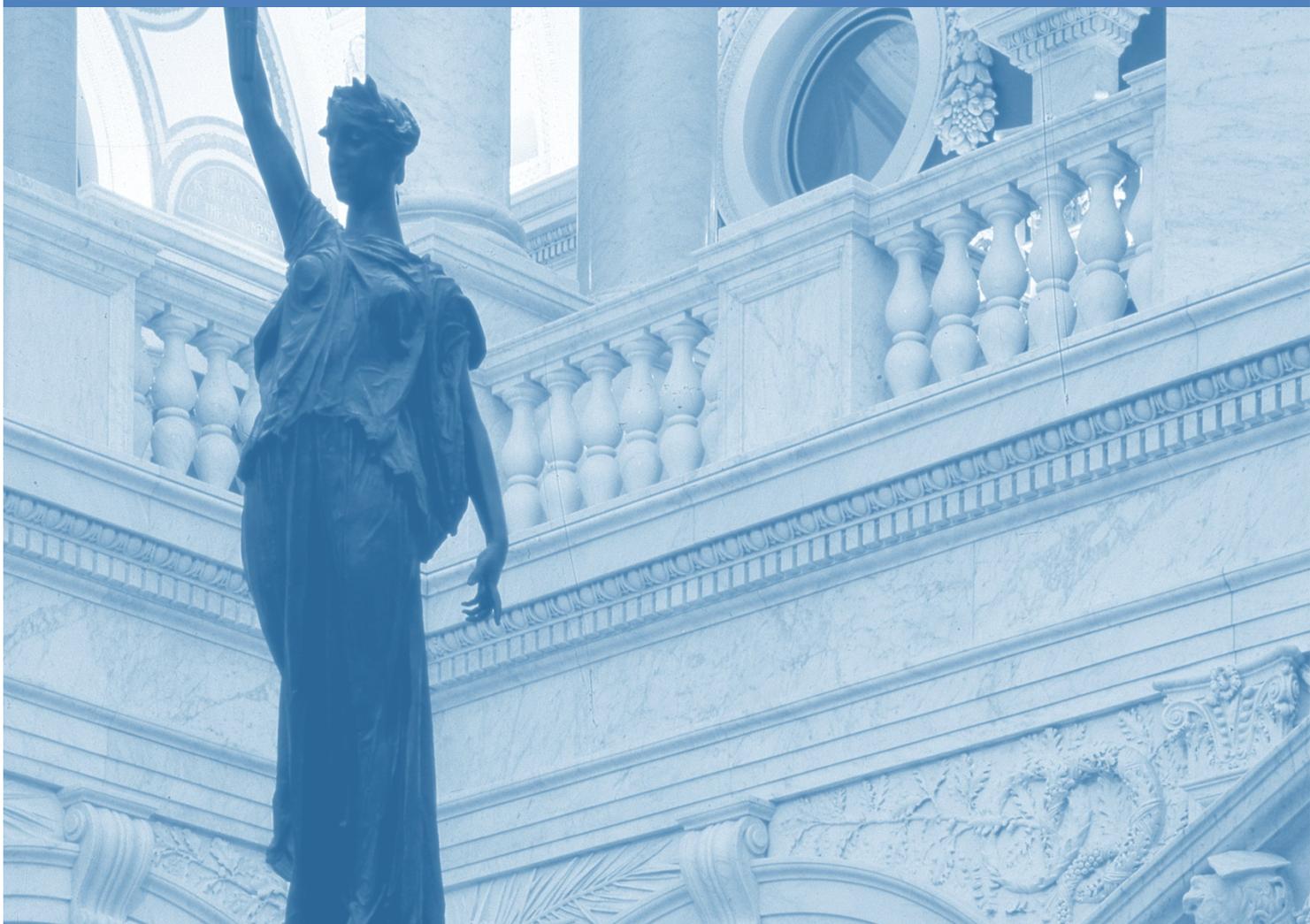




## Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment



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## MEMORANDUM

**DATE:** September 18, 2018

**TO:** Dr. Carla Hayden  
Librarian of Congress

**FROM:** Kurt W. Hyde  
Inspector General 

**SUBJECT:** Report No. 2018-SP-102, *Steady Progress, But There Are Gaps in OCIO's Roadmap to Modernize Its IT Environment*

The Chairman of the Committee on House Administration told the Office of the Inspector General (OIG) he wanted the Library of Congress (Library) to address and resolve the top management challenges identified in OIG's Semiannual Reports to the Congress. Consequently, for the semiannual reporting period ending in March 31, 2018, OIG selected two such challenges – strategic planning and information technology – to evaluate the Library's efforts related to them and present our findings in our semiannual report. For the evaluation of the Library's efforts to develop a well-designed and functioning information technology (IT) environment, our objectives were to determine the scope of the operations and investments associated with its development, status of development activities, adequacy of development plans, and transparency associated with development activities. This required an analysis of the actions planned for improving the Library's IT governance, IT investment practices, and IT system development transparency.

This transmits our final report on the Library's efforts to develop a well-designed and functioning IT environment. The report did not make formal recommendations that required management to respond to the draft report, in accordance with LCR 9-160, *Rights and Responsibilities of Employees to the Inspector General*, §6.A. The final report will be made publicly available.

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

cc: Principal Deputy Librarian  
Chief Information Officer  
Chief of Staff  
General Counsel

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## Summary

The Office of the Inspector General (OIG) has initiated a series of evaluations to report on the Library's progress in developing and implementing a modern information technology (IT) environment. We will focus on the status of development activities, the adequacy of development plans, and the associated transparency provided by the Office of the Chief Information Officer (OCIO).

The key to the Library of Congress (Library) successfully developing a modern IT environment is the OCIO using a strategic approach to improve its IT governance, establishing accountability for IT investments, implementing a well-designed and functioning primary computing facility, and employing IT best practices. In order for OCIO to be successful in this approach, an essential element involves establishing short-, mid-, and long-term goals. A well-designed plan also provides OCIO with an effective format for conveying what progress has been made to Library management and informing key stakeholders, such as Congress, about the resources needed and the level of effort required to accomplish the desired result.

OIG believes that it is essential to establish a baseline from which we will measure OCIO's progress going forward. Movement towards a modern and efficient IT environment can only occur when planning links required tasks along a pathway that progresses logically and orderly through interfaces that act as stepping stones to the next layer of IT environment. Progress will not occur with the delivery of random and unconnected tasks. The plotting of the plan's pathway from initiation of the development to completion and delivery is in actuality the project's critical path. This will also identify the key performers, thereby establishing the basis for performance management while providing stakeholders and Library leadership with the necessary accountability to assess OCIO's progress going forward.

