



**CALPADS Fall 2 Post-Release Assessment  
for the  
California Department of Education  
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V2 (corrected see note below)



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NOTE: This is Version 2 (V2) which corrected a typographical error in Version 1 (V1). There was text inadvertently deleted at the end of the first paragraph of System Status, Item 3 – Operational Configuration Management during editing. This text has been added back to complete the sentence. The corrected text appears on Page 10 of this version. This is the only material content difference between the versions.

## INTRODUCTION

This assessment was conducted in response to a CDE request based on the Fall 2 release and subsequent system instability. This report is a milestone project assessment to report on the status, progress, gaps and recommendations as of the Fall 2 release of the California Pupil Achievement Data System (CALPADS). The purpose of the report is to provide the California Department of Education (CDE) a detailed independent verification and validation (IV&V) assessment of the project and system as the project prepares for the final two major releases and the planned transition to acceptance, warranty, maintenance, and operations activities over the course of the next six months. In preparing this report, Sabot Technologies (Sabot) in its role as IV&V consultant incorporated our own ongoing observations of the project and system as well as input provided through interviews with CDE, IBM, the Office of Technology Services (OTech), and the California Technology Agency (CaTA), previously known as the Office of the Chief Information Officer (OCIO).

This assessment report consists of four sections:




1. An Executive Summary of the findings and recommendations
2. A Project and System Status that describes the progress and status of the project and system
3. A Gap Analysis with recommendations for remediating the indicated gaps
4. A Conclusion calling out the most important take-away points

## EXECUTIVE SUMMARY


### Scorecard

In order to quickly communicate the status of an area, Sabot presents a summary of the findings in the form of a graphical scorecard.

KEY:



		
<p><b>Danger</b></p> <p>Critical danger of project/system failure</p>	<p><b>Caution</b></p> <p>Potential danger of system /project issues</p>	<p><b>All Clear</b></p> <p>No significant problems</p>

It is important to note that a rating of “All Clear” does not translate to zero or even minimal risks. All software development efforts of the size, scope, and nature of CALPADS are inherently risky ventures. This scorecard is intended to highlight areas that contain issues, problems, or risks outside of the norm.

Overall Score: 

Overall, Sabot has assessed CALPADS as in critical danger of project/system failure. This assessment is a milestone assessment conducted after the Fall 2 major release. This score represents our assessment of the project’s ability to achieve its goals and applies to the overall system and project.

This is derived from the summation of the following assessment areas:

Project Status	System Status
	

Each of these areas is scored as an aggregate of the scores of their respective assessment issues. The remainder of this report goes into detail for each of these areas including scores for each associated issue.

This overall assessment was produced in response to a CDE request based on the Fall 2 release and subsequent system instability. The last such assessment was related to CALPADS successfully completing the 2010 stability period which ended June 30, 2010. During that period

the overall team made significant improvements to system performance, quality, and project management. IBM, in keeping with some of the recommendations made in January 2010, put forth a significant effort reviewing the application. The improved processes and results were focused on the then identified source of instability, namely, the preponderance of functional application defects in the transactional (user facing) parts of the system.

Since the last reports there have been mixed results with some areas showing great improvements and others where risks have been triggered and negative results have been realized. Overall, the system and project are again in critical risk of failure.

There are some areas of the project that are performing well. The team is working well together and the project is being managed in a much more controlled manner. Communications and coordination is vastly improved and the release management process is being executed with proper rigor.

Despite these improvements, there remain critical issues with quality control in the IBM engineering process. In analyzing the results, the IBM team has demonstrated that they do not possess the technical skills to design and develop the system to contractual specifications.

The January 2010 report and subsequent reports identified a risk related to the quality of CALPADS' back-end processing. While Sabot made recommendations related to the need for a review and corrective action effort for the systems operation (back-end processing) parts of the system, IBM did not perform a rigorous engineering review in these areas. Both CDE and Sabot IV&V have continually urged IBM to perform such an effort with appropriately skilled technical staff.

