

The Impact of Human Error on the Bottom Line

By Robert J. Latino

Abstract: Recent legislation and regulatory guidelines in healthcare are forcing those that must comply to add these requirements to their list of priorities. JCAHO's Sentinel Event Policy (LD 5.1) and FMEA Guidelines are two such examples for the purposes of this article. Hospitals today are under increasing scrutiny by the government due to public pressure as a result of IOM "To Err is Human Report" in 1999. Many see these regulations as non-value added activities, which are a burden on an already full plate. However, few understand the purposes of such regulations and how they can be used to relieve the burdens that currently exist. Furthermore, the divide between the caregiver level and the finance level demonstrates that it is difficult to correlate the cost of poor judgment to the bottom line of a company's financials. In this paper, we will explore how this can and has been done in other industries for decades.

The GAP

We all know this term as it is often overly used, but that is because it makes a simple statement. For our reference purposes, we are using the "GAP" analogy to relate it to Root Cause Analysis (RCA), which is a vital task in the JCAHO Sentinel Event Policy.

The GAP is simply a graphical expression of the difference between where we are, as opposed to where we either should be, or can be. In manufacturing it may be the difference between actual and projected production. In Finance it may be the difference between actual and projected profits. In Customer Service, it may be the difference between actual and desired customer service levels. In Healthcare it may be the difference between actual and projected claims. As you can see, it can be the difference between an actual and desired state of anything.

A simple GAP analysis may look something like this:

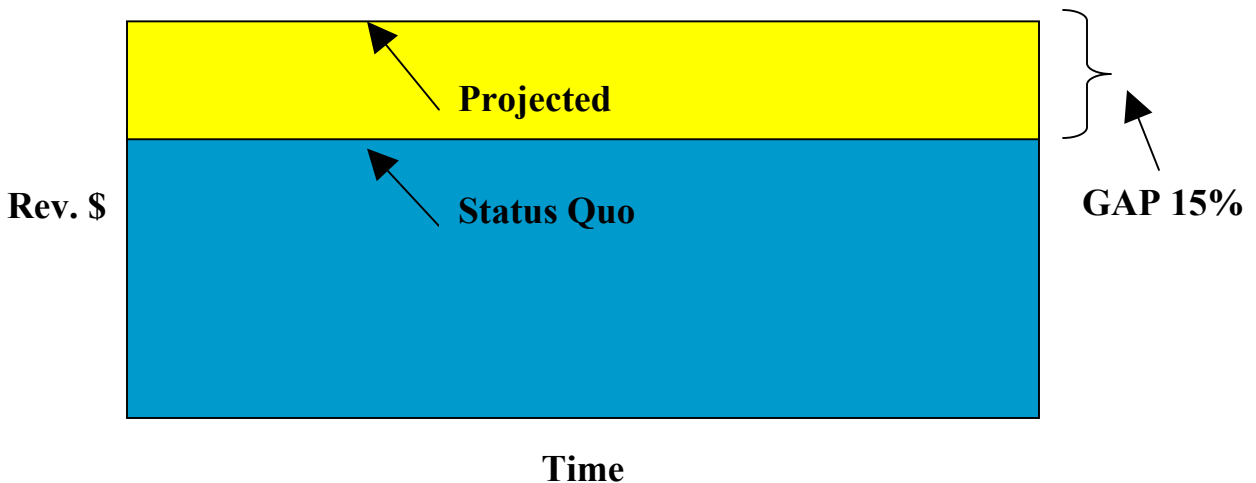


Figure 1 – Sample GAP Analysis Demonstrating Gap in Revenues

This is an important starting point because it ties the Failure Modes and Effects Analyses (FMEA) and the Root Cause Analyses (RCA) to an organization's Key Performance Indicators (KPI), creating a defined focus for the company.

What is the GAP Made Up Of?

Now that we know the difference between where we are and what our desired state is, we must place the microscope on the GAP. What events occur that erode us away from our potential or our desired state? The GAP provides us with the lump sum of how much we are losing in the units we chose to measure by (i.e. – production units, profits, customer satisfaction ratings, claims paid, etc.).

