ROOT CAUSE FAILURE ANALYSIS

**Arrelic INSIGHTS**

INTRODUCTION

Some basic principles about root cause analysis. The first, for the most part, things happen for a reason, and we call those reasons causes. The second, is that not all causes are equally important. Some are much more important than others. And finally, if we can understand root causes and control them then we can get the results that we like out of our process. One of the commonly used root cause analysis tools, is what we call the two-year-old approach. You know, if you've ever had the pleasure of having a two-year-old in your life, you know they ask, "Why?" a lot. So, the point of the exercises is to ask why at least five times. Here's an example that sometimes is used. Hey, there's oil on the floor. The first immediate reaction is, well, let's clean it up so we have a clean workplace. But, it's better to ask, why is there oil on the floor? Well, there' oil on the floor because the machine overhead is leaking. Oh, why is the machine overhead leaky? Well, the machine overhead is leaking because it's got a bad gasket. Why does it have a bad gasket? Because we have a policy and we got such a good deal on a large batch of these low quality gaskets

There's another tool, that similar in spirit, to the Five-Why approach and that sometimes is called Variation Breakdown or it's sometimes called the Thought Map. All it does is, like Five Whys, keeps asking what influences this or why does this happen. But it does not make the assumption that it's always just one cause. So one question is, what might affect the amount of time that it takes me to get to work in the morning? Well, off-hand I can think of some different things we might choose different routes. For example, we might have the scenic route, or the freeway route, or we might prefer the route past the coffee shop. Certainly the level of traffic on the road is going to make a difference. How early we leave is going to make a difference and we might choose different modes of transportation. That'll affect how long it takes me to get to work

Then, for some of these, one level is all you need to go to. For example, we may only have three routes to choose from and so this tree ends right here but for the amount of traffic on the road, well, that might be caused by the number of accidents, by the road conditions, by the amount of road work that's going on, or by the time of day. If we can avoid rush hour, so much the better. Then you ask, what affects road conditions and the road conditions are mostly affected. We think by the weather, and it can be snowy, or it can be rainier, it can be clear. So, basically you go through and make this little chart that lets the causes flow down, and the lowest level items on the chart are. Then what you would consider your root causes. Now, in some cases you're going to come up against one of these where you say we don't know, and that's a good place to start an investigation.

5 Why Analysis

Problem Statement
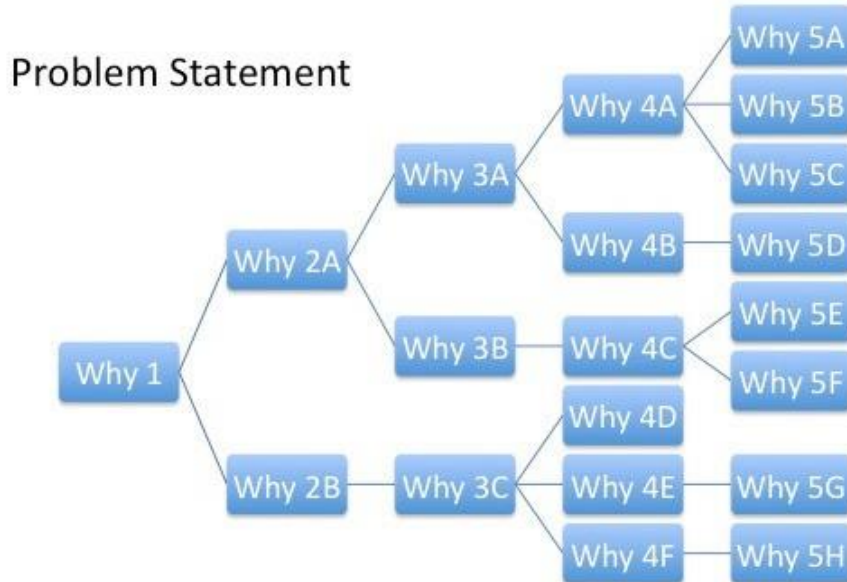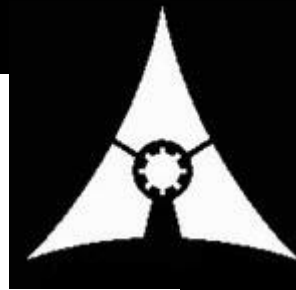
©2010 Paulsen & Paulsen, LLC

