CAREER COMPASS

Steer Your Career. Accelerate Our Mission.

Solve Problems with Root Cause Analysis

Participant Workbook

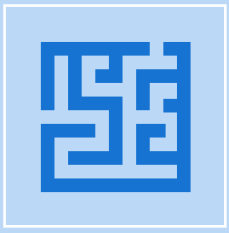
CAREER COMPASS
Steer Your Career. Accelerate Our Mission.

Table of Contents

Introduction

Objective

Objective: obtain grounding in key problem-solving elements, including how to identify problems and how to define problems and symptoms through root cause analysis.



Participants will be able to…

Identify what is a problem.

Determine the framework needed to solve problems.

Apply that framework to reach a solution.

Agenda

1. Discuss problem identification—How do you spot a problem?
2. Problem solving skills
3. Five Steps of Root Cause Analysis

Reflection

Identify a situation in which you wish you had applied more problem-solving skills.

- Maybe you reached a solution, but it didn't solve the actual problem?
- Maybe you didn't spend enough time on the root cause analysis?

Use the space provided here to capture your response.

When we improve our problem-solving skills, we are better able to fix things that are broken, assess risk, improve performance, and seize opportunities for innovation.

Problem Identification

What is a problem? How does one recognize a problem? What are the types of problems? In this section, we are going to discover two types of problem.

Type 1 Problems

Type 2 Problems

Type 1 Problem

Picture #1

What do you think the problem is in this picture?

Use the space provided here to capture your response.

Picture #2
What do you think the problem is in this picture?

Use the space provided here to capture your response.

Picture #1 and #2 are easy to solve problems. In picture #1 we can see we have a flat tire. Without even knowing why the tire is flat, we know we ought to replace it with a full tire so we can drive again! Some quick troubleshooting will tell us why the tire is flat (e.g. drove over a nail, low tire pressure, etc.) and what we can possibly do to avoid getting a flat tire in the future. In picture #2, we can see this plant is dead or nearly there. Without even knowing why the plant is dead, we know we must salvage the plant or throw it out and get a new one. With some quick troubleshooting we can figure out why the plant is dead (e.g. it wasn't watered, it didn't get enough sun, etc.) and what we can possibly do to avoid killing our plant again in the future.

Type 2 Problem

Picture #3
What do you think the problem is in this picture?

Use the space provided here to capture your response.

Picture #3 is a calving glacier. “Since the early 1900s, many glaciers around the world have been rapidly melting. Human activities are at the root of this phenomenon. Specifically, since the industrial revolution, carbon dioxide and other greenhouse gas emissions have raised temperatures, even higher in the poles, and as a result, glaciers are rapidly melting, calving off into the sea and retreating on land.” (World Wild Life)

We have an outline of the problem- climate change. However, what contributes to the change of climate? What human activities are creating this change? What influence does this have on the rest of the globe? And what can be done to correct this change? This is a much bigger problem than this image lets on.

Continuing with our ice theme, this image shows an iceberg, the tip and the submerged portion. **This draws to mind the phrase, “the tip of the iceberg”, meaning a small part of something (such as a problem) that is seen or known about when there is a much larger part that is not seen or known about.** These are Type 2 problems; they require sit-down, dedicated thinking time for solving; they are more complex problems, and often they are problems you need a team to solve. The type of problem where there is more going on below the surface than we are readily aware of.

Type 1 Problems

"On-the-go" problem-solving, where the problem is relatively easy to spot and solve and can typically be solved on your own.

