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November 6, 2023

The Honorable Ronald D. Kouchi
President of the Senate
and Members of the Senate
Thirty-Second State Legislature
State Capitol, Room 409
Honolulu, Hawaiʻi 96813

The Honorable Scott K. Saiki
Speaker and Members of the
House of Representatives
Thirty-Second State Legislature
State Capitol, Room 431
Honolulu, Hawaiʻi 96813

Aloha Senate President Kouchi, Speaker Saiki, and Members of the Legislature:

Pursuant to HRS section 27-43.6, which requires the Chief Information Officer to submit applicable independent verification and validation (IV&V) reports to the Legislature within ten days of receiving the report, please find attached the report the Office of Enterprise Technology Services received for the State of Hawaiʻi, Public Utilities Commission (PUC), Content and Document Management System Project.

In accordance with HRS section 93-16, this report may be viewed electronically at http://ets.hawaii.gov (see "Reports").

Sincerely,

Douglas Murdock (Nov 6, 2023 12:07 HST)

Douglas Murdock
Chief Information Officer
State of Hawaiʻi

Attachment

PUBLIC CONSULTING GROUP

Solutions that Matter

State of Hawaii

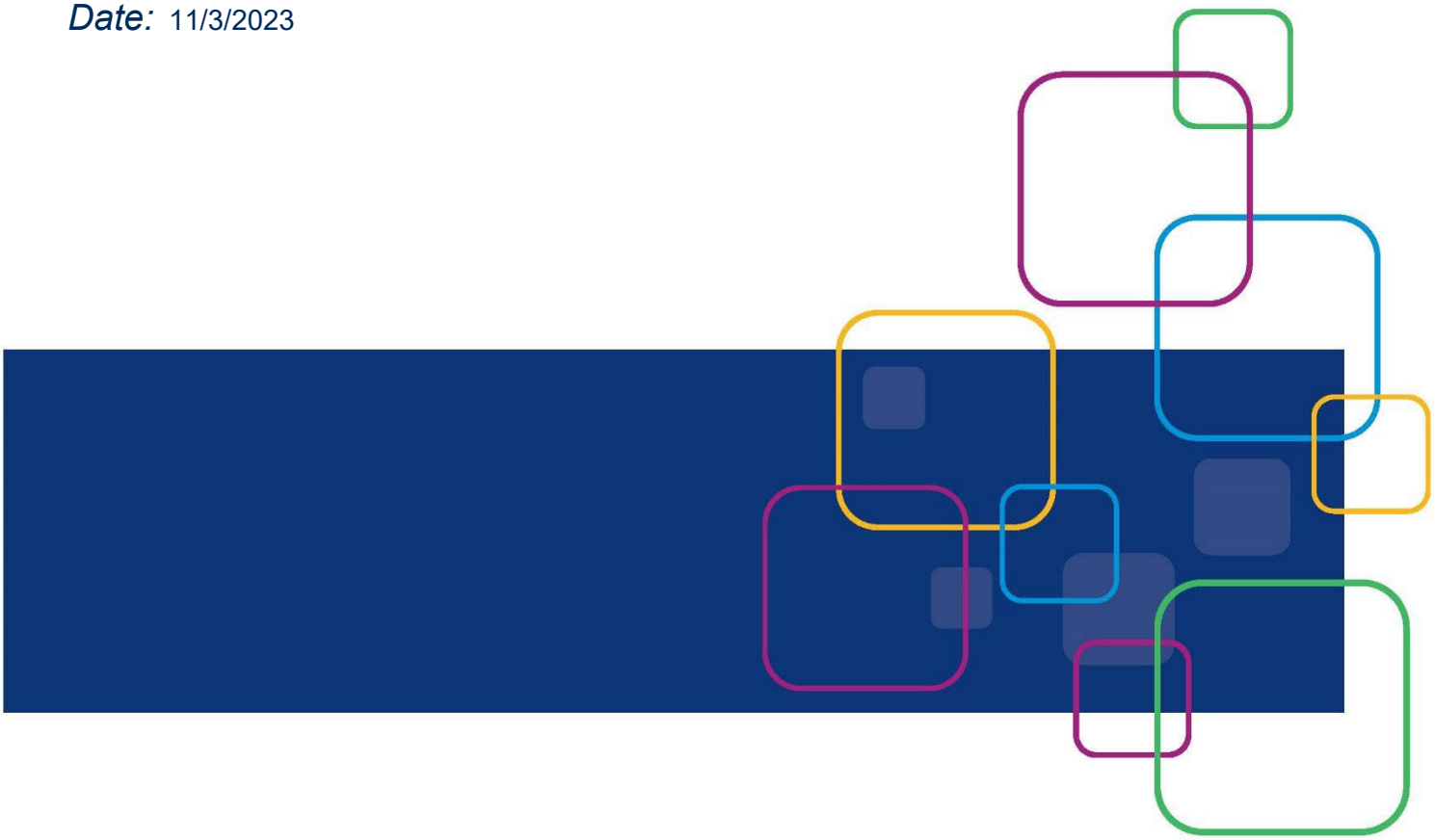
Public Utilities Commission (PUC)