Since the completion, in June 2010 of the stabilization demonstration, the system has once again become instable; however, it is due to failures in areas that were not causing the stability problems during the Fall 1 deployment timeframe. Fall 2 has proven to stress the system in new ways, thereby exposing new issues. Specifically, the back-end processing of the system is at the root of the new state of system instability. The nightly processing does not operate reliably nor does it process with the performance required. This instability and lack of performance are the primary drivers for the overall assessment score.




The remainder of this report expands upon the instability and performance issues as well as providing detailed assessments in other areas for CDE consideration.


## PROJECT AND SYSTEM STATUS




Project Status:







The following issues and related assessments are related to how the project is being conducted and managed. They include both technical and project management oriented areas derived from Sabot's on-going project-level IV&V activities and reports, as well as, specific milestone feedback resulting from the targeted stakeholder interviews. (Note: The focus of this portion of the assessment is on the parts of the system that are under development or planned. The operation of the deployed portions of the system is covered in the next section.)

Issue/Score	Sabot's Assessment
1. Project management 	<p>The project is being well controlled. Communications and coordination among the team members are working well. There are regular status meetings and project management artifacts are generally kept up to date. The addition of IBM project management resources (deputy project manager) has been a great help.</p> <p>CDE's project manager is effectively managing the project and contract. He is well supported by CDE's Project Management Office. It is due to this improved rigor that CDE is able to better hold IBM accountable for performance on their contract.</p>
2. Risk management 	<p>The risk management process is back on track. Risk meetings occur monthly. The project leadership has scrubbed the risk list to ensure risks are up to date and the risk assessments are reflecting their current state. The project should add a risk discussion to the weekly status meetings so that approaching and high severity risks are reviewed more often than monthly.</p>
3. Schedule management 	<p>The schedule as a project artifact is generally kept up to date by IBM. The process for managing the schedule has improved. Both CDE and IBM project management resources are doing a good job of tracking task completion on the schedule to the degree that the schedule specifies the tasks.</p> <p>The issue with the schedule is slippage and level of detail. There have been delays in all major releases as a result of a variety of IBM shortcomings. IBM continually causes delays for reasons including quality</p>

Issue/Score	Sabot's Assessment
	<p>issues, underestimation of scope, and poor coordination of testing. The process for rebaselining the schedule has generally involved CDE's CALPADS executive committee including representatives from CaTA and the California School Information Services (CSIS). These decisions have been made in the best interest of the State, the CDE, and the Local Education Agencies (LEA); however, they are always made reluctantly and under conditions of duress and dilemma caused by IBM's failure to produce quality software on a consistent basis.</p> <p>The delays in-turn put pressure on the subsequent release schedules thereby compounding the overall delay. The entire CALPADS implementation was due to be completed as of February 2010. The project is over one year delayed at this point and there remain many months of development to complete the contractually required scope. IBM is grossly out of compliance with their contract schedule and as a result the project is grossly out of compliance with its planned schedule for completion and realization of value as stated in the project approval documents.</p> <p>This continual delay has dramatically reduced and delayed CDE's ability to realize the intended value of the system. This is unlikely to change as there are two remaining major releases, Spring and End of Year. Due to the present schedule status, the value of Spring and End of Year may not be fully realized based on the timing of the eventual release and successful operation of the system. Overall, the goals of the legislation that CALPADS was to help meet have gone severely underserved to date with little prospect that they will be served fully this fiscal year.</p>
<p>4. Knowledge transfer </p>	<p>There has been some positive change over the course of the past weeks in the area of knowledge transfer (KT). The CDE and IBM have begun formal knowledge transfer planning and have had several meetings on this topic. Nonetheless, knowledge transfer is not being performed as planned or as required by the contract. CDE's RFP and IBM's proposal (incorporated into the contract) specifically states that KT activities will be</p>

