



Deliverable: 1.3 Quality Assurance Plan

VoteCal Statewide Voter Registration System Project

State of California, Secretary of State (SOS)



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Work Product Acceptance

Catalyst Consulting Group is pleased to present the following VoteCal Project work product/deliverable. This work product is now complete and is ready for the Secretary of State to review and approve.

Work Product: Deliverable: 1.3 Quality Assurance Plan
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Exhibit 2: VoteCal System Tasks and Deliverables
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Secretary of State

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1 Introduction

This document is Deliverable 1.3, the Quality Assurance Plan. It has been developed to the specifications presented in Deliverable Expectation Document (DED) 1.3, Quality Assurance Plan and as reviewed by the Secretary of State (SOS).

For the purposes of this document, the Quality Assurance Plan (Deliverable 1.3) will be referenced as the Quality Management Plan. Unless explicitly stated otherwise, references such as Quality Management Plan and Quality Management Process are intended to reflect the plan, process, resources, and components managed by Catalyst.

This Quality Management Plan presents the activities, processes, and tools associated with Catalyst's management of process and product quality on the VoteCal Project.

1.1 Purpose and Objectives

This Quality Management Plan defines how Catalyst will implement, support, and communicate project quality practices for use with the VoteCal Project. The Quality Management Plan documents the overall approach for quality management and provides detail on the quality processes to be applied by the Catalyst Project Team to meet the needs of the project and deliver a quality VoteCal System.

The project management processes described in the Catalyst Quality Management Plan are the actual quality management processes that will be implemented for the VoteCal Project and will be enforced throughout the project. The Catalyst Quality Management Plan is based on three guiding principles:

- Catalyst has an earnest commitment to executing sound project management processes as the foundation for achieving the VoteCal Project objectives.
- Catalyst recognizes the responsibility to streamline the processes and procedures, making them as simple as possible for the project team to execute while continuing to work toward a positive outcome.
- Catalyst supports the philosophy of prevention over inspection, which means that the cost of preventing mistakes is much less than the cost of making and correcting them.

1.2 Scope

This Quality Management Plan defines the activities and processes related to managing the quality of the Catalyst VoteCal system implementation effort. The activities of the EMS Vendors, Counties, IV&V vendor, and SOS are specifically excluded from the scope of quality efforts managed by Catalyst or defined within this plan.

1.3 Standards

The project management processes described in this Quality Management Plan and implemented throughout the VoteCal project are based on the following standards:

- Institute of Electrical and Electronics Engineers (IEEE) Standard for Software Quality Assurance Plans, 2002 Revision (IEEE Standard 730-2002)
- Project Management Body of Knowledge (PMBOK), 4th Edition, published by the Project Management Institute. Project Quality Management Knowledge Area (Chapter 8).

The SOS has adopted the state's (previously Department of Finance's) Project Management Methodology as its standard, as was described in Section 200 of the Statewide Information Management Manual in March 2006 when the project was approved. The methodology also reflects industry-standard processes described in the PMBOK.

1.4 Assumptions, Dependencies, and Constraints

This Quality Management Plan was developed on the basis of the following assumptions:

- Catalyst understands that quality management requires compliance with quality management processes by all members of the team.
- Catalyst participation in the VoteCal Project is on the basis of a fixed price bid. Certain quality metrics, such as productivity analysis, will remain proprietary.

1.5 Document Control

Quality Management is a dynamic process that occurs throughout a project's life cycle. Accordingly, at a minimum, the quality management process will be reviewed at the end of each project phase, and the Quality Management Plan will be updated as required.

This document contains a revision history log. When changes occur, the version number will be incremented and the date, name of the person authoring the change, and a description of the change will be recorded in the revision history log of the document.

As with other work products of the VoteCal project, the approved Quality Management Plan will be placed under configuration management in accordance with the Document Management Plan, a subsidiary plan to the Project Management Plan. Also, in accordance with the Document Management Plan, the Quality Management Plan will be stored on the SharePoint server and available to the project team, the Independent Project Oversight Consultant (IPOC), Independent Verification and Validation (IV&V) vendor, and SOS senior management.