## What the Evaluation Found

Our evaluation identified seven key initiatives that demonstrate important progress by OCIO toward a modern IT environment and are vital

foundational elements in its development. We have included in our baseline the current state of those initiatives. They include OCIO's remediating a significant number of open OIG and Government Accountability Office (GAO) audit recommendations; implementing an IT Strategic Plan; issuing the IT Program Modernization Plan; centralizing the Library's IT function in OCIO; upgrading the authority and span of control of the Project Management Office; initiating Technology Business Management (TBM) as its business analysis and cost accounting methodology; and coordinating with the Copyright Office to develop a Modified U.S. Copyright Office Provisional IT Modernization Plan.

OCIO intended for the recently released IT Program Modernization Plan (Modernization Plan) to serve as a roadmap for achieving the goals set forth in the Library's 2016-2020 IT Strategic Plan. It presents 15 key projects, initiatives, and activities underway or planned for fiscal years 2018-2020 classified under one of the four IT strategic goals in the Library's IT Strategic Plan. OCIO has advised us that it will use the Modernization Plan as its program plan for OIG tracking and reporting for this top management challenge.

### **Gaps in the Modernization Plan and Baseline**

Although we believe OCIO has made progress towards improving IT operations and movement towards a modern and efficient IT environment, we also feel they have not adequately articulated their plans and vision to that end. Over the course of developing a modern IT environment, OCIO must address gaps in the Modernization Plan and in other initiatives that are part of the current baseline. As currently structured, the Modernization Plan lacks important categories of details necessary for it to be useful in understanding how its 15 key projects, initiatives, and activities develop, interact, and progress to deliver a modern IT environment.

In addition, the Modernization Plan would be more useful if it included cost estimates for individual initiatives and for the modernization effort as a whole.

The Library must identify planned project resources by establishing a reliable system of accountability for collecting good cost data. Reliable information about costs is critical for evaluating progress on individual targets and milestones. Accurate and reliable cost accounting data is needed for effective project management. Poor cost accounting data will inhibit effective decision-making, increasing the risk of cost overruns or reductions in project scope due to unexpected limitations on capital resources. The Library is in the infancy of developing cost accounting, a comprehensive framework, and data to establish its approach to IT cost accounting. The Office of the Chief Financial Officer and Human Resources Services will need to be leading partners in this effort.

In addition, the current Modernization Plan does not identify the risks involved, describe how OCIO will address those risks, or include consideration of the Library's tolerance for risk. Developing a risk management plan and associated risk mitigations are key factors for responding to target/milestone variances, minimizing delays and financial losses, and reducing exposure to project failure.

Finally, the Library and OCIO in general do not have adequate customer data to assess customer expectations, needs, or requirements. In order to measure and improve their delivery of services, the Library and OCIO must develop a strategy for collecting, analyzing, responding to, and storing customer data. GAO research has shown that to be successful, IT organizations should measure (which requires obtaining good customer data) the satisfaction of their users and take steps to improve it.

In discussions with OCIO about our concerns, they have responded by taking the initiative to assign a Senior Program Manager to develop a program plan and related documentation that will ensure coordination and full communication of the components of IT modernization at the Library.

## Management Comments

Management stated that the Library is committed to using Project Management Institute project principles to guide its IT modernization. OIG did not make formal recommendations that required a management response.

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## Background

The Office of the Inspector General (OIG) continues to recognize and report that developing a well-designed and functioning information technology (IT) environment remains a Top Management Challenge for Library of Congress (Library) management. To evaluate the Library's efforts to modernize its IT environment, OIG employed the Council of the Inspectors General on Integrity and Efficiency's (CIGIE) *Standards for Inspections and Evaluations*.<sup>1</sup> Developing a well-designed and functioning IT environment confronts even the most accomplished federal agency management with a formidable challenge. The challenge involves well thought out planning, the orchestration of large numbers of human resources, and timely investment in capital assets. Success depends on the ability of management to interface key components at the right time, react to functional variances, and nimbly maintain course on the project's critical path.

OIG's overall objective requires it to analyze the steps taken to ensure that the Library develops an effective plan for tracking its efforts to implement a well-designed and functioning IT environment. This includes evaluating whether the Library uses a strategic approach to improve its IT governance, establish accountability for IT investments, implement a well-designed and functioning primary computing facility, provide alternate hosting options, and employ IT best practices. In this interim document, we will report our observations about progress to date, establish a baseline for measuring future progress, and ensure that the Library can measure its progress towards strategic goals.

A well-designed plan provides the Office of the Chief Information Officer (OCIO) an effective format for conveying to senior Library management modernization progress. OCIO should also use the plan to convey to key stakeholders including Congress not only its development progress but also the resources and level of effort required to accomplish the desired result. Maintaining stakeholder and congressional support depends on straightforward and reliable project communications.

OIG first reported in an all-inclusive manner about significant deficiencies in the Library IT environment in its March 2009 report No. 2008-PA-105, *Information Technology Strategic Planning: A Well-Developed Framework is Essential to Support the Library's Current and Future IT Needs*. That report examined shortcomings in the Library's IT strategic planning, investment process, organizational structure, enterprise architecture, and customer service. Since September 2011, OIG has reported in its *Semiannual Report to the Congress* that Library management faces the Top Management Challenge

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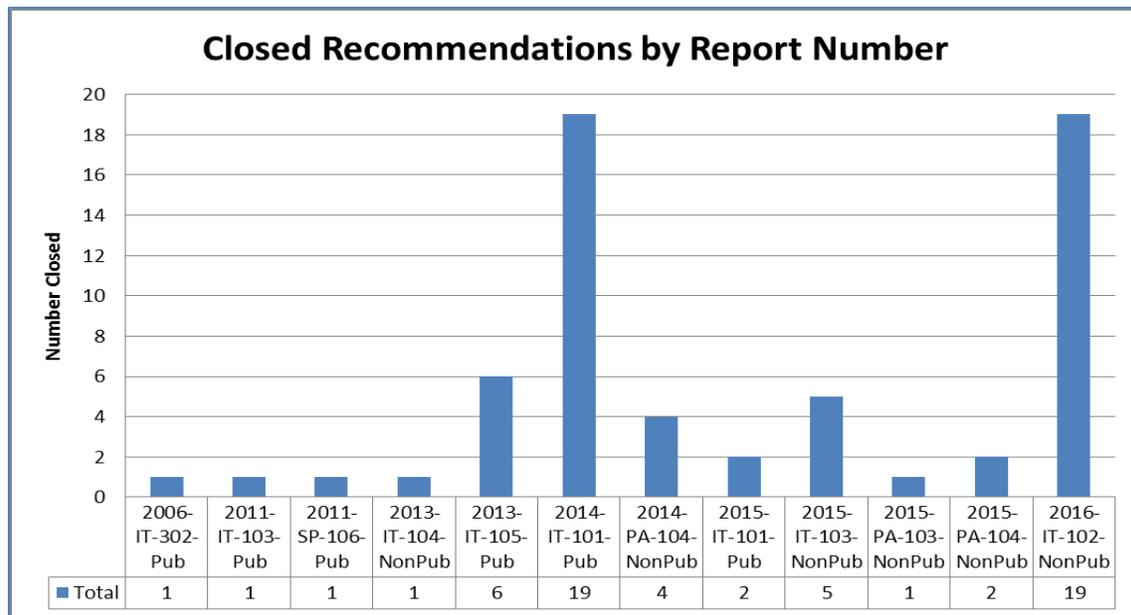
<sup>1</sup> See Appendix A: Objectives, Scope, and Methodology.

of developing an efficient IT environment that delivers well designed and functioning IT services to Library service units.