Case and Document Management System (CDMS) Replacement Project

IV&V Post Go-Live Assessment Report - Final

Version: 1.0

Date: 11/3/2023



Document History

Version	Date	Brief Description of Modifications
0.1	9/8/2023	Initial Draft
0.2	10/13/2023	Second Draft - Incorporated comments from PUC, the ASI, and internal review
1.0	11/3/2023	Final Draft

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I. Introduction

The Hawaii Public Utilities Commission (PUC) acquired the services of the Public Consulting Group LLC (PCG) to provide Independent Verification and Validation (IV&V) services on the Case and Document Management System (CDMS) replacement project. The CDMS Project replaced the PUC's existing legacy system with a Salesforce platform solution to allow PUC to manage cases, dockets and documents online.

In the software development life cycle, risks are common and, in many cases, predictable. As a best practice, the early identification of potential risks and the development of mitigation strategies minimize and mitigate risks before they materialize into significant project issues. Throughout the PUC CDMS project, IV&V identified a number of risks and mitigation strategies that were actionable within the scope of the project resources and timeline. In some cases, IV&V identified risks and mitigation strategies to which the Project quickly responded, and the team was ultimately able to deliver a system PUC could use. However, IV&V noted challenges throughout the Design, Development and Implementation (DDI) phase that should be taken into account on future projects and/or other Information Technology (IT) initiatives undertaken by the PUC or the State of Hawaii, which are presented in this Post Go-Live Report.

II. Summary

The PUC CDMS project began July 2021 and went live on July 19, 2023 with a system that met most of the PUC's needs. Some of the Project successes were a result of:

- A well-written Request for Proposal (RFP) that provided good context of project systems, goals and objectives which enabled the System Integrator to hit the ground running and minimize onboarding activities
- A very knowledgeable PUC IT lead who provided subject matter expertise in a variety of project areas which facilitated faster information gathering and decision-making processes
- Executive leadership communications that stressed the importance of the Project which allowed staff to prioritize project activities over non-project activities
- Implementing "hypercare" support, group chat, service staff phone numbers, and a "war room" during the first two weeks after going live which provided users the support necessary to adopt a new system

However, the Project went live later than anticipated with functional gaps the Project elected to remedy after go-live. The Project encountered challenges as a result of inadequate business analysis and testing activities, which were not conducted thoroughly and were not addressed in a timely manner, thereby contributing to project delays. For example, PUC's business and user interface needs were not thoroughly defined in the early stages of the Project which led to misunderstandings and designs that needed rework. This was compounded by limited system demonstrations during development phases where PUC was unable to fully picture end-to-end functionality. Despite that, the Project continued into subsequent development cycles without timely feedback from PUC. Additionally, PUC found it challenging to verify system functionality because of a lack of insight into testing activities, as well as a lack of a Requirements Traceability Matrix (RTM) that would allow PUC to validate that all requirements were met and fully tested. This uncertainty as to whether the system was implemented in accordance with contracted requirements, combined with discovering defects and revisions during User

Acceptance Testing, led to a substantial amount of rework, unexpected efforts from PUC resources, prolonged testing schedules, and overall project delays.

The Project was able to address other IV&V concerns. For example, PUC was able to find ways to make PUC resource Subject Matter Experts (SMEs) available throughout the lifecycle, and PUC subsequently contracted an independent business analyst to support testing and validating requirements were fully met.

The following describes IV&V identified project lessons learned starting with the "Top 3 Lessons Learned" followed by an itemized list of lessons learned grouped by the same IV&V risk categories utilized in the monthly IV&V reports.

