

Intuitive Investigative Analysis

An alternative to Root Cause Analysis

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*“Keep looking below surface appearances.
Don’t shrink from doing so (just) because you might not like what you find”*
Colin Powell, Secretary of State

In contrast to incidents with a high consequence factor, which the application of a formal robust and resource intensive analysis is warranted, there is a population of incidents which the consequence is moderate and where a less intense investigation technique may be more suited. That technique is the “Intuitive Investigative Analysis” (IIA), which admittedly is less robust than a number of proprietary Root Cause Systems yet it can yield effective results with a reasonable degree of confidence economically.

An Intuitive Investigations you say. Now hold on a minute, I thought this Root Cause stuff was science.

It is generally believed that in order to have confidence in the outcome of an investigation one must employ a scientific method. Perhaps that is an over statement, but many would picture an extensive Root Cause, in all its grandeur, when an event has occurred that you are compelled to identify the cause. In any event if you are in the business of fixing problems you have been probably been approached by any number of performance improvement experts that along with their personalized and often proprietary Root Cause analysis system will show you the way. This means, the lengthy investigations involving a team of players, investigation charters, independent oversight, event charting, barrier analysis, failure mode analysis, and so on and so forth. And I would agree with those experts, that approach must be employed for the investigation of those infrequent significant events. There is no substitute for a structured, standardized and methodical investigation and analysis system under those circumstances. This is particularly important with scenarios where you have limited knowledge of the process or where the introduction of the investigators’ bias cannot be tolerated. But do you realistically have all the resources necessary to perform all the Root Causes Analysis you want? Probably not, but it wouldn’t be wise to simply choose not to investigate incidents arbitrarily and forego the necessary corrective actions.

The dilemma is plain to see, everyone can see the benefit of cause analysis, but investing resources to achieve a thorough investigation for all events is not practical. Depending on your organizations’ threshold for identifying incidents you could have hundreds or even thousands of documented conditions. We will discuss this in more detail later but the majority of these events will likely be defined as non-consequential or marginal therefore an investigation of any sort may not be recommended. In these cases you would simply document the condition or simply fix the condition and document it in your trending program. The population, of these types of events, has been shown to represent upwards to 80% of documented conditions, again dependent on your threshold. This paper will not discuss trending any further but I will simply leave you with this thought “if a condition is worth documenting it is worth trending” Trending programs can be designed to look at precursor behaviors or leading indicators, both of which have proven to be an excellent source of predicting future performance. A thoughtfully designed trending program along with an effective management process can identify potential process weaknesses thus providing you with an opportunity to shore up defenses preventing more significant events.

So what about the remaining 20% of conditions? The majority of those conditions will likely not require a Root Cause analysis either, again depending on your threshold for identifying conditions and how you categorize those conditions. Experience suggests only about 5% of the conditions reported warrant a formal Root Cause. I would further suggest that, of those, 1% of the events would be significant enough that an independent external investigation team would be required. The benefits of the external team are three fold: 1) Independence 2) Investigation Proficiency 3) Credibility. It is extremely difficult for an organization to exercise independence and demonstrate investigative rigor for highly significant events. There are specialists who can help you with these events.

That leaves approximately 15% of the conditions that require neither an internal or external Root

Cause analysis yet the condition warrants something more than just simply fixing the condition or documenting and trending the condition. But it may not be practical to perform a Root Cause analysis on these 15%, so what sort of analysis can you perform to achieve a relatively rapid and effective understanding of the issue much less devise a corrective action plan in response. What about applying the “intuitive investigative analysis” approach. There may be reluctance to accept the idea that a reasonable understanding of an event can be achieved without the aid of a formal Root Cause analysis, yet important business and technical decisions are made everyday without the aid of a formal Root Cause. More importantly these decisions have proven to be efficient and effective and still we doubt our intuitive ability to discern. Again I am not speaking of significant events with serious consequences. But what of moderate consequence events, can we afford to be less robust? The answer is yes, because in the real world you can’t afford to treat all incidents like significant incidents. Given limited resources the “intuitive investigative analysis” maybe the answer for not only less significant events but also for some of the conditions you simply fixed without further investigations because of limited resources. A pyramid distribution illustration is provided at the end of this paper and it shows a break down of incidents by investigation type and target percentages along with some supporting information.

When you get down to the basics all we are talking about is fixing broke things. They may be people, processes or things but lets not make this harder than it has to be. But how? General Colin Powell has a process that addresses analysis and making a decision. It goes as follows:

Part I - “Use the formula $P= 40$ to 70 , in which P stands for probability of success and the numbers indicate the percentage of information required”

Part II – “Once the information is the 40-70 range go with your gut”

It is interesting that General Powell says go with your gut once you get into the 40-70 range. The performance improvement science and philosophy of Poka-Yoke or “error proofing” says something very similar. One of it’s eight principles states “seek out the root cause” Yet another principle is “fix it now once you have a 60% confidence in the understanding of the problem and resolution”. Sounds a lot like avoid “analysis paralysis” and it complements General Powell’s theory as well.

It is clear in Secretary Powell’s’ statement that he acknowledges there are conflicting priorities, limited resources, limited information, differing levels of significance that challenge any analysis and resolution but nevertheless the decision must be made. Keep in mind Colin Powell does not view this as reckless or “swag” and never should you. In fact it is the explanation and logic for which we all make important decisions and which I have adopted and applied to the Intuitive Investigative Analysis method. In order be successful on you job, you must intuitively know what the issues are, what is causing them, what corrective actions need to be implemented, and when to engage in course corrections when the results are less than expected. Responsible individuals are expected to do all of this and more, with limited information and with no guarantee of success, yet they do succeed. Colin Powell was conveying the balance of art and science in the decision making process which I have simply describe as “intuitive” There is risk with this argument and Colin Powell recognized it as well, not every one has the qualities to understand and sense an issue, much less make recommendations to correct it. The take away is, you can perform an intuitive investigation with a reasonably high success rate however, success will be dependent on the abilities of the investigator and organization. A few of the key characteristics an investigator will need are listed below. A detailed list of Organizational attributes can be found in the EMRI™.

