

# Troubleshooting Theory and Strategy

INVESTIGATION

ANALYSIS

IMPLEMENTATION

## INVESTIGATION

1. **Write a Problem Statement:** A problem statement must be broad enough to describe the problem, but narrow enough to focus the investigation. It should not contain value judgments and should be a factual answer to the question "What is wrong?"
2. **Write a Problem Description:** Describe the problem in more detail by collecting as many symptoms and details as possible, including the time of the incident. Do not underestimate or overestimate the magnitude of the problem. Stick to the facts in the data that you gather.
3. **Identify Differences and Changes:** Identify differences between the faulted system and any similar working systems. Has this problem always existed? Has the system ever worked properly? In addition, identify any recent changes to the system.

**Example:** Servers crashed on Wednesday evening.

**Example:** A customer attempted to start their 1992 Chevy Cobalt at 8 a.m., but the car would not start. The car makes a clicking sound when someone tries to start it. However, the headlights and windshield wipers turn on and function properly.

**Example:** Our records show that the server's memory was upgraded 3 months ago.

## ANALYSIS

1. **Identify all Possible Causes:** Identify as many possible causes for the problem as possible. State if any of the information you gathered in the Investigation phase matches a known issue.
2. **Identify the Most Likely Causes:** Consider how likely each potential cause is. Do not eliminate a possible cause until you absolutely disprove it. Rank likely causes from most likely to least likely.
3. **Test Possible Causes:** Test the remaining likely causes in the least disruptive fashion possible. Schedule testing of the most likely causes immediately.

**Tip:** If possible, collaborate with peers to identify possible causes if you work in a team environment.

**Tip:** Apply falsification to eliminate possible causes. In addition, use the "5 Whys" method to get to the root cause.

**Tip:** If several of the most likely causes can be tested non-disruptively and inexpensively, start with them.

## IMPLEMENTATION

1. **Apply the Fix:** Work in the least-disruptive, lowest-cost manner possible. Implement the fix in a way that will completely verify that the fix has resolved the problem.
2. **Verify the Fix:** Check to see that the problem is really resolved, and also verify that you have not introduced any new problems.
3. **Document the Resolution:** Document the resolution for future reference, to track recurring problems, and to improve the design of the product.

**Tip:** If you previously tested the fix in a test environment, now apply the fix to the production environment.

**Tip:** As part of the verification process, consider performing a root cause analysis again to ensure that you actually resolved the root cause of the problem.

**Example:** Write a Knowledge Base article or Technical Service Bulletin that describes the problem and the troubleshooting steps taken to resolve it.

For more information on troubleshooting, go to the Troubleshooting Theory and Strategy topic in Qwikipedia (<https://qwikipedia.brainkeeper.net/>)