

Cause & Effect Diagrams by Linda Westfall

Improving quality involves taking action on the root causes of a problem or the causes of variation in a process. "With most practical applications, the number of possible causes for any given problem can be huge. Dr. Kaoru Ikkawa developed a simple method of graphically displaying the causes of any given quality problem." [Pyzdek-01] The purpose of a Cause and Effect diagram is to organize and graphically represent the causes of a particular problem.

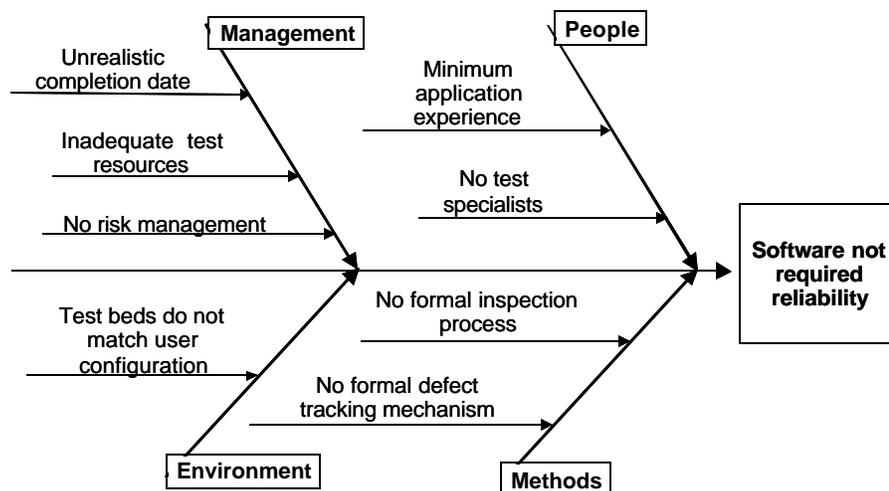


Figure 1 – Example Cause & Effect

In a Cause and Effect diagram, also referred to as an Ishikawa diagram or Fishbone diagram, the problem is put at the "head" of the fish. As illustrated in figure 1, the major fish bones are typically major drivers like management, people, environment and methods. From these major drivers, specific drivers that are causing the problem are listed. This diagram only shows a single level off the major drivers but sublevels and sub-sublevels can also be added as additional branches off each of these branches.

A variation on the cause and effect diagram is the process type diagram shown in figure 2. Here the causes of the problem related to each step in a process are investigated. For example, if we are again looking at the problem of the software not being of the required reliability, we might look at the major steps in the software development process (e.g., requirements, design, code, test) and analyze the causes related to each of those process steps. Or for example, if the problem is that too many defects are escaping from the detailed design inspection, we would look at the major steps in the inspection process (e.g., overview, preparation, inspection, follow-up) and the causes related to each of those process steps.

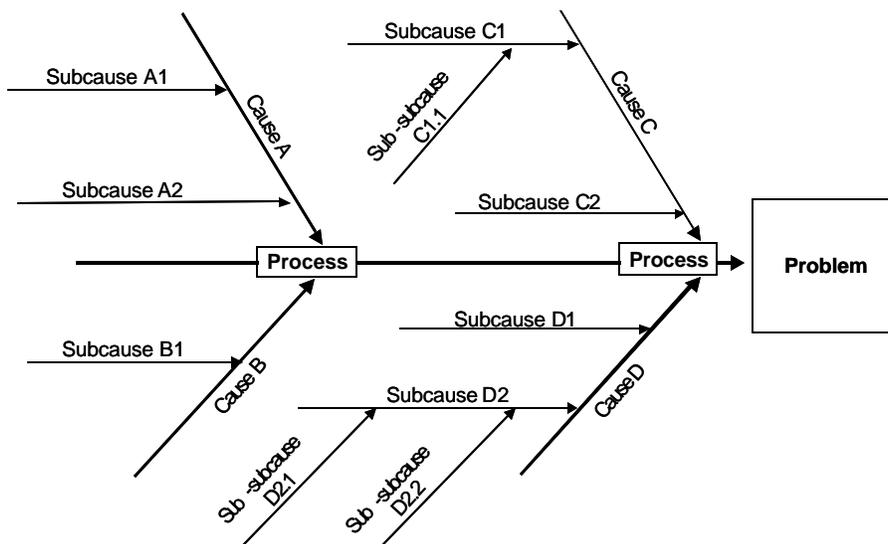


Figure 2 – Process Type Cause & Effect

Cause and effect diagrams are not only useful in the analysis of actual problems. They can be used to analyze potential problems and their potential causes. For example, in Risk Analysis or Hazard Analysis, the potential problem (risk or hazard) is placed at the "head" of the fish and potential drivers that might cause the risk or hazard to turn into an actual problem are documented as the branches of the diagram.

Pyzdek-01 Thomas Pyzdek, The Six Sigma Handbook, McGraw-Hill, New York, Quality Publishing Tucson, 2001, ISBN 0-07-137233-4.