2 Roles and Responsibilities

2.1 Catalyst Project Manager

- Collaborate with the Catalyst Quality Manager, Catalyst Team Leads, and Catalyst Process Owners in the development of quality metrics and standards by phase.
- Enforcing compliance with quality management processes by all members of the team and handling non-compliance issues.
- Support the Catalyst Quality Manager in securing resources to perform quality management.
- Participate in quality management reviews as required.
- Provide oversight to the closure of corrective actions arising from quality reviews.

2.2 Catalyst Quality Manager

- Provide overall leadership of quality management activities, including managing quality reviews and overseeing follow-on corrective actions.
- Collaborate with the Catalyst Project Manager, Catalyst Team Leads, and Catalyst Process Owners in the development of quality metrics and standards by phase.
- Schedule and perform evaluations of process quality assurance reviews.
- Enforcing compliance with quality management processes by all members of the team and elevating non-compliance issues to the Catalyst Project Manager.
- Update the Quality Management Plan and maintain the overall quality standards for the Catalyst VoteCal Project processes and products.
- Provide oversight to the closure of corrective actions arising from quality reviews.

2.3 Catalyst Team Leads

- Oversee and support the application of quality standards for the Catalyst VoteCal Project processes and products to their respective team members.
- Collaborate with the Catalyst Project Manager, Catalyst Quality Manager, and Catalyst Process Owners in the development of quality metrics and standards by phase.
- Participate in quality management reviews as required.
- Inspect/checkout the installed application hardware software for its ability to satisfy VoteCal Project requirements.

2.4 Catalyst Process Owners

- Oversee and support the application of quality standards for the Catalyst VoteCal Project processes to their assigned processes.
- Collaborate with the Catalyst Project Manager, Catalyst Quality Manager, and Catalyst Team Leads in the development of quality metrics and standards by phase.
- Participate in quality management reviews as required.

3 Quality Management Approach

This plan presents the Catalyst quality management approach by describing the specific processes and metrics to assess process and product quality on the VoteCal Project.

The Quality Management activities are:

- Quality Planning – the process of identifying quality requirements and/or standards for the project and product, and documenting how the project will demonstrate compliance.
- Process Quality Assurance – The monitoring of specific project process results to determine whether the team is performing to relevant quality standards and the identification of actions to correct unsatisfactory performance.

- **Product Quality Assurance** – The planned and systematic pattern of all actions necessary to provide adequate confidence that an item or product conforms to established technical requirements.

Catalyst quality management activities will be performed by the Catalyst Quality Manager and Catalyst Project Team. The Catalyst quality management activities will be coordinated with the SOS Core Team and the IV&V vendor.

3.1 Quality Planning

Quality planning is the process of identifying quality requirements and/or standards for the project and product, and documenting how the project will demonstrate compliance. Quality planning includes establishing the quality standards, identification of the quality metrics to be applied, creating the quality checklists, and conducting lessons learned activities. Catalyst will schedule detailed quality management activities, including reviews of lessons learned meetings, through use of control lists.

3.1.1 Establish Quality Standards

This quality planning process establishes the quality standards – the process descriptions, standards, and procedures – the Catalyst Team will use. The Catalyst Project Manager and Catalyst Quality Manager, in collaboration with the Catalyst Team Leads and Catalyst Process Owners, will define and develop the quality process descriptions, standards, and procedures prior to the start of each project phase during phase planning. The output from the lessons learned process will serve as input to these phase planning activities.

These quality process descriptions, standards, and procedures will reflect a progressive elaboration from existing Catalyst management plans and will form the basis on which future Catalyst management plans are developed. The established quality standards will be documented in updates to the respective Catalyst management plans and to this Quality Management Plan.

3.1.2 Identify Quality Metrics

This quality planning process identifies the metrics the Catalyst Team will use. The Catalyst Project Manager and Catalyst Quality Manager, in collaboration with the Catalyst Team Leads and Catalyst Process Owners, will identify and develop the quality metrics prior to the start of each project phase. The metrics will be identified during phase planning, based on the quality standards established by the Catalyst Project Team, and documented in updates to this Quality Management Plan. The Catalyst Project Team will use the quality metrics to evaluate whether the project is achieving its goals.

