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The Top 10 Elements of a Root Cause Analysis Effort

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Abstract: I recently posted an i-Presentation on Reliabilityweb.com that evoked an unexpected resounding response from viewers. This i-Presentation was entitled “The Essential Elements of Root Cause Analysis”. The interesting aspect about this type of response was that the majority of submittals also responded with comments to the presenters. It became apparent from these comments that most people are looking for the basics about what a Root Cause Analysis effort is and where do my efforts rate.

As a provider myself, these results showed me that we in the business tend to be too close to our methodologies and as a result use language that mostly only Root Cause Analysis veterans can decipher. We are missing the point when it comes to the “blocking and tackling” fundamentals of a Root Cause Analysis effort and what those face who must research the topic. They likely find confusion about what they read about Root Cause Analysis in the marketplace. This article is meant to convey these basics to those that find themselves in the position of mapping out a path forward to establish their new Root Cause Analysis efforts.

Everyone says they do Root Cause Analysis and they are not lying!

The term Root Cause Analysis can be traced back to the great philosophers of our time. However, the term today is likely much more confusing than the term back then. This is because there are so many different Root Cause Analysis methodologies on the market that it is difficult to know which ones are right for which situations.

Many people today use the term Root Cause Analysis as if it is universally understood. They use it as if there is a standard, or universally accepted methodology. Make no mistake, there is no such universal methodology. Root Cause Analysis is a noun, and all the brands on the market are adjectives describing that noun.

Everyone says they do Root Cause Analysis, and none of them are lying. Because there is no universally accepted methodology, there is no universally accepted definition! Therefore we can all apply whatever methodology we wish in our facility and call it Root Cause Analysis.

This paper is meant to look at Root Cause Analysis from the standpoint of what the fundamentals are of a true Root Cause Analysis process. Notice that we did not say Root Cause Analysis methodology, but a Root Cause Analysis “Process”. Many believe that using a Root Cause Analysis tool like the 5-Whys, a Fishbone Diagram or a Logic Tree constitute a Root Cause Analysis effort. Life would be much simpler if this were the case. Unfortunately, in the world we live in today, we must consider the environments in which we work and how these environments can help or hurt our good Root Cause Analysis intentions.

Throughout this paper, keep the parallel in your mind between a police detective and a Root Cause analyst. The roles are very similar, the primary difference being the environments in which the analysts work. The analytical processes used by both are the same. Let’s explore these fundamentals.

The Top 10 Fundamentals of a ROOT CAUSE ANALYSIS Effort:

1. Establishing Management Support
2. Training Qualified Analysts and Team Members
3. Consistently Determining When Root Cause Analysis is to be Applied

4. Correctly Defining the Event
5. Using Cause-And-Effect: Tightly Coupled Logic
6. Collecting Evidence: Establishing Facts
7. Drilling Down to Understanding Bad Decisions
8. Tracking Return-On-Investment (ROI)
9. Measuring Root Cause Analysis Effort Effectiveness
10. Creating a Knowledge Management Database

Let's explore each of these in a little more depth:

1. **Establishing Management Support:** Management support starts with an agreement in principle on the concepts and benefits of Root Cause Analysis to the organization. In most cases a Root Cause Analysis effort is born when a progressive executive chooses to be a Champion or Sponsor for the effort. Just like a Root Cause Analysis analyst, the best ones will be those that WANT to do it, not HAVE to do it. Management support is not merely "lip service" but it is "walking the talk" with actions. Evidence of serious management support of a Root Cause Analysis effort involves:
 - a. Writing a "fat" check to support the Root Cause Analysis effort.
 - b. Management attending abbreviated training on how to support the Root Cause Analysis effort they have chosen
 - c. Establishing a Root Cause Analysis policy for the organization. This makes it a requirement to do Root Cause Analysis under certain circumstances as opposed to doing it when we want to.
 - d. Establishing a Root Cause Analysis procedure for the organization. This outlines the specific conditions that trigger a Root Cause Analysis to be conducted, how to define the event, the process to be followed, the pre-requisites of the analyst and team members and how recommendations will be handled.
 - e. Providing incentives for Root Cause Analysis personnel such as tying their Root Cause Analysis results to their performance evaluations.
 - f. Providing technical resources for analysts to help prove their hypotheses.
 - g. Ensuring that Root Cause Analysis recommendations get a fair shake in the work order system (as opposed to being back burner items forever).
 - h. Setting up tracking systems to monitor performance of the effort from a corporate perspective.
2. **Training Qualified Lead Analysts and Team Members:** Pre-requisites should be established for who is qualified to lead teams and who is qualified to participate on teams. Oftentimes organizations feel that Root Cause Analyses are purely engineering exercises and therefore do not require hourly personnel on the teams. This is simply not the case. The sharp end personnel, those closest to the work, will likely know more about any given failure on the floor than their superiors. It is our contention that Root Cause Analysis CANNOT be done without the participation of the hourly personnel. Qualified Lead Analysts will learn that their role is to be a facilitator not a participator. This is sometime hard to grasp as our natural tendency after a failure is to assign the technical expert as the lead analyst. Unfortunately, the technical expert is sometimes too close to the event and may have a bias where they have something to lose or gain by the outcome.
3. **Consistently Determining When Root Cause Analysis is to be Applied:** A properly written Root Cause Analysis procedure should clearly outline what triggers a Root Cause Analysis to be conducted in a facility. Depending on how progressive the organization is, will determine if Root Cause Analyses are only required on high visibility sporadic events (reactive use of Root Cause Analysis) or will Root Cause Analyses be conducted on the more chronic type of events (proactive) which are potential precursors to the catastrophes. Many often do not realize as well that Root Cause Analyses can be done on failures that have not occurred! Root Cause Analyses can be done proactively on hi risk events

identified in a Failure Modes and Effects Analysis (FMEA). How? We simply treat the hi risk events as if it did happen and work backwards to understand all the factors that have to be in place for the consequences to occur. By identifying the root causes in this manner, we will implement recommendations that will reduce the chances that those causes will be triggered.

