

This is the accessible text file for Library of Congress Office of the Inspector General audit report number 2020-IT-104 entitled 'Library Services Audio Visual Collection Management System (AVCMS) Development which was released on December 2, 2021.

Office of the Inspector General
Library of Congress
Memo

Date December 2, 2021
To Dr. Carla Hayden
Librarian of Congress
From Kimberly Byrd
Acting Inspector General
Subject Library Services Audio Visual Collection Management System (AVCMS) Development ♦ Audit No. 2020-IT-104

This transmits our final report for the Office of the Inspector General ♦s audit of the Library of Congress ♦s Library Collections and Services Group (formerly Library Services) Audio Visual Collection Management System (AVCMS) Development.
The report contains seven new recommendations intended to improve management and minimize operational and cost inefficiencies for the AVCMS systems development effort, as well as future information technology projects.
Based on management's written responses to the draft report, we consider all of the seven of the new recommendations resolved. Your response provided an action plan for the implementation for those recommendations, in accordance with LCR 9-160, Rights and Responsibilities of Employees to the Inspector General, ♦6.A.
We appreciate the cooperation and courtesies extended by the Library Collections and Services Group and the Office of the Chief Information Officer.

cc Principal Deputy Librarian
Chief Information Officer
Deputy Librarian for Library Collections and Services
Chief Financial Officer
General Counsel

LIBRARY OF CONGRESS
LIBRARY SERVICES AUDIO-VISUAL COLLECTION MANAGEMENT SYSTEM (AVCMS)

AUDIT REPORT

NOVEMBER 23, 2021

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Ms. Kimberly Byrd
Acting Inspector General
Office of Inspector General
Library of Congress

Dear Ms. Byrd,

Cotton & Company LLP is pleased to submit the attached audit report detailing the results of our performance audit of the Library Services and the Office of the Chief Information Officer ♦s

(OCIO's) efforts to develop the Audio Visual Collection Management System (AVCMS) Project (OCIO PMO Project #567). The Library Office of Inspector General (OIG) engaged Cotton & Company to conduct this performance audit pursuant to Contract Number LCOIG20D0004. Cotton & Company performed our fieldwork from September 2020 through February 2021. As a result of the Coronavirus pandemic, all work was performed remotely in the Washington DC metropolitan area.

Cotton & Company conducted this performance audit in accordance with Generally Accepted Government Auditing Standards, 2018 Revision, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Sincerely,
Cotton & Company LLP

Loren Schwartz CPA, CISA, CISSP
Partner

EXECUTIVE SUMMARY

The Library Services organization acquires, catalogs, processes, preserves, and makes accessible the collections of the largest and most comprehensive legislative research material and public library in the world. Within the Library Services organization, the National Audio-Visual Conservation Center (NAVCC) provides access and information services for the motion picture and television collections to an international community of film and television professionals, archivists, scholars, and researchers. Library Services' Merged Audio-Visual Information System (MAVIS) holds all descriptive, holdings, technical, and rights-related metadata associated with the collection of audiovisual items within NAVCC.

The vendor for the MAVIS system will no longer support the system after 2021. As a result, to ensure that the Library Services information system can reliably continue to support Library Services' core business functions and serve its constituency, the Library is replacing MAVIS. This replacement effort will include the installation of a commercial off-the-shelf (COTS) application solution to replace MAVIS.

The Library Office of Inspector General (OIG) engaged Cotton & Company LLP to conduct a performance audit and evaluate Library Services and Office of the Chief Information Officer's (OCIO's) efforts to develop a new Library Services business application, particularly with regard to the Library Services Audio Visual Collection Management System (AVCMS) (OCIO Project Management Office (PMO) Project #567). The objectives of our audit were to:

1. Evaluate Library Services and OCIO's project management and software development practices using the U.S. Government Accountability Office's (GAO) Schedule Assessment Guide, Cost Estimating and Assessment Guide, and Software Development: Effective Practices and Federal Challenges in Applying Agile Methodologies.
2. Evaluate and conclude on whether the representation of the project in Library Services is comprehensive and sufficient with regard to scheduling Library Services staff activities to support the implementation.

Summary of Results

Although the Library complied with many of GAO's best practices, improvements are needed in some key policies and practices. We determined the AVCMS project was approved and is monitored by an active governance structure, as evidenced by the Project Charter signed by a Library Services Project Sponsor and OCIO Management. OCIO Management prepares regular status updates for inclusion in the

minutes for its weekly AVCMS meetings with Library Services and the vendor.

Additionally, Library Services' staff resources were generally sufficient to support implementation of MAVIS replacement. Specifically we found that the AVCMS project staffing and resources are tracked and discussed with Library Services team leads, OCIO, and the vendor for the AVCMS project. OCIO holds weekly Project Manager (PM) Meetings, weekly AVCMS Team Lead meetings, and monthly Senior Stakeholder meetings to identify Library Services resources as needed. In addition, the Library Services PM coordinates with each of the AVCMS Team Leads to discuss staffing and project milestones. These discussions facilitate the process in order to identify available staff and align their time to meet project milestones. Cotton & Company noted Library Services monitors the staff and the time charged for the AVCMS project through meetings held between the stakeholders and project management. The stakeholder and PM meetings also address any upcoming activities for the AVCMS project. However, despite these positive project management activities, we noted the following deficiencies impacting the audit objectives:

- Required project management cost and risk documentation was not adequately completed for AVCMS: The OCIO PMO did not have a comprehensive cost estimate for the AVCMS project. Specifically, we noted for the AVCMS project: o The OCIO PMO did not complete the required Cost Estimation Spreadsheet and Cost Estimate Document as part of the initiation phase of the AVCMS project.

