

Fishbone Diagram

The Cause and Effect (a.k.a. Fishbone Diagram)

A fishbone diagram helps team members visually diagram a problem or condition's root causes, allowing them to truly diagnose the problem rather than focusing on symptoms. It allows team members to separate a problem's content from its history, and allows for team consensus around the problem and its causes.

When utilizing a team approach to problem solving, there are often many opinions as to the problem's root cause. One way to capture these different ideas and stimulate the team's brainstorming on root causes is the cause and effect diagram, commonly called a fishbone. The fishbone will help to visually display the many potential causes for a specific problem or effect. It is particularly useful in a group setting and for situations in which little quantitative data is available for analysis.

You Tube presentations on developing Fishbone Diagrams:

<https://www.youtube.com/watch?v=2rLB-1z9cPY&feature=youtu.b> Arizona Public Health Training Center, Quality Improvement Series

<https://www.youtube.com/watch?v=Kz5Pr8aPKtw> sixsigmamoneybelt

https://www.youtube.com/watch?v=mfHy6_-vDAc Dr. Eugene F.M. O'Loughlin, National College of Ireland

1. Constructing a Fishbone Diagram

To construct a fishbone, start with stating the problem in the form of a question, such as "Why are newspapers delivered late on Saturdays?" Framing it as a "why" question will help in brainstorming, as each root cause idea should answer the question. 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."

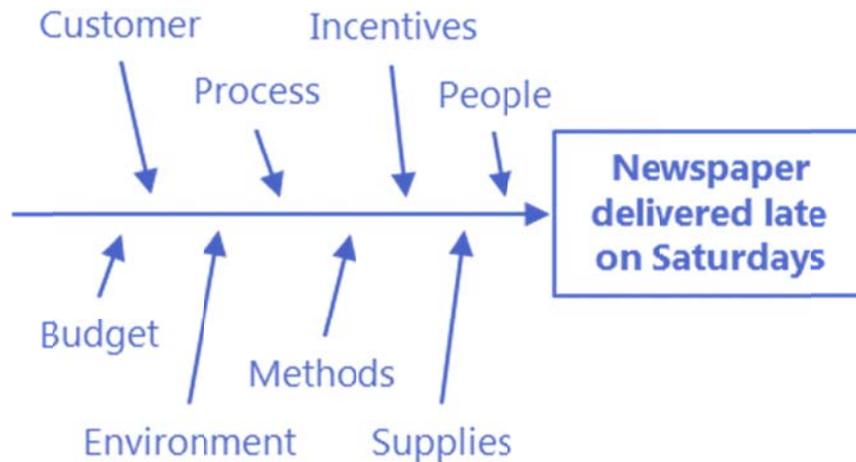


2. Categorization

Brainstorm **major categories** of your process or procedure. Brainstorm **major categories** of your process or procedure. Brainstorming can creatively and effectively generate a high volume of ideas on a given topic, in a non-judgmental way by:

- Encouraging open thinking
- Involving all team members
- Preventing a few team members from dominating the conversation
- Allowing team members to build on each other's ideas while staying focused on a common goal

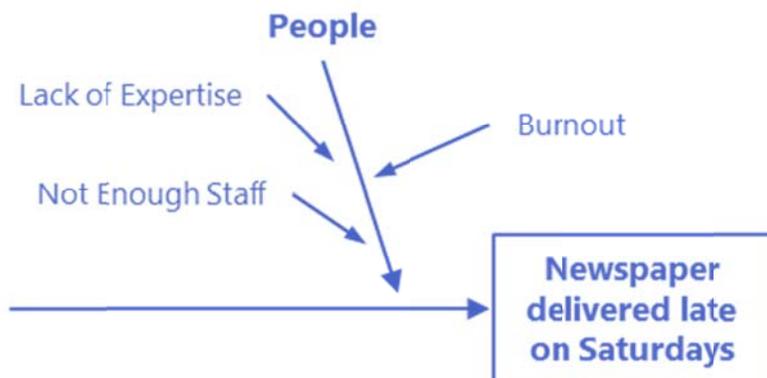
Connect the *major categories* to the backbone, in "ribs." There is no specific number of steps or categories you might need to describe the problem. Some brainstormed categories are listed for the problem statement-- Newspaper delivered late on Saturdays.



