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May 30, 2019

The Honorable Ronald D. Kouchi,  
President, and  
Members of The Senate  
Twenty-Ninth State Legislature  
Hawaii State Capitol, Room 409  
Honolulu, Hawaii 96813

The Honorable Scott K. Saiki,  
Speaker, and  
Members of The House of Representatives  
Twenty-Ninth State Legislature  
Hawaii State Capitol, Room 431  
Honolulu, Hawaii 96813

Dear 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 it, please find attached the report the Office of Enterprise Technology Services (ETS) received for the State of Hawaii Department of Accounting and General Services (DAGS) and ETS' HawaiiPay Project.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Douglas Murdock".

DOUGLAS MURDOCK  
Chief Information Officer  
State of Hawai'i

Attachment (1)

State of Hawaii

Department of Accounting and General  
Services (DAGS)

Office of Enterprise Technology Services (ETS)  
HawaiiPay Project

## IV&V HawaiiPay Phase I: **Lessons Learned**

Version 3.0 – Final

May 13, 2019



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## *1. Document History*

Version	Date	Brief Description of Modifications
1.0	April 1, 2019	Draft submitted to state for review.
2.0	May 2, 2019	Revised draft submitted
3.0	May 13, 2019	Final submitted

## *2. Document Author & Contact Information*

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## *I. Introduction*

The State of Hawaii's (SOH) Office of the Enterprise Technology Services (ETS) acquired the services of the Public Consulting Group – Pacific Point (PCG-PP), hereafter referred to as PCG, to provide Independent Verification and Validation (IV&V) services for the HawaiiPay Project with the Department of Accounting and General Services (DAGS). These services include ongoing periodic assessments, monthly reports as well as a Lesson Learned report. As the final deliverable for the first Phase of the HawaiiPay project, IV&V was asked to construct and deliver a Lessons Learned report. This report is intended to outline key areas of risk that the project either fully or partially mitigated or were not successfully mitigated, which in turn can become lessons learned that could benefit further phases of the project or other Information Technology initiatives undertaken by the State.

In the software development life cycle, risks are common and in many cases predictable. As a matter of best practice, the earlier a risk can be identified and addressed the higher the rate of preventing that risk being triggered into a project issue. For the purposes of this report IV&V defines risks as potential problems the project may encounter if no corrective action is taken. IV&V defines issues as an actual project concern that requires corrective action to ensure the success of the project.

IV&V activities through the first phase of the HawaiiPay project outlined a number of potential risks as well as potential mitigation strategies that were intended to be actionable within the scope of the project's resources and timeline. Additionally, the HawaiiPay project team identified a number of other risks. As a matter of practice, the project team, working with project stakeholders and the System Integration partner (CherryRoad), took steps to implement process enhancements or implemented new processes, that were focused on either fully mitigating the risk or reducing the overall impact if the risk became an issue.

IV&V noted in many cases the project efforts to identify and reduce risk as well as deal with issues, was adequate. However, IV&V also noted a number of key areas that could benefit from additional or enhance mitigation steps which could potentially benefit the project and help to meet the project's overall objectives.

IV&V has reported these findings to the project in a number of deliverables and verbal communications.

### **1.1 Purpose**

Although at the time of this report, the first phase of the HawaiiPay project was complete, the purpose of this report is to document risks and issues, identified during the first phase of the HawaiiPay project, that could be used to enhance processes and methodologies going forward. The report will include a narrative that describes the top 3 lessons learned as well a breakdown of other findings, and any associated lessons learned, grouped by the same key sections that the IV&V Monthly Status reports utilizes to describe the project's areas of focus. It should be noted that these lessons learned should in no way reflect negatively on the project team and their leadership. IV&V identified risks early on that the teams were understaffed for this level of effort and, yet the team was able to achieve a high level of

success. These lessons learned may aide the project, and other Information Technology projects, in future endeavors to help avoid similar challenges.

