Incident Investigation Techniques - Apply Your Findings

An Online Continuing Education Course for Engineers

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Incident Investigation Techniques - Apply Your Findings

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Prologue

Applying root cause findings from an incident investigation is crucial for continuous improvement. Why would your organization spend time, resources, and money to complete a root cause analysis (RCA) only to skimp or compromise when using the findings? Many companies do precisely this without realizing it. This scenario will sound familiar if you are already a trained RCA Leader. You have a team of 5-10 experts assisting in completing an incident investigation from a significant recordable injury or environmental release. You spent over a month, maybe two, creating a report, sharing your findings, and presenting your recommendations to management. This is your Golden Globe moment, and when you leave the meeting, one of two things has happened. First, everything went well, and you are the hero. Second, your recommendations were shredded, and you left the room knowing nothing would be improved. However, everyone feels better because you have a Band-Aid fix that sounds great.

Findings and recommendations are crucial for several reasons:

1. **Prevention of Future Incidents** – Addressing root causes eliminates the underlying issues, reducing the likelihood of recurrence.
2. **Improved Safety and Compliance**—Implementing corrective actions based on RCA ensures a safer work environment and compliance with industry regulations. Morale is better at organizations that embrace RCA because employees know issues will be addressed promptly.
3. **Cost Reduction**—Preventing future incidents minimizes costs associated with downtime, repairs, workers' compensation, legal liabilities, and potential fines. However, this is often overshadowed by the costly upfront costs to mitigate issues when selling solutions to management.
4. **Enhanced Efficiency**—Identifying and resolving systemic issues improves processes, reduces waste, and increases productivity.
5. **Reputation Protection**—Consistently addressing root causes maintains stakeholder trust and prevents reputational damage caused by recurring problems.
6. **Continuous Improvement**—Applying findings fosters a learning culture and proactive problem-solving, strengthening overall operational resilience. All company employees should be involved in the incident process and avoid the blame game. These are opportunities to improve, not regress.
7. **Culture Enhancement**—Companies with substantial environmental, health, and safety (EHS) programs have the potential to build trust and retain high-performing employees. Robust, no-blame incident investigation programs build engagement and support at all company levels.

This training module will demonstrate how to utilize findings and recommendations to the fullest and build on the following training modules offered through this website, such as:

- **Incident Investigation Principles & Techniques 101**
- **Incident Investigation and Techniques 201**
- **Advanced Incident Troubleshooting Guide**
- **Writing Effective Recommendations for Incidents, PHAs, LOPAs, MOCs, Reviews, Projects, and Audits**
- **Introduction to Data Trending Objectives**
- **Diagnosing and Mitigating Normalization of Deviance for Professional Engineers**
- **Other lessons for learning and incident reviews by this author.**

Let's begin to learn together.

RCA Strategy

In this training module, we will learn how to apply RCA findings effectively. This requires a structured approach to ensure that corrective actions lead to meaningful, long-term improvements that will prevent or reduce the chances of a recurrence of the undesired event. Here's a step-by-step strategy:

- **Prioritizing Root Causes**
  - Rank identified root causes based on their risk, likelihood of recurrence, and organizational impact on improvement.
  - Focus on the most critical issues first to maximize effectiveness.

- **Define Corrective and Preventive Actions (CAPA)**
  - **Corrective Actions**: These are taken *after* an incident or problem has occurred. They are designed to eliminate the root cause of the existing problem and prevent its immediate recurrence.
    - They address the specific incident and its immediate consequences.
  - **Preventive Actions**: These are taken before an incident or problem occurs or after a corrective action to prevent a similar future issue.
    - They address systemic weaknesses and potential future failures
  - **All Actions:** Ensure solutions are practical, cost-effective, and sustainable. Being cost-effective does not mean action avoidance.
    - Root cause corrections can be watered down by management reviews from leaders who do not buy into the process. This is a constant battle that must be fought to protect the integrity of the process.
  - **HOP (Human and Organizational Performance):** This is an opportunity to engage the workforce through assistance with discovering additional findings and developing actions

to prevent recurrence.[1]

- **Assign Responsibilities and Deadlines**
  - **Accountability:** refers to the obligation or willingness to accept responsibility for an assigned action, decision, and consequence of that action. It involves being answerable for outcomes, whether positive or negative.

