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Root Cause Analysis versus Shallow Cause Analysis: What's the Difference?

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Abstract: Are the outcomes different when we use the 5-Whys, the Fishbone or a Logic Tree? Can deficiencies in our approach to RCA increase the risk of excessive downtime? These questions will be discussed to determine if we are using Root Cause Analysis or Shallow Cause Analysis approaches.

.Common RCA Analytical Tools Review

The goal of this description is not to teach how to use these tools properly, but to demonstrate how they can lack breadth and depth of approach. Analytical tools are only as good as their users. Used properly, any of these tools can be used comprehensively to produce acceptable results. However, experience shows the attractiveness of these tools is actually their drawback as well. These tools are typically attractive because they are quick to produce a result, require few resources and are inexpensive. These are the very same reasons they often lack breadth and depth.

The 5-Whys

Let's start with the 5-Whys. While there are varying forms of this simplistic approach, the most common understanding is the analyst is to ask the question "WHY?" five times and they will uncover *the* root cause.

The form this approach may look like is as follows:

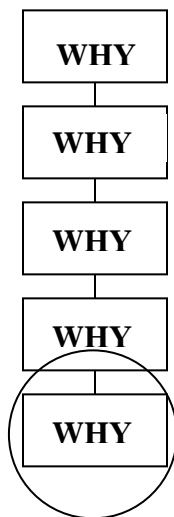


Figure 1: The 5-Why's Analytical Tool

There is a reason we do not hear about the NTSB investigator's using the 5-Why approach in the course of their investigation. The main flaws with this concept when used under conditions which warrant a "Root Cause Analysis approach" are that failure does not always occur in a linear pattern. Multiple factors combine laterally to allow the undesirable outcomes to occur. Also there is almost never a single root cause and this is a

misleading aspect of this approach. People tend to use this tool by themselves and not in a team and rarely back up their assertions with evidence.

The Fishbone Diagram

The fishbone diagram is the second most popular analytical Quality tool on the market. This approach gets its name from its form, which is the shape of a fish. The spine of the fish typically represents the sequence of events leading to the undesirable outcome. The fish bones themselves represent categories that should be evaluated as to having been a contributor to the sequence of events. These categories change from user to user and analysis to analysis. The most popular categories tend to be:

- **The 4 M's:** Methods, Machines, Materials, Manpower
- **The 4 P's:** Place, Procedure, People, Policies
- **The 4 S's:** Surroundings, Suppliers, Systems, Skills

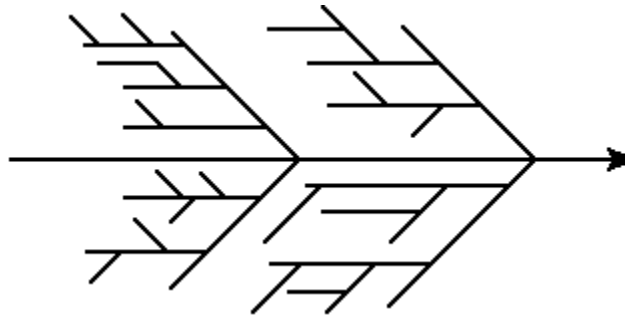


Figure 2: The Fishbone Diagram Sample

The fishbone is often a tool used for structured brainstorming. Team members decide on the categories and continue to ask what factors within the category caused the event to occur. Once these factors are identified then they ask *why* the factors occurred and so on.

As a brainstorming technique this tool is less likely to depend on evidence to support hypotheses and more likely to let hearsay fly as fact. This process is also not cause-and-effect based, but category based. The users must pick the category set they wish to use and throw out ideas within that category. If the correct categories for the event at hand were not selected, key root causes could be missed.

The PROACT Logic Tree

The PROACT¹ Logic Tree is representative of a tool specifically designed for use within RCA. The logic tree is an expression of cause-and-effect relationships that queued up in a particular sequence at a particular time to cause an undesirable outcome to occur. These cause-and-effect relationships are validated with hard evidence as opposed to hearsay. The evidence leads the analysis, not the loudest expert in the room. The strength of the tool is such that it can, and is, used in court to support solid cases.

A logic tree starts off with a description of the facts associated with an event. These facts will comprise what is called the Top Box (the Event and the Modes). Modes are the manifestations of the failure and the Event is “the least acceptable consequence” that triggered the need for an RCA. While we may know what the Modes are, we

¹ PROACT is a registered trademark of Reliability Center, Inc. (www.reliability.com)

do not know how they were permitted to occur. So we proceed with the questioning of *how could* the Mode have occurred?

Many have been conditioned to ask the question *why* during such analyses. However, using this methodology the question used is *how could*? When looking at the differences between these two questions we find that when simply asking *why* we are connoting a singular answer and to a point, an opinion. When asking *how could* we are seeking all the possibilities (not only the most likely) and evidence to back up what did and did not occur.