## 1.2 Project Background

As noted in other IV&V reports, the HawaiiPay Project is a statewide initiative intended to modernize the current Payroll system into one integrated statewide solution. The state contracted with a system integrator (CherryRoad) to provide key management and technical services for the duration of the HawaiiPay Project. To provide the required functionality, the state chose PeopleSoft, an established commercially available off the shelf (COTS) solution. An existing instance of PeopleSoft has already been deployed for Department of Human Resources Development (DHRD). The state chose to utilize this existing instance to support all state employees. The project identified a number of concerns that could be addressed during the ongoing maintenance and operations (M&O) phase as well as prior to committing to the second phase (Time and Attendance) of the HawaiiPay initiative.

## II. Summary

IV&V noted in previous reports that during the review of the project's plans, activities, and outputs, IV&V did not discover any critical issues with the project's processes and methods that led up to the final Go Live. Also, as noted previously, the HawaiiPay Project has developed a mature, skilled team and has implemented and improved their tools, processes, and regular project management cadence which enabled the team to quickly and effectively address most issues that presented themselves during the lifecycle of the project. However, IV&V did note a number of processes and controls that could have been enhanced to help reduce the overall risks and improve the quality of information processed by the HawaiiPay solution. Some of these concerns may have been preventable with the addition of more specific controls that ensure project tasks are executed correctly and at the correct time.

The following describes project lessons learned starting with the "Top 3 Lessons Learned" followed by a more extensive, detailed list of lessons learned grouped by the same IV&V risk categories utilized in the monthly IV&V reports.

## III. Top 3 Lessons Learned

<b>#1</b>	<b>Implementing an enhanced OCM strategy which incorporates early outreach to organizations (and reinforced through regular updates) will reduce negative impacts such as schedule slippage and surprises to stakeholders, and will increase positive impacts such as end-user buy-in and adoption.</b>
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IV&V observed several challenges with external departments (state departments stakeholders other than DAGS) that largely, due to the state's organizational hierarchy and reporting structure that limits the authority of governing authorities (and hence project leadership) to direct state resources and departmental leadership. Projects that involve departments that are loosely accountable to project governing bodies could resist important project directives/requests and pose a significant risk to project schedules and budgets. HawaiiPay attempts to direct departments to comply with important project directives were not always met with compliance and often met with opposition that resulted in department readiness issues, end-user confusion, undue pressure on the HawaiiPay help desk, and ultimately lead to negative impacts to project schedule and budget.

The primary lesson learned was, given that project leadership lacks the authority to direct those not under their control, OCM strategies should address this risk and extensive efforts be made to engage external department stakeholders to effect buy-in and commitment to project activities, early on and throughout the project. Project leadership (as well as the project team) ended up spending a significant amount of time and effort managing departmental pushback and readiness issues. OCM strategies should include relationship (bridge) building activities, institution of departmental change agents, establishing clear communication channels (reliable, responsive and informed points of contact), and establishing effective metrics for monitoring each department's level of understanding and buy-in. The ADKAR Model (Awareness, Desire, Knowledge, Ability and Reinforcement) outlines five milestones in successful change management -- awareness, desire, knowledge, ability and reinforcement. These and other OCM metrics can be leveraged to determine when project resources need to be allocated to ensure departmental understanding and buy-in. Corrective action plans can be developed to address departmental interactions that indicate they may have challenges complying with project directives. Projects can also benefit greatly from the use of departmental change agents (aka. Super SME's) as part of an effective OCM strategy. If organized well, given clear objectives, and are well supervised, these agents can make inroads into departments for the project where leadership level communications and activities may fall short. The strategy should clearly define how the change agents will accomplish their objectives.

The type of OCM effort described thus far would be best led by a dedicated OCM manager that is given clear objectives that include external department understanding, expectation management, and buy-in. Early and often communications can include clarifying details of what departments can expect once they are fully engaged to begin implementation. In-person information sharing, regular check-in's, and whiteboard sessions are often effective and can include visual process flows that clearly depict processes, their involvement, expectations, and lead to open discussions about readiness and possible problem areas. The project can use these opportunities to clearly communicate and reinforce readiness deadlines/milestones and instill a sense of urgency. Whiteboard sessions can be leveraged to clearly explain project methodology including the principle of minimum viable product as a risk mitigation strategy for a phased approach that helps assure a successful rollout and limit schedule delays. This should help them understand why all the features they want will not be included in initial releases. Clearly explaining the process for change management may help alleviate concerns that their preferred features will never be implemented.