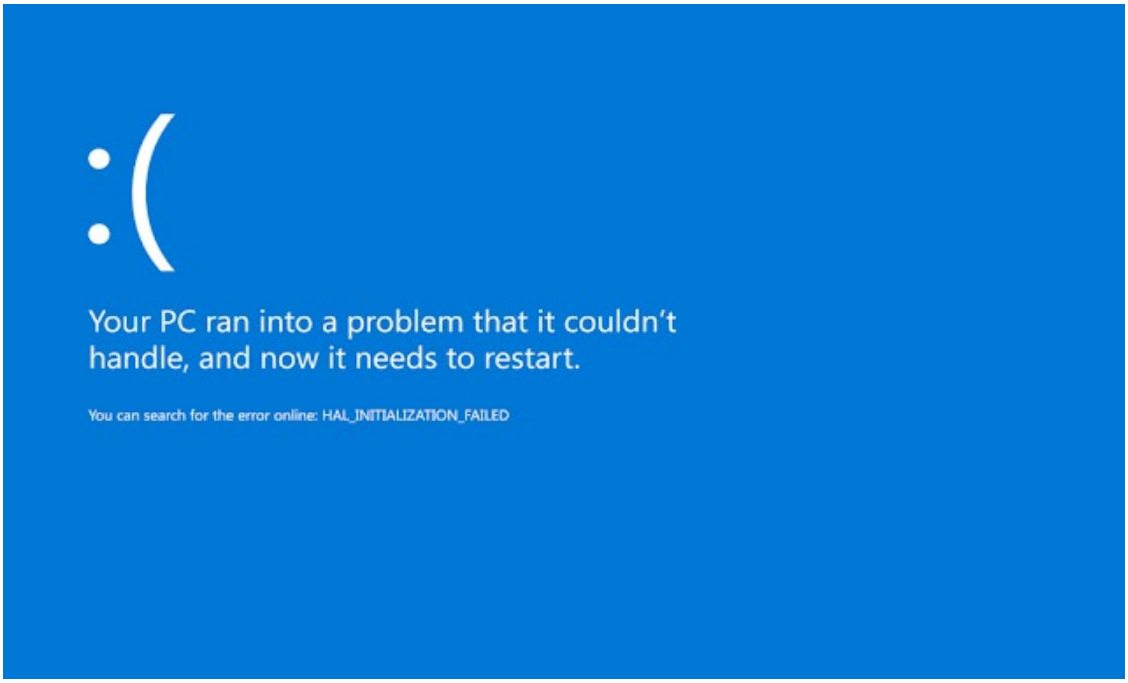
Type 2 Problems

Complex problems, that often need a team and sit-down, dedicated thinking time for solving.

Strategies for describing and defining the problem:

1. Make measurable, observable, clear, specific statements
2. Identify the discrepancy between a desired state and what is occurring

Identifying Problems- Exercise



What is the problem here? Do you think this is a Type 1 or a Type 2 problem?

Use the space provided here to capture your response.

This is a Type 2 problem. The computer no longer works and is giving a very non-specific error message. You've probably all gotten this blue screen. Yes, we can just restart our computer, and it may work ok, but once you start getting this screen, you know there is a larger problem, and usually you have no idea what it is or how to fix it. Time to get IT involved!

What is the problem here? Do you think this is a Type 1 or a Type 2 problem?

Use the space provided here to capture your response.

This is a Type 1 problem. This is a pretty simple problem. A headlight is burned out. There is a very small number of possible reasons why this would happen; typically, a filament or fuse has burned out. The fix is simple- replace the bulb or the fuse, and you're good to go!

Problem Solving Skills

What are examples of problem-solving skills?

Use the space provided here to capture your response.