With the appointment of a Chief Information Officer (CIO) in September 2015 and his placement in a direct reporting line to the Librarian, the Library established organizational technology leadership designed to tackle the important and essential assignment of establishing a well-designed and functioning IT environment.

The *Reports Consolidation Act of 2000*, specifically 31 U.S.C. 3516(d), requires executive branch Inspectors General to report on management and performance challenges facing an agency and assess the agency's progress in addressing those challenges as part of the agency's consolidated report. While not specifically required for the Library OIG, this Office follows the practice of executive branch Inspectors General and reports on the Library's Top Management Challenges in its *Semiannual Report to the Congress*. Additionally, we have initiated a process to more closely monitor progress toward resolution of Top Management Challenges through reports using CIGIE's *Quality Standards for Inspection and Evaluation*.

OIG's ongoing review demonstrates that the Library has begun the difficult process of remediating previously identified shortcomings in IT planning and operations. Since March 2017, OIG has closed over 60 prior report recommendations from public and non-public information technology reviews and evaluations (see Figure 1). For example, our recent evaluation of Tier 1 contingency planning noted progress in the areas of contingency plan documentation compared to our 2016 review of similar controls. With the implementation in May 2017 of Library of Congress Regulation (LCR) 5-110, *Information Technology Resource Management*, the Library implemented OIG's recommendations for designating the CIO as chair of the IT Steering Committee, promulgated the duties of the IT Steering Committee, and defined the IT investment management (ITIM) process.



**Figure 1:** Closed Recommendations by Report Number

**Source:** Library of Congress, Office of the Inspector General.

The Library should take a strategic approach in its efforts to develop a well-designed and functioning IT environment. Strategic planning has many purposes, but among the most important are planning and management. As described by the Office of Management and Budget (OMB), “strategic goals and objectives [are used] to guide implementation and management. Each strategic goal should be supported by a suite of strategic objectives and performance goals.”<sup>2</sup>

Established project management methodologies, such as the Project Management Institute’s *A Guide to the Project Management Body of Knowledge (PMBOK)* have much to offer the Library as it moves forward with its modernization efforts. OCIO has begun to develop a project management approach to improving its IT governance, implementing IT best practices, and establishing a well-designed and functioning IT environment. Based on the results of this interim review, as well as the 14 audits and evaluations of IT control areas OIG has conducted at the Library since 2013, we believe that a PMBOK project management approach will provide the Library with the best opportunity to overcome this Top Management Challenge.

This document is an interim report and represents a point in time. As part of OIG’s overall IT environment evaluation, our future efforts will include:

<sup>2</sup> Office of Management and Budget *Circular A-11, Section 230-Agency Strategic Planning*.

- reviewing the Library's Program Management Plan for addressing the issues highlighted in the Top Management Challenge;
- analyzing the critical path identified by management;
- tracking progress for accomplishing the all-important work breakdown structures;
- evaluating the accomplishment of targets and milestones; and
- inquiring of management about the realignment of resources to address variances in achieving milestones and targets.

## Envisioning a Well Designed and Functioning IT Environment

To assess Library progress on a well-designed and functioning IT environment, management, stakeholders, Congress, and taxpayers should have a common understanding of what that goal looks like in the long term. Strategic planning is a valuable tool for communicating to agency managers, employees, delivery partners, suppliers, Congress, and the public a vision for the future. A well designed and functioning IT environment provides its customers with an efficient, safe, and reliable environment employing best practices.

These best practices for an agency IT organization include:

1. continuing to evolve good IT practices in its ITIM processes;
2. establishing an effective enterprise architecture (EA) function that ensures the technology landscape employs the current technological features while communicating its vision for the successor hosting environment;
3. maintaining an effective system of internal control over IT activities;
4. implementing tools that monitor hosting environment activities and provide data for in-depth performance analysis;
5. maintaining accurate and reliable cost accounting data for IT investment decisions and cost recovery;
6. researching and improving continually data and system protection methods;
7. devising a flexible human capital plan that provides well qualified talent while retaining high performing employees;
8. benchmarking performance against high performing IT operations to ensure continuous improvement; and

9. defining IT service delivery requirements and associated service level agreements with performance metrics and reporting.

An agency IT function cannot accomplish this desired state in one giant leap. It involves a process that uses planned stages (work breakdown structures) for delivering layers of operating improvements, cultivating systems of internal control, maturing investment decision making, and improving budget execution. The process requires communicating to stakeholders a clear roadmap that progresses towards defined milestones and targets. Those destinations should identify short- (one year), medium- (three years), and long-term (five years) intervals that coincide with the strategic planning cycle and promote resource adjustments based on variances realized at those critical junctures. “Milestones bring reality to a strategic plan. If the [organization] doesn't meet milestones as it executes the plan, leaders have to reconsider whether they've got the right strategy...[s]trategy planning needs to be conducted in real time, connected to shifts in the competitive environment and the [organization's] own changing strengths and weaknesses. This means defining the mission in the short to medium term as well as in the long term.”<sup>3</sup>

OMB Memorandum M-16-19 and the Federal IT Acquisition Reform Act (FITARA) have provided criteria and comprehensive guidance for best practices in key areas of data center expansions and management. Although neither OMB M-16-19 nor FITARA require Library compliance, the positions of authority and magnitude of IT resources under each body's control establish both as appropriate resources for IT best practices. As authoritative sources for IT best practices, FITARA and OMB M-16-19 provide guidance for such critical issues affecting the Library's development of a well-designed and functioning environment as:

- CIO leadership and responsibility for IT environment and data center decisions, management, and budget;
- virtualization to enable pooling of storage, network and computer resources;
- movement to provisioned services, including configurable and flexible technology;
- use of clouds; and
- metering to measure modernization progress (e.g., virtualization).