3.1.3 Create Quality Checklists

This quality planning process identifies the quality checklists the Catalyst Team will use. The Catalyst Project Manager and Catalyst Quality Manager, in collaboration with the Catalyst Team Leads and Catalyst Process Owners, will define and develop the quality checklists prior to the start of each project phase. The checklists will be identified during phase planning and will be documented in updates to this Quality Management Plan. The Catalyst Project Team will use the quality checklists as a tool that is an integral part of the process and product quality reviews. The Catalyst management plans will form the primary standard and basis for creating the checklist criteria that will be applied to the quality reviews. The entry and exit criteria, presented in Table 3-1 Types of Product Quality Assurance

Reviews of this plan, will also be used as an input to the development of the quality checklist criteria. The Process Quality Assurance and Product Quality Assurance sections of this Quality Management Plan discuss the application of these checklists to the respective quality assurance processes.

3.1.4 Lessons Learned

The Catalyst Quality Manager will collect lessons learned at formal checkpoints at the end of each project phase. The Catalyst Quality Manager will schedule a meeting with the Catalyst and SOS Project Managers within 30 days of the scheduled completion of the project phase. In this session, the Catalyst Quality Manager will facilitate brainstorming and collect lessons learned. The Catalyst Quality Manager will schedule a meeting with the SOS Project Team and Catalyst Project Team to present the lessons learned.

The Catalyst Quality Manager will schedule separate meetings as needed to determine corrective actions and process improvements. These lessons learned are then acted on, where possible, to improve the success of future project phases including incorporation of our experience on the project into subsequent phase planning activities. Therefore, the quality of project activities and deliverables will increase incrementally throughout the project life cycle through the incorporation of quality management recommendations from the preceding review stage into the activities and related deliverables for the next stage. This approach minimizes issues at the end of the project and facilitates a successful go-live.

3.2 Process Quality Assurance

Process quality assurance is the monitoring of specific project process results to determine whether the team is performing to relevant quality standards and the identification of actions required to correct unsatisfactory performance. These process quality assurance activities will consist of process quality reviews followed by recommendations and possible corrective action plans.

The Catalyst Quality Manager will perform process quality reviews to verify that project processes are operational in support of VoteCal project success. The essential question that the reviews will address is the objective evaluation of the designated performed processes against the applicable process descriptions, standards, and procedures. Section 3.1.1 – Establish Quality Standards 3.1.1 of this plan presents the process by which the process descriptions, standards, and procedures are established.

The Catalyst Quality Manager will perform process quality reviews on Catalyst project management processes including:

- Document Management
- Schedule Management
- Quality Management
- Configuration Management
- Issue Management
- Change Control Management
- Risk Management
- Requirements Management

The Catalyst project management processes presented in this list will be revised in updates to this plan during subsequent project phases and as the corresponding Catalyst management plans are completed by Catalyst and approved by SOS.

The Catalyst Quality Manager will create and apply checklists to document the execution and record the results of performing quality process reviews. Prior to the review of the selected process, the Catalyst Quality Manager will provide the Catalyst Process Owner with a Process Quality Review Checklist that includes clear expectations of the review. In the process review, the Catalyst Quality Manager will complete the Process Quality Review Checklist to verify process compliance factors including:

- Responsibilities are assigned
- Process activities are scheduled
- Entry criteria conditions are established and are consistent with plans
- Process inputs are identified, controlled, and available
- Process steps are completed as planned
- Process outputs are controlled and consistent with plans
- Process exit criteria conditions are defined and met

Following completion of the process quality review, the completed Process Quality Review Checklist will be reviewed by the Catalyst Quality Manager. The completed checklist will be uploaded to the VoteCal SharePoint site created and maintained by Catalyst. The corrective action items identified on the completed checklist will be input into JIRA as action items to be addressed by the work product owner and tracked by the Catalyst Quality Manager.

3.3 Product Quality Assurance

Product quality assurance is the planned and systematic pattern of all actions necessary to provide adequate confidence that an item or product conforms to established technical requirements. These product quality assurance activities will consist of product quality assurance reviews followed by recommendations and possible corrective action plans.

