tasking, we assessed the OCIO's project-level compliance with the GAO *Schedule Assessment Guide* and *Cost Estimating and Assessment Guide*, and the PMBOK guidelines. The results of this assessment are found in Appendices F, G and H of the report.

The OCIO observes that "*The Library's PMLC directive does not direct that all projects follow all aspects of the PMBOK. The Library categorizes projects as small, medium, and large to maximize the return on investment for project management overhead. Project documentation requirements are different based on the size of the project as defined in LCD 5-310.1.*" This simply means that smaller, or less complex, projects do not require the full discipline of all project management artifacts. The PMLC uses a Project Classification Worksheet to assess the size and complexity of each project, which defines the

project's required management artifacts. Obsidian fully agrees with the OCIO's observation and PMLC procedure, and considered this factor in our assessments.

The OCIO also noted that the "*OCIO follows the Library's PMLC which is based on the PMBOK and GAO guidelines. The PMLC is under continuous improvement*." Obsidian fully agrees with this observation as well. We observed very good progress in the adoption of GAO and PMBOK guidelines since the OCIO established the Project Management Office (PMO).

The OCIO's position in regards to the findings in Appendices F, G and H of the report is that the PMLC has processes and procedures that comply with the GAO and PMBOK guidelines. The OCIO made several comments on our individual assessments that highlighted this fact. Examples of the OCIO comments are:

> *"[t]he PMLC has clearly defined guidance for statusing activities within project activities. The guidance provides very clear steps and MS Project tips to help guide the PMs*", and
>
> *"The PMLC clearly defines process details for conducting status meetings with the team to track status, but to also address risks/issues, and enhance interpersonal communications amongst the team members."*

The OCIO also expressed concern that the Obsidian assessments of GAO/PMBOK compliance were subjective as opposed to quantitative.

Obsidian's position is that our assessment of GAO and PMBOK compliance was not focused on the availability PMLC guidance, processes or templates, but rather on the actual project management artifacts used to manage the 14 IT Modernization projects defined in the scope of our task. Our assessment looked at the individual project documents and assessed each against the GAO PMBOK guidelines. In some cases, the project artifacts were complete and well documented, some were only partially executed, while others were either merely a blank template or the artifact was missing entirely. This inconsistency varied greatly by project. Therefore, Obsidian's subjectivity was not with the assessment of any given project artifact, but the aggregate of all applicable artifacts to the specific GAO/PMBOK guideline. Our subjectivity was limited as to how the totality of documents assessed reflected the: 1) artifacts developed and contained essential information, 2) artifacts were developed but lacked essential information, or 3) artifact were not developed.

As Obsidian did not assess the OCIO's project management structure (i.e., PMLC directives, processes, and supporting templates), it could be proffered that Obsidian's assessment reflects the OCIO project management quality control, more than the PMLC's compliance GAO/PMBOK guidelines. Obsidian observes that the majority of the OCIO's PMLC directives or processes, to include PMLC templates, are largely aligned with the GAO/PMBOK guidelines, and these project artifacts are readily available to the project managers.

Management Comments on Draft OIG Report

IT Modernization Evaluation Report - Management Comments on Draft OIG Report No. 2019-IT-104							
Finding	1	Recommendation	1.1	Resp. Office	OCIO	Target Completion	n/a
Finding		**Recommendation**		**Comment**		**Obsidian Response**	
OCIO does not have an implementation plan for IT Modernization: As a strategic planning document, the 2019 OCIO IT Directional Plan5 is inadequate for use as the IT modernization effort's implementation and execution guide. ***OCIO does not refer to and does not consider the IT Directional Plan as the "implementation plan and execution guide" for IT modernization. Each project that referenced in the IT Directional Plan has its own implementation plan.***		OCIO should make a dedicated effort to develop an IT Implementation Plan for the modernization effort. The IT Implementation Plan should continue to maintain and enhance the consistency of its KPI metrics that are specific, measureable, achievable, relevant, time-bound, and that align with OCIO business and operational objectives against which individual project performance can be measured. PMO should ensure these KPI metrics are incorporated into their processes and procedures using the applicable elements of the PMBOK and GAO guidelines. In accordance with those guidelines, the plan should also be baselined.		The Library will not implement this recommendation as drafted, but has provided the OIG evidence of implementation plans for Library-defined IT projects. The CIO disagrees with the finding and associated recommendation, because the modernization projects are not related enough to have a separate, overarching, IT Implementation plan. This takes place through the strategic planning and budget processes. The Library does not manage IT Modernization as one program but instead separate IT modernization projects.		"Obsidian appreciates the OCIO's position of the IT Modernization projects are not related enough to have a separate, overarching, IT Implementation plan, and believes the IT Modernization effort should be managed as separate projects. Obsidian believes an IT Modernization implementation plan is essential to establish project management consistency and uniform, data-driven reporting across the entire IT Modernization effort."
Finding	2	Recommendation	2.1	Resp. Office	OCIO	Target Completion	4Q FY22
Finding		**Recommendation**		**Comment**		**Obsidian Response**	
Some Projects Artifacts Were Missing Essential Information: Key project documentation, as specified in the PMO's Project Classification Worksheet, was not provided for all IT Modernization project efforts.		The OCIO should perform a gap analysis to determine the PMBOK and GAO cost and schedule assessment principles and practices the Library still needs to implement		Agree. The Library plans to do a cost benefit analysis/return on investment determination for aspects of the PMBOK/GAO cost and schedule assessment principles and practices, in addition to the gap analysis. Based on that analysis and determination, the Library will choose which aspects of the PMBOK and GAO cost and schedule principles and practices to implement.		No Obsidian response required.	

Finding	2	Recommendation	2.2	Resp. Office	OCIO	Target Completion	n/a

Finding	Recommendation	Comment	Obsidian Response
Some Projects Artifacts Were Missing Essential Information: Key project documentation, as specified in the PMO's Project Classification Worksheet, was not provided for all IT Modernization project efforts.	The OCIO should implement specific guidelines that all IT projects must follow to meet PMBOK and GAO standards. For example, the Library could require that each project complete a checklist containing the specified guidelines.	This is a duplicate finding from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #5). The Library will not implement the recommendation as drafted in this report, because OCIO has already provided evidence to the OIG of implementation of IT project checklists pursuant to prior report recommendations. For example, the Library submitted the project charter template, which included a draft checklist, to the OIG in January 2020 that demonstrated the prior recommendations had been implemented. OCIO disagrees with the current finding to the extent it	Obsidian reviewed this comment with the OIG for guidance. The OIG determined that this is one of Obsidian's evaluation objectives (Key project documentation, as specified in the PMO's Project Classification Worksheet, was not provided for all IT Modernization project efforts), which does not properly reflect cost performance to budgeted targets and performance objectives, and does not duplicate the finding from OIG audit report 2018-IT-107.

Finding	2	Recommendation	2.3	Resp. Office	OCIO	Target Completion	2Q FTY22

Finding	Recommendation	Comment	Obsidian Response
Some Projects Artifacts Were Missing Essential Information: Key project documentation, as specified in the PMO's Project Classification Worksheet, was not provided for all IT Modernization project efforts.	The OCIO should develop a monitoring and quality assurance process to ensure that each IT project complies with PMBOK and GAO cost and scheduling guidelines, as adopted by the Library.	Agree	No Obsidian response required.

Finding	3	Recommendation	3.1	Resp. Office	FSD/OCIO	Target Completion	4Q FY21

Finding	Recommendation	Comment	Obsidian Response
Ineffective Management of Cost Estimation and Budget: Cost estimates were not provided for all IT Modernization Project efforts and could not be correlated to the fiscal year 2020 budget. Numerous cost estimating best practices outlined in the GAO Cost Estimating and Assessment Guide were not followed.	Obsidian recommends developing a formal checklist that contains the GAO Cost Estimating Assessment Guide's best practices for Project Managers to follow when developing, executing and maintaining project costs.	Agree. FSD and OCIO will work together to develop a formal checklist.	No Obsidian response required.

Finding	4	Recommendation	4.1	Resp. Office	OCIO	Target Completion	4Q FY21

Finding	Recommendation	Comment	Obsidian Response
Inefficient Project Schedule Management: Several schedule best practices outlined in GAO Schedule Assessment Guide were not followed, project schedules lacked sufficient detail to accurately track and manage performance, and IT Modernization project efforts are not being managed as a portfolio of projects. ***The Library disagrees with "IT Modernization project effort are not being managed as a portfolio of projects." The modernization projects are part of the OCIO portfolio of projects. The Library does not manage IT Modernization as one program with a single integrated master schedule because there is insufficient inter-dependencies between the projects.***	OCIO should undertake a dedicated effort to develop tactical project schedule management processes that align with the best practices for project schedule management as outlined in the PMBOK Knowledge Area – Project Time Management, and the GAO Schedule Assessment Guide to determine if the IT modernization project schedules provided sufficient detail to accurately track and manage performance.	Agree. The Library will develop tactical project schedule management processes that align with the best practices for project schedule management as outlined in the PMBOK and the GAO Schedule Assessment Guide.	No Obsidian response required.

Finding	4	Recommendation	4.2	Resp. Office	OCIO	Target Completion	n/a

Finding	Recommendation	Comment	Obsidian Response
Inefficient Project Schedule Management: Several schedule best practices outlined in GAO Schedule Assessment Guide were not followed, project schedules lacked sufficient detail to accurately track and manage performance, and IT Modernization project efforts are not being managed as a portfolio of projects. ***The Library disagrees with "IT Modernization project effort are not being managed as a portfolio of projects." The modernization projects are part of the OCIO portfolio of projects. The Library does not manage IT Modernization as one program with a single integrated master schedule because there is insufficient inter-dependencies between the projects.***	The PMO should analyze and collectively manage the IT modernization projects with an IMS consisting of all IT modernization project efforts. This will allow for visibility and transparency into the status of all efforts and allow for the easy identification of interdependencies and how changes to a project affect the overall modernization effort.	The Library will not implement the recommendation as drafted. The CIO disagrees with the recommendation, because the modernization projects are not related enough to manage as a program with an integrated master schedule.	Obsidian appreciates the OCIO's position of the IT Modernization projects are not related enough to be managed as a portfolio with an Integrated Master Schedule (IMS), and believes the IT Modernization effort overall should be managed as separate projects. Obsidian believes an IMS is essential to establish project cost and schedule consistency and uniform, data driven reporting across the entire IT Modernization effort.

Finding	5	Recommendation	5.1	Resp. Office	OCIO	Target Completion	n/a

Finding	Recommendation	Comment	Obsidian Response
Lack of Verifiable Goals and Success Criterion: The OCIO has not defined verifiable goals, measurable metrics and success criterion for the IT modernization effort. ***Disagree. OCIO does not consider the IT modernization effort as one large project or program but instead separate IT modernization projects. The IT modernization projects referenced in this audit do have defined verifiable goals, measurable metrics and success criterion per the Library's PMLC directive.***	OCIO IT modernization goals and success criterion should be developed to align with the OCIO's business goals and objectives to ensure the IT modernization effort achieves OCIO's stated objectives.	The Library will not implement the recommendation as drafted, because the CIO disagrees with the findings and the audit premise that there is a single IT modernization effort. All IT modernization projects are aligned with OCIO's business goal and objectives which the project charters align to the goals in the IT Directional Plan. The IT modernization projects referenced in the report align with Goal #3, Deliver Business-Driven Capabilities in the IT Directional Plan.	Obsidian appreciates the OCIO's position of the IT Modernization projects are not related enough to have a separate, overarching, IT Implementation plan, and believes the IT Modernization effort should be managed as separate projects. Obsidian believes an IT Modernization implementation plan is essential to establish project management consistency and uniform, data-driven reporting across the entire IT Modernization effort.

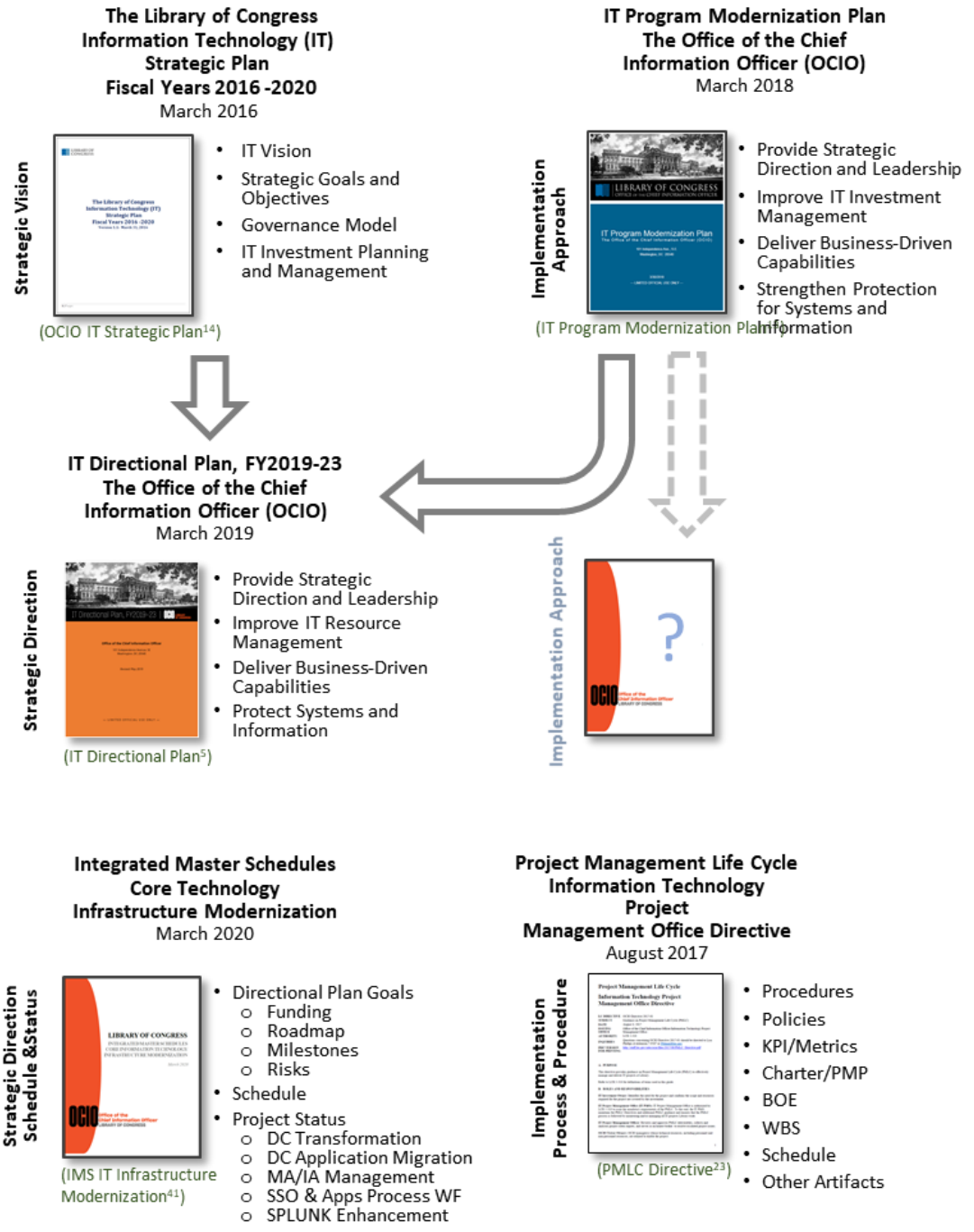
Finding	6	Recommendation	6.1	Resp. Office	FSD/OCIO	Target Completion	n/a

Finding	Recommendation	Comment	Obsidian Response
Inadequate Variance Tracking Methods: Tracking methods used for project schedule and cost variances are limited to OCIO FTE hours, which do not properly reflect cost performance to budgeted targets and performance objectives. ***Disagree. This is a duplicate finding from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #1).***	FSD, working with OCIO, should track project cost variance in a manner that meets the OCIO's business objectives.	This is a duplicate recommendation from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #1). OCIO disagrees with the underlying cause identified by the auditor and notes the PMO has metrics and KPIs relating to project scope, schedule, and cost. Moreover, in response to prior audit findings, FSD is currently evaluating an optimal future state around cost	Obsidian reviewed this comment with the OIG for guidance. The OIG determined that this is one of Obsidian's evaluation objectives (Adhering to Government Accountability Office's (GAO) Cost Estimating Assessment Guide and Schedule Assessment guidance) and the recommendation does not duplicate the finding from OIG audit report 2018-IT-107.

Appendix E – OCIO Strategic and Implementation Document Progression

The diagram below depicts the sequences in the document migration from the original OCIO Strategic Plan released in 2016 to the current IT Directional Plan used as the OCIO implementation methodology.

Document Flow



The diagram below depicts the timeline of the document migration from the original OCIO Strategic Plan released in 2016 to the current IT Directional Plan being used as the OCIO implementation methodology.

