Identifying root causes with a cause and effect tree

“I had no idea that we do all of that.” I often hear that phrase when working with departments and mapping their processes. I have seen what was supposed to be nothing more than a couple of service steps turn into a flow chart spanning several pages of 11”x17” paper. This is because processes generally have many moving parts (steps) and factors that affect results, but which are not readily apparent to the casual observer.

When a service problem occurs, there can be a significant number of factors at play which drive the issues; even in what is supposed to be a simple process. The most obvious reasons may not be the actual causes. The trick is to define accurately all of the factors that potentially could be affecting the results being observed, and then drill down into them far enough to pinpoint the true root causes. A simple, but powerful tool for doing this is the cause and effect tree.

The cause & effect tree

The purpose of the cause and effect tree (C&E tree) is to provide a structured method for gradually breaking a problem down into its component parts and to continue to do so until the root causes are identified. The resulting document looks like a tree, with branches extending out from a central trunk, hence the name C&E tree.

Developing a C&E tree requires the input of people with strong knowledge of the process and a solid understanding of the problem. For this reason, this is not an individual effort, but something an improvement project team must work on together.

Here is how to build the tree:

1. On a large piece of paper or a dry erase board, write a statement that describes the service problem that has been identified (problem statement). I suggest starting on the left side of the page and working to the right, but you can draw the tree in any direction that works best for you.
2. Next, have the project team brainstorm about what could have triggered the issue outlined in the problem statement. The resulting list (Level 1) will be made up of factors that may have caused the problem to occur. On rare occasion, one of the reasons on the list might turn out to be a root cause; but generally, the first list is made up of factors that need to be broken down further.

It may be helpful for the team to think about the factors categorically. In improvement circles, these categories are often called the 5M’s and a P. They stand for Mother nature (environment or workplace), Machines and tools, Measures, Methods and procedures, Materials, and People. You can add any additional categories you think are helpful, and I like to add in a Policies category when I work with this tool. To use these groups, you would ask the team to focus on one category at a time as they brainstorm the Level 1 list.

3. Next, have the team look at each item on the Level 1 list. Like they did for the problem statement, have the team brainstorm about what could have caused each Level 1 factor to occur. The resulting list (Level 2) will be made up of those things that may have caused the Level 1 factors.

4. Continue this process until each factor is broken down to the point that the team cannot identify any further causes for them. This usually occurs after the team has gone through four or five levels. When the team cannot break the causes down any further, they have identified the root causes of the problem.

This approach is similar to the 5 Whys tool that I have previously written about (see the article titled Solving problems by asking ‘why?’). The 5 Whys tool focuses in on a single factor and breaks it down to its root causes. A C&E tree uses an analogous approach but is applied to more complex problems with a large number of factors. Using the tree structure keeps things organized and allows you to see how all of the elements relate to one another.

**C&E tree example**

In this example, a department has identified an issue where students are turning in a form but leaving some required fields blank. The staff wants to determine what could be causing this to happen. The abbreviated illustration below shows three potential causes the team has identified.
Ideally, the project team will take steps to resolve as many of the root causes as possible. The more root causes that can be addressed, the greater the likelihood that the students will fill out the forms completely and correctly in the future. To help with the issue of students overlooking fields, the department may want to take steps to change when the students are asked to complete the form, so they have more time to do so. They may also want to move the required fields to the front page of the form, or make it clear the form is double-sided, to ensure that the students see all of the fields they need to fill in. To address the issues with the students not having the information they need to complete the form, the department may want to let students know what information they will need to bring with them so they can arrive prepared. To address the resistance to providing financial information, the department may want to communicate the reasoning behind why the information is needed, how it benefits the students, and let them know the information will be kept confidential.

When a project team needs to dig into a problem to figure out why it is occurring, especially in a process with many steps and/or decision points, the C&E tree can be a valuable tool. It will guide the project team as they dig into the issue, help to categorize and keep identified causes organized, and provide a structured tool for documenting root causes. The C&E tree is a simple and effective tool that should be in every improvement team’s toolbox. As always, I welcome your questions or comments about this topic or any others related to service and process improvement. You can email me at clayton.taylor@asu.edu.

About the author:
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