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Voting System Anomaly Root Cause Analysis Template

Root Cause Analysis

**<Anomaly Analyzed>**

**<Voting System Name + EAC Certification #>**

**<Manufacturer Name>**

**<Street Address>**

**<City, State Zip Code>**

**<Date>**

Table of Contents

[Introduction 2](#_Toc289504777)

[Anomaly Description 3](#_Toc289504778)

[Chronology of Events / Timeline 4](#_Toc289504779)

[Investigative Team and Method 5](#_Toc289504780)

[Findings and Root Cause 6](#_Toc289504781)

[Corrective Action 7](#_Toc289504782)

Introduction

***<Note: The red text is instructional and may be deleted from the final document>***

This section highlights the purpose and importance of the root cause analysis (RCA). The RCA is applicable when an anomaly is identified that has potential impact on fielded units regardless of where the anomaly was initially identified.

The RCA provides a discussion of the approach taken to identify and document the root cause of a particular problem and the follow-up actions necessary to properly address the root cause.

The purpose of an RCA in our context is to find effective solutions to voting system anomalies and to determine what factors need to be corrected to prevent such problems from reoccurring in the future.

RCA’s shall be provided to the EAC for:

* All previously EAC certified systems
* Systems under test that have been shown to have a general fault that might affect fielded systems, and
* State Certified version of systems that may have a common flaw with an EAC version but is not specifically a EAC certified system.

To provide assurance that the goals of the RCA will be met, the voting system RCA should meet the following criteria:

1. Clearly define the anomaly and its effect on the election jurisdiction and on the voting system manufacturer.
2. Clearly delineate the known causal relationships that combined to cause the anomaly.
3. Clearly establish causal relationships between the root cause(s) and the defined anomaly.
4. Clearly present the evidence used to support the existence of identified causes of the anomaly.
5. Clearly explain how the corrective actions will prevent recurrence of the defined anomaly.
6. Clearly document the above criteria in this analysis report so election officials and the voting public can easily follow the logic of the analysis.

Anomaly Description

This section provides a description of the voting system anomaly that is being analyzed and provides a clear and concise description of the problem that triggered this Root Cause Analysis. It should state the **date**, **time**, **detailed description of the event/anomaly**, who detected the anomaly, and how it affected voters, poll workers, and the election in general. For software anomalies, the RCA should state whether the problem is repeatable and if so, provide step by step instructions to recreate the failure. It is important that the descriptions are as detailed as possible since the anomaly is the source of the entire RCA. This detail should include a complete list and/or description of the “symptoms” of the anomaly and the conditions present which the symptoms occurred.

Chronology of Events / Timeline

This section shall provide a detailed chronology of the events leading up to, and following, the anomaly. This is an important piece of the RCA as the chronology of events may lead to clues in determining how or why the problem occurred. Be sure to include names, times and detailed descriptions of all activities and events (including any and all machine acceptance testing, pre-election proofing, training and system validation related to the anomalous system.)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | Date/Time | Description | Entity  Org/person | Result / Notes |  |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |

Investigative Team and Method

This section shall describe how the investigative team is assembled by the voting system manufacturer, who it consists of, and how it gathers the data to be used in the analysis. As with any process, it is important in the RCA that clear roles and methodologies be established in order to allow for the process to move in a controlled and deliberate manner. This is also an important part of the RCA because a majority of time spent in RCA is gathering data about the event/anomaly. Various methodologies exist for conducting root cause analysis. These methods include but are not limited to:

* Events and Causal Factors charting
* Fault Tree Analysis
* RPR Problem Diagnosis
* Ishikawa Diagrams
* Pareto Analysis

This section should include the RCA method employed by the manufacturer in conducting the analysis and why this particular method was used.

Findings and Root Cause

This section should describe the findings of the investigation and explain the root cause(s) based on these findings. It is possible that an RCA results in findings that are not directly related to the root cause of the anomaly. These should also be captured as manufacturer product/process improvement steps in an effort to improve the voting system. It is important to note that this section does not describe the corrective actions to be taken as a result of identifying root cause. Corrective action will be discussed separately in the next section.

Corrective Action

As the purpose of the EAC RCA is to determine the root cause of a voting system anomaly, the RCA should result in corrective actions that are taken to ensure the same anomaly does not recur. In most RCA’s there will usually be multiple corrective action options. The most preferable corrective actions are those that eliminate failure root causes through some hardware or software redesign. In so doing, these corrective actions totally eliminate reliance on election officials to perform in a specific manner such that the anomaly is eliminated. The ***least*** preferable corrective actions are those that do not eliminate the problem at its root cause, but instead rely on election officials to perform special actions to guard against the anomaly recurring. The corrective action order of precedence (starting with the most preferable to the least preferable category of solutions to voting system anomalies) is as follows:

* *Design Upgrades To Eliminate Or Mitigate The Problem*. This category of corrective actions modifies the voting system product, process, or service to eliminate the features that induced the anomaly.
* *Training*. In many instances, anomalies can be eliminated by providing training to election officials, assemblers, or other personnel to control the circumstances that could induce an anomaly.
* *Additional Testing or Inspection*. Under certain circumstances, falling back on sorting good product from bad through additional testing or inspection may be the most expedient solution. Because this is counter to general quality management prevention (rather than detection) philosophies, additional testing or inspection is ***usually not*** an acceptable way of eliminating the root cause of an anomaly other than in unusual circumstances.
* *Special Operational or Process Actions*. The last category, and the ***least preferable*** from a long term perspective, is to rely on special operational or process steps (work-around) as a problem solution. While operational or process solutions might, in rare instances, be necessary short-term solutions to an anomaly, they do not address the root problem of an anomaly. In all cases the long term solution to a voting system anomaly should migrate toward a voting system product or process change that completely eliminates the root cause of the anomaly.

Once corrective actions have been identified, evaluated, and selected, the final steps of the RCA consist of implementing the corrective action and evaluating the effectiveness of the corrective action.