Document TimeLine

The Library of Congress
Strategic Plan
Fiscal Years 2016 -2020
March 2016

Library of Congress Strategic Vision

- Service
- Collections
- Creativity
- Collaboration
- Empowerment
- **Technology***
- Organizational Structure

(Library Strategic Plan[32])

* *Deploy a dynamic, state-of-the-industry technology infrastructure that follows best practices and standards*

The Library of Congress
Information Technology (IT)
Strategic Plan
Fiscal Years 2016 -2020
March 2016

Strategic Vision

- IT Vision
- Strategic Goals and Objectives
- Governance Model
- IT Investment Planning and Management

(OCIO IT Strategic Plan[14])

Project Management Life Cycle
Information Technology
Project
Management Office Directive
August 2017

Implementation Process & Procedure

- Procedures
- Policies
- KPI/Metrics
- Charter/PMP
- BOE
- WBS
- Schedule
- Other Artifacts

(PMLC Directive[23])

IT Program Modernization
Plan
The Office of the Chief
Information Officer (OCIO)
March 2018

Implementation Approach

- Provide Strategic Direction and Leadership
- Improve IT Investment Management
- Deliver Business-Driven Capabilities
- Strengthen Protection for Systems and Information

(IT Program Modernization Plan[7])

IT Directional Plan, FY2019-23
The Office of the Chief
Information Officer (OCIO)
March 2019

Strategic Direction

- Provide Strategic Direction and Leadership
- Improve IT Resource Management
- Deliver Business-Driven Capabilities
- Protect Systems and Information

(IT Directional Plan[5])

Integrated Master Schedules
Core Technology
Infrastructure Modernization
March 2020

Strategic Direction Schedule &Status

- Directional Plan Goals
  - Funding
  - Roadmap
  - Milestones
  - Risks
- Schedule
- Project Status
  - DC Transformation
  - DC Application Migration
  - MA/IA Management
  - SSO & Apps Process WF
  - SPLUNK Enhancement

(IMS IT Infrastructure Modernization[41])

Appendix F – PMO PMBOK Alignment

Table 3 – PMO PMBOK Alignment Evaluation Summary

PMO PMBOK Alignment Evaluation Summary			
Project Management Process		**Score**	**Comments**
Evaluation Key:	● Artifact developed and contained essential information ◘ Artifact developed but lacked essential information ⊘ Artifact not developed		
Project Integration Management			
4.1 Develop Project Charter	*"Develop Project Charter is the process of developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities."* Key benefits of this process are that it provides a direct link between the project and the strategic objectives of the organization, creates a formal record of the project, and shows the organizational commitment to the project • This process is performed once or at predefined points in the project • Project charter may still be used to establish internal agreements within an organization to ensure proper delivery under the contract • Project manager is identified and assigned as early in the project as is feasible, preferably while the project charter is being developed and always prior to the start of planning • The project charter can be developed by the sponsor or the project manager in collaboration with the initiating entity. • Project charter provides the project manager with the authority to plan, execute, and control the project. • Projects are initiated by an entity external to the project such as a sponsor, program, or project management office (PMO) • Project are initiated due to internal business needs or external influences • Project charter is not considered to be a contract	●	There were numerous project charter documents that contained critical elements of a charter, to include authority to proceed with the projects as delineated in the project plans. Some of the documents such as PBC 033, contained some of the necessary details to effective craft a proper charter statement. Generally speaking, the documents were weak in establishing an overall charter (mission). The only project that contained a well-constructed and authoritative charter document was that of Project 464 (Data Center Transformation project)
4.2 Develop	*"Develop Project Management Plan is the process of defining, preparing, and coordinating all plan components and consolidating them into an integrated project management plan."* Key benefit of this process is the production of a comprehensive document that defines the basis of all project work and how the work will be performed • This process is performed once or at predefined points in the project. • Project management plan may be either summary level or detailed	●	One document, specifically PMLC Directive, provides an overview of the project management process (very closely aligned to PMBOK best practices) that highlights how

	• Project management plan should be baselined (Scope, time and cost). so that the project execution can be measured and compared to those references and performance can be managed • Project management plan may be updated as many times as necessary. No formal process is required at that time. But, once it is baselined, it may only be changed through the Perform Integrated Change Control process		each of the projects and the general program will be executed. It highlights key stakeholders in a high-level RACI. Additionally, it assigns authority to the PMO to oversee all of the projects and to provide all necessary guidance in running them. Additionally, the OCIO Program Management Plan highlights the purpose and intent of the overarching management methodology.
4.3 Direct and Manage Project Work	*"Direct and Manage Project Work is the process of leading and performing the work defined in the project management plan and implementing approved changes to achieve the project's objectives."* Key benefit of this process is that it provides overall management of the project work and deliverables, thus improving the probability of project success • This process is performed throughout the project • Direct and Manage Project Work involves executing the planned project activities to complete project deliverables and accomplish established objectives and allocate available resources. • Project Manager and project team directs the performance of planned activities • Direct and Manage Project Work also requires review of the impact of all project changes and the implementation of approved changes: corrective action, preventive action, and/or defect repair. • Work Performance data is collected and communicated to the applicable process for analysis	O	The PMLC Directive provides some guidance in how project tasks would be managed, While this is an over-arching document and not intended to dictate specific technique and methodology; it aligns to PMBOK and as such, can be assumed that PMO would provide additional guidance as needed.

4.4 Manage Project Knowledge	*"Manage Project Knowledge is the process of using existing knowledge and creating new knowledge to achieve the project's objectives and contribute to organizational learning."* Key benefits of this process are that prior organizational knowledge is leveraged to produce or improve the project outcomes, and knowledge created by the project is available to support organizational operations and future projects or phases • This process is performed throughout the project • Knowledge can be explicit or implied • Explicit knowledge can be readily codified using words, pictures, and numbers. • Tacit knowledge is personal and difficult to express, like beliefs, insights, experience, and "know-how" • Managing knowledge is not just documenting it or to obtain lessons learned only for future projects • Explicit knowledge can be easily shared, however tacit knowledge has context build so it's hard to codify and normally shared through conversations and interactions between people.	●	In comments to the Draft Report, the OCIO asserts that "*The PMO facilitates a monthly PM Collaborative, maintains a PMO Confluence site for each individual project, documents lessons learned during project closeout activities, monitors a daily PMmail Mailbox wherein the Program/Project Managers share valuable knowledge, and hosts a PM Collaborative to share processes, procedures, lessons learned, and other critical PMO updates to the PMs."* Obsidian did not request this information for our assessment and will accept the OCIO's statement as proffered.
4.5 Monitor and control Project Work	*"Manage Project Knowledge is the process of using existing knowledge and creating new knowledge to achieve the project's objectives and contribute to organizational learning."* Key benefits of this process are that prior organizational knowledge is leveraged to produce or improve the project outcomes, and knowledge created by the project is available to support organizational operations and future projects or phases • This process is performed throughout the project • Knowledge can be explicit or tacit • Explicit knowledge can be readily codified using words, pictures, and numbers. • Tacit knowledge is personal and difficult to express, like beliefs, insights, experience, and "know-how" • Managing knowledge is not just documenting it or to obtain lessons learned only for future projects • Explicit knowledge can be easily shared, however tacit knowledge has context build so it's hard to codify and normally shared through conversations and interactions between people.	●	The OCIO Program Management Plan provides instruction on tracking, reviewing and reporting progress to meet performance objectives. The various Project Plans contained varying degrees of details for the work tasks, deliverables and task duration. None had costing associated with resources.

4.6 Perform integrated Change Control	*"Perform Integrated Change Control is the process of reviewing all change requests; approving changes and managing changes to deliverables, project documents, and the project management plan. This process reviews all requests for changes to project documents, deliverables, or the project management plan and determines the resolution of the change requests."* Key Benefit it allows for documented changes within the project to be considered in an integrated manner while addressing overall project risk • This process is performed throughout the project. • The Perform Integrated Change Control process is conducted from project start through completion and is the ultimate responsibility of the project manager • Changes may be requested by any stakeholder involved with the project and may occur at any time throughout the project life cycle • Before the baselines are established, changes are not required to be formally changed • Every Change request should be either approved, deferred or rejected. • change control board (CCB): formally chartered group responsible for reviewing, evaluating, approving, deferring, or rejecting changes to the project • Customer or sponsor approval may be required for certain change requests after CCB approval, unless they are part of the CCB. • The steps when applying for change request are (Analyze the impact on all constraints, apply change request to CCB. If approved you should update the change log, change management plan, any subsidiary plans (time, cost, scope baselines) and lastly update the project management plan. If the request was rejected it's important to update the change log.	⊘	There was no documentation found that demonstrated recurring change management discussions / meetings to manage changes to the project

4.7 Close Project or Phase	*"Close Project or Phase is the process of finalizing all activities for the project, phase, or contract."* Key benefits of this process are the project or phase information is archived, the planned work is completed, and organizational team resources are released to pursue new endeavors This process is performed once or at predefined points in the project When closing the project, the project manager reviews the project management plan to ensure that all project work is completed and the project objectives has been met Activities necessary for the administrative closure of the project/phase • Actions and activities necessary to satisfy completion or exit criteria for the phase such as (all documents are up-to-date and all issues are resolved, confirm delivery of formal accepted deliverables, ensure all costs are charged to the project, closing project documents, reassigning personnel, dealing with excess material, reallocating project equipment, do final project report) • Activities related to the completion of the contractual agreements applicable to project such as (Confirm formal acceptance of seller's work, finalize open claims, update record to reflect final results, archiving information for future use) • Activities needed to (collect project/phase records, Audit project success/failure, manage knowledge sharing/transfer, identify lessons learned, archive project information for future use) • Actions and activities necessary to transfer the project's products, services, or results to the next phase or to production and/or operations. • Collecting any suggestions for improving or updating the policies and procedures of the organization, and sending them to the appropriate organizational unit. • Measuring stakeholder satisfaction. • Investigate and document the reasons for actions taken if a project is terminated before completion. In order to successfully achieve this, the project manager needs to engage proper stakeholders in the process.	O	The OCIO Program Management Plan provides instruction on validating the successful completion and closure of projects.

	Project Scope Management		
5.1 Plan Scope Management	*"Plan Scope Management is the process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled."* Key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project • This process is performed once or at predefined points • The development of the scope management plan and the detailing of the project scope begin with the analysis of information contained in the (project charter, latest approved subsidiary plans of the project management plan, historical information contained in OPA and EEF's)	O	The OCIO Program Management Plan provides a high level view of what is in scope for the IT Modernization Program. However, it does not provide details on how OCIO will collect, define and validate the scope.

5.2 Collect Requirements	*"Collect Requirements is the process of determining, documenting, and managing stakeholder needs and requirements to meet objectives."* Key benefit of this process is that it provides the basis for defining the product scope and project scope. • This process is performed once or at predefined points • The project's success is directly influenced by active stakeholder involvement in the discovery and decomposition of needs into project and product requirements • Requirements include conditions or capabilities that are required to be present in a product to satisfy an agreement and business needs. • Requirements need to be elicited, analyzed, and recorded in enough detail to be included in the scope baseline and to be measured once project execution begins • Requirements become the foundation of the WBS Cost, schedule, quality planning, and procurement	●	Many of the project charters contained ample detail about project scope, purpose and requirements.
5.3 Define Scope	*"Define Scope is the process of developing a detailed description of the project and product."* Key benefit of this process is that it describes the product, service, or result boundaries and acceptance criteria • Since all the requirements identified in Collect Requirements may not be included in the project, the Define Scope process selects the final project requirements from the requirements documentation developed during the Collect Requirements process • Develops a detailed description of the project and product, service, or result. • The preparation of a detailed project scope statement builds upon the major deliverables, assumptions, and constraints that are documented during project initiation. • Define Scope process can be highly iterative • In iterative life cycle projects, a high-level vision will be developed for the overall project, but the detailed scope is determined one iteration at a time	●	Numerous documents contained relevant Scope data that could be leveraged to produce a proper Scope Statement and list out specific scope.
5.4 Create WBS	*"Create WBS is the process of subdividing project deliverables and project work into smaller, more manageable components."* Key benefit of this process is that it provides a framework of what has to be delivered • This process is performed once or at predefined points • WBS is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables (top-down approach) • WBS organizes and defines the total scope of the project and represents the work specified in the current approved project scope statement • Planned work is contained within the lowest level of WBS components, which called Work Package • Work Package can be used to group the activities where work is scheduled and estimated, monitored, and controlled	○	Some of the Project Plans demonstrated thoughtful WBS. There was no evidence of planning to develop the detailed WBS breakdown, but the final product supports that it was managed well and that the major tasks were understood. Only a handful of the Project Plans contained sufficient WBS break-down (PBC037 LoC Splunk Enterprise and PBC 037 - MySQL Modernization)

5.5 Validate Scope	*"Validate Scope is the process of formalizing acceptance of the completed project deliverables"* Key benefit of this process is that it brings objectivity to the acceptance process and increases the probability of final product, service, or result acceptance by validating each deliverable • This process is performed periodically throughout the project as needed • The verified deliverables obtained from the Control Quality process • The verified deliverables are approved through this process by the customer or sponsor to get the accepted deliverables • Validate Scope concerned with acceptance of the deliverables • Control Quality concerned with correctness of the deliverables	⭘	There was no indication that any scope validation was performed at any time. However, the Project Charter acceptance and validation by the OCIO was inferred from the numerous approval signatures on the charter documents
5.6 Control Scope	*"Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline."* Key benefit of this process is that the scope baseline is maintained throughout the project. • This process is performed throughout the project • Controlling the project scope ensures all requested changes and recommended corrective or preventive actions are processed through the Perform Integrated Change • Manage the actual changes when they occur and is integrated with the other control processes • The uncontrolled expansion to product or project scope without adjustments to time, cost, and resources is referred to as scope creep	⊘	There was no documentation found to demonstrate that there was a managed effort to record and control scope change.

	Project Schedule Management		
6.1 Plan Schedule	*"Plan Schedule Management is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule."* Key benefit of this process is that it provides guidance and direction on how the project schedule will be managed throughout the project. • This process is performed once or at predefined points in the project	⭘	A few of the Project Planning Documents (not to be confused with MS Project WBS files), contained ample detail about the method that OCIO would manage the project schedules.
6.2 Define Activities	*"Define Activities is the process of identifying and documenting the specific actions to be performed to produce the project deliverables."* Key benefit of this process is that it decomposes work packages into schedule activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work. • This Process is performed throughout the project	⭘	Documentation was found that demonstrated an effort to identify and document the actions required in order to result in the required project deliverables. However, they do not consistently delineate the interdependencies between the tasks.

6.3 Sequence Activities	*"Sequence Activities is the process of identifying and documenting relationships among the project activities."* Key benefit of this process is that it defines the logical sequence of work to obtain the greatest efficiency given all project constraints. • This process is performed throughout the project • Every activity except the first and last should be connected to at least one predecessor and at least one successor activity with an appropriate logical relationship • Leads and lags may be used to support realistic and achievable project schedule. • Sequence Activities process concentrates on converting the project activities from a list to a diagram to act as a first step to publish the schedule baseline.	O	Several Project Plans found, where activities followed a prescribed sequence, some even demonstrating dependencies and potential for parallel tasking.
6.4 Estimate Activity Duration	*"Estimate Activity Durations is the process of estimating the number of work periods needed to complete individual activities with estimated resources."* Key benefit of this process is that it provides the amount of time each activity will take to complete • This process is performed throughout the project • Estimating activity durations uses information from (Scope of work, required resources, skill levels, resources quantities, resource calendars, constraint, effort involved and resources types) • Duration estimate is progressively elaborated and it considers quality and availability of data • Usually the number of resources and skill proficiency of resources may determine the activity's duration • It's not simple straight line or linear relationship when estimating the duration with resources There are factors to consider when estimating the duration • Law of diminishing returns: When one factor used to determine the effort required to produce a unit of work is increased while all other factors remain fixed a point will eventually be reached at which additions of that factor start to yield progressively smaller or diminishing increases in output. • Number of resources: Increasing the number of resources to twice the original number of the resources does not always reduce the time by half, as it may increase extra duration due to risk • Advances in technology: Increase in the output of a manufacturing plant may be achieved by procuring the latest advances in technology may impact duration and resource needs • Motivation of staff: Project manager also needs to be aware of Student Syndrome (procrastination), when people start to apply themselves only at the last possible moment before the deadline, and Parkinson's Law where work expands to fill the time available for its completion.	O	A small number of Project Plans had relatively detailed estimation or resource planning. Most of the resources were people, though in one case, one of the Project Plans showed tasks as resources

6.5 Develop Schedule	*"Develop Schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create a schedule model for project execution and monitoring and controlling."* Key benefit of this process is that it generates a schedule model with planned dates for completing project. • This process is performed throughout the project • Developing an acceptable project schedule is an iterative process • The schedule model determines planned start and finish dates for activities and milestones • After activities has been determined, project staff is assigned to review that activities have no conflict with resource calendars or relationships	O	Only two Project Plans showed sufficient details to show how the task owners would work to produce a specific deliverable or outcome. A small number of Project Plans had relatively good quality and detail in their tasking. Most of the project plans lacked resource assignments and generally did not drill down deep enough to sufficiently list out all of the tasking. However, the project plans that did go to level three or four, had enough task detail to be used for daily cadence review.
6.6 Control Schedule	*"Control Schedule is the process of monitoring the status of the project to update the project schedule and managing changes to the schedule baseline."* Key benefit of this process is that the schedule baseline is maintained throughout the project • This process is performed throughout the project • Updating the schedule model requires knowing the actual performance to date • Regular and milestone status updates from contractors and suppliers are a means of ensuring the work is progressing as agreed upon to ensure the schedule is under control • Reviews and walkthroughs should be done to ensure the contractor reports are accurate	O	Some of the Project Plans were partially (or fully) updated to show evidence of on-going monitoring of project status.