Issue/Score	Sabot's Assessment
	<p>performed throughout the project. Very little of this has been realized.</p> <p>There is a link between this and the issue of system configuration management. In order for IBM to be able to train CDE, they must themselves know the state of the system and all of the processes required to keep it in operation and well maintained. The system state includes documentation of all of the system settings, configurations, and an overall as-built specification. This material forms the basis for training content. IBM has not demonstrated that this level of documentation exists.</p> <p>The lack of knowledge transfer represents a risk to the project in that the State personnel cannot be expected to successfully take control of the system without proper training and experience with it.</p>
<p>5. General team dynamics/management and communications</p> 	<p>The broad project team is operating very well together. There have been marked improvements in the communications and coordination of all stakeholder organizations to include CDE, CSIS, OTech, and IBM. Meetings generally start and finish on schedule, are productive, and stick to an agenda. There has been some de facto clarification of roles (governance) amongst the groups, however, no official governance has been documented and communicated. This remains a concern.</p>
<p>6. Change control, release management</p> 	<p>The release management process is being controlled well by the coordinated team of IBM, CDE, CSIS, and OTech. The release schedule is well thought-out. Releases are well coordinated, planned, and executed.</p>
<p>7. Continuous improvement/incorporating reality-based decision making and planning</p> 	<p>There has been little time to focus on continuous improvement as a result of the constant need to deal with issues. This is unlikely to change until towards the end of the project when knowledge transfer starts to take effect.</p> <p>IBM has not applied the lesson they learned regarding the user-facing parts of the system. They failed to recognize that although at the time there were not significant problems with the back-end processing, they should have realized that quality problems were likely</p>

Issue/Score	Sabot's Assessment
	<p>since it was the same team using the same poor quality control processes that developed this part of the system. Hence, they should have included, as part of their stabilization efforts, a complete technical review and corrective action to proactively discover and correct defects in the back end of the system.</p>
<p>8. Testing and quality control</p> 	<p>In the several releases since June 2010 there have been very few functional defects. This comment applies to the transactional or user-facing parts of the system. This is positive confirmation that the improved processes IBM developed and put into practice during the stabilization period are sound and have been enforced.</p> <p>The counter example to this is apparent when one notes the increasingly poor performance and defects experienced with the back-end processing parts of the system. This validates the suspicion that IBM did not apply enough effort or the right level of skilled personnel to this part of the system. There is a link between this and the issue of operational system configuration management. It is difficult to correctly design, develop, and test back-end processes for a system that is poorly controlled.</p>
<p>9. Oversight</p> 	<p>As of 10/30/2010 external oversight has been reduced on the project as per CaTA's direction. Part of this direction included a commitment that a similar level of effort and skillset would be provided by CaTA to backfill the non-technical oversight role. Because of CaTA policy changes, this did not come to fruition. In its place CaTA has staff monitoring the project schedule and status reports and attending certain meetings. However, this results in leaving the project with fewer independent oversight resources than planned.</p>
<p>10. Requirements management/ system acceptance</p> 	<p>While improved, there is still concern with the state of the requirements. CDE has put forth a significant effort to analyze and classify the state of each functional requirement of the system. This is the first step in the acceptance process. This requirements status information is maintained in an updated Requirements Traceability Matrix (RTM). (Note: The RTM is not a contractual deliverable, but is tied to an approved work</p>


Issue/Score	Sabot's Assessment
	<p>authorization.) The RTM is also a critical work product for both CDE and IBM to determine if the project scope has been completed. It is a best practice to keep an RTM updated throughout the project as the source of record for determining scope progress. Due to the nature of the technical team and the structure of their work, IBM is in a better position to assess the state of the technical requirements with CDE and IV&amp;V there to validate. Once this is performed, the result will be used to reconcile any differences of opinion and eventually the tool will be able to determine definitively that the scope has been fully implemented.</p>
<p>11. Budget management</p> 	<p>The state of the budget is unknown for both FY 2010/2011 and FY 2011/2012. CDE has been operating with the assumption that there will be an eventual resolution to the fallout from the previous administration's veto of CALPADS funding for FY 2010/2011.</p>


System Status:






This section focuses on assessing the operation of the system and its performance. Such an assessment serves as an indicator of the quality being produced by the project and a warning sign of underlying issues. It also assesses, although to a lesser degree, how well the business value is being realized and the potential for it to be realized in the future. The assessment is performed in context of the fact that the system as deployed is incomplete having approximately 60% of the functionality in production between the Fall 1 and Fall 2 major releases.

