Why People Don't Develop Effective Corrective Actions

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Abstract

Finding the root causes of problems is only half the story. Before a problem is fixed, someone must develop effective corrective actions. Why, even when the root causes are staring them in the face, do so many people still fail to develop effective corrective actions?

This paper will draw on the observations of the authors' experience with incident investigators and investigative teams at power plants and across a wide variety of industries and cover the three common reasons why people ***DON'T*** develop effective corrective actions:

1. People start fixing problems before finding the problem's root causes.
2. Management has no real commitment to fix problems.
3. People developing corrective actions can't see "Outside the Box".

The authors will then suggest ideas to help investigators develop effective corrective actions.

Finally, the authors discuss the lessons they learned when implementing one of the ideas for improving corrective actions.

Why Don't We Fix Problems?

In the course of helping many utilities and other companies implement improved processes to solve problems by fixing root causes, the authors have observed that ***ALL*** major accidents are preceded by warnings. These warnings come in the form of incidents. These incidents are telling the plant's owners where real problems are hiding. They are giving the plant's owners the chance to find and fix the problems ***BEFORE*** a major accident can occur.

With the knowledge that minor incidents are subtly warning their owners (providing clues that we can use to avoid major accidents), one would think that the plant's owners would be extremely interested in learning from incidents and preventing the incident's recurrence by implementing effective corrective actions.

But having a problem happen over and over again can only mean one thing - the problem ***IS NOT*** being effectively fixed. Sooner or later the lack of effective corrective action to incidents will allow a major accident to occur.

If examples are needed to prove this point, they are recent, plentiful, international,

and from almost every industry. Here are samples of some infamous ones:

- Three Mile Island
- Bhopal
- Challenger
- Ford Boiler Explosion
- Flixborough Chemical Explosion
- Tosco Coker Fire
- Hatfield, UK, Rail Crash
- Concorde Crash
- Davis-Besse Reactor Head Vessel Hole
- Phillips Pasadena Explosion

With all the advanced knowledge and technology one might wonder:

Why are there so many examples of accidents (dozens of which happen around the world every month) that indicate that we are not effectively learning from our experience?

Why aren't we developing effective corrective actions to save lives and improve productivity, product quality, and maintenance?

Before we answer these questions let us first define the terms we are using:

Incident: An event, accident, plant upset, or other deviation from desirable operation that caused some undesirable outcome (or could have caused an undesirable outcome) that one would like to prevent in the future.

Corrective Action: The action taken to prevent recurrence of an incident. (As opposed to immediate action taken to fix damage to a system or equipment that occurred during an incident.)

Three Reasons For Poor Corrective Action

After helping hundreds of facilities improve their root cause analysis and after having seen several facilities FAIL to improve performance, the authors found there are three general reasons that companies don't develop effective corrective actions:

1. People start fixing problems before finding the problem's root causes.
2. Management has no real commitment to fix problems.
3. People developing corrective actions can't see "Outside the Box".

These three general reasons for poor corrective action can occur individually or in any combination. Let's look at the causes for and impact of each and what one can do to prevent them.

Jumping to Solutions

When confronted with a problem, one instinctive reaction is to try to fix it. This "jumping to solutions" without adequate analysis of the problem is the first reason that people develop ineffective corrective actions.

Why do people jump directly to solutions without analysis?

One answer is that they don't systematically investigate the problem because they don't have a good understanding of the causes of the problem. As Albert Einstein said,

"It's impossible to solve significant problems using the same level of knowledge that created them."

So one's root cause system must have embedded knowledge to help find causes beyond "the level of knowledge that created them."

Another reason is that people don't know how to systematically investigate the root causes of a problem. Therefore, developing corrective actions may seem like the next logical step once the basic symptoms of the incident have been identified. This total lack of understanding of systematic problem solving can sometimes produce almost humorous results. One of the authors' favorite corrective actions was discovered during a review of some investigation reports to see if the client needed to improve their root cause analysis. The corrective action recommended in one report was:

"Make sure this never happens again."

The intent was good but the details, based on a thorough understanding of the root causes, were missing.

Another reason is that they are accustomed to using cause and effect analysis to determine root causes. If they have already seen the effect before then they think they know the cause (same problem as last time). Therefore, they use the same corrective action for problems that may have different causes.

Another reason that people have shared with the authors is that they thought the problem was too simple to require formal analysis. Therefore, they jumped straight into the development of "simple" corrective actions.

Still another reason to jump straight to corrective actions is that they were looking for an excuse to implement a particular corrective action. The incident, which seems to be related to a project that they needed approval to start, was a great way to increase the project's priority. Why analyze the problem when you already have the answer that you want!

Finally, some people simply use one of three standard corrective actions that they think fix all human performance problems. They know that management will approve these corrective actions so why dig further (and potentially stick out their neck by pointing out a management problem) when these three standard corrective actions are so easy. What are the three standard corrective actions?