Finally, the OCM strategy should craft an escalation process for departments that miss important deadlines/milestone dates. The project should clearly document missed readiness deadlines, communicate the possible consequences of missed deadlines clearly to department leaders (via the communication methods defined in the OCM, communication management, and issue escalation plans) in a timely manner to help ensure leadership is not surprised and has ample opportunity to respond and manage the risks.

**#2**

**Establishing thorough data validation practices can reduce unexpected errors that could create schedule delays and put undue pressure on the project team to resolve data errors.**

The HawaiiPay project was faced with multiple data quality problems that ended up putting undue strain on project resources and at times impacted the project schedule. This required that the project team often work excessive hours (late nights and weekends) to assure project success and to ensure project deadlines were not missed. The lesson is that additional early efforts to establish enhanced data validation processes and practices can reduce errors and also provide early detection of errors. This could alleviate excessive project team efforts to manually identify and correct errors. Future RFP's can include language to require SI's to automate testing and data validation wherever possible, especially for projects with known state resource limitations.

One of HawaiiPay's challenges included interface testing with external departments/agencies. The lesson was projects should establish clear interface testing processes with early and often outreach to departments (see top lesson learned #1 above) to include early in-person meetings that assure clear understanding of requirements and minimize any misunderstandings. Embedding technical resources in the department early on could minimize confusion, clarify expectations and mutual understand of data being sent/provided, and lockdown interface design well before go-live draws near.

Projects can leverage Memorandums of Agreement (MOA) to clarify responsibilities and expectations. MOA's can detail the level of commitment required to minimize surprises and extraordinary late game efforts. Recommend state IT governance bodies establish foundational IT RFP development guidance that includes thorough/detailed SI testing requirements that include requirements to automate testing wherever feasible.

Finally, testing best practices typically include early training (system as well as testing processes) of business personnel who will act as testers to ensure proper understanding of expectations and validate their ability to thoroughly test and validate system functionality and data.



**#3**

**Establishing thorough internal controls based on established security policies can help to reduce fraud and other security risks as well as provide project leadership with leverage to control departments giving users excessive permissions.**

The state currently lacks formally documented statewide security controls related to the segregation of duties, protection of assets, and prevention of fraud that could adequately and appropriately authorize the project to establish system-wide controls related to end-user provisioning and permissions.

Though the project can assure that individual departments will not be able to access other departments data, the lack of formal security controls continues to leave the HawaiiPay project with limited ability to deny external department requests for excessive end user provisioning requests that could conflict with established controls and expose private data (PII) to unauthorized personnel and increase the risk of fraud and identity theft.

First, the state should pursue development of enforceable segregation of duties and protection of assets standards/policies that departments can leverage to drive effective department and project policies. Second, when state-level policies are not available, departments who are project owners could develop and employ their own similar policies that projects could then leverage to enforce good security practices. Finally, when appropriate security policies are unavailable at a higher level, the project can draft their own and leverage them as justification for rejecting requests for excessive permissions.

Additionally, projects can establish early MOA's with external department participants that obligates them to follow security guidelines/policies/standards established by the project. Projects can also implement controls designed to prevent end users from completing system transactions that are not in the best interest of the state. These control objectives should include controls that, where possible, prevent unauthorized access to system functionality that would violate standards and/or policies related to adequate segregation of duties. This could include a mechanism or process to detect/identify user provisioning requests that include conflicting roles and/or behaviors not in line with the expected activity for a given users roles (i.e. transactions that seem unusual, unnecessary or inappropriate for their role).

## IV. Lessons Learned

This section details project lessons learned grouped by IV&V findings categories and subject areas.