	Project Cost Management		
7.1 Plan Cost Management	*"Plan Cost Management is the process of defining how the project costs will be estimated, budgeted, managed monitored, and controlled."* Key benefit of this process is that it provides guidance and direction on how the project costs will be managed throughout the project • This process is performed once or at predefined points in the project • The cost management planning effort occurs early in project planning and sets the framework for each of the cost management processes so that processes performance will be efficient and coordinated	○	The IT Funding Framework Package document provides details of the Technology Business Management methodology, which establishes a framework for evaluating the costs of each of the modernization efforts, to ensure a business value return on the investment. In addition, the FY20 Draft IT Finance Plan July 2019 document provides details about the planned expenditures.
7.2 Estimate Costs	*"Estimate Costs is the process of developing an approximation of the cost of resources needed to complete project work."* Key benefit of this process is that it determines the monetary resources required for the project • This process is performed periodically throughout the project as needed. • A cost estimate is a quantitative assessment of the likely costs for resources required to complete the activity • Cost estimates include the identification and consideration of costing alternatives to initiate and complete the project • Cost trade-offs and risks should be considered to achieve optimal costs for the project • Cost estimates are generally expressed in units of some currency or time measure units • The accuracy of a project estimate will increase as the project progresses through project life cycle • In project initiation phase have a rough order of magnitude (ROM) estimate in the range of (-25% to +75%). Later in projects when more information is known definitive estimate could narrow the range to (-5% to +10%)	○	The FY20 Draft IT Finance Plan July 2019 document provides a comprehensive view of OCIO's budget for all of the IT Modernization projects. They also cover some of the more expensive expenditures such as staffing. This document alone represents a well-crafted budget plan.
7.3 Determine Budget	*"Determine Budget is the process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline."* Key benefit of this process is that it determines the cost baseline against which project performance can be monitored and controlled • This process is performed once or at predefined points in the project. • Project budget includes all the funds authorized to execute the project.	●	The FY20 IT Finance Plan July 2019 document provides a comprehensive view of OCIO's budget for all of the IT Modernization projects. They also cover some of the more expensive expenditures such as staffing. This document alone represents a well-crafted budget plan.

7.4 Control Cost	*"Control Costs is the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline."* Key benefit of this process is that the cost baseline is maintained throughout the project • This process is performed throughout the project • Any increase to the authorized budget require an approved change	●	The FY20 IT Finance Plan July 2019 document also provides recurring reporting on the investments across the various Service Units and how their investments have impacted each of the IT Modernization projects.

	Project Quality Management		
8.1 Plan Quality	*"Plan Quality Management is the process of identifying quality requirements and/or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with quality requirements and/or standards."* Key benefit of this process is that it provides guidance and direction on how quality will be managed and verified throughout the project • This process is performed once or at predefined points in the project • Quality planning should be performed in parallel with the other planning processes	⊘	There was no documentation found that demonstrated discussion and agreement on how the tasking would be measured to validate and ensure acceptable quality levels would be achieved.
8.2 Manage Quality	*"Manage Quality is the process of translating the quality management plan into executable quality activities that incorporate the organization's quality policies into the project."* Key benefits of this process are that it increases the probability of meeting the quality objectives as well as identifying ineffective processes and causes of poor quality • This process is performed throughout the project • Manage Quality is sometimes called quality assurance. although Manage Quality has a broader definition than quality assurance as it is used in non-project work • Quality assurance focuses on the processes used in the project and using these processes effectively by following and meeting standards • Manage quality includes all the quality assurance activities and also concerned with the product design aspects and process improvements • Manage quality will fall under the conformance work category in the cost of quality framework. • Manage quality helps in designing and optimal project, build confidence in future products, quality processes meets quality objectives and improve efficiency and effectiveness • Manage Quality is considered the work of everybody. In agile projects quality management is performed by all team members. However, in traditional projects only specific members do it	⊘	There was documentation found that delineated the specific and measureable performance metrics by which each task and subsequently each project would be evaluated for quality.

8.3 Control Quality	*"Control Quality is the process of monitoring and recording results of executing the quality management activities in order to assess performance and ensure the project outputs are complete, correct, and meet customer expectations."* Key benefit of this process is verifying that project deliverables and work meet the requirements specified by key stakeholders for final acceptance. • This process is performed throughout the project • Control quality determines if the project outputs do what they were intended to do. Those outputs need to comply with all applicable standards, requirements, regulations, and specifications • Control Quality process is performed to measure the completeness, compliance, and fitness for use of a product/service prior to user acceptance and final delivery • Control quality in agile projects can be performed by all team members throughout the project life cycle. However, in waterfall projects it's performed at specific times, toward the end of the project or • phase, by specified team members	⊘	Without process / policies to define how quality measurements would be taken, nor what the measurements are, there is no way that the team could have assessed performance.

	Project Resource Management		
9.1 Plan Resource Management	*"Plan Resource Management is the process of defining how to estimate, acquire, manage, and use team and physical resources."* Key benefit of this process is that it establishes the approach and level of management effort needed for managing project resources based on the type and complexity of the project. • This process is performed once or at predefined points in the project. • Resource planning is used to determine and identify an approach to ensure that sufficient resources are available for the successful completion of the project • Project resources include team members, supplies, materials, equipment, services and facilities resources can be obtained from the organization's internal assets or from outside the organization through a procurement process. • Other projects may be competing for the same resources required for the project at the same time and location which may impact project costs, schedules, risk and quality.	○	From the expenditure perspective, the FY20 IT Finance Plan July 2019 document details the budget set apart for staffing. The Integrated Planning Team Overview 2019-05-08 document provides descriptions of the IT Planning and Governance stages of the IT Governance processes, which feeds the detailed Financial Plan. This plan includes details about the funding and of the required resources that will allow the team to proceed with project execution.

9.2 Estimate Activity Resources	*"Estimate Activity Resources is the process of estimating team resources and the type and quantities of materials, equipment, and supplies necessary to perform project work."* Key benefit of this process is that it identifies the type, quantity, and characteristics of resources required to complete the project. • This process is performed periodically throughout the project as needed • The Estimate Activity Resources process is closely coordinated with other processes, such as the Estimate Costs	O	While there was no documentation found that demonstrated the process of finding and building (acquiring) the project team with the necessary skills that match those that would be in the human resource plan (missing), the Basis of Estimates and Cost documents clearly indicated well understood labor costs and labor categories, thus it must be assumed that the OCIO had a plan for acquiring the necessary team members to perform the project tasks.
9.3 Acquire Resources	*"Acquire Resources is the process of obtaining team members, facilities, equipment, materials, supplies, and other resources necessary to complete project work."* Key benefit of this process is that it outlines and guides the selection of resources and assigns them to their respective activities. • This process is performed periodically throughout the project as needed • Resources can be internal or external • Internal resources are acquired (assigned) from functional or resource managers • External resources are acquired through the procurement processes. • The project management team may or may not have direct control over resource • The project manager or project team should effectively negotiate and influence others who are in a position to provide the required team and physical resources for the project. • Failure to acquire the necessary resources for the project affect project schedules, budgets, customer satisfaction, and risks and it decreases the probability of success or result in cancellation • If the team resources are not available due to constraints such as economic factors or assignment to other projects, the project manager or team may be required to assign alternative resources, perhaps with different competencies or costs. Alternative resources are allowed provided there is no violation of legal, regulatory, mandatory, or other specific criteria • These factors should be considered and accounted for in the planning stages of the project	O	While there was no documentation found that demonstrated the process of finding and building (acquiring) the project team with the necessary skills that match those that would be in the human resource plan (missing), the Basis of Estimates and Cost documents clearly indicated well understood labor costs and labor categories, thus it must be assumed that the OCIO had a plan for acquiring the necessary team members to perform the project tasks.

9.4 Develop Project Team	*"Develop Team is the process of improving competencies, team member interaction, and the overall team environment to enhance project performance."*
	Key benefit of this process is that it results in improved teamwork, enhanced interpersonal skills and competencies, motivated employees, reduced attrition, and improved overall project performance.
	• This process is performed throughout the project
	• Project managers require skills to identify, build, maintain, motivate, lead, and inspire project teams to achieve high team performance and meet the project's objectives
	• Teamwork is a critical factor for project success, and developing and effective team is the project manager's responsibility
	• In a climate of mutual trust. Developing the project team improves the people skills, technical competencies, and overall team environment and project performance
	• Objective of developing a project team include (Improve the team knowledge and skill to achieve project's objective and lower cost and reduce time, improve trust among the team to raise morale and lower conflict, create dynamic collaborative team to improve productivity and allow cross-training to share knowledge and expertise and empower decision making)
	• One of the models to describe team development is "Tuckman ladder" which includes five stages of development the team may go through. Projects with team members who worked together in the
	• past may skip a stage:
	  ○ Forming: a phase where the team members meet and learn about the project and their formal roles. Team members tend to be independent and not as open in this phase
	  ○ Storming: the team begins to address the project work, technical decisions, and the project management approach. If team members are not collaborative or open to differing ideas and perspectives, the environment can become counterproductive
	  ○ Norming: team members begin to work together and adjust their work habits and behaviors to support the team. The team members learn to trust each other
	  ○ Performing: Teams that reach the performing stage function as a well-organized unit. They are interdependent and work through issues smoothly and effectively
	  ○ Adjourning: the team completes the work and moves on from the project. This typically occurs when staff is released from the project as deliverables are completed or as part of the Close Project or Phase process
	• The duration of a particular stage depends upon team dynamics, team size, and team leadership
		⊘	There was no documentation found that supported any personnel skills development.

9.5 Manage Project Team	*"Manage Team is the process of tracking team member performance, providing feedback, resolving issues, and managing team changes to optimize project performance."* Key benefit of this process is that it influences team behavior, manages conflict, and resolves issues. • This process is performed throughout the project • Team management involves a combination of skills with special emphasis on communication, conflict management, negotiation, and leadership • Project managers should provide challenging assignments to team members and provide recognition for high performance • The project manager needs to be sensitive to both the willingness and the ability of team members to perform their work and adjust their management and leadership styles accordingly	⊘	There was no documentation found that demonstrated a recurring effort to track individual contributions by each project team member

9.6 Control Resources	*"Control Resources is the process of ensuring that the physical resources assigned and allocated to the project are available as planned, as well as monitoring the planned versus actual utilization of resources and taking corrective action as necessary."* Key benefit of this process is ensuring that the assigned resources are available to the project at the right time and in the right place and are released when no longer needed • Control Resources process should be performed continuously in all project phases and throughout the project life cycle • The resources needed for the project should be assigned and released at the right time, right place, and right amount for the project to continue without delays • The Control Resources process is concerned with physical resources such as equipment, materials and facilities. Team members are addressed in the Manage Team process. • Updating resource allocation requires knowing what actual resources have been used to date and what is still needed	⊘	There was no documentation found that demonstrated a recurring effort to track individual contributions by each project team member

Project Communication Management			
10.1 Plan Communication	*"Plan Communications Management is the process of developing an appropriate approach and plan for project communications activities based on the information needs of each stakeholder or group, available organizational assets, and the needs of the project."* Key benefit of this process is a documented approach to effectively and efficiently engage stakeholders by presenting relevant information in a timely manner • This process is performed periodically throughout the project as needed • An effective communications management plan is developed early in project life cycle • It should be reviewed regularly and modified when necessary when the stakeholder community changes or at the start of each new project phase. • On most projects, communications planning is performed very early, during stakeholder identification and project management plan development.	●	Numerous Communications Plan documents contained significant levels of details as to how project information would be disseminated to the various stakeholders. Specifically, PBC_022_PMLC_Directive contained notional guidance on conducting said communications.
10.2 Manage Communication	*"Manage Communications is the process of ensuring timely and appropriate collection, creation, distribution, storage, retrieval, management, monitoring, and the ultimate disposition of project information."* Key benefit of this process is that it enables an efficient and effective information flow between the project team and the stakeholders • This process is performed throughout the project • The Manage Communications process identifies all aspects of effective communication, including choice of appropriate technologies, methods, and techniques • It should allow flexibility in the communication activities allowing adjustments in the methods and techniques to accommodate the changing needs of stakeholders and the project. • This process ensures that the information has been generated is appropriately generated and formatted and received by the intended audience. Also provides opportunities for stakeholders to make requests for further information and clarification • Techniques for effective communication management includes (Sender-receiver models, choice of media, writing style, meeting management, presentations, facilitation and Active listening)	○	The collection of PBCs could be construed as the team's attempt at storing and distributing team documentation.

10.3 Monitor Communication	*"Manage Communications is the process of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met"* Key benefit of this process is that it enables an efficient and effective information flow between the project team and the stakeholders • This process is performed throughout the project • The Manage Communications process identifies all aspects of effective communication, including choice of appropriate technologies, methods, and techniques • It should allow flexibility in the communication activities allowing adjustments in the methods and techniques to accommodate the changing needs of stakeholders and the project. • This process ensure that the information has been generated is appropriately generated and formatted and received by the intended audience. Also provides opportunities for stakeholders to make requests for further information and clarification • Techniques for effective communication management includes (Sender-receiver models, choice of media, writing style, meeting management, presentations, facilitation and Active listening)	O	There is evidence within the Communications plans that substantiates that there was a concerted effort to manage the distribution of communications, and to conduct routing meetings to further communicate project content.

	Project Risk Management		
11.1 Plan Risk	*"Plan Risk Management is the process of defining how to conduct risk management activities for a project."* Key benefit of this process is that it ensures that the degree, type, and visibility of risk management are proportionate to both risks and the importance of the project to the organization and other stakeholders • This process is performed once or at predefined points in the project • The Plan Risk Management process should begin when a project is conceived and should be completed early in the project.	O	The OCIO Program Management Plan eludes to the existence of a Risk Management Plan, as well does the PMLC Directive document.
11.2 Identify Risks	*"Identify Risks is the process of identifying individual project risks as well as sources of overall project risk, and documenting their characteristics."* Key benefit of this process is the documentation of existing individual project risks and the sources of overall project risk. It also brings together information so the project team can respond appropriately to identified risks • This process is performed throughout the project • Identify Risks considers both individual project risks and sources of overall project risk • All project stakeholders should be encouraged to identify individual project risks • It's important to involve project team so they can develop and maintain sense of ownership and responsibility for identified individual risks and overall project risk • Risk owners for individual project risks may be nominated as part of the Identify Risks process, and will be confirmed during the Perform Qualitative Risk Analysis process • Identify Risks is an iterative process, since new individual project risks may emerge as the project progresses through its life cycle • Preliminary risk responses may also be identified and recorded and will be reviewed and confirmed as part of the Plan Risk Responses process	O	The OCIO Program Management Plan goes into some detail to the approach by which OCIO will identify risks. While in itself is not a stand-alone guideline for how to perform this task, it is indication that the PMO does have a clear method that it wants to follow to perform risk identification. Numerous Risk Registers provided by OCIO, clearly articulate the identified risks along with a preliminary risk response from the stakeholders (both a mitigation and contingent strategy). OCIO provided a total of nine Risk Registers for PBCs 259, 274, 492, 252,532, 533,551, 566 and 597.

11.3 Perform Qualitative Risk Analysis	*"Perform Qualitative Risk Analysis is the process of prioritizing individual project risks for further analysis or action by assessing their probability of occurrence and impact as well as other characteristics."* Key benefit of this process is that it focuses efforts on high-priority risks • This process is performed throughout the project • Perform Qualitative Risk Analysis assesses the priority of identified individual project risks using their probability of occurrence, and Impact on project objectives • Effective assessment therefore requires explicit identification and management of the risk attitudes of key participants in the Perform Qualitative Risk Analysis process • Risk perception introduces bias into the assessment of identified risks. • Addressing bias is a key part of the facilitator's role if used • Perform Qualitative Risk Analysis establishes the relative priorities of individual project risks for Plan Risk Responses, as it identifies a risk owner for each risk who will take responsibility for planning an appropriate risk response and ensuring that it is implemented • Qualitative Risk Analysis also lays the foundation for Perform Quantitative Risk Analysis • In agile development environment, the Perform Qualitative Risk Analysis process is conducted before the start of each iteration	●	As with Identification of Risks, the OCIO Program Management Plan also goes into some detail about the approach the OCIO will take to perform both qualitative and quantitative risk analysis. Of the nine Risk Registers, all nine provided both a qualitative and a quantitative assessment of the risk impact to the project. It is not clear how this value was applied to the general risk response, but it is assumed that the impact value was taken into consideration at some point.
11.4 Perform Quantitative Risk	*"Perform Quantitative Risk Analysis is the process of numerically analyzing the combined effect of identified individual project risks and other sources of uncertainty on overall project objectives."* Key benefit of this process is that it quantifies overall project risk exposure, and it can also provide additional quantitative risk information to support risk response planning • This process is not required for every project, but where it is used, it is performed throughout the project • Applying this process depends on availability of high-quality data about individual project risks and uncertainty, as well as a sound underlying project baseline for scope, schedule, and cost. • Quantitative risk analysis usually requires specialized risk software and expertise. And it consumes additional time and cost. • It is most likely appropriate for large or complex projects, or if it was contractual requirement or if a key stakeholder requires it • Quantitative risk analysis is the only reliable method to assess overall project risk • Outputs from Perform Quantitative Risk Analysis are used as inputs to the Plan Risk Responses process. recommending responses to the level of overall project risk and key individual risks Perform Quantitative	●	As with Identification of Risks, the OCIO Program Management Plan also goes into some detail about the approach the OCIO will take to perform both qualitative and quantitative risk analysis. Of the nine Risk Registers, all nine provided both a qualitative and a quantitative assessment of the risk impact to the project. It is not clear how this value was applied to the general risk response, but it is assumed that the impact value was taken into consideration at some point.

11.5 Plan Risk Responses	*"Plan Risk Responses is the process of developing options, selecting strategies, and agreeing on actions to address overall project risk exposure, as well as to treat individual project risks."* Key benefit of this process is that it identifies appropriate ways to address overall project risk and individual project risks • This process is performed throughout the project • This process also allocates resources and inserts activities into project documents and the project management plan as needed • Effective and appropriate risk responses can minimize individual threats, maximize individual opportunities, and reduce overall project risk exposure • Unsuitable risk responses can have the converse effect • Once risks have been identified, analyzed, and prioritized, plans should be developed by the nominated risk owner to address project risk • Risk responses should be appropriate for the significance of the risk, cost-effective in meeting the challenge, realistic within the project context, agreed upon by all parties involved, and owned by a responsible person. • For large or complex projects, it may be appropriate to use a mathematical optimization model or real options analysis as a basis for a more robust economic analysis of alternative risk response. • contingency plan (or fallback plan) can be developed for implementation if the selected strategy turns out not to be fully effective or if an accepted risk occurs • Secondary risks are risks that arise as a direct result of implementing a risk response.	●	In PBC 024 OCIO FY20_Risks, we find that OCIO has identified risks and has scored the risks in order to assign appropriate levels of resource allocation as part of their risk response. As mentioned above, of the nine available Risk Registers, all provided analytical evaluation of the risk impact. The individual risks that were categorized as HIGH impact, also displayed Contingency plans, which supports the assumption that the risks overall risk impact was taken into consideration.