3. Contributing Factors

Brainstorm possible *problem causes* specific to each *major category*, 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.



4. 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.)*
- *Etc.*

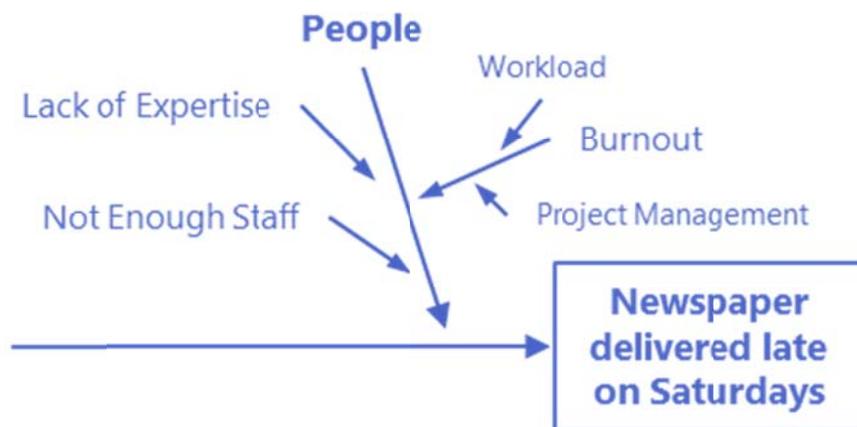
Sometimes this asking process is called the "Five Whys," as five is often a manageable number to reach a suitable root cause. Your team may need more or less than five whys.

You Tube presentation 5 whys with fishbone diagram

<https://www.youtube.com/watch?v=v7M1Gs951Jk>

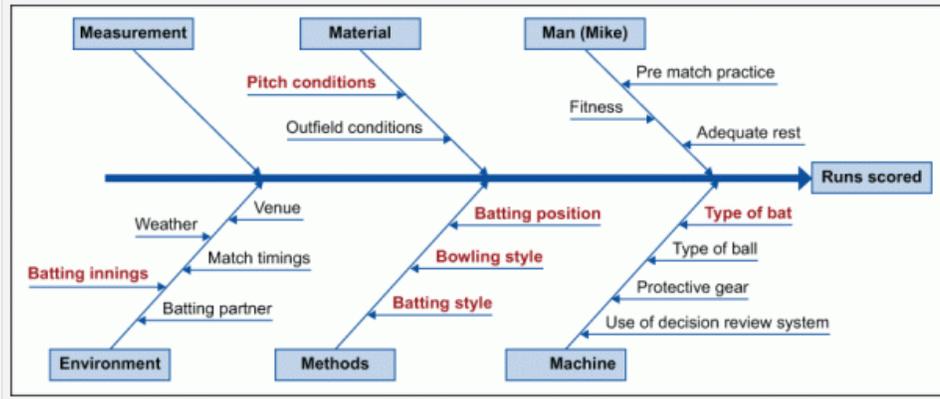
5. Five Whys = Deeper Causes

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.

Figure 4: Example of Completed Fishbone Diagram – graphic excerpted from “Case Study: Applying Six Sigma to Cricket” at <http://www.isixsigma.com/implementation/sports/case-study-applying-six-sigma-to-cricket/> (Click to enlarge)



6. Test for Root Causes

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

Hint: Use check sheets to determine the frequencies of various causes, and scatter plots to test the strength of cause-effect correlation. (QI Toolbox: [Check Sheet](#), [Scatter Plot](#).)

References:

Minnesota Department of Health, Quality Improvement: www.health.state.mn.us/qi