### A. Communications Management

Communications Management	
SUBJECT AREA	LESSONS LEARNED
Communications to external agencies/departments	<ul style="list-style-type: none"> <li>• Extensive awareness campaigns for each stakeholder group.</li> <li>• Enact overt and persistent efforts to address communications that have proven to be ineffective and with organizations that have known communication challenges.</li> <li>• Over-communicate important messages as well as messages that are likely to be missed. For example, multiple emails can be sent to reiterate important messages or restate them in increasingly simple or overt terms.</li> <li>• Significant efforts can be made to assure third party agencies (TPA) understand and are able to support project efforts. Additional efforts can be made to validation their understanding. The project can provide template letters to TPA's that provide clear communications that TPA's can modify to meet their specific needs. The project can request TPA's allow the project to review/validate any communications sent out that involve the project.</li> <li>• Obtain agreements with each department on the process for the project to review/validate all project related communications sent to users/stakeholders.</li> <li>• Obtain executive support at the highest levels possible (e.g. the Governor) and request executives send communications to departments vocalizing their full support and requesting their full cooperation. Recommend providing regular updates to executives on departments level of cooperation and commitments to project required activities.</li> </ul>
Develop and monitor communication effectiveness metrics	<ul style="list-style-type: none"> <li>• Define the communication metrics that should be captured for each stakeholder group to ensure they are ready to execute their tasks and transition in accordance with the project's schedule.</li> <li>• Define the communication performance targets for external stakeholders, and/or success criteria for each stakeholder group, so that informed implementation decisions are made based on the state of readiness of external stakeholders.</li> </ul>
Facilitating cross-functional communication within the agencies (IT and HR and Payroll and Finance)	<ul style="list-style-type: none"> <li>• The project team could seek to set clear expectations in initial meetings and require that each group is represented or that the departments assign the required points of contact (with phone numbers) for each functional group. OCM team could find ways to establish positive working relationships with POC's and leveraged these relationships for more efficient communications that don't always have to flow through departmental leadership. MOA's could</li> </ul>

	set expectations that project will communicate with those POC's directly as needed throughout the project with the expectation that they would report progress back to their leadership regularly.
Daily standups effectiveness	<ul style="list-style-type: none"> <li>Institution of daily standups proved effective for the HawaiiPay project and mitigated several communication and organizational risks. Standups were effectively managed and rarely required more than allotted 30 minutes, and ensured important project communications occurred daily.</li> </ul>

## B. Contract Management

Contract Management	
SUBJECT AREA	LESSONS LEARNED
Tracking of non-functional contract requirements	<ul style="list-style-type: none"> <li>Project team should establish a strong working relationship with the division/group responsible for contract management to assure they have a clear understanding of expectations and a strong commitment to achieving the objectives of contract requirement validation.</li> <li>Utilize checklists of non-functional contract requirements that the SI must satisfy in order to close-out the contract and actively monitor progress.</li> </ul>

## C. Cost & Schedule Management

Cost & Schedule Management	
SUBJECT AREA	LESSONS LEARNED
Integration of project schedules	<ul style="list-style-type: none"> <li>The project should request (and include as an RFP requirement) that the SI integrate project schedules to include both state and SI activities (including detailed organizational change, communication, cutover, interface, and readiness assessment activities for stakeholders) that should clarify dependencies and more easily identify resource over-allocations.</li> </ul>
Concurrent execution and production support activities	<ul style="list-style-type: none"> <li>The decision to run concurrent execution of production support and new development should be carefully considered and should only be attempted with high functioning and sufficiently staffed project teams. Project leadership should not only weigh their team's capabilities but also their capacity to effectively support both activities and seek the teams buy-in to confirm that all tasks and deliverables are achievable in the prescribed timeframes.</li> <li>The project plan should clearly identify which tasks are production vs. project and the PMO should document detailed plans for the resources and processes needed to address both efforts.</li> </ul>
Readiness of external departments could	<ul style="list-style-type: none"> <li>The project should make efforts to ensure readiness deadlines/milestones are clearly communicated to department leaders early and often.</li> </ul>

impact project budget/schedule	<ul style="list-style-type: none"> <li>• Provide clear expectations regarding readiness activity deadlines and important milestones to each department.</li> <li>• The project should clearly document missed readiness deadlines, communicate the possible consequences of missed deadlines clearly to department leaders in a timely manner to help ensure leadership is not surprised and has ample opportunity to respond and manage the risks.</li> <li>• Identify departments that could have communication challenges early on and consider implementing a strategy of over-communication to mitigate these challenges.</li> <li>• Schedule and coordinate (early on) regular in-person information sharing meetings and readiness discussions between the project and departments that may have readiness challenges.</li> </ul>
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#### D. Human Resource Management