11.6 Implement Risk Responses	*"Implement Risk Responses is the process of implementing agreed-upon risk response plans."* Key benefit of this process is that it ensures that agreed-upon risk responses are executed as planned in order to address overall project risk exposure, minimize individual project threats, and maximize individual project opportunities • This process is performed throughout the project • A common problem with project risk management that no action is taken against identified risks • Only if risk owners give the required level of effort to implement the agreed-upon responses will the overall risk exposure of the project and individual threats and opportunities be managed proactively.	O	In the Change And Release Management implementation (CARM) Project Charter Version 1.1, there is some indication that there is an understood change management process which will require evaluation. However, there is no indication that the risks derived from these changes was ever evaluated, nor is there indication that actions were taken to mitigate them." In PBC 024 OCIO FY20 Risks, we do find that a great number of risks have been identified, and responses crafted. There is also indication of the evaluation frequency. Unfortunately, there is no indication how the lessons learned from said risks will be captured. Unfortunately, the nine Risk Registers displayed inconsistent follow-through in the implementation or the risk strategies. Many of the identified risks still appear as Open, while only a handful show that the risk resulted in a positive outcome. The Risk Register for the Oracle 12c Project (259) is an excellent example of how OCIO properly managed risk throughout the life of the project.

11.7 Monitor Risks	*"The process of monitoring the implementation of agreed-upon risk response plans, tracking identified risks, identifying and analyzing new risks, and evaluating risk process effectiveness throughout the project."* Key benefit of this process is that it enables project decisions to be based on current information about overall project risk exposure and individual project risks • This process is performed throughout the project	O	As with Identification of Risks, the OCIO Program Management Plan also goes into some detail about the approach the OCIO will take to perform risk control management. As indicated above, the nine available Risk Registers do not show consistent tracking of the implementation of whatever risk strategy was devised. It is equally difficult to determine if the risk ever presented a challenge to the team during the execution of the project, as many of the risks are still categorized as OPEN.

	Project Procurement Management		
12.1 Plan Procurement Management	*"Plan Procurement Management is the process of documenting project procurement decisions, specifying the approach and identifying potential sellers."* Key benefit of this process is that it determines whether to acquire goods and services from outside the project and, if so, what to acquire as well as how and when to acquire it. • This process is performed once or at predefined points in the project. • Defining roles and responsibilities related to procurement should be done early in the Plan Procurement Management process • Typical steps for this process is to (Prepare procurement statement of work (SOW) or terms of reference (TOR), Prepare high cost estimate for budget, Advertise the opportunity, Identify sellers shortlist, Prepare bid documents, Prepare and submit proposal, Conduct technical evaluation, Perform cost evaluation, Select the winning proposal, and Sign contracts. • The requirements of the project schedule can significantly influence the strategy during the Plan Procurement Management process • The elements of scope in scope base line develop Statement of Work (SOW) and Terms of Reference (TOR) • If the project team does not have the skills to perform the procurement activities for which they are responsible, additional resources will be acquired or training will need to be provided, or both.	⃠	There was no documentation found that demonstrated an approach to identify potential acquisition requirements, making acquisition decisions, identifying external suppliers, and evaluating acquisition models
12.2 Conduct Procurement	*"Conduct Procurements is the process of obtaining seller responses, selecting a seller, and awarding a contract."* Key Benefit is that it selects a qualified seller and implements the legal agreement for delivery. • This process is performed periodically thought the project as needed	N/A	There was no documentation found that demonstrated an acquisition process established by the FAR. The OCIO has stated that the Library does not follow the FAR.

12.3 Control Procurement	*"Control Procurements is the process of managing procurement relationships; monitoring contract performance, and making changes and corrections as appropriate; and closing out contracts."* Key benefit is that it ensures that both the seller's and buyer's performance meet the project's requirements according to the terms of the legal agreement • This process is performed throughout the project as needed • Both buyer and seller are required to ensure both parties meet their contractual obligations • Because of the legal aspect, many organizations treat contract administration as an organizational function that is separate from the project. While a procurement administrator may be on the project team, this individual typically reports to a supervisor from a different department • The quality of the controls, including the independence and credibility of procurement audits, is critical to the reliability of the procurement system • Control Procurements has a financial management component that involves monitoring payments to the seller. • A contract that requires payments linked to project output and deliverables rather than inputs such as labor hours has better controls. • Agreements can be amended at any time prior to contract closure by mutual consent, in accordance with the change control terms of the agreement. Such amendments are typically captured in writing	⊘	There was no documentation found that demonstrated an active involvement of managing acquisition relationships, monitoring contract performance, and making changes / corrections to those contracts.

	Project Stakeholder Management		
13.1 Identify Stakeholders	*"Identify Stakeholders is the process of identifying project stakeholders regularly and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success."* Key benefit of this process is that enables the project team to identify the appropriate focus for engagement of each stakeholder or group stakeholders • This process is performed periodically throughout the project • This process frequently occurs for the first time in a project either prior to or at the same time the project charter is developed and approved • It is repeated as necessary, but should be performed at start of each phase or when a significant change in the organization occurs • Each time the identification process is repeated, the project management plan components and project documents should be consulted to identify relevant project stakeholders.	O	Some of the documents reference key stakeholders, but do not document their interests, needs, involvement, influence or potential impact to the project success.
13.2 Plan Stakeholder	*"Plan Stakeholder Engagement is the process of developing approaches to involve project stakeholders based on their needs, expectations, interests, and potential impact on the project."* Key benefit is that it provides an actionable plan to interact effectively with stakeholders. • This process is performed periodically throughout the project. • The first version of the stakeholder engagement plan is developed after the initial stakeholder community has been identified by the Identify Stakeholder process • The stakeholder engagement plan is updated regularly to reflect changes to the stakeholder community	O	Very limited documentation on an approach for stakeholder communication. Specifically, PBC_022_PMLC_Directive contained notional information about roles, responsibilities, engagement, execution and closure of any communications strategy.

13.3 Manage Stakeholder	*"Manage Stakeholder Engagement is the process of communicating and working with stakeholders to meet their needs and expectations, address issues, and foster appropriate stakeholder involvement."* Key benefit of this process is that it allows the project manager to increase support and minimize resistance from stakeholders • This process in performed throughout the project • Manage stakeholder engagement involves (Engaging stakeholder at appropriate project stages, Manage stakeholder expectations through negotiations and communications, Address any risk related to stakeholders management and Clarifying and resolving identified issues) • Managing stakeholder engagement helps to ensure that stakeholders clearly understand the project goals, objectives, benefits, and risks for the project, as well as how their contribution will enhance • project success	O	Limited indication of memorandums and meeting minutes demonstrates that there was an effort to manage stakeholder engagement.
13.4 Monitor Stakeholder Engagement	*"Monitor Stakeholder Engagement is the process of monitoring project stakeholder relationships and tailoring strategies for engaging stakeholders through modification of engagement strategies and plans."* Key benefit of this process is that it maintains or increases the efficiency and effectiveness of stakeholder engagement activities as the project evolves and its environment changes. • This process is performed throughout the project	O	There was no documentation found to demonstrate an active effort to monitor relationships, adjust strategies and plans according to relationship and requirements shifts, and changes to the stakeholder engagement plan. However, in concert with the Communications Plan documents as well as Project Charters, it can be deduced that there was a method in place to manage and control the flow of information between Stakeholders and PMO.

Appendix G – Alignment to the GAO Guidelines

Table 4 – Library of Congress Alignment to the GAO Guidelines

GAO-16-89G: Schedule Assessment Guide		
Best Practice Characteristic and Overall Assessment	**Best Practice**	**Detailed Assessment**
1. Capturing All Activities and Key Questions ***Minimally Meets Requirements***	a) Is there an IMS for managing the entire program (not just a block, increment, or prime contractor)? Is the schedule defined at an appropriate level to ensure effective management? b) Is the IMS maintained in scheduling software and linked to external, detailed project schedules? c) How does management ensure the accuracy of reported schedule information? Do the government program management office and contractors have different scheduling software systems? If so, how is integrity preserved and verified when converting the schedule? d) Does the IMS include government, contractor, and applicable subcontractor effort? e) Does the schedule reflect the program WBS and does the WBS allow tracking key deliverables? Does every activity trace to an appropriate WBS element, and do the activities define how the deliverables will be produced? Does the schedule WBS map to the cost estimate WBS? Is there a WBS dictionary? f) Are key milestones identified and are they consistent with the contract dates and other key dates management established in the baseline schedule? g) Does the schedule have clear start and finish milestones? Are there too many milestones in relation to detail activities? h) Are activities within the schedule easily traced to key documents and other information through activity or task codes? Are all contractor activities mapped to the contract statement of work (SOW) to ensure that all	a) ***Does Not Meet*** **-** The OCIO does not use an Integrated Master Schedule to manage any aspect of the IT Modernization effort. Each project is required to have a project schedule, but there is no linkage from these individual schedules to any overlying (Master) schedule. b) ***Does Not Meet*** **-** The OCIO does not use an Integrated Master Schedule to manage any aspect of the IT Modernization effort. c) ***Minimally Meets*** **-** Project managers maintain their own project schedule in Microsoft Project. Schedule accuracy and maintenance varies with each project based upon the diligence of the project manager. The project schedules vary widely in their identification of resources and the application of resource task allocation, and none of the schedule track schedule variances to actual costs. Of the 12 project schedules provided, 8 identified project resources. However, only 3 included reasonable resource task allocation, 4 provided a minimal level of resource task allocation, and the remaining 5 provided no resource allocation. d) ***Does Not Meet*** **-** The OCIO does not use an Integrated Master Schedule to manage any aspect of the IT Modernization effort. e) ***Minimally Meets*** **-** No 'WBS' were provided, as the OCIO uses the Project Schedule as an pseudo WBS in that it list all of the project tasks. While the size of the project has an impact on the size of the task list, the level of task detail varied widely among the individual project schedules. The absence of an actual WBS does not permit verification of the WBS structure or traceability to WBS elements. f) ***Does Not Meet*** **-** While the OCIO does not have contract deliverables in the traditional fashion, none of the Project Schedule identify major milestones that can be tracked as interdependencies with other projects. Schedule performance is limited to percent completion to the initial schedule dates, however we found no evidence that the project schedules are

	effort is accounted for in the schedule? i) Are activity names unique and descriptive? Are activities phrased in verb-noun combinations (for example, develop documentation)? Are milestones named with verb-noun or noun-verb combinations (for example, start project or project finished)? j) Are level-of-effort activities clearly marked? k) Does the schedule include significant risk mitigation efforts as discrete activities? If not, how are they documented and tracked?	baselined to track changes in tasks or task durations. g) ***Partially Meets*** **-** Each project schedule has start and end dates for each task, but none of the Project Schedules identify major milestones that can be tracked as potential interdependencies with other projects. h) ***Does Not Meet*** **-** The individual project schedules do not have any links or references to any external documentation. This includes cost estimates to track schedule and cost variances. i) ***Meets*** **-** The majority of project schedule tasks are clearly named or defined. j) ***Partially Meets*** **-** The individual project schedules vary widely on level of effort and information detail. The level of effort information included in the schedules reviewed consisted of resource identification and allocation to tasks. Of the 12 project schedules provided, 8 identified project resources. However, only 3 included reasonable resource task allocation, 4 provided a minimal level of resource task allocation, and the remaining 5 provided no resource allocation. k) ***Partially Meets*** **-** While none of the individual project schedules contain any mention of risk, or risk contingencies, 3 of the Risk Registers specifically called out schedule performance risk, and 2 of the Risk Registers mention staffing risks without specific reference to schedule impacts.
2. Sequencing All Activities ***Partially Meets Requirements***	a) Have the activities and logical relationships been determined by those executing the program? b) Are the majority of the relationships within the detailed schedules finish-to-start? c) Are predecessor links (with the exception of the start milestone) or successor links (with the exception of the finish milestone) missing? d) Are any predecessors or successors dangling? • Does each activity (except the start milestone) have an F–S or S–S predecessor that drives its start date? • Does each activity (except the finish milestone and deliverables that leave the project without subsequent effect on the project) have an	a) ***Meets*** **-** Each of the individual project schedules have tasks that are logical and reasonable to achieve the objectives of the Project Charter. However, the level of detail in the tasks varies greatly among the projects. b) ***Partially Meets*** **-** The majority of the tasks identified in the individual project schedule have start-to-finish dates in what appear to be logical work segments, however, there is no WBS to validate the work segments or task elements. A large number of the work segments identified in the various project schedules have finish-to-start dates, but the application of this methodology varies widely among the schedules. None of the project schedules employ critical path methodology. c) ***Minimally Meets*** **-** The application of predecessors and successors varies widely among the project schedules. Of the 12 project schedules reviewed, 2 of the

	F–S or F–F successor that it drives? e) Do summary activities have predecessor or successor links? f) Do activities have start-to-finish links? g) How much convergence (that is, several parallel activities converging at one major event) is there in the schedule? For activities that have many converging predecessors, do those predecessors have adequate float? h) Does the schedule contain date constraints other than as soon as possible? Is each one justified in the schedule documentation? i) Are lags or leads specified between the activities? Can these be more accurately characterized by improving logic or adding activity detail?	schedule reasonably employed predecessors and 4 employed predecessors only partially. The remaining 5 schedule did not use predecessors at all. None of the project schedule employed successors in the project scheduling. d) ***Minimally Meets*** **-** The application of predecessors and successors varies widely among the project schedules. Of the 12 project schedules reviewed, 2 of the schedule reasonably employed predecessors and 4 employed predecessors only partially. The remaining 5 schedule did not use predecessors at all. None of the project schedule employed successors in the project scheduling. e) ***Significantly Meets*** **-** The majority of the roll-up tasks have start and finish dates based upon the subtasks. f) ***Meets*** **-** The vast majority of the tasks identified in the various project schedules have start-to-finish links. g) ***Minimally Meets*** **-** The majority of the project schedule have large blocks of tasks that are essentially run in parallel to a single end date. None of the project schedules reviewed employed float days, and all project schedule do not, or only minimally, employed predecessors. h) ***Minimally Meets*** **-** The individual project schedule are configured to exclude weekdays (MS Project default setting), but does not exclude Federal holidays or moratorium periods of any sort. None of the project schedules show any date constraints, and float days are only minimally employed. i) ***Minimally Meets*** **-** Of the 12 project schedules reviewed, only 4 employed float days, which allows for lag or lead time between tasks.
3. Assigning Resources to All Activities Key Questions ***Does Not Meet Requirements***	a) What resources are specified and assigned to the activities? At what level of detail are resources specified (for example, as labor categories, organizations, or individual names)? b) Are significant material and equipment resources described in the schedule? c) Do summary activities or milestones have resource assignments? d) How were resource estimates developed for each activity?	a) ***Partially Meets*** **-** The identification and task allocation of resources varied widely among the 12 project schedule reviewed. Six Project Schedules clearly identified the required project resources, and 1 partially identified resources. Of the 6 projects that identified resources, only 4 allocated these resources to individual tasks. b) ***Does Not Meet*** **–** None of the 12 Project Schedules reviewed identified or scheduled any material or equipment resources. c) ***Does Not Meet*** **-** While the Project Schedules provide roll-up tasks (task

	e) Has analysis ensured that resources are sufficient and available in each work period when needed? • Is obtaining scarce resources to accomplish the work potentially difficult? • Are more resources required than are available for some work periods? What is the plan for resolving resource deficiencies? f) Has resource leveling been performed? g) To what extent are the resource estimates in the schedule consistent with those in the program cost estimate?	categories or work segments), there are no major project activities or milestones identified or summarized in any of the project schedules assessed. d) ***Does Not Meet*** **-** While the Project Schedules to do estimate any resources costs, each project is required to have a Cost Estimate that estimates the labor hours (Basis of Estimate) for the project. However, the Cost Estimate is not applied to the Project Schedule resources or allocated to the individual tasks. As such, project costs are not tracked in the project schedule. e) ***Minimally Meets*** **-** It is assumed the purpose of the Cost Estimate is to allocate funding and assign resources to the individual projects. However, Obsidian has no information on the details of this OCIO process. Resources are assigned to the project, and the project manager uses other project management tools to track a subset of the total project labor hours (OCIO FTE only) worked on the project. Labor assigned to the project from other Library Service Units is not tracked or reported. Labor hours are tracked as a percentage of budgeted labor to the overall project schedule, not by work segment or task. f) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed had any labor-leveling applied to the tasks. g) ***Does Not Meet*** **-** While a Cost Estimate is required for each project, it consists of only direct and indirect labor estimates, and is not linked to the project schedule.
4. Establishing Durations for All Activities Key Questions ***Partially Meets Requirements***	a) Were durations determined from work to be done and realistic assumptions about available resources, productivity, normal interferences and distractions, and reliance on others? b) For a detailed schedule, are durations short enough to be consistent with the needs of effective planning and program execution? c) Are activities long in duration because of LOE or rolling wave planning? d) Are LOE activity durations determined by the activities they support? e) Did the person responsible for the activities estimate their durations?	a) ***Does Not Meet*** **-** No information is provided in the Project Schedules, or reference made to other project documentation, that demonstrates the work to be done has been developed with reasonable assumptions concerning resource availability or other construing factors. b) ***Significantly Meets*** **-** The tasks appear to be reasonable in duration as to minimize the overall project duration. However, we did observe that the Project Schedules do not exclude Federal Holidays or any other moratorium periods. c) ***Significantly Meets*** **-** The Project Schedules are separated into work segments that generally align with waves of activity. However, the Level of Effort (LOE) is developed by the Cost Estimate document that is not linked or referenced in the Project Schedule, so verifying the

