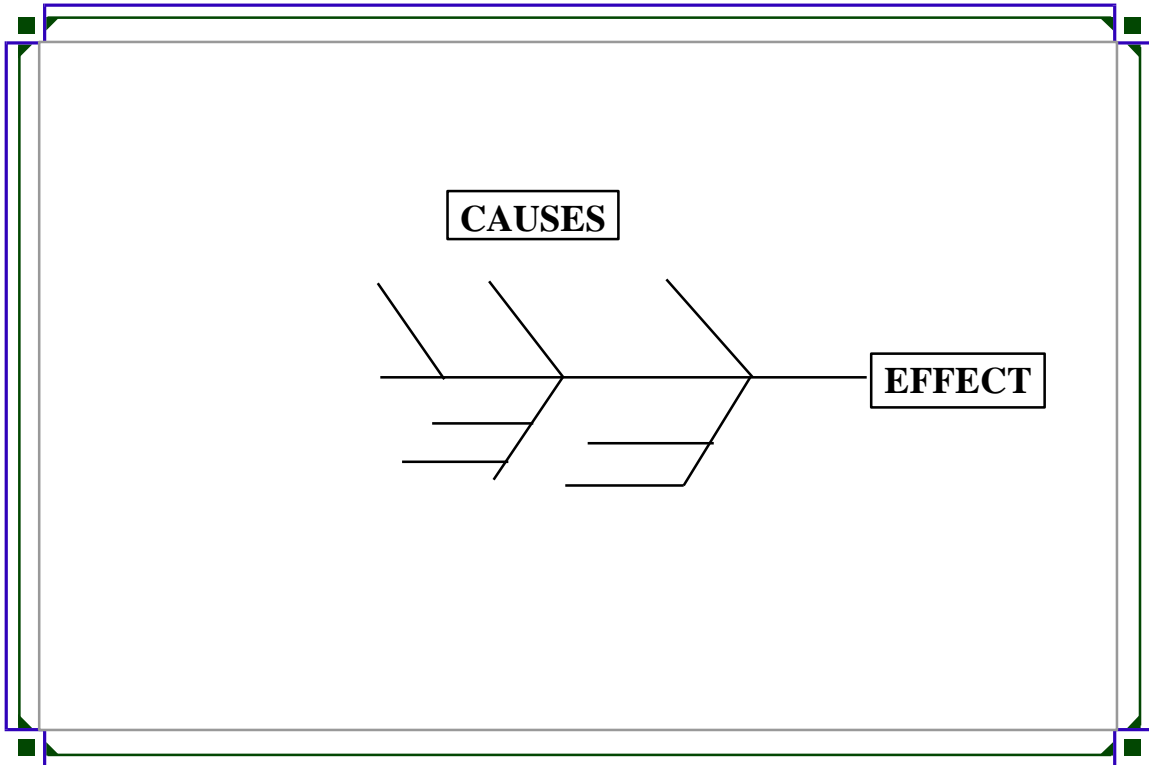


CAUSE AND EFFECT DIAGRAM



Purpose

A **cause and effect diagram** (also known as a Fishbone Diagram or Ishikawa Diagram) is a graphic illustration of the relationship between a given outcome and all of the factors that worked together to produce the outcome. The chart developed is most commonly called a fishbone diagram and part of the cause and effect analysis. The purpose of a cause and effect analysis is to help a team solve a problem by identifying its possible causes.

A fishbone diagram helps teams to reach a common understanding of problems and exposes gaps in existing knowledge. While they can be used at almost any point in the problem solving process, fishbone diagrams are most commonly used to help analyze

problems. They are also frequently used to identify the factors that must be present in order to successfully implement solutions.

The fishbone diagram is broken down into two major components. The first is the effect. The effect is what has happened or what is wrong. This portion of the diagram is usually known as the “head box” of the diagram. The second component is the cause of the problem at issue. In order to develop a **cause and effect diagram** it is necessary to determine what categories the causes will take.

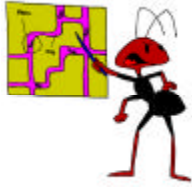
There are three methods of developing the major categories of causes.

1. You can review and include those appropriate categories taken from generic causes:

- | | |
|----------------|---------------|
| a. Environment | f. People |
| b. Machines | g. Plant |
| c. Materials | h. Policies |
| d. Methods | i. Procedures |
| e. Money | |

2. If you are working on a process, you may break down the process into its major steps by creating flow charts. Each of those major activities are then assigned a bone on the fishbone diagram.

3. You may also brainstorm possible causes. After the brainstorm list is generated, segment the ideas into major categories and use them as major bones in the fishbone diagram. A brainstorming session is useful in minimizing the possibility of overlooking one or more possible causes.