Human Resource Management	
SUBJECT AREA	LESSONS LEARNED
Performance of HawaiiPay project team	<ul style="list-style-type: none"> <li>• Project success typically begins with formulation of a highly functioning project team. Project leadership for HawaiiPay proved effective at finding the right project team resources and mobilizing them to be effective and highly functioning. Project success was largely due to 5-6 key resources. The project found ways to work around state HR constraints to hire and properly compensate these individuals. State recruitment and compensation capabilities should be enhanced to ensure success on similar state IT projects.</li> </ul>
Impact of project resource attrition	<ul style="list-style-type: none"> <li>• Initiate early succession planning and knowledge transfer planning activities to mitigate the risk of unexpected departure of key resources.</li> <li>• As key resources rise to leadership positions, the project may consider re-allocation of their labor-intensive activities to junior resources, so they can dedicate themselves to supervisory roles where they would utilize their skills more effectively by performing coaching and quality control, thereby increasing the overall project quality. As responsibilities are transitioned, team members taking on new responsibilities typically have a greater sense of motivation, project ownership and commitment.</li> <li>• Develop a Knowledge Management (KM) strategy to help ensure project knowledge (tacit and otherwise) is not lost when staff leave the project or state employment.</li> <li>• Survey project resources to determine job satisfaction and take appropriate steps to increase retention.</li> </ul>

	<ul style="list-style-type: none"> <li>Establish resource management practices to effectively manage the project team including exit interviews to identify reasons for leaving that can be addressed before more staff decide to leave.</li> </ul>
Sufficient resources and dedicated leads filling key roles	<ul style="list-style-type: none"> <li>Establish clear project priorities early on and assign dedicated leaders to assure prioritized project goals (e.g. effective OCM) are met. Evaluate which project resources are needed that would help free up talented/motivated resources so that they can be dedicated to key strategic leadership positions.</li> <li>Create and utilize a resource management plan to assure planful, instead of reactive, addition and management of resources. Plan should address movement of resources as project transitions to different phases (e.g. moving from DD&amp;I to M&amp;O). Plan should also describe activities that could be executed in the event a key resource is lost. Plan should also identify resources that can be repurposed to respond to urgent resource needs in other groups (e.g. utilizing help desk staff to validate test data).</li> <li>Formalize and document (e.g. via org charts, POC lists/directories) all leadership roles and project points of contact for key areas and ensure stakeholders have easy access to comprehensive project role lists that include contact info.</li> </ul>

#### E. Knowledge Transfer

Knowledge Transfer	
SUBJECT AREA	LESSONS LEARNED
Detailed turnover plan	<ul style="list-style-type: none"> <li>Ensure a detailed turnover plan is included as an RFP requirement. Include requirements that the SI utilize detailed checklists for turnover to ensure an effective turnover to the state and that nothing is overlooked.</li> <li>Assign turnover tasks to individuals and require task signoff by task owners once they validate tasks have been effectively completed.</li> <li>Utilize readiness checkpoints and key performance indicators (KPI's) to monitor readiness effectiveness and report to project leadership. KPI's can be utilized to assure a timely and effective system turnover as well as provide project leadership an opportunity to shore up efforts when turnover efforts are not achieving expected results.</li> <li>Request the SI continue to update relevant documents (so that the content is accurate and up to date) to assure an effective turnover to the state for M&amp;O.</li> <li>Turnover strategy/plan (as well as the OCM and training plan) should address a strategy for transitioning existing report analysts over to the new systems reporting tools/features. Effective turnover strategies typically include reducing the need for IT staff to create reports and empowering existing reporting analyst that are "in the</li> </ul>

	field” so that they can effectively produce their own reports with limited IT support.
ALM (Application Lifecycle Management) tool selection	<ul style="list-style-type: none"> <li>State IT governance bodies should establish guidance for state software development projects that include recommended modern ALM tools. RFP’s should require the SI utilize modern/standard ALM tools (Microsoft Team Foundation Server, IBM’s Rational Suite, etc.) This should ease the turnover of ALM data (requirements, defects, trouble tickets, etc.) to the state once the project is complete and the state takes over for M&amp;O. ALM tools that integrate trouble tickets with defect/resolution details can help the state troubleshoot system issues in the future.</li> </ul>