	f) Was the program duration determined by some target or mandated date? g) Are durations based on appropriate calendars? Do any specific conditions necessitate special calendars, and are they addressed (for example, religious holidays, network periods for climate, shift work, unavailability of resources)? h) Are activity durations assigned inconsistent time units?	wave planning based on LOE is not possible. d) ***Minimally Meets*** **-** The resource identification and allocation varies widely among the 12 Project Schedules reviewed. All work tasks and their associated roll-up work segments have durations, but it is unclear based upon the Project Schedule or Cost Estimate how these durations were determined. There are no WBS documents to link the project tasks in the schedule to an element of the WBS for validation. e) ***Meets*** **-** The PMLC requires the project manager develop the project documentation. Within this requirement is the development of the Project Charter, the Cost Estimates and the Project Schedule. Given this OCIO requirement, the project manager is the person responsible for the development of the project activities and their duration. f) ***Meets*** **-** While the OCIO does not consider the IT Modernization effort a 'program' (referring to it as an "effort"), the IT Modernization effort was directed by the Library of Congress Strategic Plan in 2017. This plan, subsequently updated annually, had target dates for all major modernization efforts. g) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed excluded Federal Holiday or other moratorium periods, and float days to allow for project slippage was only minimally employed. h) ***Meets*** **-** All project schedule tasks are uniformly expressed in days (default MS Project setting).
5. Verifying that Schedule is Traceable Horizontally and Vertically Key Questions ***Minimally Meets Requirements***	a) Is all logic in place and has the technical content of the schedule been validated? b) Are major hand-offs and deliverables easily identified in the schedule? How are major hand-offs and deliverables negotiated and monitored? c) Has horizontal traceability been demonstrated by observing the effects of delaying an activity by many days within the schedule or a similar shock to the network? d) Are the key dates consistent between lower-level detailed working schedules and higher-level summary schedules? Do all lower-level activities roll up into higher WBS levels?	a) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed had technical links in any of the project tasks to validate an individual task. b) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed had major activities or milestones defined, or links to any interdependencies with other projects. c) ***Does Not Meet*** **-** There was no WBS provided outside of the individual Project Schedule task listings, or references to another documentation, that would allow for tractability of any of the project tasks. d) ***Meets*** **-** The large majority of the 12 Project Schedule reviewed linked the lower-level tasks with their associated higher-level roll-up categories (work segments). e) ***Minimally Meets*** **-** The Project Schedule summary data is entered into the PMO's

	e) Do major milestones map between the schedule and management documents and presentations?	Access database and summarized in the Weekly Portfolio Report. However, the project data is manually entered into the Access database as a subjective assessment.
6. Confirming that the Critical Path is Valid Key Questions ***Does Not Meet Requirements***	a) Is the critical path, or longest path (in the presence of date constraints), calculated by the scheduling software valid? • Are any activities in the schedule missing logic or constrained without justification? Are these issues resulting in an unreliable critical path? • Is the critical path a continuous path from the status date to the major completion milestones? • Does the critical path start with a constraint so that other activities are unimportant in driving the milestone date? If so, is there justification for that constraint? d. Does the critical path include LOE activities? Is the critical path driven by activities of unusually long duration that are not considered planning packages? • Is the critical path driven in any way by lags or leads? b) Does management use the critical path to focus on activities that will detrimentally affect key program milestones and deliveries if they slip?	a) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed employed a critical path. b) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed employed a critical path.
7. Ensuring Reasonable Total Float Key Questions ***Minimally Meets Requirements***	a) Are the total float values that the scheduling software calculates reasonable and do they accurately reflect true schedule flexibility? b) Are excessive values of total float being driven by activities that are missing logic? c) Is total float monitored? Does management have a plan to mitigate negative total float? d) Does management rely on free float to level resources or reassign resources to assist critical activities?	a) ***Minimally Meets*** **-** Of the 12 Project Schedules reviewed, 2 employed float days and 2 partially employed float days. However, the float day capability of MS Project was not used, rather 'extra' days were added to the duration between tasks. b) ***Minimally Meets*** **-** Of the 12 Project Schedules reviewed, 2 employed float days and 2 partially employed float days. However, the float day capability of MS Project was not used, rather 'extra' days were added to the duration between tasks. c) ***Does Not Meet*** **-** Use of float days varies widely among the 12 Project Schedules, as the use of float days appears to be discretionary by the project managers. The PMO does not manage or monitor float days. d) ***Does Not Meet*** **-** The PMO does not manage or monitor float days.

8. Conducting Schedule Risk Analysis Key Questions ***Does Not Meet Requirements***	a) Was an SRA performed to determine the confidence level in achieving the program schedule and other key dates? • Was the schedule checked to ensure that it meets best practices before the simulation was conducted? • Are there data fields within the schedule for risk analysis such as optimistic, most likely, and pessimistic durations? • Were uncertainties in activity durations statistically correlated to one another? • How much schedule contingency was selected and what is the probability of meeting the completion date? • Did the SRA identify activities during the simulation that most often ended up on the critical path, so that near-critical path activities can be closely monitored? b) Was a risk register used as an input to schedule development? c) a. Was the risk register used in identifying the risk factors potentially driving the schedule before the SRA was conducted? d) b. Once the SRA was conducted, were risks prioritized by probability and magnitude of effect? e) Are the SRA data, assumptions, and methodology available and documented? f) Are the probabilities and impact ranges reasonable and based on information gathered from knowledgeable sources? Is there evidence of bias in the risk data? g) How is the use of schedule contingency controlled and authorized? h) Is an SRA performed periodically to reflect actual progress and changes in risks?	a) ***Partially Meets*** **-** Of the 13 Risk Registers provided, 4 had risks associated with schedule performance, and 2 had staffing issues as potential risks with no specific reference to the project schedule. b) ***Does Not Meet*** **-** None of the 12 Project Schedules had conducted any type of risk analysis. c) ***Does Not Meet*** **-** None of the 12 Project Schedules had conducted any type of risk analysis. d) ***Does Not Meet*** **-** None of the 12 Project Schedules had conducted any type of risk analysis. e) ***Does Not Meet*** **-** None of the 12 Project Schedules had conducted any type of risk analysis.
9. Updating the Schedule Using Logic and Progress Key Questions ***Minimally Meets Requirements***	a) Is progress recorded regularly? Has the schedule been updated recently as planned? Is the status date recorded? b) Is at least one in-progress activity critical? c) Do any activities have start or finish dates in the past without	a) ***Partially Meets*** **-** The 12 Project Schedules reviewed, 6 were not updated as of the end of the month prior to their file date attribute, meaning the project schedule had not been maintained (updated) for the month prior to the file being last saved.

	actual start or finish dates? Do any activities have actual start or finish dates in the future? d) Is responsibility for changing or statusing the schedule assigned to someone who has the proper training and experience in CPM scheduling? e) Were any activities started or completed out of sequence? If so, was the logic retained, or did the scheduler use progress override? f) Does a schedule narrative accompany each status update and include the following? • the status of key milestone dates, including the program finish date; • the status of key hand-offs or giver/receiver dates; • explanations for any changes in key dates; • changes in network logic, including lags, date constraints, and relationship logic and their effect on the schedule time; • a description of the critical paths, near-critical paths, and longest paths along with a comparison to the previous period's paths; and • a description of any significant scheduling software options that changed between update periods, such as the criticality threshold for total float, progress override versus retained logic and whether resource assignments are progressed along with duration. g) Is the schedule structure examined after each update to ensure that no logic is missing, constraints are necessary, and no activities impede the ability of the schedule to dynamically forecast dates?	b) ***Does Not Meet*** **-** None of the 12 Project Schedule identified any critical tasks. c) ***Significantly Meets*** **-** Of the 12 Project Schedules evaluated, 3 included a complete list of actual dates, 1 showed significant use of actual dates, 5 partially used actual dates, 1 had a minimal use of actual dates, and 1 did not have any actual dates. d) ***Does Not Meet*** **-** The Project Schedule is managed by the project manager. No information was provided as to the level of training the project manager has received in the use of MS Project. There is no 'responsible individual' identified for managing schedule changes other the project manager. The OCIO does employ a change management process that reviews all project changes. e) ***Does Not Meet*** **-** Of the 12 Project schedule evaluated, 4 showed tasks that were started out of sequence, and none had any explanation as to the rationale or positive/negative impact of these schedule changes. f) ***Does Not Meet*** **-** None of the 12 Project Schedule evaluated had any rationale or supporting documentation for the schedule tasks, task durations, or task sequencing. There are other project documents, such as the Project Charter, Cost Estimates and Risk Registers, but none of these document are linked to, or referenced by, the Project Schedule. g) ***Does Not Meet*** **-** There is no indication on any of the 12 Project Schedules that the structure or content of the schedule is evaluated after it is developed. None of the projects schedules were baselined that would support this effort.
10. Maintaining a Baseline Schedule Key Questions ***Does Not Meet Requirements***	a) Is the baseline schedule the basis for measuring performance? b) Does a schedule basis document exist? Does the document • describe the general approach to the program? • describe the overall structure of the IMS, including the	a) ***Does Not Meet*** **-** Of the 12 Project Schedule reviewed, none were baselined. Baselining project schedule was not a requirement at the time of our assessment, but has since been put into practice by the OCIO. b) ***Does Not Meet*** **-** None of the 12 Project Schedules reviewed had any supporting

	scope and purpose of projects, staff responsible for each project, the relationship between projects, a WBS dictionary, the status delivery dates for each project, and a list of key hand-off products and their estimated dates? • describe the settings for key options for the scheduling software? • provide an overview of the assumptions and ground rules, including justification for calendars and any lags, constraints, or long activity durations? • provide an appropriately detailed rationale for the basic approach to estimating key activity durations and justification of the estimating relationship between duration, effort, and assigned resource units? • contain a dictionary of abbreviations, acronyms, and custom fields? • describe the use of resources within the schedule? • describe the critical risks prioritized in a schedule risk analysis as well as schedule contingency? • discuss the derivation of the critical paths and longest path and justify excessive total float? c) Are changes to the baseline schedule reviewed and approved according to the schedule change control process? d) Is trend analysis performed, such as monitoring start and finish dates, available float, and available schedule contingency?	documentation. All were stand-alone Microsoft Project schedules without task notes or linkages to other documents/schedules. c) ***Does Not Meet*** **-** Of the 12 Project Schedule reviewed, none were baselined d) ***Does Not Meet*** **-** There is no evidence that the PMO trends any of the individual Project Schedules to measure or report on schedule performance. However, the PMO does monitor project schedule performance.

GAO-09-3SP: GAO Cost Estimating Assessment Guide		
Best Practice Characteristic and Overall Assessment	**Best Practice**	**Detailed Assessment**
1. Best Practices Checklist: The Estimate ***Minimally Meets Requirements***	a) The cost estimate type is clearly defined and is appropriate for its purpose. b) The cost estimate contains all elements suitable to its type—ICA, ICE, IGCE, LCCE, rough order of magnitude, total ownership cost: development, procurement, operating and support, disposal costs, and all sunk costs. • AOA, CEA, EA, cost-benefit analysis: consistently evaluate all alternatives. • EA, cost-benefit analysis: portray estimates as present values. c) All program costs have been estimated, including all life-cycle costs. d) The cost estimate is independent of funding source and appropriations. e) An affordability analysis has been performed at the agency level to see how the program fits within the overall portfolio. • The agency has a process for developing cost estimates that includes • The 12-step best practice process outlined in chapter 1. • An overall agency portfolio sand chart displays all costs for every program. f) The estimate is updated as actual costs become available from the EVM system or requirements change. g) Post mortems and lessons learned are continually documented.	a) ***Minimally Meets*** **-** While there is an overall OCIO budget that was provided in the FY20 Draft Finance Plan, it was structured in such a manner that costs could not be correlated to any specific IT Modernization project. b) ***Minimally Meets*** **-** Cost elements were limited to labor hours by fiscal year. There were no cost-benefit analyses or alternatives provided. c) ***Minimally Meets*** **-** Cost elements were limited to labor hours by fiscal year. There were no life-cycle analyses provided d) ***Meets*** **-** The project cost estimates were developed as stand-alone document independent of funding source or appropriations. e) ***Does Not Meet*** **-** There were no indications that an affordability analysis was conducted, or that the 12 step GAO cost estimate best practice was not followed. The FY20 Draft Finance Plan does show investments required to support the individual IT Modernization projects. f) ***Does Not Meet*** **-** No actual costs were provided for 2017 through 2020. The OCIO has not implemented EVM. g) ***Does Not Meet*** **-** No postdate reserves or lessons learned were provided by the OCIO to evaluate.
2. Best Practices Checklist: Purpose, Scope, and Schedule ***Minimally Meets Requirements***	a) The estimate's purpose is clearly defined. b) Its scope is clearly defined. c) The level of detail the estimate is to be conducted at is consistent with the level of detail available for the program. For example, an engineering buildup estimate should be conducted only on a well-defined program.	a) ***Does Not Meet*** **-** The Cost Estimating Template does not provided a purpose for the cost estimate. However, the OCIO does require a Project Charter and a Project Management Plan that provide project-level requirement statements. b) ***Does Not Meet*** **-** The Cost Estimating Template does not provided a scope for the cost estimate. However, the OCIO does require a Project Charter

	d) The team has been allotted adequate time and resources to develop the estimate.	and a Project Management Plan that provide project scope. c) ***Partially Meets*** **-** The Cost Estimating Template does not provide a cost build-up for anything beyond direct and indirect labor hours by labor category. d) ***Minimally Meets*** **-** The Cost Estimating Template is developed by the Project Manager. There was no information provided as to the level of training each project manager has, or the time allocated to complete, the development of the estimate.
3. Best Practices Checklist: Cost Assessment Team ***Minimally Meets Requirements***	a) The estimating team's composition is commensurate with the assignment • The team has the proper number and mix of resources. • Team members are from a centralized cost estimating organization. • The team includes experienced and trained cost analysts. • The team includes, or has direct access to, analysts experienced in the program's major areas. • Team members' responsibilities are clearly defined. • Team members' experience, qualifications, certifications, and training are identified. • The team participated in on-the-job training, including plant and site visits. b) A master schedule with a written study plan has been developed. c) The team has access to the necessary subject matter experts.	a) ***Minimally Meets*** **-** The Cost Estimating Template is developed by the Project Manager. There was no information provided that suggested the project manager had any other resources to assist him/her in this effort. Other than labor hours being parsed by labor category, the team member's roles are not defined in the Cost Estimating Template. b) ***Does Not Meet*** **-** The OCIO does not use a master schedule in its management of the IT Modernization projects. c) ***Partially Meets*** **-** While no information was provided that specifically addressed this requirement for each of the IT Modernization project, the FY20 Draft Finance Plan states that USCO and OCIO plan to engage consultants with specific expertise in complex project scheduling and estimation methods. The recommendations resulting from this FY19-funded consulting engagement may significantly alter the final FY20 spending plan and will inform all future planning efforts.

4. Best Practices Checklist: Technical Baseline Description ***Does Not Meet Requirements***	a) There is a technical baseline: • The technical baseline has been developed by qualified personnel such as system engineers. • It has been updated with technical, program, and schedule changes, and it contains sufficient detail of the best available information at any given time. • The information in the technical baseline generally drives the cost estimate and the cost estimating methodology. • The cost estimate is based on information in the technical baseline and has been approved by management. b) The technical baseline answers the following: • What the program is supposed to do—requirements; • How the program will fulfill its mission—purpose; • What it will look like—technical characteristics; • Where and how the program will be built—development plan; • How the program will be acquired—acquisition strategy; • How the program will operate—operational plan; • Which characteristics affect cost the most—risk.	a) ***Does Not Meet -*** There were no technical baselines provided to evaluate. However, the OCIO does require a Project Management Plan, which often contains some level of technical detail (without baseline). b) ***Does Not Meet -*** There were no technical baselines provided to evaluate. However, the OCIO does require a Project Management Plan, which often contains some level of technical detail (without baseline).
5. Best Practices Checklist: Work Breakdown Structure ***Partially Meets Requirements***	a) A product-oriented WBS represents best practice. b) It reflects the program work that needs to be done. It • clearly outlines the end product and major work for the program; • contains at least 3 levels of indenture; • is flexible and tailored to the program. c) The 100 percent rule applies: the sum of the children equals the parent. • The WBS defines all work packages, which in turn include all cost elements and deliverables.	a) ***Significantly Meets -*** While the OCIO does not specifically create a WBS for each project, each project does develop a Project Schedule. The OCIO has stated that the Project Schedules constitutes the project WBS. The majority of the 12 Project Schedules reviewed had at least three levels of detail and were tailored specifically to the project. b) ***Partially Meets -*** While the OCIO does not specifically create a WBS for each project, each project does develop a Project Schedule. The OCIO has stated that the Project Schedule constitutes the WBS. The majority of the 12 Project Schedules reviewed provided a task breakdown that appeared to address the work required to successfully deliver the project. However, the Project Schedule 'WBS' only addressed the work tasks