There is an interrelationship between the system operational status and the project status. Performance of the system operations are a result of the project activities from which they are derived. As such, this section will drive both operational and project gaps and recommendations even though the issues are all based in the system operations.

Issue/Score	Sabot's Assessment
<p>1. File submission.</p> <p>The submission of large files submitted in the course of the day is one function of the</p> 	<p>This function was previously a source of database locking contention which caused overall system performance degradation. This issue was initially addressed with a temporary work-around in which the larger files were queued up and processed at the end of</p>

Issue/Score	Sabot's Assessment
<p>transactional part of CALPADS.</p>	<p>the day. IBM eventually addressed the root cause of the system performance issue; however, the queuing feature was left in place due to the fact that large SNIF files can only be processed at the rate of approximately 1,000 records per minute. This constraint is related to the nature of the business rules, the implementation of the rules in code, and the performance of the system software.</p> <p>It is unclear if there is a hardware constraint related to this performance limitation. Hardware constraints have been considered and initially determined not to be a factor; however, IBM reversed this position and implemented an upgraded storage area network (SAN) controller. This has shown to have no effect on the large file submission processing.</p> <p>There is also a lack of clarity with and some conflict among the requirements for throughput in the system specifically related to this function that may make it difficult to hold IBM responsible for improving performance beyond a certain point. Despite this complication, the manners in which the large files are queued up and processed have an impact on the overall business effectiveness of the system detrimentally impacting the system's ability to meet its overall purpose and business goals.</p>
<p>2. Overnight processing </p> <p>The overnight processing is a set of necessary processing that occurs after business hours. It is dependent upon the submission and transactional processing of the uploaded data from the LEAs. The contractual window for this processing is 8 hours from 10PM to 6AM. Since the implementation of Fall 1 in 2009, the system performance has not consistently met this standard. Performance of the nightly processes worsened since the Fall 2 deployment in the fall of 2010. As of late, weekly averages have ranged from 9+ hours to 14+ hours. There have also been a</p>	<p>It is apparent that the design and implementation of the overnight processing features are flawed. This is not unexpected if one considers the following facts:</p> <ul style="list-style-type: none"> <li>• The same IBM team that was responsible for the defect-laden transactional code that caused all of the Fall 1 problems designed and implemented the core of the back-end processing code as well.</li> <li>• Although CDE had been questioning the capability of concurrent submissions since early 2010, IBM did not sufficiently stress the system in terms of concurrent submission windows or the number or size of submissions until about the time that Fall 2 was implemented. This allowed the flaws in the system to exist without manifesting in observable issues.</li> </ul>