1. **Discipline**. This starts by warning the individual involved to "be more careful next time." It escalates to the progressive discipline system. It ends with dismissal if the offending employee doesn't "straighten up and fly right!"
2. **Training**. This can even be a special form of discipline if you make your training bad enough. Have you ever seen somebody threatened with being sent back to training?
3. **Procedures**. If you don't have a procedure, write one. If you already have a procedure, make it longer.

There are probably even more reasons that people start fixing problems before finding the problem's root causes. However, no matter what the reason, inadequate root cause analysis can cause the corrective actions to be ineffective.

Jumping to solutions is the easiest problem to fix of the three reasons for ineffective corrective actions. Just adopt a systematic process for analyzing the root

causes of problems *BEFORE* developing corrective actions.

Of course, the authors recommend reading the *TapRooT® Book*[1] for more information on systematic root cause analysis. (The authors developed the system.)

Next, train problem solvers to use the process.

Finally demand that the process be used. The best way to see that the process is used is by having senior management request its use and by having them be involved in reviewing the results of its use.

Motivation

Definition of Insanity:
Doing things the same way
and expecting a different result.

The authors have seen management teams that really don't want to change the way the plant is run. Management just wants the problems to stop. Does this seem similar to the definition above?

There can be several excuses for this type of behavior. They include:

- We don't have the budget.
- The union won't let us.
- The regulator won't let us.
- The lawyers won't let us.
- The ROI isn't enough.
- You can't fix all the problems.
- We've always done it this way.
- It can't be done any other way.

This type of leadership quickly teaches employees (eager to please their bosses) that the fix to pick is the quickest and easiest one that causes the least disruption to the plant's normal routine. Again, these corrective actions often look like the three standard corrective actions described in the previous section.

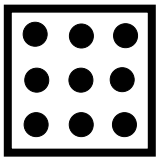
Unfortunately, warnings and training are some of the weakest corrective actions that one can develop.

What are the strongest corrective actions? Julian Christiansen[2] suggested the following hierarchy (from strongest to weakest):

1. **Design** (using the principles of human engineering)
2. **Remove the Human** (sometimes this is not cost effective and may not be the safest route since equipment can fail)
3. **Guard** (barriers will be circumvented if they interfere with job performance)
4. **Warn** (familiarity breeds contempt or at least not noticing)
5. **Train** (although adequate training is imperative, there is a tendency to rely on people's skills and good will to compensate for an accident prone work situation)

This lack of desire to change by management (Management laziness? Or are they just fooling themselves?) may be the hardest problem of the three to correct. Change resistive managers seldom "suddenly wake up" to realize that they must lead change. They may if the organization experiences a major accident, a major public relations or regulatory disaster, or a financial meltdown. However, the author's observation has been that it frequently requires new management. And new managers don't necessarily mean change for the better.

Can't See "Outside the Box"



"The Box"

What is the least number of straight lines - without lifting your pen - to connect all the dots in the box above?

Five? Four? Three? One?

The authors' favorite answer is one thick line that connects all the dots! But one of the people in the authors' office objected. He claimed, "That's not fair!"

He said that in mathematics lines don't have width. One of the authors replied that if they didn't have width, one couldn't see them. And besides, the dots have width, why not the lines?

The point of this example is to demonstrate that the box and the way one thinks about the problem can limit one's answers.

Many people who perform adequate root cause analysis are similarly limited in developing effective corrective actions because they can't see beyond their current practices (which often were the reason for the incident). Their thinking is limited by their "box."

Their limited thinking results in ineffective corrective actions. These corrective actions limited by their "box" are similar to the three standard corrective actions mentioned before.

Ideas for Seeing Outside the Box

So what can one do to get people to think outside the box? There have been articles and books published on creative thinking. There are web sites and courses to help one become more creative. But the authors wanted a more systematic way to ensure adequate corrective actions.

Therefore in 1995/1996 System Improvements developed the Corrective Action Helper® module of the patent pending TapRooT® Software. This module links the root causes (or any other level) in the TapRooT® Root Cause Tree®[1] to suggestions for developing effective corrective actions both for the specific root causes that were found and for any generic causes of that specific root causes (generic causes are the systemic cause that allows the specific root cause to exist).

These suggestions, just a mouse click away, help people see alternatives to the three standard corrective actions. They also help people developing corrective actions check to see that they have considered all the implications of the root cause and its corrective actions.

The Corrective Action Helper® module also suggests reference material to provide the user with background material to learn more about the problem they are trying to correct.

The theory behind development of the Corrective Action Helper® module was that experts in root cause analysis and corrective actions, unbiased by "The Box," could develop ideas for solving the root causes of problems and that they could write these ideas in a generic enough format so that they could be applied to any industry.

Mark Paradies, one of the authors of this paper, took the first pass at writing the corrective actions for every level of cause on the TapRooT® Root Cause Tree®. He quickly found that there were five standard items to be considered in developing any corrective action. These were:

1. Verifying that the root cause was correct BEFORE developing the corrective action.
2. Developing corrective action for the identified specific root cause of a particular incident.
3. If applicable, developing corrective action for any generic causes (systemic causes) of the identified specific root cause.
4. Developing supporting corrective actions (for example, training operators about a new procedure) required to fully implement any changes resulting for the two previous corrective action development initiative (steps 2 & 3).
5. Providing references, if needed and if available, for the user to learn more about the topic to help them adapt the ideas to their specific industry or application.