- In addition to the Initiation phase documents, a Sensitivity Analysis and a Quantified Risk Assessment was not completed, which is required for large projects with High Risk and High Complexity Scores.

- OCIO did not adequately define and document a System Development Life Cycle (SDLC) implementation methodology for AVCMS: o Although the AVCMS Project charter stated the project would be run using Agile methodology, the project was being run using a Hybrid methodology. The PMO Training and References guidance specifies that when applying a Hybrid approach, the Project Management Plan must outline which activities would be Agile and which activities would be Waterfall. Despite this guidance, OCIO could not provide us with documentation to support how a Hybrid implementation methodology was to be executed.

- Incomplete Risk Register for the AVCMS Project Risks: Library Congress Directive (LCD) 5-310.1 Project Management Life Cycle (PMLC) Guidance describes the Risk Register as a record of risks that provides an assessment of impact and probability, mitigation strategy, contingency plan, and resolution for each risk. The AVCMS Risk Register did not establish Contingency Plans for 9 out of 38 risks identified, as is required by PMLC Guidance. All 9 of the risks missing contingency plans were categorized with a High weighted risk.

- Implementation of Unapproved IT Governance Structure: As reported in U.S. Copyright Office's Public Records Performance Audit Report, Report No. 2020-IT-101 (November, 2021) , we noted the OCIO implemented a revised governance structure in advance of receiving required approvals as documented in LCR 1-710: Library of Congress Regulations (LCRs) and LCDs. We did not issue a repeat recommendation for this observation.

- Insufficient AVCMS Project Monitoring: Similar to a prior recommendation in OIG's audit report, 2018-IT-107 Library Working Through Agile Delivery Method Challenges for Copyright IT Modernization Project, Recommendation 1, we noted OCIO had not developed adequate mechanisms for tracking the status of project completion for the AVCMS project. Specifically, we noted: o The project schedule requires the cost, capacity, and percent of work scheduled be included in the project schedule per the Quality Management Plan, but are not included in the schedule.

- Actual project costs for the AVCMS project were neither documented, nor can they be retrieved for the period of April 2020 through August 2020.

The prior recommendation was written to address the issue at the PMO level for all future projects and is being monitored for completion by the OIG office. We did not issue a repeat recommendation for this observation.

BACKGROUND

The Library is an agency under the Legislative Branch of the U.S. Government, comprised of several internal divisions of service units, including the Office of the Librarian, the Congressional Research Service, the U.S. Copyright Office, the Law Library of Congress, and Library Services. It is

the world's largest and most comprehensive library, maintaining a collection of more than 164 million items, many of them unique and irreplaceable, in more than 470 languages. The Library's mission is to support the Congress in fulfilling its constitutional duties and to further the progress of knowledge and creativity for the benefit of the American people.

The Library Services organization acquires, catalogs, processes, preserves, and makes accessible the collections of the largest and most comprehensive legislative research material and public library in the world. In rendering collections accessible to patrons of the Library, current and future staff also provides services to libraries around the world through bibliographic information, standards setting, and digital collections.

Within the Library Services organization, the NAVCC includes the Motion Picture, Broadcasting & Recorded Sound (MBRS) division. The Motion Picture and Television Reading Room provides access and information services for the motion picture and television collections to an international community of film and television professionals, archivists, scholars, and researchers. The Recorded Sound Reference Center is the public access place for the Library's audio collections, which reflect the entire history of sound technology, from wax cylinders, through LPs and tapes, to compact audio discs.

MAVIS

MAVIS holds all descriptive, holdings, technical, and rights-related metadata associated with the collection of audiovisual items within the MBRS division of the Library. MAVIS provides interfaces into its data via a Windows-based application, direct Oracle SQL access, and an XML SOAP-based [Footnote 1] web service. The database and the interfaces are the functional components that make up the MAVIS system.

The vendor for the MAVIS system will no longer support MAVIS after 2021. As a result, in order to ensure the Library Services information system can reliably continue to support Library Services' core business functions and serve its constituency, the Library is replacing MAVIS. This replacement effort will include the installation of a COTS application solution to replace MAVIS and the normalization of data and interfaces to the MAVIS replacement application.

AVCMS

The Library issued a solicitation for a contractor to implement a Collection Management System (CMS) for the Library's moving image and recorded sound collections, with extensibility to other special collections formats. AVCMS is to include data hosting, installation, configuration, integration, customization, and training; documentation of standard and custom functionality, workflows, and features; data migration workflows and support; upgrade support; and application and technical support for the duration of the contract in order to meet the Library's requirements for an enterprise-grade audiovisual and special collections CMS.

For the implementation of AVCMS, the contractor must comply with the Library's PMLC and SDLC policies. The contract stipulates the required deliverables and schedule of events for the project.

The project charter for the AVCMS project outlined: (1) the planned start date of April 15, 2020 and planned completion date of October 30, 2021; (2) the project estimated a total project cost of \$4,339,024; and (3) the following project milestones and release plan:

Project Milestones for First Year (Fiscal Years 2020 through 2022): Data migration start from legacy data sources to CME [Footnote 2]

Date: April 15, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): CME staging and development versions installed on Amazon Web Services (AWS)

Date: April 16, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): Contract Award

Date: April 17, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): Setup local underlying infrastructure for AVCMS based on vendor requirements

Date: April 30, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): In coordination with Library Services, support establishment of Application Programming Interface (API) connections from AVCMS to identified targets

Date: April 30, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): Start of maintenance of staging and production versions of AVCMS

Date: May 29, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): Ports between Packard Campus Workflow Application (PCWA) MAVIS & Veteran's History Project (VHP) opened for live connections between CME

Date: June 1, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): PCWA Transition Assessment complete

Date: September 30, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): CME Authorization to Operate (ATO)