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<sup>3</sup> *Execution: The Discipline of Getting Things Done*, Larry Bossidy and Ram Charan with Charles Burck (New York: Crown Business, a division of Random House, Inc. 2002), p 197-198.

Additionally, Congress and OMB have set forth guidance for best practices through other legislation, circulars, and memorandums that provide useful guidance for the Library's modernization efforts. The guidance addresses:

- Technology Business Management (cost accounting for IT capital investments and tracking of IT period expenses);
- capital planning;
- customer service (IT service management);
- risk assessment; and
- cyber and physical security.

Availing itself of these various resources, OCIO has the guidance and methods for building a valid and credible program plan. That plan will then serve as the basis for developing the Library's IT environment and communicating progress to key stakeholders.

### The Library Has Made Significant Progress in Addressing Some IT Environment Issues

The Library has made notable progress in the early stages of its efforts to develop a well-designed and functioning IT environment. Much of the progress made appropriately involves foundational work breakdown structures on which succeeding work breakdown structures must rely. A good example of a foundational work breakdown structure was OCIO's development and implementation of the FY 2016-2020 IT Strategic Plan. OCIO structured this key plan with 4 primary goals, 7 strategies, and 10 objectives on which 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. To succeed and retain support, OCIO must communicate to management and stakeholders the interrelationships and dependencies of the activities needed to achieve its goals. From there the OCIO should update those affected parties using its program management plan as the tool for measuring progress. OCIO's early progress includes the following:

***Remediation of Open Audit Recommendations*** – Based on our review of 62 recommendations addressed to OCIO and closed in the period of March 2017 – February 2018, we conclude that OCIO has demonstrated a focused effort on remediating fundamental policy and operational shortcomings. These improvements largely affected the ability of the Library to plan, track, and execute on IT investment projects. More specifically, the improvements focused on the difficult areas of addressing policies and organizational structure, which are the necessary initial steps to affect long-term change. We noted that during the same period the Library implemented nine of 31 remediation activities addressing the

Governmental Accountability Office's (GAO) report, *Strong Leadership Needed to Address Serious IT Management Weaknesses*, March 31, 2015.<sup>4</sup> Additionally, OCIO closed 58 of 74 non-public recommendations.

***IT Strategic Plan*** – OCIO created and implemented an IT Strategic Plan spanning 2016-2020. Specific IT strategic goals include: (1) providing strategic direction and leadership; (2) improving IT investment management; (3) delivering business-driven capabilities; and (4) strengthening protection for systems and information (see Figure 2).<sup>5</sup>

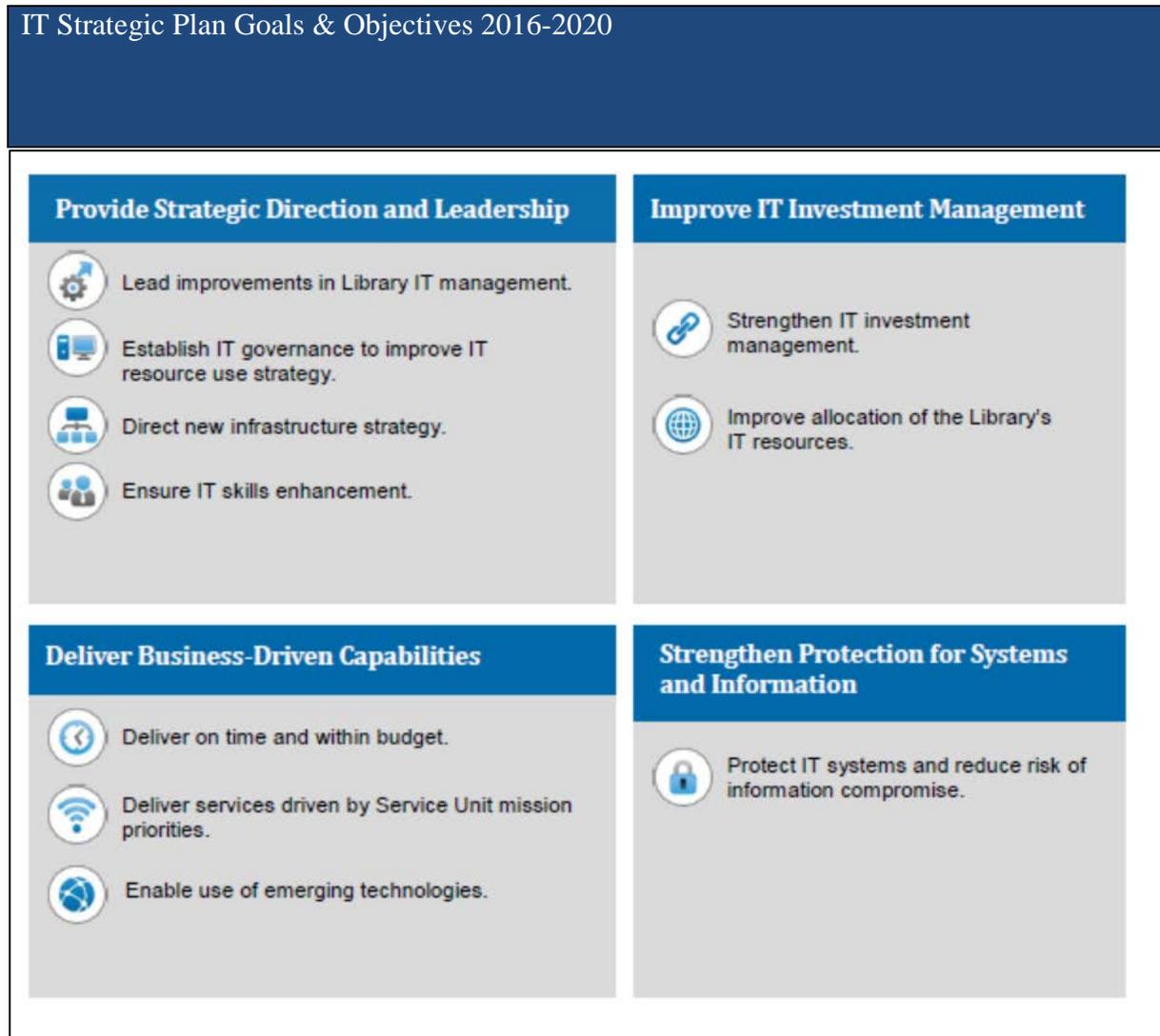
Notably, the new IT Strategic Plan includes an emphasis on the need for enhanced strategic and project management. According to the IT Strategic Plan, OCIO now provides guidance and templates for the Library-wide use of Project Management Life Cycle (PMLC) and System Development Life Cycle (SDLC) processes through the Project Management Office. The PMLC and SDLC will utilize the appropriate information and supporting tools to ensure that project managers and project teams comply with federal and industry best practices for project management and software development while adhering to Library business priorities and the IT investment processes. PMLC and SDLC will be part of the overarching plan to design and modernize the Library IT environment, improve IT governance, and incorporate best practices and standards to ultimately improve IT services for business customers.