#### F. Operational Readiness

Operational Readiness	
SUBJECT AREA	LESSONS LEARNED
High volume of manual processes at cutover	<ul style="list-style-type: none"> <li>Include clear requirements in the RFP for the SI to automate manual processes and utilize modern tools for automation of manual processes wherever feasible.</li> <li>Cutover checklists should include detailed descriptions of how to execute the task (as if for a back-up resource) and ensure that all dependencies between cutover tasks are identified and have designated contacts.</li> </ul>
Detailed processes for Help Desk and end user support	<ul style="list-style-type: none"> <li>The HawaiiPay projects plan for and utilizing a temporary staffing agency to increase the capacity of the help desk staff proved essential as well as effective in mitigating risks around help desk staff becoming overwhelmed, user frustration, and bad press. Future projects could follow suit and include it as a contingency in budget and project planning activities.</li> </ul>

#### G. Organizational Change Management

Organizational Change Management	
SUBJECT AREA	LESSONS LEARNED
Early information sharing and collaboration with external agency could reduce surprises, unexpected changes to agency requirements, resistance, and lack of cooperation.	<ul style="list-style-type: none"> <li>If OCM is deemed a primary objective of the project, recommend appointing a dedicated OCM strategy manager whose primary responsibility is to own/drive the OCM strategy and help direct OCM activities.</li> <li>Projects can benefit greatly from the use of change agents (aka. Super SME’s) as part of an effect OCM strategy. The strategy should clearly define how the change agents will accomplish the following: <ul style="list-style-type: none"> <li>Complete training to ensure they understand the role</li> <li>Ensure their time is sufficiently allocated to perform the Change Agent / Super SME tasks</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Report to both project leadership and department leadership any issues or concerns.</li> <li>• When OCM involves buy-in from external agencies/departments, the OCM strategy should include substantial outreach activities to these agencies/departments as lack of sufficient buy-in can have significant negative impacts to the project.</li> <li>• OCM strategy for cross-departmental projects could address an approach for creating a cross departmental user group community which could achieve multiple goals:             <ul style="list-style-type: none"> <li>○ Build/enhance external stakeholder buy-in and ownership in the success of the project.</li> <li>○ Provide the project with an additional communication channel. The project could explain complex issues to the Super Users who may be better adept at taking the message back to leadership and explaining difficult project decisions.</li> <li>○ Could easily transition into user support or train the trainer role, enhancing project training activities and mitigating the risk when users are unable to attend scheduled project training sessions.</li> </ul> </li> <li>• OCM strategy should include follow-through to validate communications are effectual and the message is being received by appropriate stakeholders.</li> <li>• OCM strategy should include an approach for increasing targeted communications to large stakeholders who either have indications of internal communication challenges or who have expressed frustration with existing project communications.</li> <li>• OCM strategy should include an approach to over-communicate important messages and provide simplified, clarifying details/instructions, for stakeholders. Especially those who have been known to misunderstand or misconstrue messages/instructions.</li> <li>• RFP should include requirements for the SI to support effective OCM through clear messaging to users within the software to assure users are not confused with new functionality.</li> </ul>
Optimization of OCM management structure	<ul style="list-style-type: none"> <li>• A dedicated OCM manager working in collaboration with the lead Business Analyst may be necessary to ensure OCM efforts are managed well and key relationships with agency representatives are established early on to assure a high level of buy-in.</li> </ul>
Impact of Legislative Actions	<ul style="list-style-type: none"> <li>• Project risk management strategy should account for legislative actions that could negatively impact the project. Mitigation strategies could include establishing increased communication with lawmakers and legislative analysts to assure informed legislative decisions.</li> <li>• Risk mitigation strategies could include closely tracking legislative actions and legal cases that could impact the project, in order to be proactive in planning for these instead of being reactive.</li> </ul>