Date: September 30, 2020

Project Milestones for First Year (Fiscal Years 2020 through 2022): Data migration start from CME to AVCMS

Date: January 4, 2021

Project Milestones for First Year (Fiscal Years 2020 through 2022): Completion of API testing with successful connections in place

Date: February 26, 2021

Project Milestones for First Year (Fiscal Years 2020 through 2022): AVCMS ATO

Date: July 30, 2021

Project Milestones for First Year (Fiscal Years 2020 through 2022): System go-live

Date: August 31, 2021

Project Milestones for First Year (Fiscal Years 2020 through 2022): Decommission of MAVIS System

Date: October 31, 2021

Source: Audio Visual Collection Management System (PMO ID #567) Project Charter, dated September 21, 2020

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

The Library OIG engaged Cotton & Company to conduct a performance audit of Library Services and OCIO's efforts to develop a new Library Services business application, particularly with regard to the Library Services' AVCMS (OCIO PMO Project #567). The audit objectives were to:

1. Evaluate Library Services and OCIO's project management and software development practices using GAO's Schedule Assessment Guide, Cost Estimating and Assessment Guide, and Software Development: Effective Practices and Federal Challenges in Applying Agile Methodologies. At a minimum:
 - a. Determine whether Library Services and OCIO comprehensively and reasonably estimated applicable Library-wide costs, established a baseline, appropriately issued a cost accumulation guide to all parties, and reported, monitored, and mitigated any risks related to comparisons of budgeted to actual costs.
 - b. Determine whether Library Services and OCIO formed a baseline for the complete schedule, matched the baseline schedule to the baseline costs, and sufficiently monitored this schedule and mitigated any risks.
 - c. Evaluate and conclude on the management of requirements related to development work packages. This includes assessing and concluding on the levels of total work unit (user stories), additional work identified during the project, and issue resolution work compared to the capacity and capabilities of

the development team.

d. Evaluate and conclude on the organizational and governance structure of the project and determine whether the structure includes executive management commitment and support, a clear project charter with appropriately delineated roles and accountability, and an appropriately active steering committee and project sponsor.

e. Obtain and review the project plan and ensure that it includes key components such as critical milestones and deliverables; requirements for each process area; clear parameters for scope, budget, resources, and time; appropriate and comprehensive performance measures, comprehensive and budgeted work breakdown structures, and a contingency plan. Confirm the proper use of baselining and change management procedures with regard to the project plan.

f. Examine and evaluate project-to-date variances (including variances in budgeted to actual and forecast to complete) for adequacy, as well as for evidence of senior executive management review and approval.

2. Evaluate and conclude on whether the representation of the project in Library Services is comprehensive and sufficient with regard to scheduling Library Services staff activities to support the implementation.

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards, 2018 Revision, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Scope and Methodology

In meeting these two objectives, Cotton & Company assessed internal controls we deemed to be significant to the audit objective. Specifically, we assessed nine of the 17 principles associated within the five components of internal control defined in GAO's Standards for Internal Control in the Federal Government. The following table summarizes the principles we assessed:

Control Environment

Principle 2 - Exercise Oversight Responsibility

Principle 3 - Establish Structure, Responsibility, and Authority

Risk Assessment

Principle 6 - Define Objectives and Risk Tolerance

Principle 7 - Identify, Analyze, and Respond to Risks

Principle 8 - Assess Fraud Risk

Control Activities

Principle 12 - Implement Control Activities

Communication

Principle 13 - Use Quality Information

Monitoring

Principle 16 - Perform Monitoring Activities

Principle 17 - Evaluate Issues and Remediate Deficiencies

We assessed the design, implementation, and operating effectiveness of internal controls and identified deficiencies we believe could affect the Library Services and OCIO's efforts to develop

the Library Services AVCMS project. The following section provides details regarding the procedures we performed to conduct our audit and assess internal controls relevant to the audit objectives.

To meet our audit objectives, Cotton & Company:

- Recalculated OCIO's project cost estimation for the AVCMS project using the supporting documentation for the basis of estimates, [Footnote 3] including the cost estimation spreadsheet, cost estimate document, project personnel budget spreadsheet, and independent government cost estimate (IGCE).
- Inspected the AVCMS Project Charter, [Footnote 4] Project Management Plan, [Footnote 5] and AVCMS Risk Register [Footnote 6] supporting the AVCMS Project baseline [Footnote 7] schedule.
- Inquired with OCIO regarding user stories for the AVCMS project to determine whether the user stories completed to date are representative of the level of effort expended on the AVCMS project to date.
- Inspected the AVCMS Project Charter and the Governance Board meeting minutes to determine whether the organizational and governance structure includes executive management commitment and support.
- Inspected AVCMS Project Management Plan, including key components such as Project Classification Worksheet, Project Schedule, Project Status Reports, Risk Register, and Issue Log.
- Inspected the actual hours recorded by Library employees working on the AVCMS Project and calculated the difference between the hours from the cost estimate and the actual hours to date.
- Inquired with Library Services Management to determine how Library Services staffing and resources are allocated to support the AVCMS project.
- Inspected the recommendations in U.S. Copyright Office's Public Records Performance Audit Report, Report No. 2020-IT-101 (November, 2021), and evaluated the impact to our audit objectives and observations.
- Inspected the open recommendations in the GAO Report, Library of Congress: Strong Leadership Needed to Address Serious Information Technology Management Weaknesses (March 2015), and evaluated the impact to our audit objectives and observations.