***IT Program Modernization Plan*** – OCIO intended for the recently developed framework for the IT Program Modernization Plan (Modernization Plan) to serve as a roadmap for achieving the goals set forth in the Library's 2016-2020 IT Strategic Plan. OCIO advised OIG that the Modernization Plan would also serve as its program management plan for addressing its Top Management Challenge for IT environment. It presents 15 key projects, initiatives, and activities underway or planned for fiscal years 2018-2020 classified under one of the four IT strategic goals in the Library's IT Strategic Plan. The Modernization Plan has gaps (see *Gaps in the Current Modernization Plan* on page 16). Nevertheless, the existing framework presents a promising approach to modernization of the Library's environment.

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<sup>4</sup> <https://www.gao.gov/products/GAO-15-315>

<sup>5</sup> See Appendix B for a chart showing the alignment of the Library's strategic goals, IT Strategic Plan, and IT Modernization Plan Key Areas.



**Figure 2:** IT Strategic Plan, Goals and Objectives 2016-2020

Source: IT Strategic Plan FYs 2016-2020

***Centralization of the Library's IT Function in the OCIO*** – One of the most significant accomplishments of the past year was the consolidation of IT responsibilities into OCIO. In December of 2017, the Library completed centralization and announced it in The Library of Congress Gazette.<sup>6</sup> For the first time, IT supervisory personnel report to a central office instead of individual service units, setting the stage for a more coordinated and consistent approach to addressing IT issues. This immediately benefits the Library with movement towards consistent

<sup>6</sup> The Library of Congress Gazette, Volume 46, December 15, 2017, p 7.

oversight of key IT roles. An example of one of the most important roles is the information system security officer (ISSO). With ISSOs now residing in OCIO's IT Security Directorate the expected results include improved system security plans for new and enhanced business applications, higher quality continuous monitoring, improved IT contingency plans, and better assessments of the risks and vulnerabilities confronting each business application. Additionally, this change will lead to more consistent documentation and improved assessments of IT system and application security controls. Further, centralizing this important security function will allow for pooling of resources, thereby reducing the gaps and overlaps of skills that occurred under the prior, more dispersed, organizational model.

***Project Management Office (PMO)*** – OCIO created a centralized IT 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, the 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.

Actions taken during the past year by OCIO have permitted the closure of a number of outstanding OIG recommendations, including issues relating to the PMLC, SDLC, and IT investment management process. For example, LCR 5-310, issued in August 2017, created the PMO and established the requirement that it oversee all IT projects. This centralized IT PMO will also provide a necessary underpinning for improved IT investment management. As noted in the GAO ITIM Framework, good project management “form[s] the foundation of good performance measurement and the project-level control processes that underlie mature investment control processes.”<sup>7</sup> The new Library regulation cites the Project Management Institute's PMBOK, industry best practices, and Library-specific IT Project Management requirements and assigns to the PMO specific responsibility for developing and providing PMLC and SDLC directives for all service units. The required use of PMLC and SDLC methodologies will help ensure consistency in project management. While these established methodologies were in use for some IT projects previously, their use was not mandatory. Service units often applied PMLC and SDLC practices in an ad hoc or inconsistent manner.

***Technology Business Management (TBM)*** – OCIO took the first steps toward initiating this comprehensive approach to categorizing, collecting,

<sup>7</sup> GAO, GAO-04-394G *Information Technology Investment Management*, March 2004, Version 1.1, p 25.

and analyzing IT data in FY 2018. A vital step towards developing an effective IT cost accounting methodology, TBM is essential for improving IT investment decision making, analyzing period costs, and maximizing return on all IT expenditures. When fully implemented, TBM will provide Library management with the capability to improve financial analysis for IT investment planning, system development performance, system period performance, operating performance by functional area, and IT system rationalization. An essential ingredient for achieving a well-designed and functioning IT environment, integrating TBM throughout the Library will not be easy.

OCIO may encounter significant organizational barriers as it begins to develop the quantity and quality of data necessary to support effective analysis. Successful implementation of TBM will require a major commitment on the part of financial management, including a partnership with OCFO and with committed compliance from all service units expending funds on IT. In the TBM Council's book, *Technology Business Management: The Four Value Conversations CIOs Must Have With Their Businesses*, the author states "[o]f all the data types you will employ, there is only one essential source of truth, and that is your corporate [agency] financial data. You must ground your cost models in this data..."<sup>8</sup> Clearly, without OCFO's full partnership in the development of TBM, it will not succeed resulting in a ripple effect that will undermine the Library's ITIM process.

**Copyright Modernization Plan** – In September 2017, the CIO in coordination with the Copyright Office submitted to the House Committee on Appropriations a plan to harmonize their ongoing parallel modernization efforts. Known as the Modified IT Plan, this document, issued jointly by the Acting Register of Copyrights and the Library OCIO, provides a high-level description of how the Copyright Office and OCIO will work together under a shared services model. The plan established a Copyright Modernization Governance Board comprising the CIO, the Register and other senior management to facilitate close collaboration on the Copyright Office modernization. Additionally, a Copyright Modernization Office (CMO) was established to coordinate modernization efforts throughout the Copyright Office and with the Library's OCIO's PMO.

**Other Accomplishments** – In addition to the above important initiatives, since the beginning of 2017 OCIO reports that it has made progress on the following:

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<sup>8</sup> *Technology Business Management: The Four Value Conversations CIOs Must Have With Their Businesses*, published by Technology Business Management Council Ltd, Bellevue, Washington, 2016, p 85.

- completed Phase 1.5 reorganization of OCIO;
- established IT Customer Engagement Directorate to improve customer relations;
- established Digital Strategy Directorate;
- established OCIO Executive Management Team;
- created a Business Continuity Disaster Recovery Program;
- developed Information Technology Contingency Plans for the Library's inventory of major IT systems using a new contingency planning disaster recovery template;
- restructured the agency IT authorizing official structure and associated process;
- developed and promulgated ten LCRs to establish the role of the CIO and OCIO functions; and
- engaged in a service unit-wide IT skills assessment survey.

