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When problems arise, does your organization struggle to eliminate them from happening again?

- Is a “full-scale” root cause analysis considered an impossible or unnecessary expense?
- Does your plate feel too full to spend extra time fixing a problem?
- Is there a general perception that structured problem-solving processes are only effective on certain kinds of problems, or that they are too expensive and too time-consuming?
- Is it difficult to find a single problem-solving approach that is effective for all problems, including those with varying importance?

If you answer “yes” to one or more of these questions, don't give up. Choosing an effective problem-solving approach can:

- Help you maintain control of your organization's time investment.
- Reduce or eliminate the financial and time costs associated with recurring problems.
- Create benefits that outweigh the costs associated with problem-solving.

So, how do you choose a problem-solving approach that allows you to control your time investment without forgoing your ability to define and eliminate problems?

The perceived benefits and drawbacks of different problem-solving philosophies are closely tied to beliefs about the extent to which each approach is considered shallow or deep-rooted.

Shallow approaches

Some people hold a belief that certain problem solving methods require less time, fewer people, or cost less to complete than others. There is a perception that some shallow methods do not have the capability to find the “root causes” or effectively solve complex problems; therefore, they are better suited for less significant incidents.

Shallow-rooted methods might be perceived to only consider “surface,” “immediate” or “proximate” causes.” They might not look back in time very far prior to the incident. Shallow methods might also consider only a few levels of causation.

Deep-rooted approaches

There are beliefs and perceptions that some deep-rooted methods require more time, people and financial investment to complete, so they are best suited for working on complex or highly significant events.¹ Deep-rooted approaches also paint an image that the analysis goes “deep” into the problem or a “long way” back into the past in order to find many levels of causation so that the “true root cause”² can be discovered.

Scalable approaches

Is Apollo RCA a shallow or deep-rooted RCA approach? Well, it is neither, and it is both!

¹ For a complete review and comparison of various RCA methods refer to www.realitycharting.com/root-cause-analysis/comparisons/

² For those people trained in the Apollo RCA way of thinking, it is generally understood from the 3rd characteristic of the cause and effect principle why the concept of a “true root cause” or single “root cause” is a myth.

Apollo RCA (ARCA) is a problem-solving method that is *scalable* depending on the significance of the problem, real world constraints (i.e., time) and the ability of the RCA team to find causes.

ARCA is scalable because it is principle-based, meaning it works the same way every time. To understand this in more detail, let's review ARCA. It is a structured process designed to understand the causes of past events for the purpose of preventing recurrence. ARCA is a simple but structured four-step process:

Step 1. Define the problem.

Step 2. Create an Apollo Cause & Effect Chart.

Step 3. Identify effective solutions.

Step 4. Implement the best solutions.

In Step 1, defining the problem involves writing down *what* exactly the problem is. The "*what*" statement from the problem definition is called the *Primary Effect* and this is the specific effect that your organization wants to prevent from happening again (if performing a "reactive" analysis). In the problem definition, the *Primary Effect* is further defined by *when* it happened, *where* it happened and the *significance* it represents relative to the organizational goals and objectives.

In Step 2, a causal understanding of how the *Primary Effect* happened is created through the development of an Apollo cause and effect chart using the cause and effect principle and RealityCharting® software³.

³ RealityCharting® software.
<http://www.apollorca.com/realchart/about.shtml>

An Apollo cause and effect chart follows these principles:

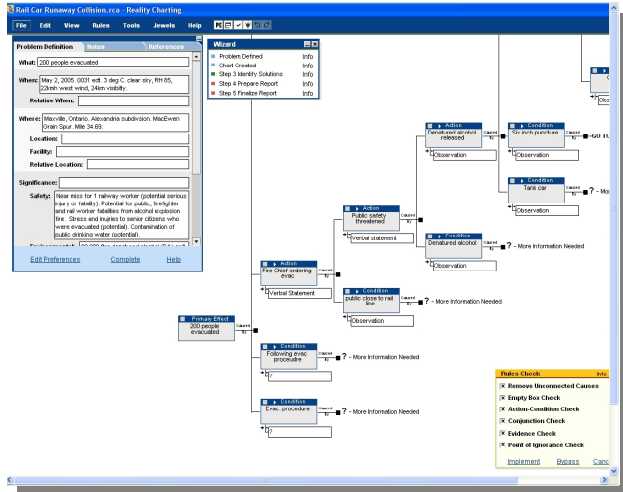
- The analysis starts in the present and goes back into the past.
- It is constructed with sets of inter-dependent causal relationships.
- Cause paths are traced back in time to a point where the RCA team chooses to stop the analysis. The decision to stop the analysis of a cause path is based either on the team's agreement that there is no value in continuing the path or when the causes of the last effect cannot be pinpointed.
- All causes are supported with evidence.

In Step 3, solution ideas are developed based on the evidence-based causal relationships identified on the Apollo cause and effect chart. The solutions ideas are evaluated against three important solutions criteria, which are designed to help the team identify which solutions will be effective.

In Step 4, the *best* effective solutions are implemented and the success of those solutions is monitored. After success has been achieved, the lessons learned are then shared with everyone in the organization.

In summary, ARCA is a simple causal problem-solving process whereby one asks "why" of a defined problem. The "what" answers with at least two causes in the form of an action and condition, then asks "why" of each answer and continues asking "why" of each stated cause until there are no more answers. Further investigation is conducted to find causes of any unanswered questions and the process is repeated several times until a complete cause and effect chart, called a Realitychart (Figure 1), is created showing all the known causes and their inter-relationships. Every cause on the chart has evidence to support its existence or a "?" is used to reflect an unknown and thus a risk.