Issue/Score	Sabot's Assessment
<p>significant number of occurrences where one or all of these processes fail. In some cases, the failure occurs and is caught and corrected by IBM allowing the processing to complete albeit at a much later time in the day than it would otherwise. In other cases the process was caught too late or the failure too catastrophic to restart the process resulting in a complete lack of processed data for the LEAs the next day.</p>	<ul style="list-style-type: none"> <li>• Despite advice to the contrary, IBM did not commit to or execute a thorough review and proactive corrective effort to the code in the back-end part of the system.</li> </ul> <p>IBM has and continues to put forth some effort to correct the poor performance of these processes. There was some hope that the recent SAN upgrade would improve performance in this area as well as others. The result of this upgrade is not definitive because it has only been in place for a few business days however the following are initial observations:</p> <ul style="list-style-type: none"> <li>• The upgrade did not have a detrimental effect on performance or stability.</li> <li>• The nightly processing has improved marginally (10% -15% estimated).</li> <li>• Stability was not improved; the failures still occur.</li> </ul> <p>However, this reliance on a hardware-based corrective action is evidence of IBM's failure to illustrate any measurable improvement resulting from their software and architectural tuning efforts. They also have failed to explain why the performance is poor even on days when there is light system usage. It is apparent that IBM does not know the root cause of the performance issues.</p>
<p>3. Operational configuration management</p> 	<p>There have been several incidents resulting in CALPADS outages or system failures that are attributable to the lack of control of the system configuration settings and other parameters. This continues to be a danger area insomuch as IBM has not performed a thorough review of this aspect of the system. It is apparent that IBM does not have a thorough specification for all of the configurations and settings in the system. The recently delivered Systems Operation Manual did not contain appropriate level of detail in this area. The continual system failures due to configuration anomalies such as date-range errors, data-type errors, and other operational settings represent a risk that other parameters will cause other failures.</p> <p>Other times there have been outages as a result of an apparent failure of infrastructure components under</p>

Issue/Score	Sabot's Assessment
	<p>OTech's area of responsibility. For example, there are occasionally periods where the users have difficulty accessing or remaining signed into the system. Some of these occurrences have been attributed to network or other infrastructure failures. This points to the need for more robust management and interagency coordination of those portions of the environment as well.</p>
<p>4. Environments </p>	<p>There are two issues with the environments being used for CALPADS. First, the team has realized a conflict with the scheduling of releases and the use of the pre-production environment. Because of the issues experienced with the back-end processing, there is a need to utilize the pre-production environment for back-end process testing as possible solutions are developed and tuning is performed. This activity has proven to be incompatible with concurrent use of the pre-production environment for user acceptance testing (UAT). It is also a result of the need to crash the schedule which puts pressure on resources and can cause environment contention. This is, at a minimum, indicative of poor planning and project resource scheduling by IBM who were hired due to their expertise and methodology in developing large systems.</p> <p>Second, the backup method for the pre-production environment is different than that for the production environment. IBM and CDE have communicated the need for exactly matched environments to OTech. There were issues with the backup process that caused a different method to be implemented in each environment. This is counter to best practices in that the two environments are supposed to be as closely aligned as possible. The backup difference has proven to cause issues making system performance testing in the pre-production environment unreliable. There have been recent discussions among IBM, CDE and OTech regarding this difference and possible solutions.</p>
<p>5. Scalability </p>	<p>CALPADS was initially scoped, designed, and sized to handle projected workloads three years into the future from the date of implementation. The performance standards therefore must be demonstrated using the expected workload rather than that experienced today.</p>

<b>Issue/Score</b>	<b>Sabot's Assessment</b>
	<p>In interviewing IBM, their stated goal is that the nightly processes, in order to give CDE confidence that the system is scalable for the agreed upon three years, must be demonstrated to be complete in 4 hours, not the 8 hours allowed by contract terms. Sabot concurs with this goal.</p> <p>Alternately, IBM must work with CDE to create a series of tests that exercise the system with datasets and usage parameters to match that which would be expected in three years. IBM has resisted this arguing that it is infeasible despite this best practice is routinely met on system development efforts that are larger and more complex than CALPADS.</p>

## GAP ANALYSIS AND RECOMMENDATIONS

Sabot performed an analysis of the project and system status assessments to derive specific gaps that should be addressed in order for CALPADS to succeed. The gaps presented may be derived from one or more issues and may be tightly or loosely tied to the issue(s). For each gap, Sabot has a recommendation to either close the gap or manage the risk implied by it.