Clearly, OCIO has been active on a number of fronts since the beginning of FY 2017. However, reported progress to date consists primarily of individual activities without documented linkages to a comprehensive IT strategic approach. As a result, it is difficult to determine the degree to which the individual steps move the Library toward its ultimate goal of a well-designed and functioning IT environment. Only a plan to measure progress against will provide stakeholders the ability to evaluate progress and determine whether IT investments bring the desired return. OCIO has informed us that they are in the process of documenting the linkages for a strategic approach setting the foundation for measuring modernization progress.

## Planning, Tracking, and Evaluating the Path Forward

The framework of project management and its widely recognized components provide the logical format for communicating progress to stakeholders. The Library has begun the arduous 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 Modernization Plan 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 Modernization Plan to the everyday tactics needed for its implementation will require OCIO, the PMO, and the service units to carefully consider how the plan will play out over time. Many organizations encounter difficulty because responsibilities, milestones, and decision points are not adequately communicated. Using the framework of project

management and its widely recognized components will provide the CIO and his team with the logical format for communicating progress towards the intended IT environment. Below we discuss the components of project management that we believe convey critical information to stakeholders in a uniform fashion at any point along the development path.

*Development of a Critical Path* – The development of a critical path that identifies, documents, and communicates the time sequence in which major planned activities are expected to take place is a crucial component. The traditional critical path analysis model describes the relationship between four categories of information: (1) the activities required to complete the project; (2) the time that each activity will take to complete; (3) dependencies between the various activities; and (4) the deliverables or endpoints of the critical path. Clearly, with a program as massive as the modernization of IT at the Library of Congress, much of this detailed information cannot be known at the start of the initiative and plans will change and evolve throughout the modernization process.

In contrast to the detailed, traditional critical path analysis used to guide individual IT projects, the Library would benefit from the development of a critical path to guide the implementation of the Modernization Plan. Various service units and Congress have stated that they are not clear about OCIO's path. Also, the OIG could not gain an adequate understanding of the path and its milestones. A plan can help prevent confusion over the progression of activity, reduce the risk of duplicate efforts, and help ensure that project dependencies are able to interface at critical times. Importantly, by defining a critical path for the overall effort, it will provide for those responsible a means to measure progress toward the goal and make needed corrections at the earliest possible opportunity.

Initial critical path analysis should consist of broad descriptions with general details and definitions. As OCIO makes progress down the critical path, however, individual detailed project plans, often called work breakdown structures would be developed to more fully describe planned and completed activities and the relationships between activities. Each individual work breakdown structure should have a designated project manager responsible for reporting on progress, identifying variances, and taking action to ensure any needed adjustments. The critical path would define the state of the IT environment at near-, mid-, and long-term points in time, while each individual work breakdown structure would include a specific endpoint or deliverable to be attained at some defined point along the critical path. The Project Management Institute provides extensive guidance on the development and implementation of critical path methodology.

The Library has established the general parameters of strategic direction, including the Library's 2016-2020 Strategic Plan, the Copyright Office's

Modified IT Plan, various service unit strategic plans, the 2016-2020 IT Strategic Plan and the Modernization Plan. A revised strategic plan for the Library covering fiscal years 2019-2023 is under development and significant revisions to other strategic direction are expected.

Implementing the various strategic documents will likely be challenging for the Library. It is especially important that OCIO reliably measure and document performance because the overall initiative is so complex, with many uncertainties and interlocking parts. Even though specific details will change throughout the execution of the strategy, it is important that the Library establish a baseline so that it can measure progress, identify bottlenecks, and make adjustments as needed.

Actions needed to allow measurement of progress toward strategic goals include identification of milestones, key decision points, assignment of responsibility, and provisions for monitoring and oversight. As currently configured, it would be difficult or impossible for a reviewer to say whether the Library is on track for achieving its mid- and long-term IT strategic goals.

The Modernization Plan lays out goals through 2020 for each key modernization area (KMA) located within each of the four IT strategic goals. Linear timelines depict the targets and milestones within each KMA in very general terms. If the Library is to be successful in achieving its goals, important details should be finalized and communicated. Filling in the gaps in the Modernization Plan will provide a key component of the roadmap for achieving a well-designed and functioning IT environment. Additionally, a detailed roadmap will help ensure the Library is able to make progress toward its overall goal, even in the face of unexpected or unplanned changes. A required management skill for navigating the roadmap is a culture of execution. "Leaders in an execution culture design strategies that are more roadmaps than rigid paths...[t]hat way they can respond quickly when the unexpected happens."<sup>9</sup>

OCIO can document and evaluate planning decisions involved in the execution of the Modernization Plan in a number of different ways. PMBOK describes actionable and measureable components that are useful in establishing a baseline and measuring future progress against that baseline. PMBOK techniques support Project and Development Life Cycle processes and deliverables needed to implement the end goal. However, even if OCIO chooses some other recognized methodology to support the IT modernization effort, at a minimum, it should employ the following types of information and analysis to provide clear communication about the project and its progress,

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<sup>9</sup> *Execution: The Discipline of Getting Things Done*, Larry Bossidy and Ram Charan with Charles Burck (New York: Crown Business, a division of Random House, Inc. 2002), p 7.

effective performance measurement and evaluation, and a shared understanding about goals and objectives.

*Establishing a Work Breakdown Structure* – Described by PMBOK 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,”<sup>10</sup> a work breakdown structure or similar document is vital for effective costing and monitoring of schedules. Work breakdown structures establish manageable components (work packages) for tracking and evaluating project progress. Without such detailed project plans, the risks of project cost overruns, delays, and failures are greatly increased.

*Creating Useful Performance Metrics* – OCIO should identify valid and reliable performance measurements (metrics) for each target/milestone. Comparing actual performance with established performance metrics within the Modernization Plan allows IT management to demonstrate accomplishments, identify areas of delay or other concern, and make appropriate adjustments to ensure accomplishment of important goals. “Leaders who execute look for deviations from desired managerial tolerances—the gap between the desired and actual outcome...[t]hen they move to close the gap and raise the bar...”<sup>11</sup> Reliable performance reporting also allows those responsible for oversight to better understand the progress that has been made and any variances from planned accomplishments.

*Identify Planned Project Resources* – OCIO should develop a Responsibility Assignment Matrix showing the project resources assigned to each work package included in each work breakdown structure. Tracking the assignment and consumption of resources is a key internal control ensuring that the Library controls its development costs and appropriately manages development of the IT environment.

*Collect Good Cost Data* – Reliable information about costs is critical for evaluating progress on individual targets and milestones. Costs derived from budget documentation should demonstrate how costs of planned work elements have been considered against current and planned fiscal year budget levels. Accurate and reliable cost accounting data is needed for effective project management. Such data allows management to project the resources required to accomplish a particular work breakdown structure, as well as evaluate any variances, and develop necessary steps to remedy variances.

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<sup>10</sup> Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK)* – Sixth Edition, p 157.

