**OBJECTIVE OF THE TECHNIQUE**

The objective of using the 5 whys technique is to get people with strong cause-effect understanding of a problem together to jointly work to understand the **root cause** of the problem - rather than some intermediate cause. **Then the team can develop effective countermeasures**. When intermediate causes are treated, the likelihood of the problem repeating is very likely. These are sometimes called Effect-Cause diagrams since you are working from the effect and trying to find the cause.

**An example ..** This is one I actually worked on. (just by coincidence the answer was found by asking “Why?” five times. Sometimes it takes 2 other times it takes 6…five is just a metaphor for “multiple”.)

An operator slipped and fell. We had a lost time accident, the first one in 18 months. My job was to find the root cause. (you will later see this is an example of a “point problem”)

**Why 1…..**Why did the operator fall?….he slipped on the oil…temp fix, clean up the spill… problem certainly can repeat, not a root cause correction

**Why 2 ….** Why was the oil on the ground? …. the nearby pump’s mechanical seal was leaking…temp fix, replace the mechanical seal….could easily repeat not a root cause correction

**Why 3…**Why did the pump mechanical seal fail? We found the shaft seal o-ring was damaged. Almost surely happened when it was last repaired, could have been a bad o-ring. Or an installation error. We checked 500 o-rings in stock, not one was damaged, concluded it was an error made upon installation.

**Why 4…**Why was the bad repair not found before leaving the shop? Either the prescribed hydrotest was not performed or the test procedure is inadequate. We confirmed the test was performed, at least the documentation was in place, we trusted the information. We next did some tests and scored some o-rings so they looked much like the one removed from the seal that failed in operation, installed the mechanical seals and retested the pumps, 2 of 5 repetitions passed.

**Why 5 …** Why did some pass and others fail? We concluded that the test was not severe enough so we tested the 5 replicates on light machine oil. All 5 failed.

**Root cause …** the existing test procedure using water was inadequate to find small shaft sealing problems following a repair.

**Checking the logic of the 5 Why Analysis. using the “Therefore” technique thusly** (note this only checks that the 5 why is logically correct)

* We found leaks using oil testing versus hydrotesting **therefore**
* Hydrotesting was not sensitive enough to find small leaks, and some repairs left the shop not properly repaired, **therefore**
* This pump seal failed in operation **therefore**,
* Oil leaked with the pump in operation, **therefore**
* It created a slipping hazard causing the accident

This one checks quite nicely….

**Corrective actions** .. prove all mechanical seal repairs using a pressure test with oil rather than hydrotesting. This required an upgrade of our test equipment.

**Follow up actions after further reflection** (always a good idea) ..reviewed all seal failures that occurred on start up. Found that >90% of all failures which occurred on start-up were on light products. Water, chemicals plus medium and heavier oils (jet fuel and heavier), which comprise 62% of the pump seal repairs accounted for less then 10% of the failures. Although only 11% of all failures were on start-up, this caused another investigation and we found the training on seal installation needed to be improved. This subsequent evaluation led us to reinstitute water testing on all except light oil pumps. Hydrotesting is easier, cheaper, faster and safer than water testing. Seal failures could be seen to be declining and failures due to this issue dropped to zero in the subsequent months. (just for your information, this refinery had over 10,000 pumps and performed 40 seal repairs per week)

**UNIQUENESS OF THE TECHNIQUE**

It Is distinguished from the Ishakawa diagram. In the 5 Whys you are expected to come up with *fact-based reasons*. In a fishbone (Ishakawa) diagram you use brainstorming to come up with possible areas to investigate so you could find the facts. The fishbone is a *group of opinions*. The 5 whys is a *cascade of cause and effect relationships* that are based on evidence as well as theory.

**The questions …..** The question to answer for the 5 whys is “what is the root cause?” the question to answer in the fishbone is “where is a likely place that I can start looking to find the root cause?”

**The setting**.

The 5 Whys can be executed in a group or by an individual. Whomever is involved needs to have sound cause-effect knowledge for this specific problem. If they are not familiar with the intimate process details, they cannot be helpful except for facilitating the session, if that is necessary.

As for Fishbone brainstorming, seldom is it done by an individual. The people involved should have process knowledge but this rule is frequently minimized. The input of everyone is equated even if they have inferior or even no process knowledge. Fishbone analysis is grossly overused in problem specification and understanding and should not be used until you have exhausted the use of your data. Too often fishbone analysis is used not because it should be used…but because it can be used. This is a gross and egregious logical error that sucks up a great amount of time and leads nowhere.

**SOME CONCEPTS**

**Problems……**In problem solving methodologies it is important to separate three types of “concerns”. There are problems, potential problems and there are also decisions. They are explained by the attached PowerPoint. Problems have three characteristics: First, they are a concern; Second they occur in the present; Finally to fix them, you need to find and remove their root cause.

**Root cause**…. actionable items, that when they are removed, reasonable people would agree, that they would also remove the undesirable symptoms that created the concern.

**Focusing questions ….** getting off to a good start

1. What is the objective?
2. How do you measure success? Or what does success look like?

**Getting from opinions to facts** ….. use the two management follow-up questions.

1. How do you know?
2. What data do you have to support that?

**Three typical applications** …

1. A point problem where you are trying to find the root cause to a specific problem. There is almost always only one path and one root cause. Proceed from one effect to its cause. Do not go further until the cause if found and verified.
2. A system problem. Often there is more than one cause that needs to be addressed. Do “Effect-cause” analysis and document each level. DO NOT go beyond any level until the cause is found. We are not brainstorming. Remember we are not dealing with opinions, we are looking for facts, verifiable reasons. If you suspect opinions, ferret out with the 2 management follow-up questions.
3. A serious concern that is really a decision but not technically a problem. These almost always end up where the “root cause” is an issue with the standard (prespecification of both the results and the methods used) or an execution of the standard

This a list of talking points, although it is incomplete in many ways, I am equally sure it can prove helpful. You will able to expand on them only when you start using the 5 whys properly and then rigorously and introspectively reflect on how well you are doing. Dr Deming says:

“It is not enough to do your best; you must know what to do, and then do your best.“

W. Edwards Deming

Be well,

Lonnie

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