In addition to proactive Quality Assurance, Catalyst will perform product quality assurance reviews on VoteCal Project work products developed by Catalyst. Product quality assurance reviews will focus on two essential questions:

- Work product check – Are expected outcomes defined?
- Work product review – Are expected outcomes being met?

There are different types of product quality assurance reviews that will be applied by Catalyst for use on VoteCal Project work products developed by Catalyst. Each type of product quality assurance review represents increasing levels of rigor.

- Desk Check – A desk check is a self-inspection of a work product by the developer of the product. All VoteCal Project work products developed by Catalyst will undergo a desk check by the work

product owner. The desk check review process will include the completion of a Desk Check Checklist for all Catalyst developed work products except Phase 0 deliverables.

- Peer Review – A peer review is an independent review of a work product by one or more Catalyst peers. The peer review process will include the completion of a Peer Review Checklist.
- Inspection – An inspection is a formal meeting is a collaborative review of a work product by a group of key Catalyst participants where the content of a work product is presented in detail. The inspection review process will include the completion of an Inspection Checklist.

The following table describes the different types of product quality assurance reviews in further detail.

Table 3-1 Types of Product Quality Assurance Reviews

Type of Review	Description	Entry / Exit Criteria	Output
Desk Check	<p>The desk check is a self-conducted quality review. The developer of the work performs this check, which is that person’s verification that he or she has met the requirements for that work object. This review is made against a checklist of requirements or expected outcomes.</p> <p>The desk check review is applied to all Catalyst developed work products, excepting those specified in the Statement of Work (SOW) as Phase 0 - Ongoing Process Tasks and Deliverables. Those deliverables produced as part of the Phase 0 tasks will be subject to the desk check review informally as they will not require the completion of a Desk Check Checklist. The desk check review will be completed in advance of any other types of reviews.</p>	<p>Entry Criteria</p> <ul style="list-style-type: none"> ▪ Client agrees with content ▪ Project lead agrees with content ▪ Work product meets requirements ▪ Work product is complete <p>Exit Criteria</p> <ul style="list-style-type: none"> ▪ Work product is consistent with requirements, client expectations, and project lead expectations ▪ Work product is consistent with Catalyst work product standards 	<p>The output of the desk check process is a completed Desk Check Checklist (excluding Phase 0 Catalyst developed deliverables) and a work product that meets the defined exit criteria.</p>

Type of Review	Description	Entry / Exit Criteria	Output
Peer Review	<p>The peer review is a quality technique employed as a quality review step for complex designs or deliverables that have cross-team impact. The review takes place as an independent review by Catalyst peers in an informal meeting between two people or through a meeting with a larger group for more complex, integrated designs. The review participants will decide on any required actions or corrections and determine whether any follow-up reviews are warranted. The review comments are documented in the Peer Review Checklist and any agreed-on changes applied to the final product before submission to SOS.</p>	<p>Entry Criteria</p> <ul style="list-style-type: none"> ▪ Successful completion of desk check ▪ Client agrees with content ▪ Project lead agrees with content ▪ Work product meets requirements ▪ Work product is complete ▪ Peer review meeting is scheduled and agenda distributed ▪ Any requirements, standards, plans, guidelines, or procedures against which the work product is to be evaluated are distributed ▪ Work product distributed to review team before Peer Review <p>Exit Criteria</p> <ul style="list-style-type: none"> ▪ Work product is consistent with requirements, client expectations, and project lead expectations ▪ Work product is consistent with Catalyst work product standards ▪ Comments from reviewers addressed and closed 	<p>The output of the peer review process is a completed Peer Review Checklist and a work product that meets the defined exit criteria.</p>

Type of Review	Description	Entry / Exit Criteria	Output
Inspection	<p>The inspection is applied to high-risk deliverables. The format for this review is a formal meeting at which the developer of the work presents the work results in detail to a larger group of key Catalyst participants who provide appropriate feedback regarding its content and quality. The review participants will decide on any required actions or corrections and determine whether any follow-up reviews are warranted. The review comments are documented in the Inspection Checklist and any agreed-on changes applied to the final product before submission to SOS.</p>	<p>Entry Criteria</p> <ul style="list-style-type: none"> ▪ Successful completion of desk check ▪ Client agrees with content ▪ Project lead agrees with content ▪ Work product meets requirements ▪ Work product is complete ▪ Inspection is scheduled and agenda distributed ▪ Any requirements, standards, plans, guidelines, or procedures against which the work product is to be evaluated are distributed ▪ Work product distributed to review team before Inspection <p>Exit Criteria</p> <ul style="list-style-type: none"> ▪ Work product is consistent with requirements, client expectations, and project lead expectations ▪ Work product is consistent with Catalyst work product standards ▪ Comments from reviewers addressed and closed 	<p>The output of the inspection process is a completed Inspection Checklist and a work product that meets the defined exit criteria.</p>