<sup>11</sup> *Execution: The Discipline of Getting Things Done*, Larry Bossidy and Ram Charan with Charles Burck (New York: Crown Business, a division of Random House, Inc. 2002), p 30.

The Library is in the infancy of developing cost accounting, a comprehensive framework, and data to establish its approach to IT cost accounting. Because cost accounting is such a necessary tool for evaluating progress and demonstrating accountability in the execution of detailed project plans, the implementation of a valid and reliable cost accounting system is a prerequisite for effective IT Investment Management (ITIM) and for capital planning and investment control (CPIC).

The Library's IT investment planning depends on the accuracy and reliability of its cost accounting practices. Decisions about whether to take on a particular task "in house" or to contract for external assistance relies heavily on cost accounting data. Poor cost accounting data inhibits effective decision making, increasing the risk of cost overruns or reductions in project scope due to unexpected limitations on capital resources. The Office of the Chief Financial Officer and Human Resources Services will need to be leading partners in this effort.

CPIC is an IT governance and management methodology for selecting, controlling, and evaluating the performance of IT investments throughout the full lifecycle. The goal of CPIC is the achievement of an optimal balance of IT investments at the lowest cost, with the least risk, while addressing the strategic needs of the Library, optimizing scarce IT resources, and ensuring that strategic goals are achieved. The methodology stands at the center of developing and maintaining a well-designed and functioning IT environment. Having accurate financial data, including IT period and investment costs, is critical to understanding costs and assessing returns on IT investments. As discussed earlier OCIO has embarked on establishing TBM as its cost accounting methodology.

*Establishing Risk Identification and Mitigation Processes* – All projects are unique undertakings that carry risks with various degrees of complexity that have the potential to cause projects to deviate from the plan and fail to achieve the defined objectives. Organizations should choose to take project risk in a controlled and intentional manner in order to create value while balancing risk and reward. Consequently, the effectiveness of Project Risk Management is directly related to project success.<sup>12</sup> The Committee of Sponsoring Organizations of the Treadway Commission states that risk tolerance is the application of risk appetite to specific objectives. As such, risk tolerance must be expressed in such a way that it can be mapped into the same metrics the Library uses to measure success.

Throughout the development of the well designed and functioning IT environment, OCIO should identify, evaluate, and document the sources and

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<sup>12</sup> Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK)* – Sixth Edition. P 397.

level of risk for each area of development. As OCIO moves along the critical path, continuous reevaluation of project risks and benefits is needed. This includes identifying risks beyond the Library's control that may significantly affect accomplishing the plan. Developing a risk management plan and associated risk mitigations are key factors for responding to target/milestone variances, minimizing delays and financial losses, and reducing exposure to project failure.

*Collecting IT Service Data* – OCIO and the Library in general do not have adequate customer data (for OCIO- IT service data) to effectively assess customer expectations, needs, or requirements. In order to measure and improve their delivery of services, the Library and OCIO must develop a strategy for collecting, analyzing, responding to, and storing customer data. GAO noted in its 2014 report that “[t]he weaknesses in [the Library’s] ITS’s implementation of service-level management practices were reflected by inconsistent satisfaction with the services that it provides. To be successful, IT organizations should measure [requires obtaining customer data] the satisfaction of their users and take steps to improve it. In this regard, effectively managing activities to improve user satisfaction requires planning and executing such activities in a disciplined fashion.”<sup>13</sup>

GAO’s survey of IT customers found five factors leading to dissatisfaction. Those factors were lack of transparency, poor quality of service, inconsistent implementation of IT management processes, inconsistent communication, and use of outdated technology. These factors provide ground floor issues requiring focus and follow-up by OCIO in its IT services data analysis process. Recognizing the need to initiate IT service continuous improvement, OCIO has established a new IT Quality and Performance Directorate which is responsible for collecting, analyzing, and retaining IT service data.

## Gaps in the Current Modernization Plan

The Modernization Plan contains important information about the Library’s approach to achieving a well-designed and functioning IT environment. The Modernization Plan contains information about the principles that will guide the modernization effort, to include business need identification, strategic plan and enterprise architecture alignment, IT service management, and information security and business continuity. The Modernization Plan also describes the major IT challenges faced by the Library and some information about the approach to be taken in addressing those challenges. OCIO’s presentation of the Modernization Plan details its alignment with the IT Strategic Plan’s four goals. Importantly, the document provides high-level information on 15 key modernization areas, as well as brief, summary level detail on some aspects of

<sup>13</sup> GAO Report GAO-15-315, *LIBRARY OF CONGRESS, Strong Leadership Needed to address Serious Information Technology Management Weaknesses*, March 2014, p 76.

scope, schedule, goals, and implementation strategy. Each key modernization area includes a very general roadmap illustration for achieving those goals.

While the Modernization Plan is an important step forward, additional detail is needed before it can meet its stated objective of identifying “key projects, initiatives, and activities for each of the four goals...[and] provid[e] a roadmap illustration for achieving those goals.”<sup>14</sup> 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.

In its entirety, the Modernization Plan does not provide, link to, or reference the detailed project plans needed to define the actions intended to move toward a well-designed and functioning IT environment. That is, the Modernization Plan does not incorporate work breakdown structures to separate each project into smaller, more manageable sections (work packages) so that a project manager can better assess what costs and resources he needs. Although high-level milestones appear for each modernization area, there are no measurements assigned to assess whether those milestones have been met or to define variances in the event progress falls short in achieving the milestones in the targeted timeframe.

The Modernization Plan would be more useful if it included cost estimates for individual initiatives and for the modernization effort as a whole. In addition to the absence of cost information, the current Modernization Plan does not identify the risks involved, describe how OCIO will address those risks, or include consideration of the Library's tolerance for risk. In discussions with OCIO management, they have informed OIG that they will enhance the Modernization Plan with these categories of information.

Our analysis of the Modernization Plan found that a number of areas require more information to inform the reader about its development activities. The Modernization Plan reaches only to FY 2020. OCIO should project the development forward to a full five years (FY 2022) to maintain a short-, mid-, and long-term view for achieving its destination of a fully mature, well-designed and functioning IT environment.

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<sup>14</sup> Library of Congress, *IT Program Modernization Plan*, March 30, 2018, p 8.

Accomplishing long-term improvements in the Library's IT operations and culture will require a commitment to continued development of Library-wide integrated IT planning and the continued centralization of technology operations in OCIO. Management and stakeholder support will be dependent on those audiences understanding OCIO's path forward toward a well-designed and functioning IT environment and its progress along the way. It is an imperative that the CIO provides a consistent and easily followed format for communicating this to those audiences. OIG believes using a project management approach for measuring and reporting progress will clearly demonstrate how successful OCIO is along the way.