	• In addition to hardware and software elements, the WBS contains program management and other common elements to make sure all the work is covered. d) Each system has one program WBS but may have several contract WBSs that are extended from the program WBS, depending on the number of subcontractors. e) The WBS is standardized so that cost data can be collected and used for estimating future programs. It: • facilitates portfolio management, including lessons learned; • matches schedule, cost estimate, and EVM at a high level; • is updated as changes occur and the program becomes better defined; • includes functional activities within each element that are needed to support each product deliverable; • is the starting point for developing the program's detailed schedule; • provides a framework for identifying and monitoring risks and the effectiveness of contingency plans; • provides for a common language between the government program management office, technical specialists, prime contractors, and subcontractors. f) The WBS has a dictionary that • defines each element and how it relates to others in the hierarchy; • clearly describes what is included in each element; • describes resources and functional activities needed to produce the element product; • links each element to other relevant technical documents.	need to execute the project. Schedule tasks could not be traced to their WBS element and project deliverables were not addressed. c) ***Meets*** **-** Of the 13 Cost Estimating Templates we reviewed, 6 of the cost estimates had references to subcontractor labor hours. We presumed that remaining 6 cost estimate had no requirement for subcontracted labor. d) ***Does Not Meet*** **-** The OCIO does not specifically create a WBS for each project. The OCIO has stated that the Project Schedules constitutes the project WBS. None of the Project Schedules reviewed facilitated portfolio management, lessons learned, or mapped any schedule element to the cost estimate. EVM has not been implemented by the OCIO. There is no indication that the Project Schedule tracks costs, monitors risks or provides a common language between the government program management office, technical specialists, prime contractors, and subcontractors. The OCIO does develop Risk Registers, but these registers are not linked to the Project Schedule (WBS). e) ***Does Not Meet*** **–** None of the 12 Project Schedule reviewed provided WBS dictionaries.
6. Best Practices Checklist: Ground Rules and Assumptions	a) All ground rules and assumptions have been • Developed by estimators with input from the technical community.	a) ***Does Not Meet*** **-** As the technical baselines were not provided, the Ground Rules and Assumptions associated with these documents were also not provided. b) ***Minimally Meets*** **-** The OCIO requires the development of a Risk Register for

Does Not Meet Requirements	• Based on information in the technical baseline and WBS dictionary. • Vetted and approved by upper management. • Documented to include the rationale behind the assumptions and historical data to back up any claims. • Accompanied by a level of risk of each assumption's failing and its effect on the estimate. b) To mitigate risk, • All GR&As have been placed in a single spreadsheet tab so that risk and sensitivity analysis can be performed quickly and efficiently. • All potential risks including cost, schedule, technical, and programmatic (e.g., risks associated with budget and funding, start up activities, staffing, and organizational issues) have been identified and traced to specific WBS elements. I. A schedule risk analysis has been performed to determine the program schedule's realism. II. A cost risk analysis, incorporating the results of the schedule risk analysis, has been performed to determine the program's cost estimate realism. c) Budget constraints, as well as the effect of delaying program content, have been defined. • Peaks and valleys in time-phased budgets have been explained. • Inflation index, source, and approval authority have been identified. • Dependence on participating agencies, the availability of government furnished equipment, and the effects if these assumptions do not hold have been identified. • Items excluded from the estimate have been documented and explained. • Technology was mature before it was included; if its maturity was assumed, the estimate	each project. Of the 13 Risk Registers we evaluated, none specifically highlighted costing risks, and only three identified general staffing risks that might ultimately present a cost or schedule risk. c) ***Does Not Meet -*** The Draft FY20 Finance Plan budget rolls up the individual project budgets into categories that do not reflect IT Modernization budget performance. The Draft FY20 Finance Plan provides no project-level budget detail to review or assess. d) ***Does Not Meet -*** The Project Manager develops the Cost Estimating Template. There is no indication that this estimate receives any form of auditing beyond general OCIO management oversight. The Cost Estimating Template does not provide for sensitivity or uncertainty assessments, and no project information was provided that suggests the cost estimates undergo any such analysis.

	addresses the effect of the assumption's failure on cost and schedule. d) Cost estimators and auditors met with technical staff to determine risk distributions for all assumptions; the distributions were used in sensitivity and uncertainty analyses of the effects of invalid assumptions. Management has been briefed, and the results have been documented.	
7. Best Practices Checklist: Data ***Minimally Meets Requirements***	a) As the foundation of an estimate, data • Have been gathered from historical actual cost, schedule and program, and technical sources; • Apply to the program being estimated; • Have been analyzed for cost drivers; • Have been collected from primary sources, if possible, and secondary sources as the next best option, especially for cross-checking results; • Have been adequately documented as to source, content, time, units, assessment of accuracy and reliability, and circumstances affecting the data; • Have been continually collected, protected, and stored for future use; • Were assembled as early as possible, so analysts can participate in site visits to understand the program and question data providers. b) Before being used in a cost estimate, the data were • Fully reviewed to understand their limitations and risks; • Segregated into nonrecurring and recurring costs; • Validated, using historical data as a benchmark for reasonableness; • Current and found applicable to the program being estimated; • Analyzed with a scatter plot to determine trends and outliers; • Analyzed with descriptive statistics; • Normalized to account for cost and sizing units, mission or	a) ***Minimally Meets*** **-** While is it assumed that OCIO project managers are experienced and have support resources that can assist them in the development of their Cost Estimating Template, there was no information provided that suggested the project manager has access to historical metric data that aids in this development. b) ***Minimally Meets*** **-** There was no information provided that highlighted practices or procedures for reviewing cost estimates beyond general OCIO management.

	application, technology maturity, and content so they are consistent for comparisons; • Normalized to constant base-year dollars to remove the effects of inflation, and the inflation index was documented and explained.	
8. Best Practices Checklist: Developing a Point Estimate ***Does Not Meet Requirements***	a) The cost estimator considered various cost estimating methods: • Analogy, early in the life cycle, when little was known about the system being developed: I. Adjustments were based on program information, physical and performance characteristics, and contract type. • Expert opinion, very early in the life cycle, if an estimate could be derived no other way. • The build-up method later, in acquisition, when the scope of work was well defined and a complete WBS could be determined. • Parametric, if a database of sufficient size, quality, and homogeneity was available for developing valid CERs and the data were normalized correctly. I. Parametric models were calibrated and validated using historical data. • Extrapolating from actual cost data, at the start of production. b) Cost estimating relationships were considered: • Statistical techniques were used to develop CERs: I Higher R-squared; • Statistical significance, for determining the validity of statistical relationships; I Significance levels of F and T statistics. • Before using a CER, the cost estimator I. Examined the underlying data set to understand anomalies;	a) ***Does Not Meet -*** There was no information provided as to practices and processes used to assess compliance with the GAO checklist. The Cost Estimating Template does not build-up costs by task to allow for the checklist to be implemented. The only information included in the13 Cost Estimating Templates reviewed were direct and indirect labor hours, by labor category, by fiscal year. b) ***Does Not Meet -*** There was no information provided as to practices and processes used to leverage or assess cost relationships. The Cost Estimating Template does not build-up costs by task to allow for such relationships to be evaluated.

	II. Checked equations to ensure logical relationships; III. Normalized the data; VI. Ensured that CER inputs were within the valid dataset range; V. Checked modeling assumptions to ensure they applied to the program. • Learning curve theory was applied if I. Much manual labor was required for production; II. Production was continuous or adjustments had to be made; III. Items to be produced required complex processes; IV. technological change was minimal between production lots; V. The contractor's business process was being continually improved. • The contractor's business process was being continually improved. • The point estimate was developed by aggregating the WBS element cost estimates by one of the cost estimating methods. I. Results were checked for accuracy, double-counting, and omissions and were validated with cross-checks and independent cost estimates.	
9. Best Practices Checklist: Estimating Software Costs ***Does Not Meet Requirements***	a) The software cost estimate followed the 12-step estimating process: • Software was sized with detailed knowledge of program scope, complexity, and interactions, and the cost estimators worked with software engineers to determine the appropriate sizing metric.	a) ***Does Not Meet*** **-** The Cost Estimating Template does not have a specific entry for software, and no provisions to create a software cost build-up. b) ***Does Not Meet*** **-** The Cost Estimating Template does not have a specific entry for software, and no provisions to create a software cost build-up. c) ***Does Not Meet*** **-** The Cost Estimating Template does not have a specific entry for software, and no provisions to create a software cost build-up.

	• It was sized with source lines of code, function, object, feature point, or other counts. b) The software sizing method was appropriate: • Source lines of code were used if requirements were well defined and if there was a historical database of code counts for similar programs and a standard definition for a line of code. • Function points were used if detailed requirements and specifications were available, software did not contain many algorithmic functions, and an experienced and certified function point counter was available. • COSMIC points were used if functional user requirements are known and the application is for business, real-time, embedded, or infrastructure software. • Object points were used if computer-aided software engineering tools were used to develop the software. • Reports, interfaces, conversions, extensions and forms / workflow were used for ERP programs. • Use cases and use case points were used if system and user interactions were defined. • Auto generated and reused source lines of code were identified separately from new and modified code to account for pre- and post-implementation efforts. • Several methods were used to size the software to increase the accuracy of the sizing estimate. • The final software size was adjusted for growth based on historical data, and growth is continually monitored over time. c) Software cost estimates included: • Development labor costs for coding and testing, other labor supporting software development, and non-labor costs like purchasing hardware and licenses.	d) ***Does Not Meet -*** The Cost Estimating Template does not have a specific entry for software, and no provisions to create a software cost build-up.

	• Productivity factors for converting software size into labor effort, based on historical data and calibrated to match program size and development environment. • Industry average productivity factors and risk ranges, if no historical data were available. • Assumptions about productive labor hours in a day and work days in a year. • Development schedules accounting for staff availability, prior task dependencies, concurrent and critical path activities, number and length of shifts, overtime allowance, down time, and worker locations. • Costs for help desk support, database development, and corrective, adaptive, and preventive maintenance as part of the software's life cycle cost. • Time and effort associated with rework to fix defects. • Training cost estimators to calibrate parametric tools to match the program and model results cross-checking for accuracy. • Estimators' accounting for integrating commercial off-the-shelf software into the system, including developing custom software and glue-code. • Impact of risks facing ERP system implementations as outlined • Costs associated with interfacing bolt-on applications for ERP systems. d) IT infrastructure and services components of the software cost estimate included: • Costs associated with the physical attributes of the IT infrastructure, the performance and complexity requirements, and economic considerations. • Impact of risks affecting IT infrastructure, as outlined • Costs associated with labor and material nonrecurring and recurring efforts.	
	a) The cost estimate was accompanied by a sensitivity	a) ***Does Not Meet*** **-** There was no information provided that indicated any

10. Best Practices Checklist: Sensitivity Analysis ***Does Not Meet Requirements***	analysis that identified the effects of changing key cost driver assumption and factors. • Well-documented sources supported the assumption or factor ranges. • The sensitivity analysis was part of a quantitative risk assessment and not based on arbitrary plus or minus percentages. • Cost-sensitive assumptions and factors were further examined to see whether design changes should be implemented to mitigate risk. • Sensitivity analysis was used to create a range of best and worst case costs. • Assumptions and performance characteristics listed in the technical baseline description and GR&As were tested for sensitivity, especially those least understood or at risk of changing. • Results were well documented and presented to management for decisions. b) The following steps were taken during the sensitivity analysis: • Key cost drivers were identified. • Cost elements representing the highest percentage of cost were determined and their parameters and assumptions were examined. • The total cost was re-estimated by varying each parameter between its minimum and maximum range. • Results were documented and the re-estimate was repeated for each parameter that was a key cost driver. • Outcomes were evaluated for parameters most sensitive to change. c) The sensitivity analysis provided a range of possible costs, a point estimate, and a method for performing what-if analysis.	form of detailed sensitivity or risk assessments of either costs or cost drivers was conducted. b) ***Does Not Meet*** **-** There was no information provided that indicated any form of detailed sensitivity or risk assessments of either costs or cost drivers was conducted. c) ***Does Not Meet*** **-** There was no information provided that indicated any form of detailed sensitivity or risk assessments of either costs or cost drivers was conducted.
11. Best Practices Checklist: Cost Risk and Uncertainty	a) A risk and uncertainty analysis quantified the imperfectly understood risks that are in the program and identified the effects of changing key cost driver assumptions and factors:	a) ***Minimally Meets*** **-** The OCIO Risk Register Template collects the necessary elements to identify and describe risks, determine risk impact and probability, establish a risk weighting factor, provide risk ownership, define risk mitigation

Minimally Meets Requirements	• Management was given a range of possible costs and the level of certainty in achieving the point estimate. • A risk adjusted estimate that reflects the program's risks was determined. • A cumulative probability density function, an S curve, mapped various cost estimates to a certain probability level and defensible contingency reserves were developed. • Periodic risk and uncertainty analysis was conducted to improve estimate uncertainty. b) The following 7 steps were taken in performing an uncertainty analysis: 1. Program cost drivers and associated risks were determined, including those related to changing requirements, cost estimating errors, business or economic uncertainty, and technology, schedule, program, and software uncertainty. I. All risks were documented for source, data quality and availability, and probability and consequence. II. Risks were collected from staff within and outside the program to counter optimism. III. Uncertainty was determined by cost growth factor, expert opinion (adjusted to consider a wider range of risks), statistics and Monte Carlo simulation, technology readiness levels, software engineering maturity models and risk evaluation methods, schedule risk analysis, risk cube (P-I matrix) method, or risk scoring. 2. A probability distribution modeled each cost element's uncertainty based on data availability, reliability, and variability. I. A range of values and their respective probabilities were determined either based on statistics or expressed as 3-point estimates (best case, most likely, and worst case), and rationale for choosing which method was discussed.	and contingency plans, and show when the risk was last reviewed. The template does not provide any means of giving a range of possible costs and the level of certainty in achieving the point estimate. It also does not have any means of meeting the requirements to provide adjusted risk estimate that shows a cumulative probability density function, an S curve, or map these risks to various cost estimates to establish a certain probability level and defensible contingency reserves. b) ***Minimally Meets*** **-** None of the 13 Risk Registers reviewed show any risks associated with cost drivers. Risk uncertainty factors are not determined by cost growth factor, expert opinion, statistics and Monte Carlo simulation, technology readiness levels, software engineering maturity models and risk evaluation methods, or schedule risk analysis. The Risk Register does provide a risk cube (P-I matrix) method to assess risk weighting for probability and impact scoring. c) ***Minimally Meets*** **-** While the 13 Risk Registers reviewed provided a risk cube (P-I matrix) method to assess risk weighting for probability and impact scoring, none provided a risk distribution model. d) ***Does Not Meet*** **-** None of the 13 Risk Registers conducted an assessment correlation related cost elements using any form of simulation model. e) ***Does Not Meet*** **-** None of the 13 Risk Registers conducted a Monte Carlo assessment. f) ***Does Not Meet*** **–** None of the risk management information provided suggested a point system was used in the risk assessments. g) ***Minimally Meets*** **-** While the Cost Estimating Template does require the identification of a contingency plan, it does not address defining contingency reserves or vetting this plan with any resources beyond the project manager. h) ***Does Not Meet*** **-** The Cost Estimating Template is not revisited after it is created. There are no adjustments based upon risk factors or the manifestation of actual risks. i) ***Significantly Meets*** **-** The Cost Estimating Template does identify risk triggers that initiate project manager and OCIO management actions. This activity is not correlated with EVM references as the OCIO has not implemented an EVM system as yet.

	II. Documentation of the rationale for choosing the probability distributions should be provided. III. Probability distribution reflects the risk shape and the tails of the distribution reflect the best and worst case spread as well as any skewness. Distribution bounds were adjusted to account for stakeholder bias using organization default values when data specific to the program are not available. VI. If the risk driver approach is used, the data collected, including probability of occurrence and impact, were applied to the risks themselves. V. Prediction interval statistical analysis was used for CER distribution bounds. 3. The correlation between cost elements was accounted for to capture risk. I. The correlation ensures that related cost elements move together during the simulation, resulting in reinforcement of the risks. II. Cost estimators examined the amount of correlation already existing in the model. If no correlation is present, an insertion of 0.25 correlation was added. 4. A Monte Carlo simulation model was used to develop a distribution of total possible costs and an S curve showing alternative cost estimate probabilities. I. High-priority risks were examined and identified for risk mitigation. II. Strength of correlated cost elements were examined and additional correlation added if necessary to account for risk. 5. The probability associated with the point estimate was identified. 6. Contingency reserves were recommended for achieving the desired confidence level.	The identified trigger is the only event that initiates management review, and there is no simulation of these events.

	I. The mean of the distribution tends to fall around the 55%–65% confidence level because the total cost distribution follows a lognormal trend (i.e., tendency to overrun rather than underrun costs). II. Budgeting to at least the mean of the distribution or higher is necessary to guard against potential risk. III. The cost risk and uncertainty results were vetted through a core group of experts to ensure that the proper steps were followed. VI. The estimate is continually updated with actual costs and any variances recorded to identify areas where estimating was difficult or sources of risks were not considered. 7. The risk-adjusted cost estimate was allocated, phased, and converted to then year dollars for budgeting, and high-risk elements were identified to mitigate risks. I. Results from the uncertainty analysis were used to prioritize risks based on probability and impacts as they affected the cost estimate. A risk management plan was implemented jointly with the contractor to identify and analyze risk, plan for risk mitigation, and continually track risk. • A risk database watch list was developed, and a contractor's EVM system was used for root cause analysis of cost and schedule variances, monitoring worsening trends, and providing early risk warning. • Event-driven reviews, technology demonstrations, modeling and simulation, and risk-mitigation prototyping were implemented.	
12. Best Practices Checklist: Validating the Estimate	a) The cost estimate was validated against four characteristics: 1. It is comprehensive, includes all possible costs, ensures that no costs were omitted or double-counted, and	a) ***Partially Meets*** **-** The Cost Estimating Template does not estimate all project costs, and only a general management review of the estimate is conducted. The Cost Estimating Template is not based upon a project WBS document, and does

Minimally Meets Requirements	explains and documents key assumptions. • It completely defines the program, reflects the current schedule, and contains technically reasonable assumptions. • It captures the complete technical scope of the work to be performed, using a logical WBS that accounts for all performance criteria and requirements. 2. It was documented so well that it can easily be repeated or updated and traced to original sources by auditing. • Supporting documentation identifies data sources, justifies all assumptions, and describes all estimating methods (including relationships) for all WBS elements. • Schedule milestones and deliverables can be traced and are consistent with the documentation. 3. It is accurate, not too conservative or too optimistic; is based on an assessment of most likely costs, adjusted properly for inflation; and contains few minor mistakes. • WBS estimates were checked to verify that calculations were accurate and accounted for all costs and that proper escalation factors were used to inflate costs so they were expressed consistently and accurately. • Questions associated with estimating techniques were answered to determine the estimate's accuracy. • CERs and parametric cost models were validated to ensure that they were good predictors of costs, their data were current and applied to the program, the relationships between technical parameters were logical and statistically significant, and results were tested with independent data. 4. Data limitations from uncertainty or bias were identified; results were crosschecked; an ICE was developed to see if results were similar.	not reference the Project Schedule as the pseudo WBS. b) ***Minimally Meets*** **-** The Cost Estimating Template does not contain significant documentation, or references to other documentation, that would support a subsequent or external audit. Only one milestone is required, which we found in our assessment of the 12 Project Schedule was generally the project end date. c) ***Minimally Meets*** **-** The Cost Estimating Template is not sufficiently sophisticated to adjust for any business factors (e.g., inflation) or adapt to any parametric costs. There is no alignment to a WBS, or the Project Schedule as the pseudo WBS. d) ***Does Not Meet*** **-** The Cost Estimating Template does not identify data limitations or list any major assumptions that were used in the development of the cost estimate. The template is also not adjusted for any risk or uncertainty analyses.