- Questioning Attitude
- Observant and Good listening skills
- Logical and Methodical
- Demonstrates a healthy degree of autonomy and independence
- Understanding of Process and Human error mechanisms

Heresy you say. Well, Secretary Powell went on had more controversial things to say, insights on how individuals and industries process information and solve problems that I believe is relevant to our profession.

“ Don’t be buffaloeed by the experts and elites. Experts often possess more data than judgment. Small companies and start-ups don’t have the time for analytical detachment experts. They don’t have the money for subsidize lofty elites, either”.

Doing unnecessary Root Cause investigations is an example where an enterprise fails to use a more direct and intuitive approach to fix problems. Sometimes investigations get so out of hand they take on a life of their own and that resembles a breathing bottomless pit. They can become inflated committees requiring excessive resources performing overly academic investigations to save us from the relatively non-consequential events rather than taking a more rapid and intuitive approach, conserving ones resources for the more deserving investigations. This problem can be further exasperated by continuously feeding the investigation side of the equation while being less than effective at implementing corrective action plans which then results in the same problem repeating. The inability to manage or align the consequence of the event with a reasonable investigation and corrective action implementation effort can result in analysis paralysis. In the end “too little gets fixed too late” You are frustrated, the boss is frustrated and the staff is frustrated.

So how do we do this right? A good starting point is to acknowledge that not all events are created equal. However every event and potential event has two components, which are:

the probability the event will repeat which is often based on the number of opportunities for the event
and the consequence of the event

With this in mind Table 1 has been constructed. For example a “routine” activity that carries a “ high consequence” if not performed error free has been identified on the chart with a color coded as RED. The RED designation is reserved for significant events that require a Root Cause analysis. For the sake of this discussion it will be assumed there are some activities that are so frequently performed and the consequences of failure are so severe there must be a near absolute assurance of success every time that activity is performed. These systems/activities must be addressed with a Fail Safe Design (FSD) and have not been included in Table I . Two examples of activities that require FSD come to mind. One is commercial airline flight and the other is commercial nuclear power plant operation. One would agree the planes must not fall from the sky and nuclear power plants must run as intended. In both cases the fundamental and common attribute to safe performance is basic engineering design, without it all the good intentions on the part of the pilots and plant operators would be in vain. Airplanes stay in the sky in spite of human error and the mission as professional aviation engineers was to improve upon that challenge. What that means to all of us, regardless of industry, is we should be prudent and identifies highly probable and extremely consequential events. The systems related to these potential events should be analyzed in the proactive mode using system analysis techniques followed up with design changes to the system to prevent the initial event. This introduction to “proactive analysis” is mentioned because it closely resembles an investigation and you should be factoring in your analysis portfolio when designing a Performance Improvement Program.

Table I

ProbabilityHighModerateLowNon-
consequentialroutineRCARCAIIAFIXFrequentRCAIIAFIXFIXperiodicRCAIIAFIXR&TinfrequentRCAIIA
R&TR&T

Now let's turn to a more normal range of incidents, the prioritization of those incidents, and the subsequent assigned investigation level. Table I is a matrix table that evaluates the consequence of an event and the probability for that event to occur. The probability values go from rare to routine while the consequence values go from non-consequential to extreme. The table is also segregated by color code, which goes from a cool light gray in the far bottom right column to a hot red in the upper left-hand corner. The colors and position on the chart are cross-referenced to investigation levels. For example a minor incident with a low probability of repeating because the associated evolution is rarely performed would only warrant an acknowledgement, document in your condition report process and trend at a later date if applicable. On the other hand a near sentinel event for a routine procedure should be investigated using either an in-house or independent Root Cause analysis. You should take note that incidents with only moderate consequences that are associated with activities that are only performed periodically are targeted for Intuitive Investigative Analysis.

The attached flow chart sums up the key steps in the IIA. The process resembles the skeleton process of numerous investigation processes and utilizes some of the same investigation tools. But there are some distinct differences. For example IIA acknowledges that for errors where the related activities and process is well known it may be possible to accelerate and streamline the steps normally associated with the construction of the chronological event chart and with the identification of the contributing factors as well. IIA also stresses using a Fact Finding Check List tool that is to be used early in the investigation along with referencing and integrating the EMRI™ later in the process to first broaden your cause options but ultimately is used to target the true cause and validate the process. These aspects of the process are often missed by individuals with limited Root Cause training or experience and in particular in organizations that have attempted to develop and implement a homegrown investigation process. The results are typical, underlying and related causes are not identified and subsequent corrective action plans are ineffective. At a recent visit to an East Coast nuclear facility I found that they had a relatively mature investigation process, which they referred to as an "Immediate Investigation", and they did use a Fact Finding Check List. However, they did not utilize anything like the EMRI™ to broaden their cause possibilities thus their investigations and causes were a bit shallow. Almost immediately I was able to point out a Nuclear Industry tool created by INPO called the Performance Improvement Model, which has similarities to the EMRI™. The utility adopted and integrated the INPO model into their investigation process on the spot and obtained good results for their efforts. Lastly, the IIA process will help you develop more targeted corrective actions where you can be assured they are aligned with both the incident "problem statement" and true causes, and that these actions will prove to be effective in the future. Once you have been walked through the IIA process it can be performed anytime and you can start preventing events versus reacting to them.