  - **Enforcement:** Effective enforcement relies on a foundation of accountability. When individuals and organizations feel accountable for their actions, they are more likely to comply with rules and regulations. Conversely, enforcement mechanisms can reinforce accountability by ensuring that there are consequences for non-compliance.

- **Integrate Changes into Programs and Procedures**
  - Ensure equipment upgrades, repairs, and replacements are approved, funded, and completed.
  - Update standard operating procedures (SOPs), training materials, and guidelines based on RCA findings.
  - Follow internal management protocols for managing change.
  - Ensure employees are aware of and trained on new protocols.

- **Measure Effectiveness**
  - Establish key performance indicators (KPIs) to track progress.
  - Conduct audits, inspections, or follow-up reviews to confirm that corrective actions work.
  - Measures must be planned to prevent these undesired outcomes.

- **Cultural Engagement**
  - Encourage open communication and feedback to identify any additional gaps.
  - Promote lessons learned across teams to prevent similar incidents in different areas.
  - Share the progress of the action implementation with leadership and relevant teams to reinforce organizational action.
  - **HOP**[1]**:** Integrate HOP into your incident investigation process.

- **Document Process**
  - Maintain records of RCA findings, actions taken, and results for future reference in a database.

- **Provide Avenues for Learning**
  - Share learnings with affected teams through bulletins, safety stand-downs, and leadership presentations with the workforce.

[1] *The 5 Principles of Human Performance: A contemporary update of the building blocks of Human Performance for the new view of safety*, January 23, 2019, Todd E. Conklin PhD

- **Foster Continuous Improvement**
    - **HOP:** This is another opportunity to integrate HOP into your incident investigation process. After all the actions have been completed and some time has passed, engage the unit or team where the incident occurred to determine if the actions were effective. If not, use the team to determine additional improvements.
    - **PDCA (Plan, Do, Check, Adjust):** Run through a PDCA review of your incident program to ensure that you have a continuous process.
        - Measuring effectiveness is where many incident programs fail. Long-term investments can become lost or rejected by changes in management at the organization.

Prioritizing Root Causes

Definition and Explanation of a Root Cause:
A root cause is the fundamental basis or underlying reason why an incident or problem developed. You can think of it as the core issue that, if resolved, would prevent the recurrence of the problem. Importantly, it is not simply a symptom or an underlying cause but the deepest point in a causal chain leading to the observed event.

Here is another way to view a root cause. The STIM Safety Solutions process defines a Root Cause as the basis for why a general cause developed, leading to an Adverse (undesired) Event. STIM Root Causes can be further defined as mistakes, errors, omissions, and failures in creating a fault-tolerant system (FTS) where a worker can reasonably be expected to perform work safely.[2]

Key Characteristics of a Root Cause:

- **Underlying:** It exists below the surface of apparent symptoms.
- **Preventative:** Addressing it will prevent the problem from recurring.
- **Systemic:** It often involves systemic issues within processes, policies, or systems rather than isolated individual errors. Systemic issues persist until the root causes are addressed. Data trending, which is explained later, can assist in determining systemic issues.
- **Controllable:** It is something that the organization can modify or control.

Explanation and Elaboration:
To truly grasp the concept of a root cause, it's helpful to distinguish it from other types of causes:

- **Underlying Cause:** This is an incident's direct, observable trigger. For example, a "software crash" might immediately cause a service outage.
- **Contributing Cause:** These factors contribute to the incident but are not the primary drivers. For example, "insufficient server capacity" might contribute to a service outage, but the root cause might be a lack of capacity planning.