Figure 1. Example Realitychart created in RealityCharting®



All causes are then examined to find ways to eliminate, prevent or control them with a solution that is 1) within your control, 2) prevents recurrence of the cause it acts on, and 3) meets your goals and objectives. The result is clear causal connections between your solutions and the defined problem. The extent of the analysis is dictated by the nature of the problem and the constraints you choose to impose on your analysis.

Let’s look at some typical constraints:

How much effort must you invest to achieve effective results?

In an Apollo RCA, the challenge of determining how much time, people and money to dedicate to the RCA simplifies after the problem is defined. The *Significance* section of the *Problem Definition* defines the importance of a given problem relative to an organization’s goals and objectives. It helps to answer the questions:

1. How much time is required?
2. Who needs to be involved?
3. How much is the problem owner willing to spend on the analyses?

4. How much is the problem owner willing to spend on solutions?

An RCA Practitioner⁴ or RCA Team must balance the Apollo RCA with any real world constraints and limitations such as time allotted to work on the RCA. How is this accomplished?

1. When the Apollo method is followed, it will help problem solvers find effective solutions to event-based problems every time!
2. The Apollo method allows you to maintain control because it is *scalable* to fit every situation and the surrounding landscape. The decision on scale is a function of the significance of the primary effect -- and the constraints inherent to or placed on a given RCA -- coupled with the ability to find causes and support them with evidence.

For example, in Figure 2 there are two problem statements from two incidents.

- The *Primary Effect* in RCA # 1 is a defective product that got shipped to a customer. This *Primary Effect* resulted in increased costs for shipping; however, because it was a first-time supplier incident it did not affect the owner’s supplier status with his customer.
- In RCA # 2 the primary effect was the same as in RCA # 1; however, the significance of the event is much greater. The defective part was installed in the customer’s product, which resulted in serious injury. Because this event represents a recurring non-conformance incident, there is potential for litigation against the supplier. Now the supplier’s status is on shaky ground because of the potential loss of a \$10M contract with that customer.

⁴ A Practitioner is the skill level conferred on students that complete the *Apollo RCA for Practitioners* training course.

It should be clear that the significance of the RCA # 2 is much greater than RCA # 1. It should also be clear that the time and resources devoted to RCA # 2 should be more than that devoted to RCA # 1, and that the levels of causation uncovered in RCA # 2 should be more numerous and extend further back into the past and systemic aspects of the company. This is how a problem definition helps you to decide how much effort to invest in your RCA.

How can the costs of a root cause analysis – both time and money – be offset by the benefits?

At a conceptual level, imagine the *potential* of an Apollo RCA like a picture that you have inserted into a document. Using your computer’s cursor arrow you can grasp the little node at the corner of the picture and drag it in or out to scale the size of the picture to fit whatever space it needs to fit within. The space designated in your document for this picture is a function of the picture’s importance relative to the document it is in.

The trained Apollo RCA Practitioner or Team is fully in control of balancing the scale (time and money) of an RCA with the situational constraints that surround the RCA. The quantity of causes that are identified on a cause and effect chart represent a significant part of the scale and effort of any given RCA. The number of causes is a function of the degree to which control is required over the problem and the ability of the RCA Practitioner or RCA Team to find evidence-based causes. The more causes that are identified, the clearer the picture becomes. And the clearer you are about why your problem happened, the more opportunities there are for solutions. The more refined that the sets of dependent causal relationships are, the more control your solutions can have over the causes of your problem.

The more solutions you implement that control or eliminate causes throughout the cause and effect chart, the less likely that your problem can happen again. It’s possible that an Apollo RCA with 10 causes that took less than an hour to complete may be

just as effective as an Apollo RCA with a 1000 causes that took several months to complete.

Figure 2. Example Problem Definition created in RealityCharting®

RCA # 1

Problem Definition	Notes	References
What: Defective part shipped to customer		
When: September 1st, 2007		
Where: Factory A		
Significance:		
Cost: \$1400 for return shipping. \$2200 expiditor shipping of replacement part		
Frequency: First time in 2007		
Supplier Status: Status down grade from green supplier to yellow. (Red = cancelled contract)		
Customer Final Product: No Impact. Potential serious harm had part missed QA check and been installed.		
Edit Preferences	Complete	Help

RCA # 2

Problem Definition	Notes	References
What: Defective part shipped to customer		
When: September 25, 2007		
Where: Factory A		
Significance:		
Cost: Potential client litigation. Potential \$500k legal costs plus damages estimated at \$3.1M		
Frequency: Second time in 2007		
Supplier Status: Status down grade from yellow to red warning status. (Red = cancelled contract). Potential loss of \$10M contract (25% of annual sales)		
Customer Final Product: Customer final end product failed - serious injuries occurred		
Edit Preferences	Complete	Help

So what does all this mean?

ARCA is a *scalable* approach to problem solving that can be appropriately matched to the significance of -- and constraints and limitations associated with -- any problem at hand. The choice of scale (i.e., time invested in an a root cause analysis) is within control of the trained Apollo problem solver!

No matter whether a trained Apollo RCA Practitioner or RCA Team chooses a “shallow” (i.e., identify fewer causes) or “deep” approach (i.e., identify more causes) to completing an Apollo RCA, one thing will always be common between those RCAs. The Apollo RCA method will allow the Practitioner or Team to develop solutions based on known causes of the problem! Developing solutions based on known causes of a problem is a key to realizing effective problem-solving results. The difference lies only in the number of potential solutions that can be identified in the analysis and the level of confidence those solutions provide you.

References:

Gano, D. 2007. Apollo Root Cause Analysis – A New Way of Thinking. Apollonian Publications. Richland, WA, ISBN 978-1-883677-01-5



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