JCAHO requires accredited facilities to conduct RCA's of Reviewable Sentinel Events. Reviewable Sentinel Events are clearly defined in the guidelines. To provide a reader a feel for what a Reviewable Sentinel Event is, here are some JCAHO Sentinel Events numbers based on 2034 Sentinel Event reports:

- Suicides (328; 16.1%)
- Operative or postoperative complications (252; 12.4%)
- Wrong-site surgery (240; 11.8%)
- Medication errors (234; 11.5%)
- The majority of sentinel events (75%) resulted in a patient death
- Communication breakdowns remain the primary root cause of more than 60% of the sentinel events analyzed by JCAHO

Figure 2 – JCAHO May 7, 2003 Update

However, the GAP is not made up completely of just reviewable Sentinel Events. As a matter of fact, in the big picture, reviewable Sentinel Events may play a small role in the GAP. Why? Depending on how we expressed our GAP in terms of units, chronic types of losses like rework (i.e. – blood redraws in ED), inefficient systems/processes (i.e. - medication order processes) and waste (i.e. – materials, people's time) will likely represent the largest losses to an organization over an extended period of time.

Think about this. We may look at a single blood redraw as costing a few dollars in materials (i.e. – syringe, gauze, etc.) plus salaries associated with the redraw (i.e. – nurse, lab tech, delivery person) plus some additional time in the ED (i.e. – charge time in ED). Let's say a single blood draw equates to \$300. It represents total direct costs to the organization. We may not look at this as a large amount of money. However, if we have 10,000 blood redraws a year, we are now experiencing \$3,000,000 loss per year. These are not necessarily regulated reviewable Sentinel Events, so they fall under the radar as a chronic event that is often viewed as a "cost of doing business". This is another hidden

“chunk” of the GAP that everyone sees everyday, that is not necessarily viewed as a problem.

$$10,000 \text{ Blood Redraws Annually} \times \$300/\text{Blood Redraw} = \$3,000,000 \text{ Undetected Loss}$$

Equation 1 – Sample Demonstration of Events that Widen the GAP

Reviewable Sentinel Events are normally sporadic or acute type of events that will usually have insurance, regulatory and/or legal consequences. While they may be expensive, they are not nearly as expensive as the waste that goes on in our daily operations. The chronic events described above demonstrate how such poor performance is built into our status quo and in many cases, budgeted for. Most chronic type of events are not regulated in any fashion because they typically do not hurt anyone, result in a claim or have regulatory consequences. Therefore, chronic events are our real opportunities as sporadic events will get attention whether we like it or not!

Annual Target Metric

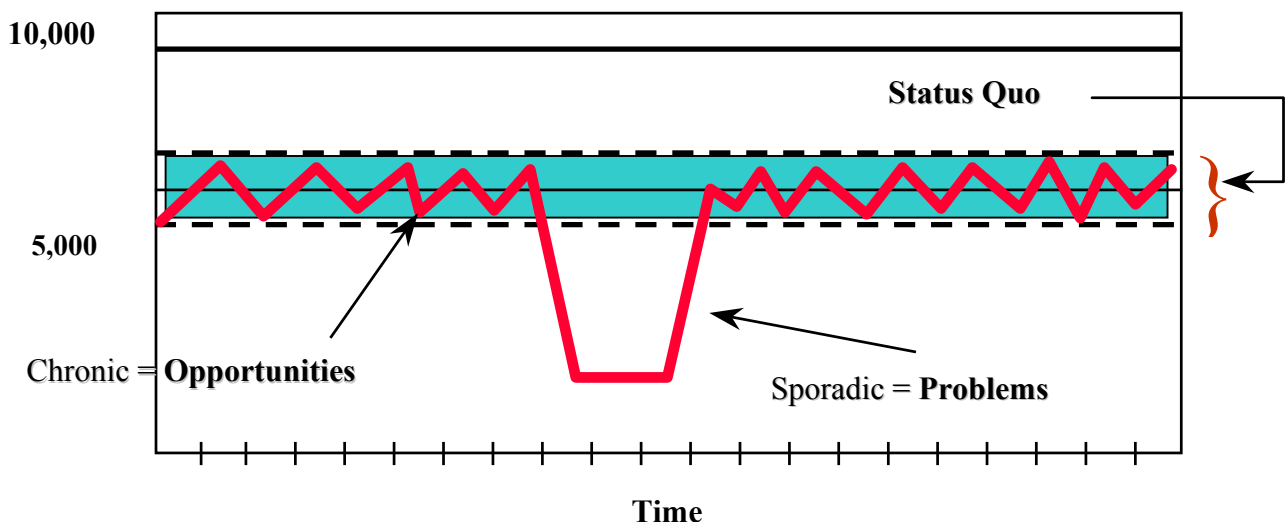


Figure 3 – Chronic Versus Sporadic/Acute Impact on Daily Operations

How Do We Define the Events in the GAP?