## H. Project Organization & Management

Project Organization & Management	
SUBJECT AREA	LESSONS LEARNED
Effectiveness of lessons learned utilization	<ul style="list-style-type: none"> <li>Lessons learned from each deployment/release can be useful if broadly distributed/communicated to the project team to ensure all are aware and best practices are implemented for future releases. For projects with multiple deployment groups, lessons learned from previous groups can be broadly distributed to other deployment groups for guidance in helping them better prepare for their deployment and a can give them visibility into what to expect.</li> <li>Formalizing the collection and distribution of lessons learned from various segments of project stakeholders can assure a thorough and accurate list of lessons learned. The project team should carefully analyze lessons learned from previous deployments and formulate action items (with owners and due dates) to address each lesson learned to assure best practices are implemented and mistakes from previous deployments are not repeated.</li> </ul>
Use of incentives to increase department engagement	<ul style="list-style-type: none"> <li>Creative and fun incentives can be effectively utilized to drive user adoption and external agency engagement. This can be an essential part of an adoption strategy for projects that have little control/authority over external agencies who may have an essential role in project success. The project could budget for incentives to be offered to users or whole departments/groups as a way to motivate stakeholders to meet project deadlines as well as encourage overall project participation, buy-in, and engagement. For example, HawaiiPay achieved high rates of employee direct deposit sign-up when they created a competition that rewarded departments with the highest sign-up rates with an ice cream party.</li> </ul>
Contingency planning to mitigate possible schedule delays	<ul style="list-style-type: none"> <li>The project could conduct specialized risk identification and analysis sessions to fully analyze the state of project risks that could negatively impact the schedule and budget. Early development of contingency plans can minimize last minute reactive planning, acquisition of additional funding, and coordination of schedule revisions. Contingency plans can be reviewed/vetted by project owners and other relevant stakeholders to assure their feasibility/viability.</li> </ul>
Enterprise-level governance	<ul style="list-style-type: none"> <li>The states IT governance group could offer guidance to projects with regard to enterprise data governance as well as enterprise security, software development practices and tools governance.</li> <li>Opportunities exist for the state to implement an effective enterprise level data governance committee (DGC) that could guide the states data governance efforts across all departments and all data-related projects.</li> <li>Until state-wide data governance is established, projects can implement a project-specific DGC that could address the data</li> </ul>



	<p>governance needs of the project with a view towards the enterprise (cross-departmental). Engagement with other departments can help improve the quality of the data governance and lead to better enterprise/state data governance once the enterprise/state DGC is implemented.</p>
End of year processing complexity	<ul style="list-style-type: none"> <li>• Projects should not underestimate the risks involved with state end of fiscal or calendar year processing activities. Project planning should carefully consider and evaluate the complexity of these processes and the strain it can put on the project team and other stakeholders. Project schedule slippage during yearend processing are common as project planners often lack visibility into yearend business processes.</li> <li>• Projects can mitigate this risk through extensive resource allocation management and project planning activities.</li> <li>• Projects can budget and plan for the addition of short term contracted resources to support the project team during peak project activity periods.</li> <li>• Project planners can track project stakeholder vacation plans and assess/manage their impacts to project activities. They should also account for the possibility that state resources may need to take vacation at yearend or risk losing vacation days.</li> <li>• Wherever possible/feasible, the project should automate relevant year-end activities that currently require manual processing so as to reduce the strain to project resources during this time. RFP's can specify this as an SI requirement.</li> </ul>
Effectiveness of steering committee and senior leadership reports	<ul style="list-style-type: none"> <li>• Continuous process improvement should be built into most if not all project processes. Effectiveness of processes should be continually evaluated, and action plans should be diligently prepared to address weaknesses and lessons learned. Tracking of these action plans and other process improvement activities should be assigned to a designated process improvement or quality manager to assure opportunities for process improvement don't "fall through the cracks".</li> <li>• Executive committee reporting can be an important part of instilling confidence in the project in state leadership circles. Instilling this confidence can play an important role in mitigating the risk that the project loses existing or future funding. Leadership confidence can also impact cross-departmental projects; without their buy-in, activities that rely on external department involvement can prove problematic.</li> <li>• Test result reporting should be easy to understand and should clearly explain the difference between real errors/bugs and expected deltas (which are NOT errors) so as not to erode stakeholder confidence in the ability of the system to produce accurate results.</li> </ul>

