

An Introduction to Root Cause Analysis

Key Points

Root Cause Analysis is a useful process for understanding and solving a problem.

Figure out what negative events are occurring. Then, look at the complex systems around those problems, and identify key points of failure. Finally, determine solutions to address those key points, or root causes.

As an analytical tool, Root Cause Analysis is an essential way to perform a comprehensive, system-wide review of significant problems as well as the events and factors leading to them.

If you only fix the deficiency (already identified) then the problem will almost certainly happen again, which will lead you to fix it, again, and again, and again.

If, instead, you look deeper to figure out why the problem is occurring, you can fix the underlying systems and processes that cause the problem.

Root Cause Analysis (RCA) is a technique that helps you answer the question of why the problem occurred in the first place.

Root Cause Analysis aims to identify the origin of a problem. It uses a specific set of steps to find the primary cause of the problem, so that you can:

1. Determine what happened.
2. Determine why it happened.
3. Figure out what to do to reduce the likelihood that it will happen again.

RCA assumes that systems and events are interrelated. An action in one area causes an action in another, and another, and so on. By following back these actions, you can discover where the problem started and how it grew into the issue you are now facing.

You will usually find three basic types of causes:

1. Physical causes – Tangible, material items failed in some way (for example, a water ingress alarm stopped working).
2. Human causes – People did something wrong, or did not do something that was needed. Human causes typically lead to physical causes (for example, no one checked the alarm circuit, which led to the sensor failing).
3. Organizational causes – A system, process, or policy that people use to make decisions or do their work is faulty (for example, no one person was responsible for sensor maintenance, and everyone assumed someone else had checked).

Root Cause Analysis looks at all three types of causes. It involves investigating the patterns of negative effects, finding hidden flaws in the system, and discovering specific actions that contributed to the problem. This often means that RCA reveals more than one root cause.

You can apply Root Cause Analysis to almost any situation. Determining how far to go in your investigation requires good judgment and common sense. Theoretically, you could continue to trace root causes back to the Stone Age, but the effort would serve no useful purpose. Be careful to understand when you've found a significant cause that can, in fact, be changed.

The Root Cause Analysis Process

Root Cause Analysis has five identifiable steps.

Step One: Define the Problem

- What do you see happening?
- What are the specific symptoms?

Step Two: Collect Data

- What proof do you have that the problem exists?
- How long has the problem existed?
- What is the impact of the problem?

You need to analyze a situation fully before you can move on to look at factors that contributed to the problem. To maximize the effectiveness of your Root Cause Analysis, consult everyone (Superintendents, Ship's staff, Authorities) who understand the situation. People who are most familiar with the problem can help lead you to a better understanding of the issues.

Step Three: Identify Possible Causal Factors

- What sequence of events leads to the problem?
- What conditions allow the problem to occur?
- What other problems surround the occurrence of the central problem?

During this stage, identify as many contributing factors as possible. Too often, people identify one or two factors and then stop, but that is not sufficient. With RCA, you don't want to simply treat the most obvious causes – you want to dig deeper.

Use these tools to help identify contributing factors:

- **Appreciation** – Use the facts and ask "So what?" to determine all the possible consequences of a fact.
- **5 Whys** – Ask "Why?" until you get to the root of the problem.
- **Drill Down** – Break down a problem into small, detailed parts to better understand the big picture.
- **Cause and Effect Diagrams** – Create a chart of all of the possible

Step Four: Identify the Root Cause(s)

- Why does the cause exist?
- What is the real reason the problem occurred?

Use the same approach as in Step Three to look at the roots of each factor. This is intended to encourage you to dig deeper at each level of cause and effect.

Step Five: Recommend and Implement Solutions

- What can you do to prevent the problem from happening again?
- How will the solution be implemented?
- Who will be responsible for it?
- What are the risks of implementing the solution?

Analyze your cause-and-effect process, and identify the changes needed for various systems. It's also important that you plan ahead to predict the effects of your solution. This way, you can spot potential failures before they happen.