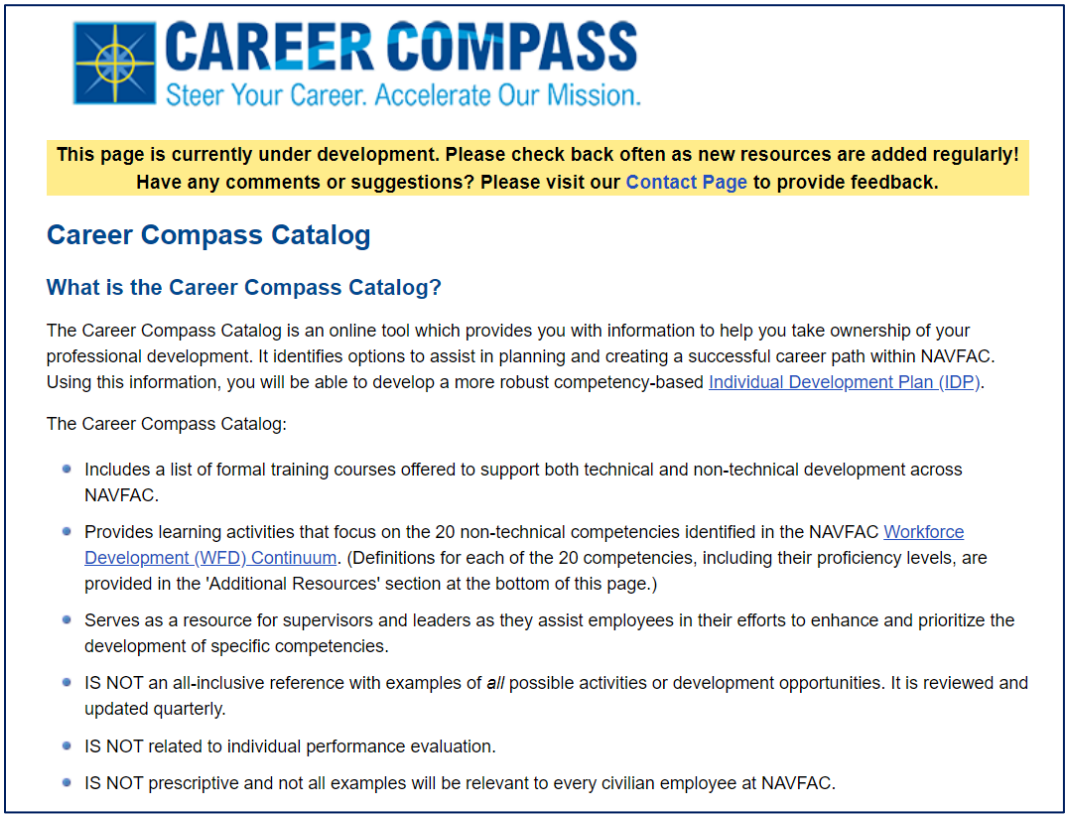
Areas to develop in order to be a good problem solver include:

- Research skills
- Attention to detail
- Active listening
- Analytical skills
- Creativity
- Communication
- Dependability

CAREER COMPASS
Steer Your Career. Accelerate Our Mission.

Career Compass

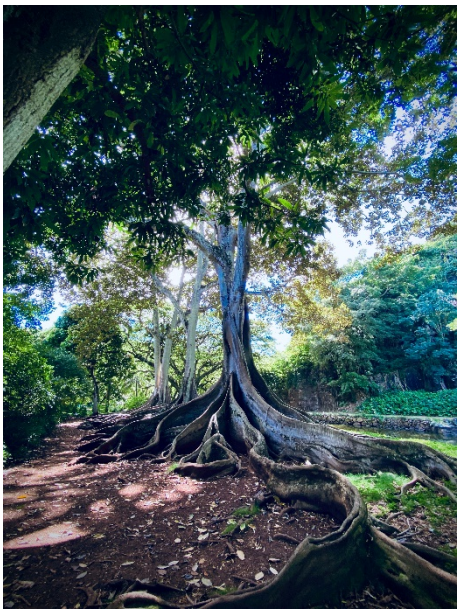
Link to Career Compass Resource Center (CCRC): https://www.navfac.navy.mil/ccrc



- Link to Career Compass Catalog (CCC): https://www.navfac.navy.mil/ccc

In order to find ways to grow your problem-solving skills, you have the Career Compass at your disposal: both the Career Compass Resource Center (CCRC) and the Career Compass Catalog (CCC). These online resources provide NAVFAC civilian employees – at all levels – access to personal and professional growth and development opportunities. You don't need a CAC to access the CCRC, which makes it great to visit on a personal device to watch videos, listen to podcasts, and more. To access the CCC, you do need a CAC. The CCC provides employees with information to help them take ownership of their professional development. It is a searchable compilation of development opportunities across NAVFAC. This is an incredible treasure chest of information holding all sorts of ideas for developing your skills. You can search specifically for problem solving, and sort by proficiency level, and learning methodology such as experiential, social, or formal learning.