Another tool that's very useful is the Pareto Chart. This nested Pareto Chart is our patented invention, and it's very handy for finding where, and when, and by whom, defects were made. That's a really good simple root cause analysis tool. For a very thorough root cause analysis, we use a trio of tools in concert and that starts with the process map. Of course, in the process map one of the important things that you're doing is looking at your knob variables. The input variables that make things what they are and cataloging all of those. Then we next move to the cause-and-effect matrix because earlier we said not all variables were important, not all causes are equally important, and in the cause-and-effect matrix, we prioritize and bring to the surface those variables that are likely to be most influential. Finally, we go to the FMEA and drill down to take a good look at the variables that the cause-and-effect matrix indicated were likely to be most important, and that's a very nice root cause analysis.

For a root cause analysis tool with a little bit more mathematical rigor, we can turn to a process behavior chart or as some people call them control charts. All that does is put your data in the order that they happened. It provides a center line, which is the average or sometimes the median, and it provides some limits here that define what constitutes an unusual event. If we get something like this, where we have got a point out of limit or if I've got shifts in my process, the rules of the process behavior chart will detect those. Then we have a very good basis for going and asking, what was going on right here.

Summary

To summarize, in the 5-Why analysis, the approach would always be What happened that caused this to happen. This other thing isn't very interesting because statistically it's all the same. We really can't tell one of these points from another, but this one is different. What makes it interesting is it is sort of the ancestor of the root cause analysis tools is what we call data mining, or sometimes exploratory data analysis, and that's just a way of finding the hidden relationships in your data. Now, this may look a little forbidding, but believe me, it's not. It's extremely simple to use.

What we have down here is some data that we have taken we have kept track of how many pounds of onions we got and as input variables or causes, the temperature, and the water, and the type of soil that we planted in, and whether or not we used to pesticide. What the computer then does is it builds us a model that we can play with and we can slide this back and forth. Here's our average harvest weight right here, 2386, and if we get warmer weather, what happens if it goes up to 2528. If I plant in sandy soil, I get only 240 pounds. So, this gives me a wealth of information about the relationship between the root causes and the outcomes that we get. That should give you some good ideas about root cause analysis tools and how to use them.

"We'll help manufacturing industries to improve plant productivity, reliability and minimize total production cost by eliminating machine downtime, lightening management decisions by analyzing the machine data with right mind and expertise; for a worry free operation."

If you have any questions or would like further information on our product and services or if you would like to discuss a potential initiative, you feel we could help with, please don't hesitate to contact us.

ARRELIC RELIABILITY PVT LTD

KIIT-TBI, Campus - 11,
KIIT University, Patia,
Bhubaneswar, Odisha,
India - 751024

📞 91 674 657 0007
✉ info@arrelic.com
🌐 www.arrelic.com

WE ARE READY TO BE YOUR BUSINESS SOLUTIONS

🐦 @Arrelic_   f /Arrelic   in /company/Arrelic

About Arrelic

Arrelic is a fast-growing deep-tech firm aiming to bring the next level of IoT based sensor technology to transform the mode of manufacturing operation and maintenance practice of various industries with extensive expertise in Reliability Engineering, Predictive Maintenance, Industrial Internet of Things (IIoT) Sensors, Machine Learning and Artificial Intelligence. We provide a single ecosystem for catering all industry needs from Consulting to IoT and Analytics as well as providing Training and Development courses for different stakeholders. We aim to help manufacturing industries to improve their overall plant productivity, reliability and minimize total production cost by 25-30% by eliminating machine downtime, lightening management decisions by analysing the machine data with right mind and expertise; for a worry free operation.

Disclaimer