## Appendix A: Objectives, Scope, and Methodology

OIG's objectives for this evaluation of the Library's efforts to develop a well-designed and functioning IT environment were to determine the scope of the operations and investments associated with its development, status of development activities, adequacy of development plans, and transparency associated with development activities. The evaluation scope involved the Library's efforts to develop a well-designed and functioning IT environment and the mechanisms used to report its progress to stakeholders and the Congress. During the evaluation, we conducted inquiries of Library management; analysis of Library documents including strategic plans at the agency and service unit levels and the IT Strategic Plan and supporting plans that informed the IT environment development process; and inspected Library policy, directives, and procedures related to the IT development process. Further, every OIG *Semiannual Report to the Congress* has identified IT environment as a top management challenge for the Library since September 2011. OIG conducted fieldwork from January 2018 through May 2018.

OIG is not making formal recommendations at this time; we are presenting these practices as guidance. OIG intends to refer to this guidance in our future evaluations and semiannual reports that address the Library's progress in modernizing its IT environment.

We conducted this evaluation in accordance with *Quality Standards for Inspection and Evaluation* published by the Council of the Inspectors General on Integrity and Efficiency and LCR 1-140, *Inspector General*. These standards require that we plan and perform our evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for determining compliance. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our evaluation objective.

## Appendix B: IT Strategic Goals Alignment with the Library Strategic Goals (Strategies) and IT Modernization Plan

### Library of Congress IT Goal Alignment with the Library Strategies

Library of Congress IT Strategic Plan - Goals				
	Goal 1	Goal 2	Goal 3	Goal 4
<b>Library of Congress Strategic Plan - Strategies</b>	<b>Provide Strategic Direction and Leadership</b>	<b>Improve IT Investment Management</b>	<b>Deliver Business-Driven Capabilities</b>	<b>Strengthen Protection for Systems and Information</b>
Strategy 1. Service	★	★	←	←
Strategy 2. Collections	★	★	←	←
Strategy 3. Creativity	★	★	←	←
Strategy 4. Collaboration	★	★	★	★
Strategy 5. Empowerment	←	←	←	←
Strategy 6. Technology	←	←	←	←
Strategy 7. Organizational Structure	←	←	←	←
<b>Performance Outcomes</b>	The Library has fully implemented an enterprise-wide approach to managing information technology.	All information technology investments comply with established information technology governance processes.	Information technology services meet evolving stakeholder needs and support the Library's mission.	The Library's enterprise cybersecurity capabilities comply with established standards across ten domains: risk, asset, access, threat, situation, sharing, response, dependencies, workforce, and program management.
<b>Key Modernization Areas</b>	<ul style="list-style-type: none"> <li>● Digital Strategy</li> <li>● IT Governance</li> <li>● Enterprise Architecture</li> <li>● Project Management</li> </ul>	<ul style="list-style-type: none"> <li>● IT Financial Management</li> <li>● IT Investment Management</li> <li>● Asset Management</li> <li>● Human Capital Management</li> </ul>	<ul style="list-style-type: none"> <li>● IT Service Design and Delivery                             <ul style="list-style-type: none"> <li>○ Congress.gov</li> <li>○ Copyright Modernization</li> <li>○ National Library</li> <li>○ Digital Library</li> </ul> </li> <li>● IT Service Management</li> <li>● IT Service Operations</li> <li>● Data Center Transformation</li> <li>● Mobile Workforce</li> </ul>	<ul style="list-style-type: none"> <li>● IT Security</li> <li>● IT Business Continuity and Disaster Recovery</li> </ul>

Table: This table demonstrates that the four goals of the Library's IT Strategic Plan collectively support the seven strategies (goals) of the Library's Strategic Plan. Key modernization areas (KMAs) are described in the IT Modernization Plan; each KMA links to one of the four IT strategic goals.

Source: Library of Congress Strategic Plan, 2016 – 2020, [https://www.loc.gov/portals/static/about/documents/library\\_congress\\_stratoplan\\_2016-2020.pdf](https://www.loc.gov/portals/static/about/documents/library_congress_stratoplan_2016-2020.pdf); Library of Congress, Information Technology Strategic Plan, Fiscal Years 2016–2020, Version 1.3 October 13, 2017; Library of Congress Office of the Chief Information Officer, IT Program Modernization Plan, March 30, 2018.

Symbol Key:

Cross-cutting Support: ★ Direct Support: ←

## Appendix C: Management Response



Office of the Librarian

### MEMORANDUM

**DATE** September 10, 2018  
**TO** Kurt Hyde, Inspector General  
**FROM** J. Mark Sweeney, Principal Deputy Librarian of Congress   
**SUBJECT** Comments on OIG Draft Report No. 2018-SP-102, *Steady Progress, But There Are Gaps in CIO's Roadmap to Modernize Its IT Environment*

Thank you for the opportunity to comment on the evaluation of the Library's progress in developing and implementing a modern information technology ("IT") environment.

We are pleased with the accomplishments that have been achieved under the first phases of IT centralization. Through the collaboration of the Office of the Chief Information Officer ("OCIO") and the heads of the service units, the Library experienced a smooth transition of IT functions without impact to patron services or internal operations. We are confident that as the OCIO moves to the next phase, its continuing efforts to foster relationships across the Library and educate service units about their respective roles and responsibilities will enhance efficiencies and administration of IT projects. As with all centralized Library infrastructure functions, collaboration between the office providing the service and the receiving office is essential to support mission-critical programs.

Thank you also for acknowledging the significant progress the OCIO has made to resolve prior audit findings. Since January 2015 through the present, the OCIO has closed 113 recommendations. Through the remediation process, which has included formalizing organizational responsibilities, taking inventories, and developing contingency plans, the Library is building a foundation that will facilitate improved oversight of existing IT resources and preparation for future requirements. The OCIO's efforts to collect and analyze data on IT expenditures in conjunction with clear policies and discussion by the IT Steering Committee has increased transparency, allowed the Executive Committee greater flexibility in considering IT investments based on evolving Library priorities, and led to better informed budget planning for the coming fiscal year.

As you note, the Library is embarking on several IT modernization initiatives over the next few years. We believe the IT Program Modernization Plan will be an important tool in guiding the Library to achieve its strategic goals and expand on the services offered to customers and patrons. We appreciate your comments on how to make the plan

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more useful and will explore ways to identify dependencies and linkages with project plans, which include the detailed approach for accomplishing each IT project. The Library is committed to using PMI project principles to guide IT program modernization.

cc: Bernard A. Barton, Jr., Chief Information Officer  
Judith Conklin, Deputy Chief Information Officer  
Elizabeth Pugh, General Counsel