Catalyst developed deliverables, excepting those specified in the Statement of Work (SOW) as Phase 0 - Ongoing Process Tasks and Deliverables, will require a formal desk check review. Those deliverables produced as part of the Phase 0 tasks will be subject to an informal desk check review. The primary difference between the formal and informal desk checks is that the formal desk check will require the completion of a Desk Check Checklist where the informal desk check will not.

Work products that are subjected to peer review will use a Peer Review Checklist. Similarly, work products that are subjected to inspection will use an Inspection Checklist. The Catalyst Team Lead or Catalyst Process Owner responsible for conducting the review will customize the checklist as part of the peer review or inspection review process in order to establish clear expectations for the review. The checklist will be completed as the review is conducted to document the completion and outcome of

the review. Any action items required to meet established quality standards will be documented as part of the review.

Following completion of the product quality reviews where a checklist is required, the output of the review process will include a completed product review checklist. An electronic copy of the completed checklist will be submitted to the Catalyst Quality Manager for review and archival to the VoteCal SharePoint site created and maintained by Catalyst. The corrective action items identified on the completed checklist will be input into JIRA as action items to be addressed by the work product owner and tracked by the Catalyst Quality Manager.

The product quality assurance reviews will be different for different types of work products. For example, a peer review of a source code module might include efficiency of code design or unit testing, factors not considered when conducting a peer review of a project management plan work product. The product quality assurance reviews for the different types of work products will be designed to account for these differences, including development of the respective checklists.

The following list that includes some of the key types of Catalyst work products developed for the VoteCal Project that will be subject to product quality assurance reviews, the types of reviews that will be applied for each, and the activities the review will consist of.

Table 3-2 Product Quality Assurance Review Activities by Work Product Type

Work Product	Desk Check ₁	Peer Review	Inspection	Activities
Weekly and Monthly Status Reports	✓ Informal			Document Review
Project Management Plans	✓	✓		Document Review
Requirements Validation Document	✓		✓	Document Review
Votecal System Requirements Traceability Matrix	✓		✓	Requirements Review
VoteCal System Requirements Specification	✓		✓	Document Review
VoteCal System Functional Specification	✓		✓	Document Review
Standard Report Specifications	✓	✓		Document Review
VoteCal Technical Architecture	✓		✓	Document Review
Catalyst Source Code Development Standards	✓	✓		Document Review
Delivery of VoteCal System Code Modules	✓	✓		Source Code Review (conformance to Catalyst standards), Unit Testing
Delivery of VoteCal System Code Modules - High Complexity and/or High Risk Modules ₂	✓	✓	✓	Source Code Review (conformance to Catalyst standards), Unit Testing

Work Product	Desk Check ₁	Peer Review	Inspection	Activities
VoteCal Staff and IT Training Materials	✓		✓	Document Review
VoteCal System Documentation	✓		✓	Document Review

(1) The primary difference between the formal and informal desk checks is that the formal desk check will require the completion of a Desk Check Checklist where the informal desk check will not.

(2) Catalyst will define the criteria for identifying high complexity and/or high risk system code modules during the design phase.

The work product types and product quality assurance review activities presented in this table will be revised in updates to this plan during subsequent project phases and as the corresponding Catalyst management plans are completed by Catalyst and approved by SOS.

3.4 Media Control

Media control in terms of the VoteCal Project is how to store, backup, and restore relevant documentation for the project. This is accomplished using the SharePoint, RequisitePro, and Subversion software products. More detail on media control can be found in the Document Management Plan, a component of the Project Management Plan (SharePoint); Requirements Management Plan (RequisitePro); and Configuration Management Plan (Subversion). The Catalyst Quality Manager will perform process reviews of the document management and configuration management processes.