FINDINGS AND RECOMMENDATIONS

Finding 1: Required project management cost and risk documentation was not adequately completed for AVCMS

Background

The Library of Congress is implementing a collection management system for the Library's moving image and recorded sound collections. The development project had a planned start date of April 15, 2020, and was parsed into four phases:

- Initiation, scheduled from March 23, 2020, through May 19, 2020
- Planning, scheduled from March 3, 2020, through November 27, 2020
- Execution, scheduled from April 20, 2020, through April 20, 2022
- Closeout, scheduled from April 20, 2022, through April 26, 2022

LCD 5-310.1, PMLC, based on the PMI Project Management Book of Knowledge (PMBOK), provides guidance on the PMLC to effectively manage and deliver IT projects at the Library. Within this document, required deliverables that must be produced during the Initiation phase within the life cycle of a project are identified as:

- Project Charter, which formally authorizes the existence of a project and provides the PM with the authority to apply organizational resources to project activities.

- Project Classification, which classifies project size for the purpose of determining the level of project management rigor and PM deliverables to be produced.
- Cost Estimating Spreadsheet, which determines specific project costs categorized by types of IT expenditures.
- Cost Estimating Document, which defines the scope of the estimate, identifies the cost estimating team, and lists the assumptions and cost drivers of the cost estimate.

In addition to the Initiation phase documents, a Sensitivity Analysis and a Quantified Risk Assessment must be completed for large projects with High Risk and High Complexity Scores, as documented in the Cost Estimation Spreadsheet. A Sensitivity Analysis assesses the potential effect on costs, based on changes to identified cost drivers and assumptions, and a Risk Assessment utilizes cost risks identified as part of overall Risk Management to determine a range of estimated costs based on the risks.

On September 24, 2020, Cotton & Company submitted a request to OCIO for the Cost Estimating Spreadsheet and Cost Estimating Document for the AVCMS development project. These documents are Initiation Phase deliverables. The OCIO ultimately provided the requested cost documentation in draft form on December 17, 2020.

The Project Classification Spreadsheet, v1.7, as listed within the Project Charter dated 9/21/2020, classifies the AVCMS development project as a large project with High Risk and Medium Complexity.

After this project was started, we understand that control checklists have been implemented in response to prior recommendations from the OIG's August 2019 report entitled, Library Working Through Agile Delivery Method Challenges for Copyright IT Modernization Project.

Condition

For the AVCMS project, OCIO did not produce the required deliverables that must be prepared during the initiation phase of the project, as defined in LOC PMLC Guidance. These particular documents are necessary to establish initial cost baselines and project lifecycle cost monitoring. Through inquiry, OCIO confirmed that a Cost Estimating Spreadsheet and Cost Estimating Document were not developed for the AVCMS development project during the initiation phase of the project.

Draft versions of the Cost Estimating documents were ultimately made available to Cotton & Company over 60 days from our initial request, however these need to be finalized, approved, and stored within the project folders. As these documents were in draft and well past the required delivery date, Cotton & Company could not provide an in-progress review of their content.

The AVCMS Project Classification Spreadsheet improperly classified the AVCMS Project as Large with High Risk and Medium Complexity based on a project duration of 7-12 months. The Project Charter states the AVCMS Project has a duration of 18 months, thereby making the correct classification of this project Large with High Risk and High Complexity. A sensitivity analysis and risk assessment were not performed as part of the initial cost estimate for the Library Services AVCMS project, likely due to the misclassification of complexity for the project.

Criteria

The GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs, Chapter 2: Cost Analysis and Cost Estimates, states:

Cost estimating is a critical element in any acquisition process and helps decision-makers evaluate resource requirements at milestones and other important decision points. It is the basis for establishing and defending budgets and drives affordability analyses. Cost estimates are integral to determining and communicating a realistic view of likely cost and schedule outcomes that can be used to plan the work necessary to develop, produce, operate, maintain, and dispose of a program.

Cost estimating also provides valuable information to help determine whether a program is feasible, how it should be designed, and the resources needed to support it.

LCD 5-310.01, PMLC, effective August 2017, states:

The required documentation for the initiation phase for a large project includes a Cost Estimating Spreadsheet, which determines specific project costs categorized by types of IT expenditures, and a Cost Estimating Document, which describes the process and assumptions.

OCIO PMO Cost Estimating Guidance, last updated August 30, 2020 states:

Cost Estimation Lead conducts Sensitivity Analysis and Quantified Risk Assessment. Sensitivity Analysis assesses the potential effect on costs based on changes to identified cost drivers and assumptions. Quantified Risk Assessment utilizes the cost risks identified as part of overall Risk Management to determine a range of estimated costs based on the risks. (See the GAO Cost Estimating and Assessment Guide, chapters 13 and 14, for detailed guidance on how to perform these analyses.) NOTE: These analyses are required for large projects with High Risk and High Complexity scores (see Cost Estimation Spreadsheet). For such projects, conducting Sensitivity analysis and quantified risk assessments ensures that contingencies are put in place to identify a new cost estimate quickly in case a cost assumption is invalidated, a cost driver changes, or a cost risk is realized.

Cause

Controls are not adequate to ensure required documentation is completed during the assigned stage of the project. The OCIO stated the Cost Estimating Document and Cost Estimating Spreadsheet were not developed due to omissions by a former PM who no longer works at the Library of Congress. There is a lack of appropriate supervisory controls to ensure documentation has been completed properly, timely, and in accordance with directives.

The Sensitivity Analysis and Risk Assessment were not completed based on the erroneous project classifications determined in the AVCMS Project Classification Spreadsheet. As noted in the criteria above, the Sensitivity Analysis and Risk Assessment are only required to be completed for large projects with High Risk and High Complexity scores; however, based on the project duration as noted within the Project Charter, the Project Classification Spreadsheet was not completed correctly, resulting in a rating which did not require these supporting documents.

In response to prior findings and recommendations, the OCIO implemented control sheets for PMO to verify correct documentation is in place during the Initiation phase, however these control-checklists do not appear to have been applied retroactively to the AVCMS project.

