# Cause & Effect Diagram

FISHBONE DIAGRAM

## ABOUT THE TOOL

A Cause-and-Effect Diagram is a tool that helps identify, sort, and display possible causes of a specific problem or quality characteristic. It graphically illustrates the relationship between a given outcome and all the factors that influence the outcome. This type of diagram is sometimes called an "Ishikawa diagram" because it was invented by Kaoru Ishikawa, or a "fishbone diagram" because of the way it looks.

Why should we use a Cause-and-Effect Diagram?

A Cause-and-Effect Diagram is a tool that is useful for identifying and organising the known or possible causes of quality, or the lack of it. The structure provided by the diagram helps team members think in a very systematic way. Some of the benefits of constructing a Cause-and-Effect Diagram are:

- Helps determine the root causes of a problem or quality characteristic using a structured approach.

- Encourages group participation and utilises group knowledge of the process.

- Uses an orderly, easy-to-read format to diagram relationships.

- Indicates possible causes of variation in a process.

- Increases knowledge of the process by helping everyone to learn more about the factors at work and how they relate.

- Identifies areas where data should be collected for further study.

## HOW DO WE DEVELOP A CAUSE-AND-EFFECT DIAGRAM?

When you develop a Cause-and-Effect Diagram, you are constructing a structured, pictorial display of a list of causes organised to show their relationship to a specific effect.

1. PROBLEM STATEMENT

   Draft a clear problem statement, on which all team members agree. Be specific about how and when the problem occurs.
   Write the problem statement on the right side of your paper, at the head of the "fish." Your team will work out and away from this problem. Draw a line with an arrow toward the head of the fish - this is the fish's "backbone."

2. CATEGORISATION

   Brainstorm major categories of your process or procedure. Connect them to the backbone, in "ribs." There is no specific number of steps or categories you might need to describe the problem; some common categories are listed below.

3. CONTRIBUTING FACTORS

   Brainstorm possible problem causes, and attach each to the appropriate rib. Your team might find it helpful to place ideas on category ribs as they are generated, or to brainstorm an entire list of ideas and then place them on ribs all at once.

   Ideally, each contributing factor would fit neatly into a single category, but some causes may seem to fit into multiple categories. If you have a contributing factor that fits into more than one category, place it in each location, and see whether, in the end, considering that factor from multiple points of view has made a difference.
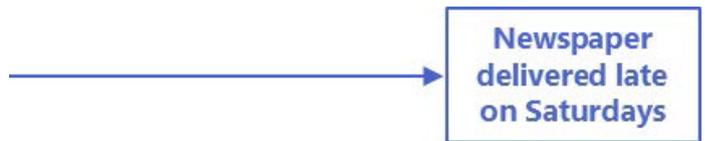
**DIAGRAM 16.4 AFFINITY DIAGRAM - PROBLEM STATEMENT**



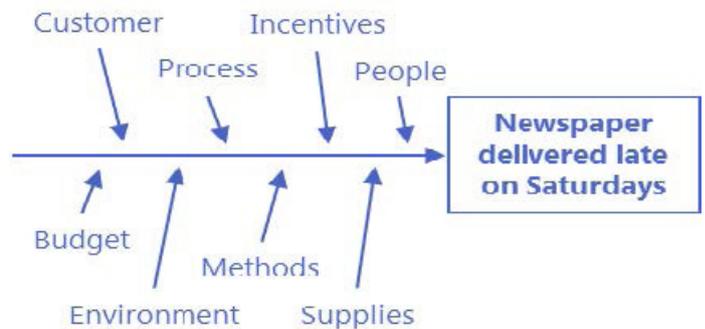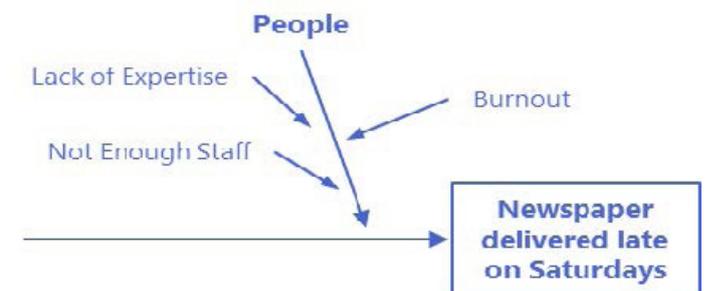**DIAGRAM 16.5 AFFINITY DIAGRAM - CATEGORISATION**



**DIAGRAM 16.5 AFFINITY DIAGRAM - CONTRIBUTING FACTORS**

1.  ASK: WHY?

    As you list a factor, repeatedly ask your team why that factor is present:

    - Why does staff lack expertise? (Because we don't attend training.)

    - Why don't we attend training? (Because we don't have the funding.)

    - Why don't we have the funding? (Because we haven't applied for grants.)

    - Why don't we apply for grants? (Because we're unaware of sources.)

    Sometimes this asking process is called the "Five Whys," as five is often a manageable number to reach a suitable root cause. Your team may need more or less than five whys.

2.  MANY RIBS: DEEPER CAUSES

    You may end up with multiple branches off of each successively smaller rib. Your team might lack expertise, for example, because of a lack of training, but also because you didn't hire the right people for the job. Treat each contributing factor as its own "mini-rib," and keep asking why each factor is occurring.

    Continue to push deeper for a clear understanding. While you could likely brainstorm all day, however, it is important to know when to stop to avoid frustration. A good rule of thumb: When a cause is controlled by more than one level of management, remove it from the group.

3.  TEST FOR ROOT CAUSES

    Test for root causes by looking for causes that appear repeatedly within categories or across major categories.

**KEY POINTS**

The Cause and Effect Analysis uses a diagram-based approach for thinking through all of the possible causes of a problem. This helps to carry out a thorough analysis of the situation by:

1.  Identify the problem.

2.  Work out the major factors involved.

3.  Identify possible causes.

4.  Analysing your diagram.

**DIAGRAM 16.5 AFFINITY DIAGRAM - DEEPER CAUSES**