	• Major assumptions were varied and other outcomes recomputed to determine their sensitivity to changes in the assumptions. • Risk and uncertainty analysis was conducted.	
13. Best Practices Checklist: Documenting the Estimate **Partially Meets Requirements**	a) The documentation describes the cost estimating process, data sources, and methods step by step so that a cost analyst unfamiliar with the program could understand what was done and replicate it. • Supporting data are adequate for easily updating the estimate to reflect actual costs or program changes and using them for future estimates. • The documentation describes the estimate with narrative and cost tables. • It contains an executive summary, introduction, and descriptions of methods, with data broken out by WBS cost elements, sensitivity analysis, risk and uncertainty analysis, management approval, and updates that reflect actual costs and changes. • Detail addresses best practices and the 12 steps of high-quality estimates. • The documentation is mathematically sensible and logical. • It discusses contingency reserves and how they were derived from risk and uncertainty analysis and the LCCE funding profile. b) It includes access to an electronic copy, and both are stored so that authorized personnel can easily find and use them for other cost estimates.	a) ***Does Not Meet*** **-** The Cost Estimating Template does not describes the process used to estimate costs, identify its data sources or costing methods. It provides no supporting data adequate for easily updating the estimate, and the template is not updated with actual costs. There is no WBS used beyond the project schedule. b) ***Meets*** **-** The Cost Estimating Template is an Excel worksheet that is stored in the OCIO project archives. Historical project data is readily available to the project managers for reference.
14. Best Practices Checklist: Presenting the Estimate to Management ***Does Not Meet Requirements***	a) The briefing to management • was simple, clear, and concise enough to convey its level of competence. • illustrated the largest cost drivers, presenting them logically, with backup charts for responding to more probing questions. • was consistent, allowing management to focus on the estimate's content. b) The briefing contained	a) ***Does Not Meet*** **-** The Cost Estimating Template is used only to develop direct and indirect labor costs. It is not a management presentation format. The template cannot be correlated to any FSD finical report. b) ***Does Not Meet*** **-** No presentation of project cost data was provided beyond the Cost Estimating Template and the FY20 Draft Finical Plan. c) ***Does Not Meet*** - There was no information provided on the management feedback to any of the

	• A title page, outline, and brief statement of purpose of the estimate. • An overview of the program's technical foundation and objectives. • LCCE results in time-phased constant-year dollars, tracked to previous estimates. • A discussion of GR&As. • The method and process for each WBS cost element, with estimating techniques and data sources. • The results of sensitivity analysis and cost drivers that were identified. • The results of risk and uncertainty analysis with confidence interval, S-curve analysis, and bounds and distributions. • The comparison of the point estimate to an ICE with discussion of differences and whether the point estimate was reasonable. • An affordability analysis based on funding and contingency reserves. • Discussion of any other concerns or challenges. • Conclusions and recommendations. c) Feedback from the briefing, including management's acceptance of the estimate, was acted on and recorded in the cost estimate documentation.	project management Cost Estimating templates.
15. Best Practices Checklist: Managing Program Costs: Planning ***Does Not Meet Requirements***	a) A cost estimate was used to measure performance against the original plan, using EVM. b) EVM and risk management were tightly integrated to ensure better program outcomes. • Strong leadership demands EVM be used to manage programs. • Stakeholders make it clear that EVM matters and hold staff accountable for results. • Management is willing to hear the truth about programs and relies on EVM data to make decisions on how to mitigate risk. • Policy outlines clear expectations for EVM as a disciplined management tool	a) ***Does Not Meet*** **-** The Cost Estimating Template is not linked to any other project or OCIO management information. EVM has not been implemented by the OCIO as yet. b) ***Minimally Meets*** **-** The OCIO has not implemented an EVN system as yet. The OCIO provides the Weekly Portfolio Report for senior management, but for obvious reasons this report is not EVM based. The OCIO does provide partial LOE reporting, risk status and subjective assessments for each project in the weekly report. c) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. d) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. e) ***Minimally Meets*** **-** The OCIO considers the Project Schedule as the project WBS. This pseudo WBS does not define the

	and requires pertinent staff to be continuously trained in cost estimating, scheduling, EVM, and risk and uncertainty analysis. c) EVM is implemented at the program level so that both government and contractor know what is expected and are held accountable. • EVM relied on the cost of completed work to determine true program status. • EVM planned all work to an appropriate level of detail from the beginning. • It measured the performance of completed work with objective techniques. • It used past performance to predict future outcomes. • It integrated cost, schedule, and performance with a single management control system. • It directed management to the most critical problems, reducing information overload. • It fostered accountability between workers and management. d) The EVM system complied with the agency's implementation of ANSI's 32 guidelines. e) The following steps in the EVM process were taken: 1. The work's scope was defined with a WBS, and effort was broken into work and planning packages. 2. The WBS and organizational breakdown structure were cross-walked to identify control accounts that show who will do the work. 3. An acceptable technique was used to schedule work to resource load activities. I. All activities were identified and sequenced, logically networked, clearly showing horizontal and vertical integration. II. Activities were resource loaded with labor, material, and overhead and durations were estimated with historical data when available, and float was identified.	scope of the project, although other project documentation (i.e., Project Charter and Project Management Plan) does provide this information. There is no project documentation linked to the Project Schedule (WBS). The Project Schedule does define work tasks in reasonable work segments. f) ***Minimally Meets*** **-** The Cost Estimating Template is used to develop the estimated costs, but this estimate is not linked to the Project Schedule (WBS) and is not updated with actual costs once created. The OCIO does not employ a master schedule. Project Schedules are not baselined to readily identify changes in scope. g) ***Does Not Meet*** **-** The Cost Estimating Template and the Project Schedule (WBS) are not aligned or linked. This prevents identifying the needed detail to determine if resources were adequate to complete each activity. h) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. i) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. j) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. No EAC assessments developed from other means were provided. k) ***Does Not Meet*** **-** The Cost Estimating Template is not linked to the Project Schedule data. l) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. No EACs developed from other means were provided. m) ***Meets*** **-** Risk Registers were provided for the majority of IT Modernization projects. While the risk descriptions and quantity of the 13 Risk Registers reviewed varied significantly, the 14 Risk Registers averaged 4 risks per project (11 registers, high of 11 risks, low of 2 risks). n) ***Does Not Meet*** **-** No information provided that suggests an Integrated Baseline Review (IBR) was conducted. o) ***Does Not Meet*** **-** No information provided to determine if an award fee criteria were developed. p) ***Does Not Meet*** **-** No information was provided to determine if a performance based payment contract was considered for fixed-price contracts. Obsidian believes this requirement is actually not applicable to the IT Modernization effort.

	III. Program master schedule and critical path were identified. V. A schedule risk analysis was performed based on an 11-point schedule assessment V. Schedule reserve was chosen and prioritized for high-risk activities. VI. The schedule was updated using logic and durations to determine dates and reflects accomplishments and is continuously analyzed for variances and changes to the critical path and completion date. 4. Resources were adequate to complete each activity and were estimated to do the work, authorize budgets, and identify management reserve for high-risk efforts. 5. Objective methods for determining earned value were used. 6. The performance measurement baseline was developed for assessing program performance; EVM performance data were analyzed and variances from the baseline plan were recorded; the performance measurement baseline was updated. 7. EACs were forecast using EVM. 8. An integrated cost-schedule risk analysis was conducted. 9. EACs from EVM were compared with an EAC from risk analysis. 10. Management took action to mitigate risk. 11. A pre-award Integrated Baseline Review (IBR) was performed where provided for to verify the performance measurement baseline's realism and compliance with ANSI guidelines. 12. Award fee criteria were developed to motivate the contractor to manage its contract with EVM to deliver the best possible product, were tied to specific contract events, and did not predetermine specific EVM measures. 13. A performance based payment contract was considered for	q) ***Does Not Meet -*** EVM has not been implemented by the OCIO as yet.

	fixed-price contracts where technical effort and risk are low. 14. The EVM system implemented was validated for compliance with the ANSI guidelines by independent and qualified staff and therefore can be considered to provide reliable and valid data from which to manage the program.	
16. Best Practices Checklist: Managing Program Costs: Execution ***Does Not Meet Requirements***	a) An IBR verified that the baseline budget and schedule captured the entire scope of work, risks were understood, and available and planned resources were adequate. b) Separate IBRs were conducted at the prime contractor and all major subcontractors. c) A performance measurement baseline assessment made a comprehensive and value-added review of control accounts. I. Before award, or not more than 6 months after, an IBR categorized risks by severity and provided team training. II. Work definition (including provisions for rework and retesting), schedule integration, resource identification, earned value measures, and baseline validation were matured and reviewed. III. Interviewers used a template in discussions with control account managers and identified where additional training was needed. IV. An action plan for assigning responsibility for handling risks was developed, and a final program risk rating was based on a summary of all identified risks. V. Management reserve was set aside that covered identified risks and care was taken to include risks identified during the IBR in the risk management plan VI. An EVM analyst monitored corrective action requests for closure. VII. A memorandum for the record described the IBR findings.	a) ***Does Not Meet*** **-** No information was provided that suggests an IBR was conducted b) ***Does Not Meet*** **-** No information was provided that suggests an IBR was conducted c) ***Does Not Meet*** **-** No information was provided that suggests an IBR was conducted. d) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. No information was provided that suggests an IBR was conducted. e) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet.

	d) A contract performance report summarized EVM data. • The data were reviewed monthly to track program progress, risks, and plans. • Management used the data to I. integrate cost and schedule performance data with technical measures; II. identify the magnitude and effect of problems causing significant variances; III. inform higher management of valid and timely program status and project future performance. • Format 1 of the CPR reported data to at least level 3 of the WBS, and format 5 explained variances and the contractor's plans for fixing them. e) Program managers analyzed EVM data monthly and sequentially for variances and EACs. • The EVM data were checked for validity and anomalies. • Performance indexes were analyzed and plotted for trends and variances. • Schedule variances were analyzed against the most recently statused schedule to see if problems were occurring on or near the critical path. • Management reserve allocations in the WBS were examined and compared against risks identified in the cost estimate. • A range of EACs was developed, using a generic index-based formula or relying on probable cost growth factors on remaining work, combined with an integrated cost schedule risk analysis. • An independent date for program completion was determined, using schedule risk analysis that identifies which activities need to be closely monitored. • Senior management used EVM data to answer basic program questions.	
17. Best Practices Checklist: Managing	a) The cost estimate was updated with actual costs, keeping it current and relevant.	a) ***Minimally Meets*** **-** The OCIO provides a Weekly Portfolio Report that presents a portion of the project costs to the Library

Program Costs: Updating ***Does Not Meet Requirements***	• Actual cost, technical, and schedule data were archived for future estimates. b) Authorized changes to the EVM performance measurement baseline were incorporated in a timely manner. • It reflected current requirements. • These changes were incorporated in a documented, disciplined, and timely manner so that budget, schedule, and work stayed together for true performance measurement. • Changes were approved and implemented in a well-defined baseline control process. c) Regular EVM system surveillance ensured the contractor's effective management of cost, schedule, and technical performance and compliance with ANSI guidelines. • The surveillance organization was independent and had authority to resolve issues. • Surveillance staff had good knowledge about EVM and agency programs. • An annual surveillance plan was developed and programs were chosen objectively. • Findings and recommendations were presented to the program team for clarification, and the final surveillance report had an action plan to resolve findings quickly. d) The contractor's overtarget baseline or overtarget schedule was detailed, reasonable, and realistic; planned for costs, schedule, and management review; and described measures in place to prevent another OTB. e) Updated EACs and other EVM data were continually reported to management. f) EVM and CFSR–like data were examined regularly to identify problems and act on them quickly.	senior management. The costs reported in this weekly report are OCIO FTE hours, and a general status of the project. b) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. c) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. d) ***Does Not Meet*** **-** The project budget information provided consisted of the initial Cost Estimating Template and the weekly reporting of OCIO FTE hours. This information was insufficient to assess the contractor's budget performance. e) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. The OCIO provides a Weekly Portfolio Report that presents a portion of the project costs. The costs reported in this weekly report are OCIO FTE hours, and a general status of the project. f) ***Does Not Meet*** **-** EVM has not been implemented by the OCIO as yet. The OCIO provides a Weekly Portfolio Report that presents a portion of the project costs. The costs reported in this weekly report are OCIO FTE hours, and a general status of the project.

Appendix H– PBC Documentation Alignment to PMBOK

Table 5 - IT Modernization PBC Documentation Alignment to PMBOK

OCIO PBC Documents	PMBOK Project Integration Management									
Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK) guidelines, 6th edition – 2017 *The PMBOK[4] is a set of standard terminology and guidelines for project management. Much of the PMBOK Guide[4] is specifically focused on project management, to include critical path method and work breakdown structure.* Checkmarks indicate OCIO document applicability to PMBOK Knowledge Management Area	Project Integration Mgmt.	Project Scope Mgmt.	Project Schedule Mgmt.	Project Cost Mgmt.	Project Quality Mgmt.	Project Resource Mgmt.	Project Comm. Mgmt.	Project Risk Mgmt.	Project Procurement Mgmt.	Project Stakeholder Mgmt.
PBC_001_IT Program Modernization Plan.pdf	-- Not Relevant --									
PBC_002_Directional Plan - Final.pdf	☑	☑	☑		☑		☑	☑		
PBC_007_OCIO_2.0_Org Chart November 2019.pdf							☑			☑
PBC_008_Library-congress-orgchart-043019.pdf										☑
PBC_009_IT Centralization CDH memo.pdf		☑					☑			
PBC_010_LC IT Strategic Plan 2016-2020_v1.1_03.31.2016.pdf	-- Not Relevant --									
PBC_011_Library of Congress 2019-2023 Digital Strategy 0.2 (1).pdf	☑	☑		☑		☑	☑	☑		
PBC_012_IT Funding Framework Package (1).pdf				☑		☑		☑	☑	☑
PBC_013_IT Governance FAQ (1).pdf					☑		☑			
PBC_014_FINAL Modified USCO Provisional IT Modernization Plan.pdf	-- Not Relevant --									
PBC_015_Provisional IT Modernization Plan and Cost Analysis Copyright.pdf	-- Not Relevant --									
PBC_016_Program_management_plan_v1_4.pdf	-- Not Relevant --									
PBC_017_PMO Project Process Workflow PMLC Initiation Phase.pdf			☑							☑
PBC_018_and_021_ PMO Weekly Project Portfolio Report - FINAL-11152019.pdf					☑		☑			
PBC_19_IT-Modernization-projects.docx		☑								
PBC_020_Project_Classification_Worksheet.xlsx	-- Not Relevant --									
PBC_022_PMLC_Directive.pdf	☑		☑							☑
PBC_023_Program Manager PD_GS-15 2210-361870 Supervisory IT Project Manager.pdf	-- Not Relevant --									
PBC_024_OCIO_FY20 Risks_11.15.19.pdf								☑		

PBC_027_FY2019-IT-103 IT Modernization Evaluation PBC 27.pdf	- - Not Relevant - -									
PBC_029_draft_FY20 IT Finance Plan July 2019 v6.pdf										
PBC_030_TSB Charter APPROVED 5-21-2019.pdf	☑									☑
PBC_031_OIG - AutoAudit Upgrades and Archiving or Replacement Business Proposal.pdf		☑			☑					
PBC_031_OIG Version of Confluence Business Proposal.pdf		☑			☑					
PBC_032_Integrated Planning Team Overview.2019-05-08.pdf	☑	☑		☑	☑	☑				☑
PBC_033_ITF Sub-Group Charter APPROVED 5-21-2019.pdf	☑	☑	☑							☑
PBC_036_and 019_IT-Modernization-projects_KLAU PBC 36_12.19.19_2.pdf		☑								
PBC_037_259 Project Schedule - Oracle 12c Upgrade.mpp			☑			☑				
PBC_037_274 Project Schedule - MySQL Modernization.mpp			☑			☑				
PBC_037_464 Project Schedule - LOC Data Center Transformation - Revised_v19.mpp	☑		☑			☑				
PBC_037_492 Project Schedule - Windows 10 Migration - 10-5-18.mpp	☑		☑			☑				
PBC_037_525 Project Schedule - LOCgov.mpp	☑		☑							
PBC_037_532 Project Schedule - Congressgov.mpp	☑		☑			☑				
PBC_037_533 Project Schedule - SCU.mpp	☑		☑							
PBC_037_551 Project Schedule - GHE Support Services - Master.mpp			☑			☑				
PBC_037_597 Project Schedule - LOC Splunk Enterprise - 12-19-19-JJ.mpp	☑		☑			☑				
Risk Registers.rar								☑		
PBC_037_IT Modernization Project Schedules v02.xlsx	- - Not Relevant - -									
2019 IT Modernization PBC List.xlsx	- - Not Relevant - -									

Appendix I – OCIO IT Directional Plan

IT Directional Plan, FY2019-23, Office of the Chief Information Officer

Overview

This IT Directional (Strategic) Plan[5] for fiscal years 2019-2023 establishes and aligns strategic and operational goals, objectives, and initiatives for the Office of the Chief Information Officer (OCIO), guided by the Library of Congress Strategic Plan 2019- 2023: Enriching the Library Experience, and its complement, the FY2019-2023 Digital Strategic Plan of the Library of Congress.