He based the corrective actions on human performance theory and research and on equipment reliability practices. His development efforts took about a year.

While he developed this initial set of recommendations, he decided that additional viewpoints were needed to avoid his own "box". Therefore, he proposed extensive reviews by people in a wide variety of industries with a wide diversity of experience to help ensure a broad perspective.

The first part of this review was an internal review of all 176 Corrective Action Helper® module suggestion categories by three in-house root cause analysis experts. After their additions and suggestions were considered, the complete package of corrective actions was broken into sections by topic (for example, one topic was Human Engineering) and reviewed by over 100 volunteer lead TapRooT® users and subject matter experts.

Twenty-eight of the reviewers had extensive comments. These suggestions and additions were reviewed and, where appropriate, incorporated into the software.

Finally, because of the extensive documentation and the belief that people would be more likely to use the tool if it was readily available, the Corrective Action Helper® module was added to the TapRooT® Software program so that a user could, once they identified a cause, click on an icon and be:

1. Challenged to verify the cause selected.
2. Provided with suggestions to solve the specific cause of the problem.
3. Provided with suggestions to solve larger programmatic (generic) causes of the specific problem (and thereby be challenged to consider programmatic causes).
4. Provided with reference suggestions to learn more about the problem if the individual developing the corrective action believes they need additional knowledge to solve the problem.

Lessons Learned From the Use of the Corrective Action Module

The Corrective Action Helper® module has been used now for almost five years. In this time the authors have been able to observe teams that did and did not use the technique when developing corrective actions. Although no formal evaluation or detailed notes have been kept, these informal observations have led the authors to some general observations:

1. Not all teams use the Corrective Action Helper® module even when it is a click away.
2. Teams that verify their causes have occasionally, but not frequently, found that they need to go back to their root cause analysis because the category they have selected does NOT pass the verification stage of the Corrective Action Helper® module.
3. Occasionally teams quickly review the module and still develop corrective actions along the lines of the three standard corrective actions mentioned previously.
4. Most teams that use the module develop more thorough corrective actions that include necessary additional steps to ensure complete implementation of the corrective actions.
5. The best improvements (as judged by the authors) were in developing of corrective actions for Management System problems and Human Engineering problems.
6. Teams that use the Corrective Action Helper® module usually have more corrective actions that are more specific than teams that don't use the module.

Teams that don't use the module have no advantage over teams that performed investigations before the module existed. Therefore, one of the objectives for updating the TapRooT® Software was to make the Corrective Action Helper® module more available (no clicks required to access the information while developing corrective actions).

The teams that used Corrective Action Helper® module but didn't seem to benefit from it proved the old saying:

"You can lead a horse to water but you can't make him drink."

This has led to additional emphasis on the development of corrective actions in the initial training for root cause analysis. The jury is still out as to whether this emphasis will overcome a person's reluctance to try new corrective actions.

As for the teams that used the Corrective Action Helper® module and appeared to benefit from it, all observations appear to be positive.

Teams that used it in general report that it was a major help in planning corrective actions and that they felt confident that their corrective actions would be effecttive. Supervisors of teams who used the technique also commented that the teams had produced much more rigorous, detailed, and specific corrective actions than those they had reviewed in the past. This frequently became a reason for requiring use of the software for investigations.

However, no formal evaluation of the corrective actions' effectiveness, as measured by post incident corrective action effectiveness in preventing the events recurrence, has been conducted.

This would be a good research topic if an industrial volunteer could be identified.

Conclusion

Learning from experience is an extremely important part of any plan to improve safety, operations, maintenance, or quality. However, people frequently do NOT implement effective corrective actions and therefore do NOT get the benefits that are possible from a systematic review of past problems.

The three main causes for this failure to develop effective corrective actions,

1. People start fixing problems before finding the problem's root causes.
2. Management has no real commitment to fix problems.
3. People developing corrective actions can't see "Outside the Box".

can largely be solved if management has the will to change the way business is being done.

Solving the problems requires,

1. Disciplined, systematic root cause analysis.
2. Management commitment and involvement.
3. Tools to help people see "Outside the Box".

Dramatic, sustained performance improvement has been shown in several cases studies (see www.taproot.com for actual Success Story case studies). In fact, with the right approach and tools and with management that wants to change, the authors have never seen a failure to improve performance.

In all failures to improve performance either the approach was flawed (poor root cause analysis or poor corrective actions) or the will was weak (no commitment to improve resulted in failure to implement corrective actions or failure to use the tools that were available).

References

1. Mark Paradies & Linda Unger, ***TapRooT® - The System for Root Cause Analysis, Problem Investigation, and Proactive Improvement***, System Improvements, Inc., Knoxville, Tennessee, 2000.

2. Julian Christiansen quoted in Alan Swain's course: "Training Course on the Prevention of Significant Nuclear Events", US Department of Energy, June 25-27, 1986.