Process

1. Draw a blank fishbone diagram. Start at the right, building major categories to the left.

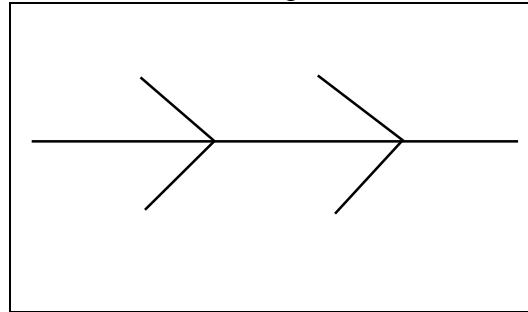
2. Write the problem statement in the “head box” of the fishbone.

3. Determine the major categories of the fishbone that relate to the stated problem.

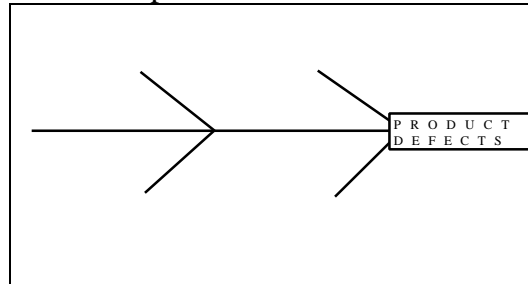


Example

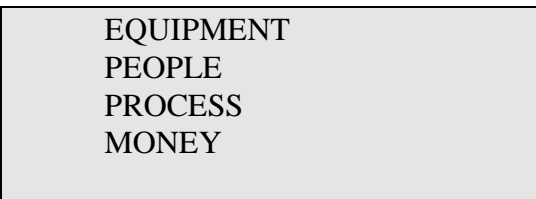
1. Blank fishbone diagram:



2. Record problem statement:



3. Major categories defined by use of appropriate generic categories:





Process

4. Place identified categories on the fishbone diagram with the most likely to have caused the problem nearest the head of the fishbone.

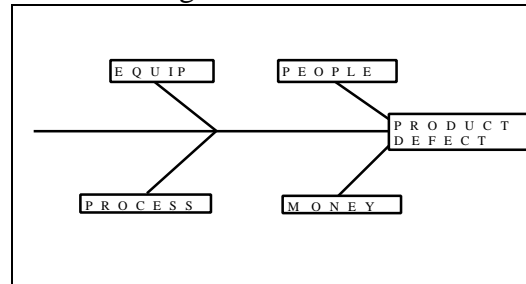
5. Beginning with the most likely cause, break that cause down into factors that contribute to that cause. This is not the time to evaluate whether a suspected cause is a true or root cause. The goal here is to identify possible or most likely causes based on the knowledge or experience of the team members. Record results on the fishbone.

6. Continue until all major causes have been broken down and recorded as in step 5. If sub causes are further broken down list the lower levels under the sub cause heading in a tree fashion.

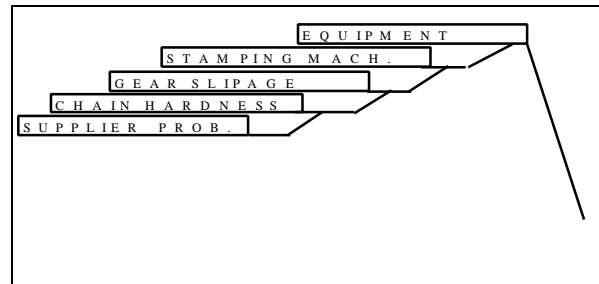
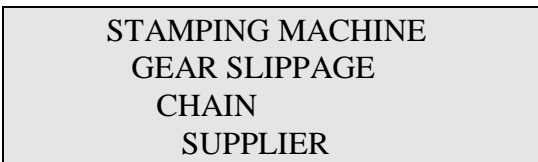


Example

4. Place categories on fishbone:



5. Record factors of the main cause:



6. Record balance of factors for each main cause:

In this example it was determined that no other factors contributed to the problem statement.



Process

7. Team takes further action to collect data that supports or disproves causes to the problem. This could take the form of interviews, root cause analysis, check sheets, flow charts, etc.



Example

7. The team decides to develop a check sheet to collect data on the equipment-related causes of the problem. The check sheet will record the causes over a period of time as the problem occurs. (See Check Sheet in the Toolbox.)



Key Points

- The most common main causes (among the generic ones listed) are people, machine, materials, methods, and environment.
- When using the fishbone diagram and during cause and effect analysis, you are listing only causes, not symptoms.
- When asking “why” or “how” or “what” from the main category, the team can identify possible causes which can help determine the root cause or lead to where further analysis or data collection is needed.
- Try not to extend the diagram much past the control of the group or process owner.
- Ensure that there is team consensus on both the problem statement and finally its root cause(s).
- Avoid jumping to solutions during cause determination and analysis.
- Be sure to collect factual data to verify or validate possible root causes.

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