Effect

Without the Cost Estimating Spreadsheet and Cost Estimating Document, the projected project costs cannot be adequately determined, assessed, documented, and baselined. The cost estimate facilitates the evaluation and resource requirements, without which leads to difficulty in establishing budgets and communicating a realistic view of the project, including whether the program is feasible and whether the resources are available to support it through development and maintenance. Additionally, without projected project costs, the project cannot be baselined to facilitate ongoing cost and schedule performance measurements and reporting.

Without the sensitivity analysis and quantified risk assessments, there is a risk that contingencies are not sufficiently put in place to identify an updated cost estimate quickly in the case where a cost assumption is invalidated, a cost driver changes, or a cost risk is realized.

Recommendation

We recommend the Library, with respect to the AVCMS project:

1.1 Finalize cost estimates (based on current estimates at completion) as the current baseline to facilitate performance management metrics through completion of the AVCMS project.

1.2 Develop and implement required project documentation, specifically the Cost Estimating Spreadsheet and Cost Estimating Document, following applicable guidance for the AVCMS project.

1.3 Develop and implement required project documents, specifically the Sensitivity Analysis and Risk Assessments following applicable guidance for the AVCMS project.

Finding 2: OCIO did not adequately define and document an SDLC implementation methodology for AVCMS

Background

LCD 5-310.2 SDLC, specifies:

Because the Agile SDLC methodology produces results faster with an expected higher degree of customer satisfaction, the Agile SDLC is the preferred approach for systems development. However teams should choose which methodology to follow based on the specific circumstances of the effort. An Agile suitability scorecard is available to help teams to make this determination.

GAO-20-590G GAO Agile Assessment Guide, p 135 states:

A common approach in Agile software development is to develop and deliver working software in fixed-length iteration, typically 2-4 weeks in length.

OCIO provided an Agile Scorecard, dated December 10, 2019, for the AVCMS project, which resulted in an overall recommendation of Agile. Additionally, OCIO provided the auditors with the Chief Information Officer (CIO) and Deputy CIO-approved AVCMS Project Charter, dated March 3, 2020, which stated that the AVCMS project would follow an Agile methodology.

Condition

OCIO did not adequately define a suitable implementation methodology under which the AVCMS project would be developed. Despite both the AVCMS Project Charter and Agile Suitability Scorecard indicating that the development project was to follow an Agile methodology, OCIO representatives informed Cotton & Company that a Hybrid methodology was actually in operation.⁸ Further, the AVCMS PM informed the auditors that sprints could last anywhere from two to four months, well outside of the normal expected sprint iterations used in a traditional Agile methodology.

[Footnote 8] Cotton & Company was provided this information by the OCIO Supervisory IT Project Manager and the Deputy Director, IT Design and Development on November 18, 2020 and December 8, 2020, respectively.

The PMO Training and References guidance specifies that when applying a Hybrid approach, the Project Management Plan must outline which activities would be Agile and which activities would be Waterfall. Despite this guidance, OCIO could not provide us with documentation to support how a Hybrid implementation methodology was to be executed. This is further evidenced by the AVCMS Project Management Plan which does not identify what elements of the project would be Agile in contrast to Waterfall.

Criteria

LCD 5-310.1 PMLC Guidance, Section 3. PMLC Overview states:

All Library IT projects must follow the PMLC, and Project Managers are expected to use the PMLC as a guide in managing their projects. Following the PMLC helps to ensure that projects are planned and executed effectively which in turn helps to ensure on time delivery of the desired project outcomes.

LCD 5-310.2 The IT PMO states:

The SDLC process, including the SDLC activities and minimally required deliverables. The PMO also ensures that specific SDLC methodologies (i.e., the Waterfall SDLC, the Agile SDLC, or a Hybrid of the two, see section 3.2 SDLC Methodologies below) align with the SDLC process.

As a supplement to LCD 5-310.2, the IT PMO provides additional guidance when following a Hybrid approach;

LOC Agile SDLC, Section 2. Scope, states:

All projects must complete the Agile Suitability Scorecard prior to initiation. If Agile is the determined framework, this SDLC applies. If it is determined that it is a Hybrid project, then the Agile framework will apply to the software design, development, and deployment portions of the overall project. If the Waterfall is the best methodology, the Waterfall SDLC applies.

LOC Hybrid SDLC, states:

Because the Hybrid approach varies depending on what aspects of the effort are Waterfall vs. iterative in nature, no single Hybrid methodology is prescribed. However when applying the Hybrid approach as part of a project, the Project Management Plan must describe which project activities will be conducted using Waterfall and which activities will be conducted using Agile.

Cause

OCIO failed to recognize and comply with LOC policy requiring a documented plan for using a Hybrid methodology (i.e., the division of tasks between Agile and Waterfall).

Effect

As a result of executing the AVCMS project with an undefined SDLC implementation methodology, the

AVCMS project may not complete required deliverables, finish on time, or finish within the budget. Additionally, the current Project Charter, which was approved by stakeholders, inaccurately reflects an Agile methodology.

Recommendation

We recommend the Library:

2.1 Review and update the AVCMS Project Charter to accurately reflect the implementation methodology and approval for this project.

2.2 Review and update the Project Management Plan to include the required details of a Hybrid methodology.

2.3 Re-perform the PM Project Charter Review Checklist to ensure all checklist requirements are met and that the project meets PMO quality standards.

Finding 3: Incomplete Risk Register for the AVCMS Project Risks

Background

According to the weekly OCIO AVCMS Status Report, dated January 7, 2021, the AVCMS project is in the control and execution phase of the project.