[2] STIM Safety Solutions Process, (2015) Jeffrey S. Caudill, PE-CSP, STIM Investigation Methodology, Module 1 – STIM Building Blocks of Design

- **Root Cause:** This is the fundamental, underlying problem that enabled the immediate and contributing causes to exist. For example, the root cause of the service outage might be a "lack of a formal capacity planning process."

Corrective vs Preventative Actions

In the strategy section, we defined the difference between corrective and preventative actions. Let's dive deeper into each of these. Actions, whether corrective or preventative, need to be clearly defined. The training module "*Writing Effective Recommendations for Incidents, PHAs, LOPAs, MOCs, Reviews, Projects, and Audits*" provides the most comprehensive lessons on this subject. However, we will give the highlights in this training module.

A good recommendation to resolve a root cause finding is more than just a suggestion; it's a carefully crafted plan of action designed to eliminate the fundamental problem and prevent its recurrence. Here's a breakdown of what constitutes a strong recommendation, why they're essential, and how to structure them effectively:

Characteristics of a Good Recommendation:[3]

- **Specific:** The recommendation should clearly state what actions must be taken. Ambiguity leads to inaction.
- **Measurable:** It should include quantifiable metrics to assess the effectiveness of the implemented changes.
- **Achievable:** The recommendation must be realistic and feasible within the organization's resources and capabilities.
- **Relevant:** It should address the identified root cause and align with the organization's goals.
- **Time-bound:** A clear timeline for implementation should be specified, including start and end dates.

This process is well known as creating ***SMART*** recommendations.

Why Recommendations Are Essential:

- **Translating Analysis into Action:** Root cause analysis is only valuable if it leads to tangible improvements. Recommendations bridge the gap between analysis and action.[4]
- **Preventing Recurrence:** Well-defined recommendations prevent the same problems from happening again, saving time, money, and resources.
- **Driving Continuous Improvement:** Recommendations provide a framework for continuous improvement by systematically addressing underlying weaknesses.[5]

[3] Rooney, J. J., & Heuvel, L. N. V. (2004). Root cause analysis for beginners. Quality Progress, 37(7), 45.
[4] Reason, J. (1997). *Managing the risks of organizational accidents*. Ashgate.
[5] Dekker, S. (2011). *Drift into failure: From hunting broken components to understanding complex systems*. Ashgate Publishing, Ltd.

- **Assigning Accountability:** Recommendations specify who implements changes and ensures accountability.[6]
- **Facilitating Communication:** Recommendations are a precise communication tool, ensuring all stakeholders understand the necessary actions.
- **Creating a learning environment:** Organizations can learn from their mistakes by implementing recommendations and documenting the results.[7]

Structure of a Good Recommendation:[3]

1. **Clearly State the Root Cause:** Restate the identified root cause to provide context.
2. **Describe the Recommended Action:** Pro… a detailed des… of the actions that must be taken.
3. **Define Measura…** …ction will be measured.
4. **Assign Re…** … for implementing the action.
5. **Establish a…** …ding milestones.
6. **Outline Re…** … budget, equipment) needed for …
7. **Address Po…** …es associated with implementat…
8. **Include Follov…** …plemented changes will be monito…

Example:

- **Root Cause:** Lac… …horized software updates, causing …
- **Recommendatio…** …ange management process that includes:
  - A documented procedure for requesting, approving, and implementing software updates.
  - A change advisory board (CAB) will review and approve all proposed changes.
  - A rollback plan for each change.
  - Training for all relevant personnel on the new process.
- **Measurable Outcomes:** Reduction in system outages caused by unauthorized software updates by 50% within six months.
- **Responsibility:** IT Department.
- **Timeline:** Process development within one month, training within two months, and full implementation within three months. These will have assigned hard dates to be verified and completed.

[6] National Institute of Standards and Technology (NIST). (2012). NIST Special Publication 800-61, Revision 2, Computer Security Incident Handling Guide. U.S. Department of Commerce.
[7] Vincent, C. (2011). Patient safety. John Wiley & Sons.