JCAHO has issued guidelines for conducting FMEA’s in healthcare. While they offer suggestions on formats, various formats are being employed in practicality. Our purpose is not to dissect the means, but to analyze the ends.

First off, FMEA is a technique that originated in the aerospace industry to be used in the new design of aircraft. It was later modified and adapted to the US military and then subsequently modified and adopted in the US heavy manufacturing industries. FMEA is an ingrained technique in these industries and in many cases required by law (i.e. – OSHA 1910.119 Process Safety Management).

Basic FMEA is a probabilistic technique that analyzes a new process for what MIGHT go wrong. In short, FMEA breaks down a system into its sub-systems and seeks to identify the PROBABILITY of something going wrong and its SEVERITY if it were to fail. Like with any prospective analysis looking into the future, such ratings are subjective and likely to be based on past experience. This is not a flaw, it is reality.

Item	Failure Mode	Effect on Other Items	Effect on Entire System	Severity (S)	Probability (P)	Criticality (C = S x P)
ADE	Wrong Dose	Length of Stay	Malpractice Claims	7	.03	.21

Table 1 – Sample Basic FMEA Spread Sheet Format

Analyses such as FMEA are extremely important to identify critical systems and their potentials for risk exposure to a company. However, they are looking at what MIGHT go wrong, not what HAS gone wrong. Therefore their initial impact on the current bottom-line may be questionable.

Introducing PROACT® Opportunity Analysis (OA)

OA is a technique developed by Reliability Center, Inc. (RCI) when it was an R&D group of a Fortune 500 chemical company back in 1972. This technique could be considered a sister technique to FMEA because while FMEA looks at what MIGHT go wrong, OA looks at what HAS gone wrong. This is a very big difference to consider, because what has gone wrong is impacting our bottom-line today.

When looking at things that HAVE gone wrong, we are looking at historical events. Therefore they are factual – they did indeed occur. This is another important point to consider because while the FMEA is subjective, the OA is based on facts. Because we are looking at things that have gone wrong, we can take into account the parameter of FREQUENCY of occurrence.

In OA, because these events have occurred, we should have a good idea about how they have impacted the organization. When such events occurred, what losses did we experience?

1. Claims Paid
2. Additional Labor \$
3. Additional Materials \$
4. Extended Lengths of Stay
5. Regulatory Fines Paid
6. Increased Insurance Premiums

These are provided to just get an idea of the impacts to the organization that individual events may have. Therefore, our OA spread sheet might look something like this:

Sub System	Event	Mode	Freq	Impact/Occurrence (Preventable=\$2595 Non-Preventable=\$4685)	Total Annual Loss
Doctor Writes Order	ADE	Prescribing Error	130 ¹	\$3640 ²	\$473200
		Transcribing Error	40	\$3640	\$145600

1 -JAMA, 1995 Vol. 274 Jul 05:Systems Analysis of Adverse Drug Events

2- JAMA, 1997 Vol.277 Jan 22/29: The Costs of Adverse Drug Events in Hospitalized Patients (avg. between non-preventable and preventable ADE's)

Table 2 – Sample OA Spread Sheet Format

Whether using FMEA or OA, the Pareto Principle (80/20 Rule) can be applied. We call this identifying our “Significant Few”. We can use these FMEA and OA focusing tools to identify the 20% or less of the events that are causing 80% or more of the risk and/or losses.