During our inspection of the AVCMS Risk Management plan, we noted the document states that the AVCMS Risk Management Team documents the potential project risks within the AVCMS Risk Register.

The AVCMS Risk Register, updated May 13, 2020, is an Excel workbook provided by the OCIO PMO. Risks are identified when there is a risk to project goals and targets. Risk probability indicates the likelihood of the risk occurring and the impact is the consequence or effectiveness of the risk occurring. Additionally, the risk register facilitates the identification of risk to Project:

- Costs
- Schedule
- Scope
- Resources
- Quality

The register includes a column for the Risk Manager (RM) to describe the contingency plan for each risk identified in the register. The RM is responsible for making an overall risk assessment and reviewing it with the team and stakeholders. The RM is also responsible for the Risk Management Plan, its effective implementation throughout the project, trends, and metric analysis, and training project personnel on risk management.

Condition

The Risk Register, which is the responsibility of the AVCMS RM, did not include contingency plans associated with nine (9) of the 38 identified risks. As such, the RM had not identified what corrective/alternate actions the Library would take if any of these risks came to fruition. All 9 of these risks were categorized with a **High** weighted risk, which is based on the possible impact and probability of the risk materializing. Of the 9 high weighted risks identified without a Contingency Plan, we noted:

- 3 risks impacted Project Schedule
- 3 risks impacted Project Scope
- 1 risk impacted Project Resources
- 1 risk impacted Project Quality
- 1 risk did not identify an impact area

Criteria

LCD 5-130.1, PMLC, effective August 2017 states:

RM: Responsible for the project's Risk Management Plan, its effective implementation throughout the project, trends and metric analysis, and training project personnel on risk management. The RM is also responsible for creating and maintaining the Risk Register (or Log), unless this task is delegated to a team member.

Risk Management Team: Project team members assigned to periodically evaluate, monitor and mitigate risks for the project. They work under the direction of the RM. RM: Responsible for the project's Risk Management Plan, its effective implementation throughout the project, trends and metric analysis, and training project personnel on risk management. The RM is also responsible for creating and maintaining the Risk Register (or Log), unless this task is delegated to a team member.

PM: Responsible for planning and overseeing all phases of a project and ensuring all process steps and deliverables are completed as planned. The PM is empowered to provide direction and manage the work of the project team. The PM follows the PMLC process and deliverables to help ensure successful completion of the project.

Risk Register Workbook Instructions:

Risks are identified when there is a Risk to Project Goals/Targets:

- Risk to Project Cost
- Risk to Project Schedule
- Risk to Project Scope
- Risk to Project Resources
- Risk to Project Quality

The guidance below describes various elements of the Risk Register in additional detail:

Contingency Plan details actions that team members will implement in case a given risk occurs. Contingency plans are applied to reduce the impact of realized risks (i.e. issues). They identify an action or product that becomes a part of the team or area working plans, and which are monitored and reported as part of regular progress reporting of the project.

Some risk cannot be avoided/mitigated in any way and the project team must accept the consequences of the risk by developing contingency plans to put in action when such accepted risk materializes.

Cause

OCIO stated that the overarching reason for the 9 risks having only a mitigation strategy and lacking a contingency plan was because OCIO was relying on mitigation strategies, which were in the Risk Register. However, the Risk Management plan states that strategies for dealing with risk should have both preventative and contingency measures. Ultimately, the RM did not accurately maintain the Risk Register and the PM did not provide adequate oversight.

Effect

Without developing contingency plans for each potential risk to the AVCMS project, the project team may not be prepared to address the risks if they are realized at any point during the project. As a result, the project may be more adversely impacted than it would have been if management had developed a plan to react to the risk in advance.

Recommendation

We recommend the Library:

3.1 Ensure the PM oversees the immediate completion of the project risk register for the AVCMS project.

ADDITIONAL OBSERVATIONS [Footnote 9]

9 Observations are control weaknesses that came to our attention, that we felt warranted management's attention, but were not as significant as the previously discussed findings and recommendations.

Observation 1: Unapproved IT Governance Policies and Procedures

Background

The National Institute of Standards and Technology (NIST) defines governance as the set of responsibilities and practices exercised by those responsible for an organization (e.g., the board of directors and executive management in a corporation, the head of a federal agency) with the express goal of: (i) providing strategic direction; (ii) ensuring that organizational mission and business objectives are achieved; (iii) ascertaining that risks are managed appropriately; and (iv) verifying that the organization's resources are used responsibly. Risks and resources can be associated with different organizational sectors (e.g., legal, finance, information technology, regulatory compliance, information security).

At the Library, the LCR 5-130, Information Technology Investment Management (ITIM) provides the framework for IT governance at the Library, identifies roles and responsibilities, implements the Library's ITIM policy, and centralizes ITIM activities. Supporting this regulation, the LCD 5-130.1, IT Investment Management, further defines roles and responsibilities and provides more detailed descriptions of each step in the IT Governance process.

Condition

The approved and published versions of LCR 5-130 and LCD 5-130.1 do not accurately reflect the current IT governance structure in place at the Library. Changes between the governance structure documented in LCR 5-130 and LCD 5-130.1 and the current governance structure we observed in practice included the removal and addition of the following governance boards or working groups:

Approved and Published LCR 5-130 and LCD 5-130.1

- IT Steering Committee
- Architecture Review Board

Current IT Governance Structure In Place

- Technology Strategy Board
- IT Finance Working Group
- IT Product Governance Board
- Technical Architecture Board
- Digital Strategy Working Group

Criteria

LCR 1-710: LCRs and LCDs, Section 7. Preparation of Regulations, Subsection A. Drafting, Review, and Approval states:

1. A proposed new or revised policy and procedural statement shall be drafted by the appropriate responsible Library manager and forwarded through administrative channels, accompanied by the transmittal and routing form, to the General Counsel. The form shall state the purpose for the new regulation or summarize the changes in the revised regulation.
2. When revised regulations are forwarded to the General Counsel for review, they must be accompanied by a red-lined version showing the suggested changes as well as a clean version of the regulation.
3. Before submission to the Executive Committee, the General Counsel may submit a new or revised regulation to any management committee, team, or other Library managers for review and comment. The General Counsel will specify the time frame by which comments must be received for consideration.
4. The General Counsel shall forward the draft regulation, with any accompanying recommendations, to the EC. The reviewing officials shall initial and date any comments or editorial changes that they may make on the draft regulation and respond to the General Counsel who shall prepare the draft

regulation for final review and approval.