## I. Quality Management

Quality Management	
SUBJECT AREA	LESSONS LEARNED
Level of effort for data cleanup is often underestimated	<ul style="list-style-type: none"> <li>Data cleanup activities should be planned for and scheduled to occur at the earliest stages of the project as the level of effort for these activities are often underestimated.</li> </ul>
Parallel testing defects	<ul style="list-style-type: none"> <li>Where feasible, automated testing should be implemented to identify defects/issues discovered during parallel testing and should not only rely on manual testing processes.</li> </ul>
Interface development and testing coordination	<ul style="list-style-type: none"> <li>Data validation strategies should include prioritization of data validation activities that are most critical to stakeholder confidence.</li> <li>Automated data validation support can not only increase data accuracy but also reduce the level of effort of manual processes for already constrained project resources.</li> </ul>
Embedded IT resources in external departments to ensure clear understanding of data, processes, and the new system	<ul style="list-style-type: none"> <li>Embedding IT resources in other departments IT teams proved effective for HawaiiPay and significantly improved understanding of interface requirements as well as interface accuracy. Embedding IT resources or in-person collaboration activities can be an effective strategy to increase interface accuracy as well as departmental buy-in to the project. This can be most effective when performed in the early stages of the project in order to minimize schedule delay risks.</li> </ul>

## J. Risk Management

Risk Management	
SUBJECT AREA	LESSONS LEARNED
Thorough mitigation strategy documentation	<ul style="list-style-type: none"> <li>Effective project risk mitigation involves careful tracking/documentation of not only risk descriptions but also mitigation strategies. Risk mitigation strategies should be reviewed often to assure risk mitigation steps are being followed and progress is being made. Mitigation steps/tasks can also be tracked in the project schedule and assigned resources to reduce risks or impacts to the project.</li> </ul>
Formal controls related to end user provisioning and segregation of duties	<ul style="list-style-type: none"> <li>Projects can mitigate legal risks by requiring system users sign user agreements. Further, the project should provide clear guidance to department administrative users (who are responsible for determining permissions for departmental users) to assure are able to effectively determine appropriate roles/permissions and that they understand their responsibilities, security best practices, guidelines, the principle of least permissions (PoLP), and risks involved with giving users excessive permissions.</li> </ul>

	<ul style="list-style-type: none"> <li>Formally notify department leadership of requests that appear to be excessive and assure clear understanding of the risks involved; request departments rollback permissions that seem excessive.</li> <li>Recommend implementation of controls designed to prevent end users from completing systems transactions that are not in the best interest of the State. These control objectives should include: <ul style="list-style-type: none"> <li>Controls that, where possible, prevent unauthorized access to system functionality that would violate standards and or policy related to adequate segregation of duties. This would include a matrix that outlines HawaiiPay user roles that conflict with the control objective.</li> <li>A mechanism or process to detect/identify user provisioning requests that include conflicting roles and/or behaviors not in line with the expected activity for a given users roles (i.e. transactions that seem unusual, unnecessary or inappropriate for their role).</li> </ul> </li> <li>There is a popular method, called Good Actor Bad Actor, used by organizations to help determine the level and type of internal controls that may be required. For instance, if the organization chooses to assume most employees will act in the best interest of the organization but will make some legitimate mistakes, and a few others will act inappropriately on purpose, you can loosen the “preventative” controls and implement more “detective” controls which allows more flexibility for key users. However, if the organization assumes most employees will not act in the best interest of the organization, the organization may need to implement tighter “preventative” controls which can constrain users from violating policy.</li> </ul>
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#### K. Systems Architecture & Design

Systems Architecture & Design	
SUBJECT AREA	LESSONS LEARNED
Impacts of long running queries on system responsiveness for users	<ul style="list-style-type: none"> <li>RFP should include requirements for a performance management plan that address performance/load/stress testing requirements to assure users are not impacted by system slowness. RFP could require that jobs that require significant processing resources be only run during off-hours, so users will not be impacted.</li> <li>RFP could also require that the system should limit the user’s ability to run queries that could overly tax the system and negatively impact other user’s system response times.</li> </ul>