Gaps	Related issues	Recommendations
<p>1. The system's back-end processing is not performing acceptably either during file submissions or during nightly processing.</p>	<ul style="list-style-type: none"> <li>• Continuous improvement</li> <li>• Testing and quality control</li> <li>• File submission</li> <li>• Overnight processing</li> <li>• Operational configuration management</li> <li>• Environments</li> <li>• Scalability</li> </ul>	<p>A. Sabot reiterates the need for IBM to form a tiger-team of qualified engineers to perform a complete review of the system's back-end processing to discover and correct defects in the technical design and implementation in order to bring system performance and stability up to standard.</p> <p>B. An additional approach would be for CDE to engage an independent contractor to perform a stability analysis on the system. This would require the consideration of contract, cost, and project implications.</p>
<p>2. The configuration of the system is in an unknown state and not documented in the appropriate technical specifications and manuals.</p>	<ul style="list-style-type: none"> <li>• Knowledge transfer</li> <li>• Testing and quality control</li> <li>• Operational configuration management</li> <li>• Environments</li> </ul>	<p>A. As part of the above mentioned comprehensive review (1.A), IBM should document the state of the system and include the specification in the Operations Manual, updated technical specifications, and knowledge transfer training content. This also will allow more reliable testing and validation as a basis for acceptance.</p>
<p>3. The technical design, code, and implementation details are not exposed sufficiently</p>	<ul style="list-style-type: none"> <li>• Knowledge transfer</li> <li>• Requirements management/ acceptance</li> </ul>	<p>A. IBM should conduct technical design and code walkthroughs to demonstrate that the system meets the technical requirements while also providing an opportunity</p>

Gaps	Related issues	Recommendations
<p>to CDE, OTech, CSIS and IV&amp;V.</p>		<p>for knowledge transfer.</p> <p>B. The details of the as-built technical design and implementation specifications should be explained and documented in the Operations Manual or other reference for CDE.</p> <p>C. CDE/CSIS/OTech must clarify and finalize their roles including staff skills and staffing levels for operating and maintaining the system.</p>
<p>4. The schedule is tight as planned. It would necessitate another significant delay in order to thoroughly analyze and correct the system design and implementation for the back-end of the system.</p>	<ul style="list-style-type: none"> <li>• Schedule</li> <li>• Requirements/ acceptance</li> </ul>	<p>A. CDE should weigh the business impact of a significant delay to the completion of the remaining functionality and stabilization of the presently deployed functionality. They should coordinate with the LEAs throughout the process.</p> <p>B. CDE should ensure that the acceptance process is not short circuited in favor of meeting any new schedule deadlines. The acceptance process must include a full trace to each functional and technical requirement and full testing and validation of their completion. This must be followed by a period whereby the system is proven to be performing to specification and stable. Acceptance must also include project requirements for support and knowledge transfer including the system operations and maintenance.</p>

## CONCLUSION

The department should take-away the following key points from this assessment:

- The additional stresses of increased use and concurrent submission periods (Fall 1 and Fall 2) have exposed instability and performance problems with the system. Moreover, the remaining releases will likely exacerbate this by further increasing the use, functionality, and amount of data.
- The system should be stabilized before any further development is conducted.
- The instability and performance problems experienced in the back-end processing parts of the system are indicative of poor technical design and implementation and a long standing lack of proactive attention by IBM to these areas.
- IBM has yet to apply the type or number of resources to fully correct the flaws in the system design and implementation. It is such a change by IBM in staffing a new corrective action properly and then continuing on to complete the project with the higher numbers and quality of technical staff that is needed for CALPADS to be salvaged.
- The instability and performance problems with the system warrant decisive focused corrective action by IBM. Such action would also result in better system documentation and preparation of State resources to transition to maintaining and operating the system. Although this type of action, as with the last stability effort, would cause a delay to the remainder of the project, building any more functionality on the presently instable system would be a greater risk to the project and CALPADS' business goals.
- The governance issue is a critical step in the State's ability to receive knowledge transfer and eventually transition to maintaining and operating the system. Without attention to this, the knowledge transfer and transition activity will fail to adequately prepare the State for operation of the system.