5. The Librarian shall give final approval to new or revised regulations.

GAO's Standards for Internal Control in the Federal Government, (The Green Book) (September 2014 Revision), Sections 3.09, 3.10, and 3.11, Documentation of the Internal Control System, state:

3.09 Management develops and maintains documentation of its internal control system.

3.10 Effective documentation assists in management's design of internal control by establishing and communicating the who, what, when, where, and why of internal control execution to personnel. Documentation also provides a means to retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel, as well as a means to communicate that knowledge as needed to external parties, such as external auditors.

3.11 Management documents internal control to meet operational needs. Documentation of controls, including changes to controls, is evidence controls are identified, capable of being communicated to those responsible for their performance, and capable of being monitored and evaluated by the entity.

Cause

In January 2019, OCIO implemented the revised IT governance structure in advance of receiving required approvals, as documented in LCR 1-710. As of January 2021, LCR 5-310 and LCD 5-310.1 have not been updated to reflect the current governance structure.

Effect

Investment governance structures without approved and published regulations and directives may obscure the scope, authority, policy, responsibilities, and definitions of the activities to the organizations participating in or effected by the objectives. Procedures for carrying out Library policy or to implement a Library policy may not be commonly understood or followed by those responsible for the activities.

Recommendation

In the OIG audit report, U.S. Copyright Office's Public Records Performance Audit Report, Report No. 2020-IT-101 (November, 2021), the following recommendation was opened:

1. The OCIO work with the Library Office of the General Counsel to obtain required approvals and publish revised versions of LCR 5-130 and LCD-5-130.1 that reflect the current IT governance structure at the Library.

We did not issue a repeat recommendation for this observation.

Observation 2: Insufficient Project Schedule Monitoring

Background

Project scheduling provides a detailed plan that represents how and when the project will deliver the products, services, and results defined in the project scope and serves as a tool for communication, managing stakeholder's expectations, and as a basis for performance reporting.

Condition

The OCIO PMO does not have consistent cost tracking and reporting for the AVCMS project. Specifically, we noted the following:

1. The cost, capacity, and percent of work scheduled are required to be included in the project schedule per the Quality Management Plan, but are not included in the schedule. Management advised us they just forgot to remove those requirements from the QMP template.

2. Management does not have full awareness into the AVCMS baseline schedule. Based on inquiries with management and inspection of project status reports, we determined that management is not fully informed of the project schedule, which is created and maintained by the AVCMS project vendor.

3. Actual project costs for the AVCMS project were neither documented, nor can they be retrieved for the period of April 2020 through August 2020. Additionally, despite the fact that actual costs were

not known, AVCMS Management status reports did not reflect this detail regarding the project status.

4. Upon inquiry with OCIO, we noted recent status reports do not accurately reflect actual AVCMS project expenses. For instance, a status report from January 13, 2021 identified total expenses in the amount \$50,100, while expense line item detail, as observed via inquiry with OCIO, detailed total expenses at the time in the amount of \$625,000.

Criteria

GAO's Schedule of Assessment Guide, Best Practice 10: Maintaining a Baseline Schedule, states:

A baseline schedule is the basis for managing the program scope, the time period for accomplishing it, and the required resources. The baseline schedule is designated the target schedule and is subjected to a configuration management control process. Program performance is measured, monitored, and reported against the baseline schedule. The schedule should be continually monitored so as to reveal when forecasted completion dates differ from baseline dates and whether schedule variances affect downstream work. A corresponding basis document explains the overall approach to the project, defines custom fields in the schedule file, details ground rules and assumptions used in developing the schedule, and justifies constraints, lags, long activity durations, and any other unique features of the schedule.

Cause

Management has not fully developed guidance for tracking project completion or project health. In OIG Report No. 2018-OT-107, Library Working Through Agile Delivery Method Challenges for Copyright IT Modernization Project we noted that project status reporting guidance found on the OCIO PMO Confluence page contained a draft section on tracking project completion. In February 2020, we noted the Library published an update to LCD 5-310.2, SDLC, to include guidance for projects following hybrid methodology. However, OCIO is currently working with a third-party contractor to implement Earned Value Management (EVM)/Earned Value Analysis (EVA) and planning to run a pilot of a Web TA Labor module to incorporate actual hours of OCIO personnel to monitor project health. The estimated completion date is fourth quarter of FY 2021. This finding and the associated recommendation has not yet been remediated.

Effect

Without effective project management, including accurate status reporting, Library management will not be aware of issues that may cause the project to fall behind schedule or require additional resources.

Recommendation

Similar to a prior recommendation in OIG's audit report, 2018-IT-107 Library Working Through Agile Delivery Method Challenges for Copyright IT Modernization Project, Recommendation 1, OIG recommended OCIO:

1. Develop and implement guidance on tracking and resolving project health issues, on development projects that follow an agile, hybrid, or other similar methodology. This guidance should follow the guidelines included in publications by PMI, OMB, and/or other risk management standard setting bodies. The guidance should also identify critical characteristics of the EVA method for measuring the project budget and progress toward completion in coordination with FSD, including establishing the project costing methodologies. In addition, the OCIO should update its status dashboards to effectively convey project progress.