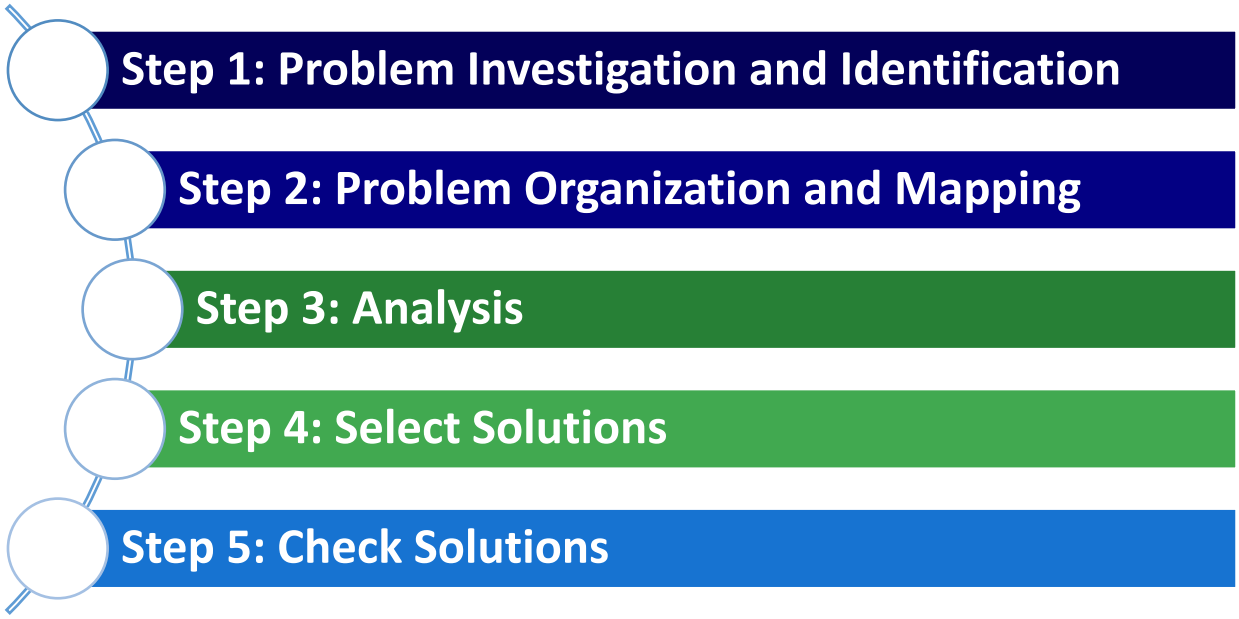
Root Cause Analysis



Root cause analysis is an analytical technique used to determine the basic underlying reason that causes a variance, defect, or risk.

Root cause analysis focuses on identifying the main reasons of a problem. It can be used to identify the reasons for a deviation and the areas the project manager should focus on in order to achieve the objectives of the project.

Five-Step Process to Root Cause Analysis



1. **What** is going on? Break the problem down.
2. **Ask why**, why, why, and why again.
3. **Collect data** to inform this research process.

Step 2: Problem Organization and Mapping

1. **Organize** the collected information into categories.
2. **Map** out the organized information showing cause and effect or in a timeline—a list of a events leading up to the occurrence or failure.

Step 3: Analysis

1. **Analyze** the information you have organized and mapped out.
2. **Look for** patterns, interruptions, location, timing, causal factors.
    - **Barrier Analysis**: Look at the sequence of events to find where physical or organizational barriers may be influencing the problem – what are the barriers?
    - **Change Analysis:** An event can also be seen as a sequence of changes in the environment (change analysis) – what changed in this problem compared to previous sequences?