3.5 Supplier Control

Supplier control in terms of the VoteCal Project is how to assure that hardware and third-party package software meets requirement. Beginning in Phase 2 – Design Phase of the project and continuing through subsequent phases, the business and technical teams (under the direction of the Catalyst Project Manager and Catalyst Team Leads) will inspect/checkout the hardware and third-party package software for its ability to satisfy the VoteCal Project business and technical requirements and work with the intended solution. When deviations between the results of these inspections/checkouts are detected, the Catalyst Team Lead will invoke the issue management process to escalate and resolve the detected problem. The Catalyst Issue Management Team will determine appropriate issue response.

Please refer to the Catalyst Supplier Management Plan, a subsidiary plan to the Project Management Plan, for further details on the Catalyst supplier management process and to the Issue Management Plan for further details on the Catalyst issue management process.

3.6 Other Quality Assurance Activities and Processes

This section presents other forms of quality assurance activities and processes that will be conducted by Catalyst. These quality assurance activities and processes include:

- Organizational Change Management (Satisfaction Surveys) – Defined and presented in the Catalyst Organizational Change Management Plan (SOW Deliverable 1.8)
- Testing (Unit, Integration, Performance, System, and User Acceptance) – Defined and presented in the Catalyst Test Management Plan (Deliverable 3.2)

4 Quality Management Metrics

Catalyst will develop and apply quality management metrics to the quality management activities and processes. Section 3.1.1 – Establish Quality Standards of this Quality Management Plan defines the process by which metrics are identified and adopted for use by the Catalyst Quality Manager on the VoteCal Project.

The Catalyst Project Manager and Catalyst Quality Manager, in collaboration with the Catalyst Team Leads and Catalyst Process Owners, will define and develop the quality metrics and standards prior to the start of each project phase. The following metrics are those being considered by Catalyst to be applied by Catalyst to our quality management process.

Table 4-1 Quality Management Metrics

Category	Type	Description	Formula
Quality Review Output	Quality Review Action Item Aging	The number of days action items remain outstanding (open and uncompleted)	Average(Sum(Open Days)) for Outstanding Action Items
	Quality Review Action Item Inventory Turnover	A ratio reflecting inventory change.	Inventory Turnover = (Ending Balance - Beginning Balance) / Beginning Balance
Defects	Defect Density	The ratio of the number of defects to program length. Normalizing by size allows groupings (module or release) of varying size to be compared.	Density = Total Number of Defects per Thousand Lines of Code (KLOC) Grouped by Module or Release (Total Defects / KLOC) by Group Note: Microsoft Visual Studio incorporates lines of code metric feature (code coverage tool).
	Defect Leakage	Defects that should have been identified in a preceding SDLC phase. Identifies inefficiencies in the software engineering process as a whole.	Leakage = Total Number of Leaked Defects (by Phase)
	Causal Analysis	The purpose of Causal Analysis is to identify common causes of defects and other problems and take action to prevent them from occurring in the future.	Count of Defects Grouped by Cause

5 Training

As discussed in Section 3.1 – Quality Planning of this Quality Management Plan, the Catalyst Project Manager and Catalyst Quality Manager, in collaboration with the Catalyst Team Leads and Catalyst

Process Owners, will define and develop the quality process descriptions, standards, and procedures prior to the start of each project phase during phase planning. These adopted process descriptions, standards, and procedures will be documented within the respective Catalyst management plans and to this Quality Management Plan. Where required, new quality checklists will be created and existing checklists updated.

The Catalyst Quality Manager will communicate the established process descriptions, standards, and procedures to the Catalyst Project Team. Required quality checklists will be made available to the Catalyst Project Team. Additional training will be conducted, as required, to facilitate Catalyst Project Team compliance with quality management processes.

6 Records Retention

Catalyst will maintain electronic documentation, within the VoteCal SharePoint site created and maintained by Catalyst, supporting the processes described within this Quality Management Plan. Template quality checklists will be made available to the Catalyst Project Team on the SharePoint site. Quality checklists will be distributed and completed electronically. Completed quality checklists will be uploaded to the SharePoint site.