The prior recommendation was written to address the issue at the PMO level for all future projects and is being monitored for completion by the OIG office. We did not issue a repeat recommendation for this observation.

APPENDIX A MANAGEMENT RESPONSE

We provided Library management with our draft version of this report, and they provided the following responses. We have not audited management's responses and therefore do not express an opinion on them.

Library

Library of Congress
Office of the Librarian
Memorandum

Date November 12, 2021

To Kimberly Byrd, Acting Inspector General

From J. Mark Sweeney, Principal Deputy Librarian of Congress

Subject Management Response to OIG report 2020-IT-104, Library Services Audio Visual Collections Management System Report

Thank you for providing the draft report on the National Audiovisual Conservation Center (NAVCC) audio-visual collections management system (AVCMS). The Library generally agrees with the recommendations and continues to refine processes for project costing and scheduling and improve quality assurance of such data.

The Office of the Chief Information Officer will review the documentation identified in the report for the AVCMS project and coordinate with the Library Collections and Services Group and the Financial Services Directorate to validate the cost estimates, risk assessments, and project timelines. The attached spreadsheet addresses each recommendation for the AVCMS and provides target dates for completion.

cc: Judith Conklin, Chief Information Officer
Robin Dale, Deputy Librarian for Library Collections and Services
Edward Jablonski, Chief Operating Officer
Mary Klutts, Chief Financial Officer
Elizabeth Pugh, General Counsel
John Rutledge, Deputy CIO
Elizabeth Scheffler, Acting Comptroller

Management Comments on Draft OIG Report No. 2020-IT-104 Library Services Audio-Visual Collection Management System (AVCMS) Audit Report

Recommendation number: 1.1 Recommendation: Finalize cost estimates (based on current estimates at completion) as the current baseline to facilitate performance management metrics through completion of the AVCMS project.

Responding Office: OCIO

Comments: The Library will finalize cost estimates to facilitate performance metrics through completion of the AVCMS project.

Target Completion: Q4 FY2022

Recommendation number: 1.2 Recommendation: Develop and implement required project documentation, specifically the Cost Estimating Spreadsheet and Cost Estimating Document, following applicable guidance for the AVCMS project.

Responding Office: OCIO

Comments: The Library will develop and implement the Cost Estimating Spreadsheet and Cost Estimating Document, following applicable OCIO Spreadsheet and Cost Estimating document for the AVCMS project.

Target Completion: Q4 FY2022

Recommendation number: 1.3 Recommendation: Develop and implement required project documents, specifically the Sensitivity Analysis and Risk Assessments following applicable guidance for the AVCMS project.

Responding Office: OCIO

Comments: The Library will develop and implement the Sensitivity Analysis and Risk Assessments following applicable guidance for the AVCMS project.

Target Completion: Q4 FY2022

Recommendation number: 2.1 Recommendation: Review and update the AVCMS Project Charter to accurately reflect the implementation methodology and approval for this project.

Responding Office: OCIO, LCSG

Comments: The Library will review and update the AVCMS Project Charter to accurately reflect the implementation methodology for the AVCMS project.

Target Completion: Q1 FY2022

Recommendation number: 2.2 Recommendation: Review and update the Project Management Plan to include the required details of a Hybrid methodology.

Responding Office: OCIO

Comments: The Library will review and update the AVCMS Project Management Plan to include the required details of a Hybrid SDLC methodology.

Target Completion: Q1 FY2022

Recommendation number: 2.3 Recommendation: Re-perform the PM Project Charter Review Checklist to ensure all checklist requirements are met and that the project meets PMO quality standards.

Responding Office: OCIO

Comments: The Library will re-perform the PM Project Charter Review Checklist for the AVCMS project to ensure the checklist requirements are met and the project meets PMO quality standards.

Target Completion: Q1 FY2022

Recommendation number: 3.1 Recommendation: Ensure the PM oversees the immediate completion of the project risk register for the AVCMS project.

Responding Office: OCIO

Comments: The Library will ensure the Project Manager oversees the immediate completion of the project risk register for the AVCMS project.

Target Completion: Q1 FY2022

Footnotes:

1. Simple Object Access Protocol (SOAP) is a standard protocol that was first designed so that applications built with different languages and on different platforms could communicate. Because it is a protocol, it imposes built-in rules that increase its complexity and overhead, which can lead to longer page load times. However, these standards also offer built-in compliances that can make it preferable for enterprise scenarios.
2. Collection Metadata Exchange (CME) provides a Get operation that allows users to retrieve the schemas for Forefront Identity Manager (FIM) resource types, as well as schema metadata, from the FIM Service database.
3. The Project Management Institute (PMI) defines ♦Basis of Estimates♦ as supporting documentation outlining the details used in establishing project estimates such as assumptions, constraints, level of detail, ranges, and confidence levels.
4. PMI defines ♦Project Charter♦ as a document issued by project initiator or sponsor that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities
5. PMI defines ♦Project Management Plan♦ as the document that describes how the project will be executed, monitored and controlled, and closed.
6. PMI defines ♦Risk Register♦ as a repository in which outputs of risk management processes are recorded.
7. PMI defines ♦Baseline♦ as the approved version of a work product that can be changed only through formal change control procedures and is used as a basis for comparison to actual results.
8. Cotton & Company was provided this information by the OCIO Supervisory IT Project Manager and the Deputy Director, IT Design and Development on November 18, 2020 and December 8, 2020, respectively.
9. Observations are control weaknesses that came to our attention, that we felt warranted management♦s attention, but were not as significant as the previously discussed findings and recommendations.