Non-Injury Trigger Example in a Root Cause Analysis Procedure

A Root Cause Analysis shall be requested for events/incidents with a total cost (maintenance, operations and lost profit opportunities) greater than \$25,000. Listed below are several examples of such events:

- Unpredicted Failure
- Property Damage
- Lost Production
- Safety Incidents
- Quality Incidents

4. **Correctly Defining the Event:** Many believe that Root Cause Analysis investigates incidents, but we really investigate negative consequences. For instance, if a pump were to fail (with no back up), many would consider that to be the event to analyze. However, when we look closer, we find that we are not analyzing this because the pump failed; we are analyzing this because a process was shut down as a result (consequence). Think about it, if there is no negative consequence to a failure, would we realistically do Root Cause Analysis on it?
5. **Using Cause-And-Effect: Tightly Coupled Logic:** Brainstorming causes is not using cause-and-effect as related to an incident. Picking cause categories such as Communications, Training, etc. is not using cause-and-effect. Cause-and-effect is tightly linking factors that led to an undesirable outcome and using hard evidence to back it up.
6. **Collecting Evidence: Establishing Facts:** If an analyst is not collecting evidence to support every one of their hypotheses (their case), they are not doing true Root Cause Analysis. Allowing hearsay to fly as fact is not a valid form of evidence. Root Cause Analysis conclusions should be based on solid evidence and not who is the loudest person in the room. If we use our detective analogy, how well would a detective fare in court if his case was based on hearsay?
7. **Drilling Down to Understanding Bad Decisions:** Analysis processes that stop at the identification of physical root causes (component level) lack depth. Analyses that focus on people that make bad decisions are often called “witch hunting” expeditions. True Root Cause Analysis will seek to understand why good people make bad decisions. Why did the person who made the decision think it was the right thing to do at the time? In this case we are searching for their situational awareness and trying to understand all the circumstances they faced that forced the decision.
8. **Tracking Return-On-Investment (ROI):** As is the case with any investment, we want to know what our return is. Root Cause Analysis is no different. If the execs have written a “fat” check, they will want to know if their money was well spent. As we all can relate, we constantly have to justify our existence in the form of demonstrating our value. The Root Cause Analysis effort is the same as we must demonstrate our results in the form of dollars to justify the continuance of the effort.
9. **Measuring Root Cause Analysis Effort Effectiveness:** ROI is only one measure of effectiveness. However, our Root Cause Analysis efforts should be further measured as to how they contribute to the Key Performance Indicators (KPI’s) of the corporation. It is vital to demonstrate this linkage as it will

make the attainment of these goals dependent on the task of Root Cause Analysis. This further helps to justify the existence of the Root Cause Analysis effort.

- 10. Creating a Knowledge Management Database:** Conducting a successful Root Cause Analysis and then putting it into a filing cabinet should be a crime. The greatest benefit any corporation can get from their Root Cause Analysis efforts is to raise the knowledge, skill and awareness of their employees to issues identified in a Root Cause Analysis. This is because we do not want other people to make the same triggering decisions that caused the previous failures to occur. Aggregating Root Cause Analysis results into an easily searchable database for lessons learned is imperative to the success of any Root Cause Analysis effort.

As you can tell from these brief descriptions of the fundamentals, few of the basics relate directly to the skill of the lead analyst and their choice of a tool. The majority relate to external support issues necessary for a Root Cause Analysis effort to be successful (not a Root Cause Analysis, but a Root Cause Analysis effort). A true Root Cause Analysis effort is usually much more than a person who is good at solving problems using their tool of choice. Our visions should include many people possessing these skills and therefore increasing safety across the corporation, while improving productivity and profitability.

Root Cause Analysis, when used properly, is a form of “corporate memory”. Think about when the re-engineering era was passing through. Corporations began to downsize by offering attractive early retirement packages. Who took them? Employees who were confident that they could easily get another job AND collect severance. This left a huge void of experience in the workplace when they left. This is because problems would occur in which they knew how to solve, but no one else did.

Think if we were able to use Root Cause Analysis so efficiently and effectively that turnover was not as big an issue. This is because we would go to our Root Cause Analysis knowledge base and be able to see how the experienced people thought through the problems and solved them. As the honorable Martin Luther King said, “I have a dream....” I have a dream also that this vision of Root Cause Analysis is not only attainable, it will be necessary to compete in the next decade. As the baby boomers pass through the workplace there will be a shortage of skilled workers to take their places and corporate memory will be lost forever! Can we afford for this to happen?

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