III. Top 3 Lessons Learned

#1	**Secure a Business Analyst, separate from the System Integrator's (SI) team, to improve overall project and system quality by providing ongoing assistance to the State throughout the project lifecycle, including RFP development, requirements elaboration, testing, training, and help desk support.**

The Project faced significant challenges due to the absence of effective and efficient business analysis. A proficient business analyst (BA) plays a pivotal role in bridging the gap between business stakeholders and the technical development team. Fundamentally, the BA possesses the ability to clearly articulate and comprehend all business requirements and their translation into system design. On this Project, the initially proposed SI business analysts were replaced with less experienced junior analysts who lacked the expertise required to effectively manage a project of this magnitude and complexity. Consequently, this led to an incomplete understanding of requirements, subsequently resulting in design and development work that necessitated rework once business stakeholders could evaluate the system as a whole.

While it is imperative for system integrators to provide a highly skilled business analyst(s), it is also advisable for the State to engage an independent Business Analyst (BA), not affiliated with the SI's team, to support the State throughout the project lifecycle to improve overall project and system quality. If this BA is involved with the development of the requirements, they should be well versed in the State's needs and expectations to assist the SI with requirements elaboration, analysis, and design activities. This BA should become well versed in the requirements and system design to serve as a valuable resource during testing, training, and help desk support.

#2	**Set clear expectations as to the level and quality of testing the SI is expected to conduct.**

User Acceptance Testing (UAT) revealed many defects that should have been identified during the SI's Unit and System Testing phases. The process of discovering, documenting, and managing functional defects consumed substantial amounts of time, diverting attention from the primary goal of UAT – which is to confirm system alignment with the business requirements.

While precise figures and percentages are challenging to ascertain, there was a prevailing consensus that the SI did not conduct an adequate level of testing prior to UAT.

One contributing factor was the absence of a Requirements Traceability Matrix (RTM), a critical project tool used to track whether testing activities adequately cover all required functionality. Furthermore, there was a lack of oversight and transparency concerning the SI's test cases and testing procedures. PUC was not always afforded the opportunity to thoroughly examine the SI's test cases in order to evaluate the adequacy of the SI's testing strategy.

To proactively address these issues on future projects, it is imperative for the State to establish clear expectations regarding the extent and quality of testing expected from the SI in the Request for Proposal (RFP) or Statement of Work (SOW). Future procurements should include strong language to assure the SI maximizes their testing efforts. For example, the State may consider establishing testing coverage metrics (e.g., each average requirement to test script ratios), requiring unit and system test result as part of a paid deliverable(s), and/or requiring the SI to perform additional rounds of system testing when UAT defects (leakage) exceeds an established threshold..

#3	**Define and require the use of a Requirements Traceability Matrix that at minimum, traces all project requirements to a passed test case.**

The SI did not provide an RTM that comprehensively traced each requirement to corresponding test case results. As a consequence, the Project faced challenges in ensuring the proper definition, tracking, and successful implementation of project requirements, as evidenced by the test cases and their results.

Throughout the various cycles of the Project, extending into UAT, the PUC encountered difficulties in effectively monitoring and tracking the status of requirements being worked on, implemented, or tested. This deficiency led to PUC's inability to accurately assess project progress and determine whether the final product met all contractual requirements and functionality. To address this, the Project extended the User Acceptance Testing phase to accommodate additional testing activities, contributing to significant project delays.

To mitigate such issues in the future, it is advisable for the State to establish and mandate the use of an RTM that, at a minimum, links all project requirements to successfully passed test cases. IV&V recommends incorporating language into the (RFP that specifies the requirements and objectives of the RTM, along with a proposed template. Additionally, the State should require the SI to conduct requirements elaboration sessions, such as Joint Application Requirements (JAR) sessions, prior to developing user stories and/or conducting design sessions. If these measures had been incorporated into the project, monitoring progress and assessing requirement fulfillment would have been significantly more streamlined, potentially leading to fewer project delays.

IV. Lessons Learned

IV&V began tracking risks and issues since our initial assessment report and provided recommendations for each identified finding. IV&V also discussed findings and recommendations at length with PUC Project Team Members and offered guidance as a trusted advisor. This section summarizes our recommendations for identified project risks/issues and restates them as lessons learned for future IT initiatives. Lessons learned are grouped by previously reported IV&V process categories specific to project management, requirements management, testing, software development, data management, and training/OCM.