Step 4: Select Solutions

1. **Appropriate** corrective action is easier to determine, once these findings are established.
2. **Choose** the suitable solution from a variety of available ones.
3. **Remember** there are many ways to solve a problem.

Step 5: Check Solutions

1. **Use** previously established metrics to assess if the solution or correction action put into place has made a difference and solved the problem.
2. **Determine** if the problem has been fixed.
3. **Try** another solution, if the problem isn't solved.

Case Study:

- The $360 million combat ship was commissioned on Nov. 21, 2015 in Milwaukee and left the Canadian port of Halifax bound for Florida in early December 2015.
- The USS Milwaukee broke down and completely lost power on its inaugural run.
- The ship had to be towed back to port, bringing up major concerns about the reliability of the ship and delaying the commissioning of further ships until the root cause of the problem could be found.
- *Reporting of a complete loss of propulsion on USS Milwaukee is deeply alarming, particularly given this ship was commissioned just 20 days ago. U.S. Navy ships are built with redundant systems to enable continued operation in the event of an engineering casualty, which makes this incident very concerning. I expect the Navy to conduct a thorough investigation into the root causes of this failure, hold individuals accountable as appropriate, and keep the Senate Armed Services Committee informed- Senator John McCain*
- During a full power run, the gas engines shut down. An alarm triggered which cause the USS Milwaukee to automatically make an emergency stop.
- Metal filings were found and removed from the lube oil filter. The ship restarted its journey.
- Four days after the emergency stop, the ship lost propulsion and was unable to proceed on its own power.
- Metal filings were discovered throughout the gas and diesel engine systems.

Step 1: Problem Investigation and Identification

- **What is the problem? Is it a Type 1 or Type 2 problem?**

Use the space provided here to capture your response.

Root Cause Analysis: USS Milwaukee

Why 1	Why did the ship lose propulsion?
Why 2	Why did the alarm go off?
Why 3	Why were metal filings in the engine systems?
Why 4	Why was the clutch ground up?
Why 5	Why didn't the clutch disengage?

What are the answers to the 5 Why questions in this situation? Write the answers in the space provided below as we go through them.

Root Cause Analysis

Step 1: Problem Investigation and Identification	• The ship lost propulsion and had to be towed to port
Step 2: Problem Organization and Mapping	• Went through the 5 Why's to arrive at a root cause
Step 3: Analysis	• A timing issue with the software
Step 4: Select Solutions	• Tweak the programming of the software
Step 5: Check Solutions	• Emergency stop testing and more thorough checking before new ships are commissioned

Final Reflection:

How can I put what I learned today into action?

Is there a specific problem I'm dealing with now that I may be successfully able to solve using Root Cause Analysis?

What will my first step be?

Use the space provided here to capture your response.

Contact Information

BD17 Contact Information: Write to us! We are always seeking to improve our learning and development products and encourage your feedback. Please email us with your suggestions and we will incorporate them into future work. Additionally, we are available to answer any questions about the content you may have and provide additional resources to support your learning endeavors.

- NAVFACHQTotalForceDevelopment@navy.mil

Development Resources

Career Compass Resource Center: An online source of information that provides NAVFAC civilian employees access to professional growth and development opportunities.

- https://www.navfac.navy.mil/ccrc

Career Compass Catalog: an online tool which provides you with information to help you take ownership of your professional development. It identifies options to assist in planning and creating a successful career path within NAVFAC.

- https://www.navfac.navy.mil/ccc

Employee Competency Assessment: Complete an online survey to assess yourself – from awareness to expert – on 20 non-technical competencies identified in the WFD Continuum and Section Two of the Community Management Framework (CMF). The assessment takes 10 to 15 minutes to complete.

- https://www.navfac.navy.mil/eca

Individual Development Plan: a tool for NAVFAC employees to define career goals and identify development opportunities as a part of career planning. Creating an IDP is the third, and most significant, step associated with participating in Career Compass, a career development program for NAVFAC civilian employees.

- https://www.navfac.navy.mil/idp