Our Office's strategic direction for the next five years is in-line with the Library's determined direction forward: user-centered, data-driven, and digitally enabled. This direction also furthers the Library's four overarching strategic goals: Expand Access, Enhance Services, Optimize Resources, and Measure Impact.

OCIO is dedicated to delivering secure, reliable, scalable, and seamlessly integrated technology solutions that enable all users to maximize their use of the Library's content and services. We believe information should exist in an environment that fosters meaningful connections and supports an open, collaborative, and unifying culture. This clear mission and vision allowed us to articulate OCIO's four goals: 1) Provide Strategic Direction and Leadership; 2) Improve IT Resource Management; 3) Deliver Business-Driven Capabilities; and 4) Protect Systems and Information.

These four goals, along with the objectives and initiatives established by each OCIO directorate to meet them, will enable OCIO to fulfill its mission and vision, while empowering successful operations across the Library. The priorities of other Library Service Units—our close partners—were considered to establish a holistic approach of how OCIO can best enable the business processes, core technologies, and expert workforce to achieve the Library's overall strategy. OCIO commits to being a strategic partner with its fellow Service Units to collect and manage digital content, automate internal processes, and deliver services electronically to all Library users.

Moving forward, this IT Directional Plan[5] will inform overarching Library priorities in the Library's Enterprise Implementation Roadmap, and, together, will be reviewed and updated annually in accordance with the Library's Strategic Plan.

Strategic Context and Drivers

Background

The Office of the Chief Information Officer (OCIO) provides strategic direction, leadership, services, and capabilities within the Information Technology (IT) domain for the Library of Congress. By optimizing resources and leveraging advanced technology, OCIO provides a technological foundation for Library operations in the 21st century and strengthens the Library's capacity to support Congress, the creative community, and the public.

In November 2016, the Librarian of Congress directed the Library to move from a decentralized technology governance model to centrally coordinating all technology activities through OCIO. The move, which culminated with full IT centralization in October 2018, improves the management of IT operations and resources, and helps to address recommendations made by auditors and congressional stakeholders by giving OCIO full oversight of:

- IT strategic planning and governance, IT project management, and enterprise architecture; IT human resources, assets, and services management;
- IT quality and performance management, and the overarching IT service delivery model for the Library;

- Communication and direct engagement with OCIO's mission partners throughout the Library; and
- IT security, and Business Continuity and Disaster Recovery planning.

With the centralization authority given by the Librarian, OCIO is better able to find enterprise-wide cost optimization opportunities and improve IT governance. Through improved cost efficiencies, OCIO will seek to shift more of the current IT resource use from "run the business"1 towards "change the business"2 when feasible. Cost optimization efforts will target agency-wide infrastructure and operations to reduce inefficiencies and eliminate redundancies where warranted. This includes:

- Applying best practices to managing commodity IT infrastructure and mission-driven IT customer services; and
- Updating the IT service catalog, (a set of IT service management practices that focus on aligning IT services with the needs of business) and begin to capture cost of service provisioning through implementation of the Technology Business Model (TBM) framework.

OCIO will also employ IT governance structures, monitoring capabilities, and management controls over all IT spending. The overall objective is to ensure timely execution and delivery, avoid cost overruns, mitigate risks, and minimize schedule slippages. Mechanisms include proactive IT investment planning and resource oversight through a newly energized cross-agency Technology Strategy Board, adoption of an enterprise-wide architecture (EA) framework, and promulgation of Project Management Office (PMO) best practices and standards that follow a modern, agile, and modular system development approach.

OCIO will assess innovation and adopt promising emerging technologies, tools, and platforms with minimal operating risks, increased potential for improved cost efficiencies, and maximum customer value. This includes adopting cloud-based services (infrastructure, platform, and software) where beneficial, enabling an increasingly mobile work force, and executing the Library's Digital Strategy. Through all this, OCIO will continue to employ the most current IT security tools and practices to ensure data integrity, security of sensitive Congressional requests and responses, and prevention of denial of service and other attacks by entities seeking to disrupt the Library's mission.

Envisioning 2025

In the summer of 2017, the Librarian of Congress introduced the Library's strategic planning initiative, Envisioning 2025, to set a new course for the Library of Congress. The initiative defined the Library's vision for the future and prioritized the actions necessary to realize that vision. The initiative will ultimately result in the realization of a digital library that leverages the technologies of tomorrow, expands access, and enhances services for a larger portion of the American population and learners around the world.

The central output of Envisioning 2025 was the Library's Strategic Plan 2019-2023: Enriching the Library Experience. The Strategic Plan is the result of the work and research of hundreds of Library staff and leaders. Through strategy labs, tiger teams, working groups, internal and external stakeholder interviews, surveys, and open staff forums, the Library collected input and insights to refine its mission and vision and determine its four strategic goals, thirteen shared objectives, and direction forward for the next five years:

Library Strategy Framework

Mission

Engage, inspire, and inform Congress and the American people with a universal and enduring source of knowledge and creativity.

Vision

All Americans are connected to the Library of Congress.

Elevating Digital

Concurrently, OCIO led the effort to articulate a digital strategy, which serves as a complement to the Library's Strategic Plan. The FY2019-2022 Digital Strategic Plan describes how the Library will use each interaction as an opportunity to move users along a path from awareness, to discovery, to use, and finally to a connection with the Library through three main goals:

- We will throw open the treasure chest.
- We will connect.
- We will invest in our future.

Directional Planning Process

To make the 2019-2022 Strategic Plan goals and objectives actionable, eleven Planning Units, comprised of Service Units and other distinct components across the Library, including OCIO, followed a step-by-step analytical process to identify, assess, and prioritize the users they serve, the services they provide, and the capabilities they deliver. Within the context of these choices, Planning Units proposed goals, objectives, and initiatives to strengthen the capabilities needed to enhance services provided to target users. They then aligned these to the Library's strategic framework.

OCIO's mission, vision, and goals are outlined below. Goals are depicted in alignment to the Library's Strategic Plan. Additional details about objectives, initiatives, and proposed performance measures are provided throughout the document. Objectives and initiatives may either be internally focused, to improve or modernize OCIO's operations, or externally focused, to support and advance the mission's business needs identified in the Library's 2019-2023 Strategic Plan.

Agency-level initiatives that have been identified as requiring support from OCIO are included as an appendix to this Directional Plan,[5] organized by the fiscal year in which each planning unit originally identified the activity to occur. The Library's Technology Strategy Board (TSB), a cross-agency executive board, recommends strategic priorities for the development and use of IT at the Library based on the Library of Congress Strategic Plan and Library of Congress Digital Strategy. While the CIO, as delegated by the Librarian of Congress, makes final technology decisions for the Library, it is the role of the TSB to recommend prioritization of the myriad investments and activities with an IT element. OCIO presents these initiatives here to provide a view into the breadth and depth of work that is dependent upon the Library's central technology service. As the TSB recommends strategic priorities among the several initiatives across units, OCIO can reorganize the appendix by priority initiative.

OCIO Strategy Framework

OCIO Mission

Deliver secure, reliable, accessible, and scalable technology solutions that enable all users to maximize their use of the Library's content and services.

OCIO Vision

Information will exist in an integrated environment that fosters meaningful connections and supports an open, collaborative, and unifying culture.

IT Directional Plan[5] Contents

Goal 1: Provide Strategic Direction and Leadership

- Objective 1.1 Digital Strategy (Agency level)
- Objective 1.2 IT Governance (Supporting)
- Objective 1.3 Project Management (Supporting)
- Objective 1.4 Enterprise Architecture (Supporting)
- Objective 1.5 Quality and Performance Management (Supporting)
- Objective 1.6 Communications (Supporting)

Goal 2: Improve IT Resource Management

- Objective 2.1 Financial Management (Agency level)
- Objective 2.2 Human Capital Management (Supporting)
- Objective 2.3 Contracts and Asset Management (Supporting)

Goal 3: Deliver Business-Driven Capabilities

- Objective 3.1 Solution Design and Delivery (Agency level)
- Objective 3.2 Customer Service Management and Mobility Support (Supporting)
- Objective 3.3 Infrastructure Transformation (Agency level)

Goal 4: Protect Systems and Information

- Objective 4.1 Information Security (Agency level)
- Objective 4.2 Business Continuity and Disaster Recovery (Supporting)
- Objective 4.3 Records Management (Supporting)

OIG Appendix B: Management Response

LIBRARY
LIBRARY OF CONGRESS

Office of the Librarian

MEMORANDUM

DATE January 13, 2021

TO Kurt Hyde, Inspector General

FROM J. Mark Sweeney, Principal Deputy Librarian of Congress

SUBJECT Management Response to OIG report 2019-IT-104, IT Modernization Evaluation

The Library of Congress (Library) has been working diligently to address findings and recommendations raised by the Government Accountability Office (GAO) and the Office of the Inspector General with respect to information technology (IT) project management and costing for the Library's IT projects. We know the Office of the Chief Information Officer (OCIO) has made significant progress in establishing and refining the Library's digital strategy and implementing IT investment policies that impose executive-level accountability and decision-making and establish linkages among budget, resources, and both Library and service unit-specific business needs. OCIO continues to mature those policies as well as the IT project management processes and IT infrastructure. Moreover, the Financial Services Directorate's directional plan acknowledges the relevance of Library-wide standards for program costing and, in conjunction with findings in the annual financial audit, has been working to develop an integrated master plan that includes processes to address complex financial reporting as well as guidance on costing as appropriate for the Library.

In general, we do not believe the report reflects the real progress made by the Library to date or OCIO's substantial ongoing efforts to resolve existing audit findings with GAO and your office. Notably, there is a fundamental difference between the auditor's and the Library's definitions of "IT projects." As further discussed in the attached, IT modernization at the Library spans varying service units and systems that cannot be treated as a monolithic project and, therefore, requires more narrowly-defined implementation plans. Accordingly, the OCIO directional plan does not serve as an implementation plan and the auditor's findings and recommendations that suggest the Library create a single schedule or plan to encompass all modernization efforts overlook the Library's business needs and strategic planning efforts to date. Moreover, we strongly disagree with including recommendations that involve topics already being addressed from prior, related, audits. Not only is there a difference of opinion regarding how the Library should treat IT Modernization, but audits that have been performed by different entities could result in conflicting opinions that adversely affect the Library's

ability to implement such recommendations successfully or efficiently. The attached chart highlights specific disagreements with key findings and recommendations and provides responses to individual recommendations.

Attachments

cc: Bernard A. Barton, Jr., Chief Information Officer
Mary Klutts, Chief Financial Officer
Edward Jablonski, Chief Operating Officer
Elizabeth Pugh, General Counsel

Management Comments on Draft OIG Report No. 2019-IT-104
IT Modernization Evaluation Report

Finding #	Finding	Rec#	Recommendation	Resp. Office	Comments	Target completion
1	**OCIO does not have an implementation plan for IT Modernization:** As a strategic planning document, the 2019 OCIO IT Directional Plan5 is inadequate for use as the IT modernization effort's implementation and execution guide. ***OCIO does not refer to and does not consider the IT Directional Plan as the "implementation plan and execution guide" for IT modernization. Each project that referenced in the IT Directional Plan has its own implementation plan.***	1.1	OCIO should make a dedicated effort to develop an IT Implementation Plan for the modernization effort. The IT Implementation Plan should continue to maintain and enhance the consistency of its KPI metrics that are specific, measureable, achievable, relevant, time-bound, and that align with OCIO business and operational objectives against which individual project performance can be measured. PMO should ensure these KPI metrics are incorporated into their processes and procedures using the applicable elements of the PMBOK and GAO guidelines. In accordance with those guidelines, the plan should also be baselined.	OCIO	The Library will not implement this recommendation as drafted, but has provided the OIG evidence of implementation plans for Library-defined IT projects. The CIO disagrees with the finding and associated recommendation, because the modernization projects are not related enough to have a separate, overarching, IT Implementation plan. This takes place through the strategic planning and budget processes. The Library does not manage IT Modernization as one program but instead separate IT modernization projects.	n/a
2	**Some Projects Artifacts Were Missing Essential Information:** Key project documentation, as specified in the PMO's Project Classification Worksheet, was not provided for all IT Modernization project efforts.	2.1	The OCIO should perform a gap analysis to determine the PMBOK and GAO cost and schedule assessment principles and practices the Library still needs to implement.	FSD/OCIO	Agree. The Library plans to do an cost benefit analysis/return on investment determination for aspects of the PMBOK/GAO cost and schedule assessment principles and practices, in addition to the gap analysis. Based on that analysis and determination, the Library will choose which aspects of the PMBOK and GAO cost and schedule principles and practices to implement.	Q4/FY22
		2.2	The OCIO should implement specific guidelines that all IT projects must follow to meet PMBOK and GAO standards. For example, the Library could require that each project complete a checklist containing the specified guidelines.	OCIO	This is a duplicate finding from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #5). The Library will not implement the recommendation as drafted in this report, because OCIO has already provided evidence to the OIG of implementation of IT project checklists pursuant to prior report recommendations. For example, the Library submitted the project charter template, which included a draft checklist, to the OIG in January 2020 that demonstrated the prior recommendations had been implemented. OCIO disagrees with the current finding to the extent it inaccurately describes the existing project documentation and misrepresents past agreements between the Library and OIG that OCIO need not update past, completed, IT project documents. The Library now requires project charters to include a checklist (page 5 of the project charter template) as part of the formal project charter review and signoff. This evidence was submitted January 23, 2020 in response to Recommendation #10 in audit 2018-IT-107.	n/a
		2.3	The OCIO should develop a monitoring and quality assurance process to ensure that each IT project complies with PMBOK and GAO cost and scheduling guidelines, as adopted by the Library.	OCIO	Agree.	Q2/FY22

3	**Ineffective Management of Cost Estimation and Budget:** Cost estimates were not provided for all IT Modernization Project efforts and could not be correlated to the fiscal year 2020 budget. Numerous cost estimating best practices outlined in the GAO Cost Estimating and Assessment Guide were not followed.	3.1	Obsidian recommends developing a formal checklist that contains the GAO Cost Estimating Assessment Guide's best practices for Project Managers to follow when developing, executing and maintaining project costs.	FSD/OCIO	Agree. FSD and OCIO will work together to develop a formal checklist.	Q4/FY21
4	**Inefficient Project Schedule Management:** Several schedule best practices outlined in GAO Schedule Assessment Guide were not followed, project schedules lacked sufficient detail to accurately track and manage performance, and IT Modernization project efforts are not being managed as a portfolio of projects. ***The Library disagrees with "IT Modernization project effort are not being managed as a portfolio of projects." The modernization projects are part of the OCIO portfolio of projects. The Library does not manage IT Modernization as one program with a single integrated master schedule because there is insufficient inter-dependencies between the projects.***	4.1	OCIO should undertake a dedicated effort to develop tactical project schedule management processes that align with the best practices for project schedule management as outlined in the PMBOK Knowledge Area – Project Time Management, and the GAO Schedule Assessment Guide to determine if the IT modernization project schedules provided sufficient detail to accurately track and manage performance.	OCIO	Agree. The Library will develop tactical project schedule management processes that align with the best practices for project schedule management as outlined in the PMBOK and the GAO Schedule Assessment Guide.	Q4/FY21
		4.2	The PMO should analyze and collectively manage the IT modernization projects with an IMS consisting of all IT modernization project efforts. This will allow for visibility and transparency into the status of all efforts and allow for the easy identification of interdependencies and how changes to a project affect the overall modernization effort.	OCIO	The Library will not implement the recommendation as drafted. The CIO disagrees with the recommendation, because the modernization projects are not related enough to manage as a program with an integrated master schedule.	n/a
5	**Lack of Verifiable Goals and Success Criterion:** The OCIO has not defined verifiable goals, measurable metrics and success criterion for the IT modernization effort. ***Disagree. OCIO does not consider the IT modernization effort as one large project or program but instead separate IT modernization projects. The IT modernization projects referenced in this audit do have defined verifiable goals, measurable metrics and success criterion per the Library's PMLC directive.***	5.1	OCIO IT modernization goals and success criterion should be developed to align with the OCIO's business goals and objectives to ensure the IT modernization effort achieves OCIO's stated objectives.	OCIO	The Library will not implement the recommendation as drafted, because the CIO disagrees with the findings and the audit premise that there is a single IT modernization effort. All IT modernization projects are aligned with OCIO's business goal and objectives which the project charters align to the goals in the IT Directional Plan. The IT modernization projects referenced in the report align with Goal #3, Deliver Business-Driven Capabilities in the IT Directional Plan.	n/a
6	**Inadequate Variance Tracking Methods:** Tracking methods used for project schedule and cost variances are limited to OCIO FTE hours, which do not properly reflect cost performance to budgeted targets and performance objectives. ***Disagree. This is a duplicate finding from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #1).***	6.1	FSD, working with OCIO, should track project cost variance in a manner that meets the OCIO's business objectives.	FSD/OCIO	This is a duplicate recommendation from OIG audit report 2018-IT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT (Finding #1). OCIO disagrees with the underlying cause identified by the auditor and notes the PMO has metrics and KPIs relating to project scope, schedule, and cost. Moreover, in response to prior audit findings, FSD is currently evaluating an optimal future state around cost management including both cost estimation and cost accounting, and the necessary policy and procedures, as well as identifying necessary staff and functional changes to enable the recommendations for FSD's modernization.	n/a