Project Management

Project Management	
SUBJECT AREA	**LESSONS LEARNED**
In agile projects, ensure project progress can easily be tracked to enable accurate predictions of go-live as well as when schedule adjustments are needed	• Set clear expectations to require a burndown chart and velocity metrics to demonstrate that the remaining work can be completed by planned dates • Include all related project-related activities and dependencies in the project schedule regardless of ownership to avoid overlooking critical path items that can impact the timeline
Adequately staff the Project with resources to support activities so as to not overburden existing resources	• Acquire additional state-side resources in key positions to support the Project • Reallocate day-to-day responsibilities of state project resources to allow staff to focus on the Project • Define, implement and strictly follow a process when reviewing and approving resource changes
Ensure project deliverables are defined and meet customer expectations and needs	• Define purpose, format, and content of all deliverables within the RFP or as early as possible. If possible, provide examples or templates. • Set high standards for quality and relevant content for each deliverable and enforce those standards and expectations
Ensure project communication supports escalation of issues	• Define and implement governance and escalation processes that promote faster communication and information dispersal for critical items • Designate an Executive-level Liaison to the vendor to resolve technical misunderstandings and escalated conflicts.

Software Development

Software Development	
SUBJECT AREA	**LESSONS LEARNED**

Software Development	
Require strong and competent business analysis activities are conducted	• Acquire a Business Analyst that is not part of the SI's team to begin supporting the State prior to the SI's start date through implementation • Develop minimum qualifications (MQs) for the business analyst role that result in a high quality resource with relevant experience and require any replacement staff also meet the MQs. • Require the SI to demonstrate all implemented functionality early so there is less of a surprise during subsequent phases such as during UAT
If process improvement is expected, plan for and dedicate resources to accomplish it	• Hire or designate a process improvement "officer, or leverage the stateside BA, to focus on identifying and tracking areas of improvement, participating in Project meetings, and managing process improvement areas • Measure process metrics before and after implementation to demonstrate improved processes and justify spending • If process improvement is expected by the SI, define within the Request for Proposal the activities and scope the SI is expected to accomplish
Confirm and validate customer policies to ensure alignment with system design	• Hire an independent Business Analyst to review business policies and procedures
Ensure the SI understands requirements if leveraging a previous vendor's requirements documentation	• Set expectations early as to how to leverage previous work • Require Joint Application Requirements sessions and elaborations before user stories are created to confirm requirements

Requirements Management

Requirements Management	
SUBJECT AREA	**LESSONS LEARNED**
Assure a Requirements Traceability Matrix is created, managed and delivered to the State	• Define in the Request for Proposal the structure, fields, values, and traceable items the State will expect within the Requirements Traceability Matrix. • Define and communicate the business need and project questions the RTM will convey and answer to accommodate flexibility in design if needed

Requirements Management	
Assure Project Requirements are fully understood	• Require the SI to conduct requirements elaboration sessions such as Joint Application Requirements (JAR) session, prior to developing user stories and approving designs • If leveraging existing requirements documentation, define the expectations of leveraging those documents in the RFP

Testing

Testing	
SUBJECT AREA	**LESSONS LEARNED**
Aim to minimize functional defects released into User Acceptance Testing	• Set clear RFP expectations for the level of SI testing to be expected • Require test scripts and test results as deliverables • Set exit criteria and clear metrics defining the number of defects found during UAT to exit and require the SI to conduct system testing again • Require the use of a Requirements Traceability Matrix (RTM) to trace all tests back to requirements to ensure functional coverage

Data Management

Data Management	
SUBJECT AREA	**LESSONS LEARNED**
Minimize bad data introduced into the Production environment at go-live	• Put in RFP that the SI needs to use most modern strategies, to reduce the amount of manual work for State SMEs, • The SI should begin data cleanup / conversion efforts on Day 1 • The customer should begin data cleanup effort on legacy system prior to procurement. This may include hiring outside resources and/or purchasing various quality tools.

Training and Organizational Change Management

Training and Organizational Change Management	
SUBJECT AREA	**LESSONS LEARNED**

Training and Organizational Change Management	
Ensure OCM is resourced sufficiently for the size of the Project	• Secure/leverage a dedicated resource focused on Organizational Change Management.