This questioning process is reiterative as we follow the cause-and-effect chain backwards. Simply ask the questions, answer them with hypotheses and use evidence to back it up. This holds true until we uncover the Human Roots or the points in which a human made a decision error. Human Roots represent errors of omission or commission by the human being. Either we did something we should not have or we did not do something we should have done. At this point we are exploring the reasoning of *why* someone made the decision they did.

This is an important point in the analysis because we are seeking to understand why someone thought the decision they made was the correct one at the time. At this point in the analysis we do switch the questioning to *why* because we are exploring a set of answers particular to an individual or group. Our answers are what we call Latent Root Causes or the organizational systems that are in place to help us make better decisions. The Latent Roots represent the rationale for the decision at the time that triggered the consequences to occur. These are called latent because they are always there lying dormant. They require a human action to be triggered and when triggered, they start a sequence of Physical Root Causes to occur. This error-chain continues, if unbroken, to the point that it results in an adverse outcome that requires an immediate response.

As can be told from this description, the logic tree approach is certainly cause-and-effect related, requires evidence to back up what people say and requires the depth of understanding the flaws in the systems that contributed to poor decisions.

The failure of a process to achieve its designed objective has to do with the design of the linkages between steps in the process: how the steps relate to one another – the hand-offs. It is the interrelationships that are themselves prone to failure and that propagate the effects of a failure to other parts of the process, often in ways that are unexpected (side effects) or not immediately evident (long-term effects).² The logic tree's strict adherence to graphically representing these tightly coupled³ relationships makes it more accurate than the other tools described for that reason.

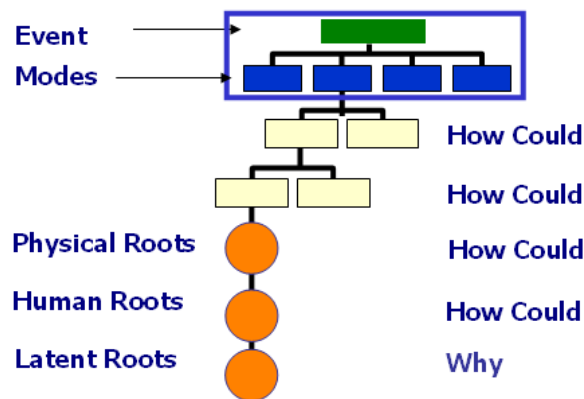


Figure 3: The PROACT Logic Tree

² Croteau, Richard et al. *Error Reduction in Health Care: A Systems Approach to Improving Patient Safety* (San Francisco: Jossey Bass Publishers, 2000), p. 181.

³ C. Perrow. *Normal Accidents: Living With High Risk Technologies* (New York: Basic Books, 1984), pp. 89-100.

In addition to these most commonly used approaches described above, many simply use form-based Root Cause Analysis. This is basically a one size fits all mentality. It is root cause “by-the-numbers” similar to “painting-by-the-numbers”. The same questions are asked no matter the incident and opinions are input as acceptable evidence. Checklists are often provided which give people the false sense that the correct answer(s) must be within the listed items. No “pick-list” RCA process can ever be comprehensive enough to consider all the possibilities that could exist in each working environment at all times. However the innate human tendency to follow the *path of least resistance* makes using pick lists very attractive. As noted author Eli Goldratt says, “An expert is not someone that gives you the answer, it is someone that asks you the right question”. That is exactly what true RCA is all about (not lip service RCA).

Many people choose to use form-based RCA systems because the regulatory authority seeking compliance provides them free of charge and *suggests* they be used. The paradigm is that “we are using their forms so we will have a better chance of complying if we use them”. This may indeed be true, but does not mean the analysis was comprehensive enough to ensure the undesirable outcome will not recur. Hence, once again, compliance does not necessarily ensure operational Reliability!

While this is a mere synopsis of a very broad topic, it is meant to get us thinking about whether the tool we are using is appropriate for Root Cause Analysis or not. As stated earlier, all RCA tools have their pro’s and con’s and are more appropriate under certain circumstances than others. All RCA tools are subject to abuse by human beings as well. The tool is only as good as the analyst applying it! The key here is to know the technical differences in the tools available and then determine which tools are more appropriate for the magnitude of the failure on deck.

Robert J. Latino is CEO of Reliability Center, Inc. Mr. Latino is a practitioner of root cause analysis in the field with his clientele as well as an educator. Mr. Latino is an author of RCI's Root Cause Analysis Methods© training and co-author of Basic Failure Analysis Methods© workshop. Mr. Latino has been published in numerous trade magazines on the topic of root cause analysis as well as a frequent speaker on the topic at trade shows and conferences. His most recent publication is titled "Root Cause Analysis - Improving Performance for Bottom Line Results" He can be contacted at 804/458-0645 or blatino@reliability.com.