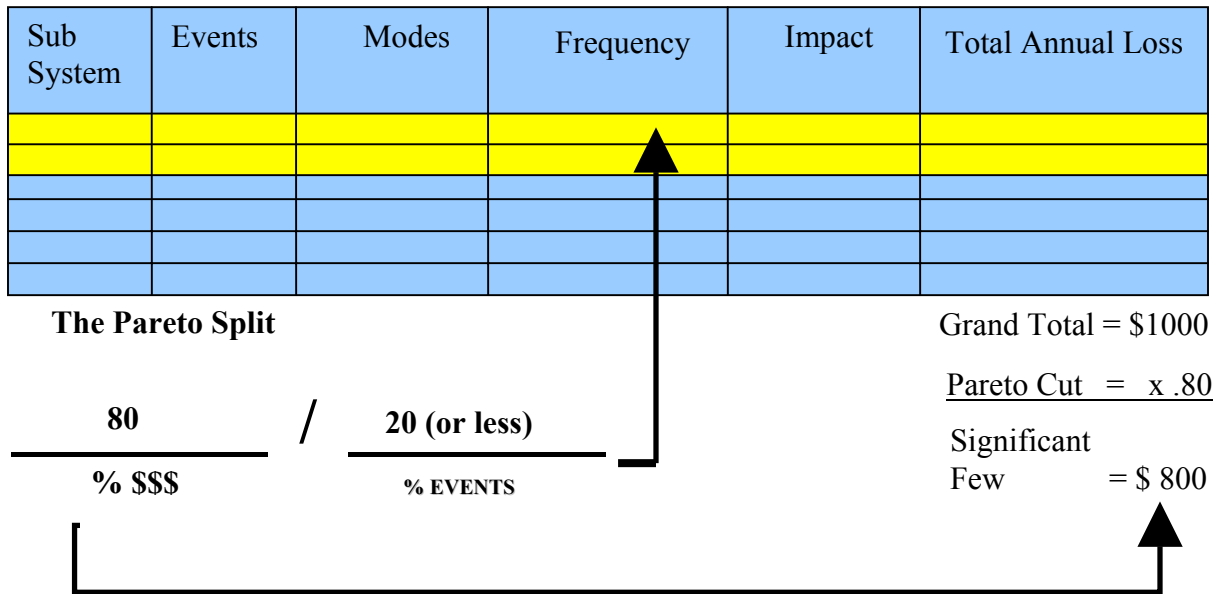


Figure 5 – Sample Pareto Split of an FMEA or an OA – The Significant Few

Now we know the specific events that are eroding away our GAP and preventing us from reaching our desired state. Now what do we do?

The Role of PROACT® RCA in Understanding Why Things Go Wrong?

We must understand that tools like FMEA and OA are used to evaluate systems or processes. RCA is used to drill down on specific events within those systems and processes. Up until this point we have analyzed critical systems and identified their Significant Few problems. Now we have basically identified qualified candidates for RCA. These candidates will include both chronic and sporadic (acute) events, but they will be based on their actual impact to the organization.

At this point we will take the microscope off of the system, and turn the magnification up and look at the critical events within the system.

PROACT® RCA is a brand of Root Cause Analysis. It is a field-proven technique from industry with a 30+ year successful track record. PROACT is an acronym that stands for the basic investigation process used by anyone in an investigative occupation.

It stands for:

PReserving Event Data
Ordering the Analysis Team
Analyzing the Data
Communicating Findings and Recommendations
Tracking for Bottom-Line Results

The purpose of this paper is not to teach the reader how to conduct RCA, but to educate in the basic understanding of the process and its expected outcomes.

Understanding Failure Mechanics

When looking at the reasons that things go wrong (failure), we must have a basic understanding of failure mechanics. Virtually all failures are the result of decision errors made by the human being. These are either errors of commission (i.e. – ADE) or errors of omission (i.e. – delay in care in ED resulting in death).

Failure causes surface at three (3) levels – Physical, Human and Latent.

1. **Physical Root Causes** are synonymous with “tangibility”. We can sense these types of things because we can touch, see, hear, smell or taste them (i.e. – improper paperwork, alarms, strange odors, etc.).
2. **Human Root Causes** are synonymous with decision errors by the human beings. As mentioned earlier, these are either errors of commission or omission. From a cause-and-effect standpoint, Human Root Causes trigger Physical Root Causes to Occur.
3. **Latent Root Causes** are synonymous with organizational system deficiencies. These are the systems we have in place to help people make better decisions (i.e.

policies, procedures, training regimens, purchasing routines, etc.). These represent the basic information in which people use to make their judgments or decisions.

The RCA process boils down to the following:

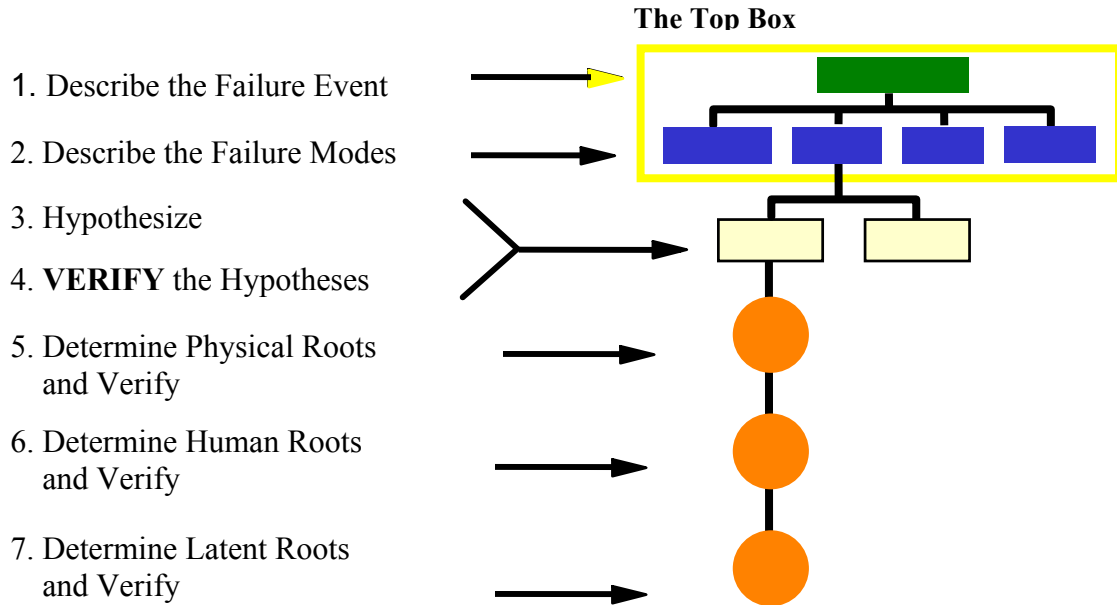


Figure 6 – Abbreviated Sample PROACT® Logic Tree Format

In the above sequence, the human is put into a position that requires a decision to be made. They have their internal knowledge bases coupled with the rules of their working environment and they make a decision to do, or not do things. As a result of their actions/inactions, this triggers a physical consequence to occur which causes another one to occur and so on.

Dr. James Reason, University of Manchester, noted scientist in the field of Human Error (1990, Human Error, Cambridge Press), coined the term “swiss cheese model” to express this same phenomenon. Dr. Reasons uses the terms Intent, Actions and Consequences. We can correlate these to our Physical, Human and Latent terminology in the following fashion for a perfect fit:

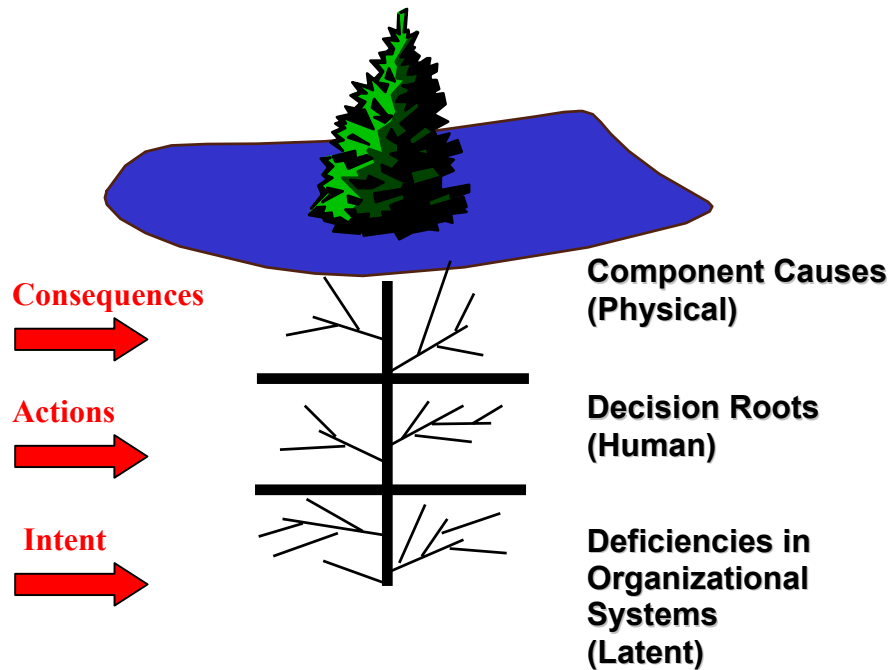


Figure 7 – The Root Causes of Events – The Decision Making Level

Experience in this field demonstrates that on average, it takes about 10 to 14 of these cause-and-effect linkages to queue up in a particular pattern for adverse outcomes or events to occur.

Tying it All Together

After drilling down and analyzing a specific event, we identify very specific Physical, Human and Latent Root Causes. We use the plural of “Causes” intentionally to emphasize that it is extremely unlikely that events have only one root cause.

It should be apparent:

1. How a poor decisions result in Adverse Outcomes or Events.
2. How such Events impact a systems performance.
3. That the system’s performance impacts corporate bottom-line results.
4. That the corporate bottom-line results impact the corporation’s Key Performance Indicator’s (KPI).

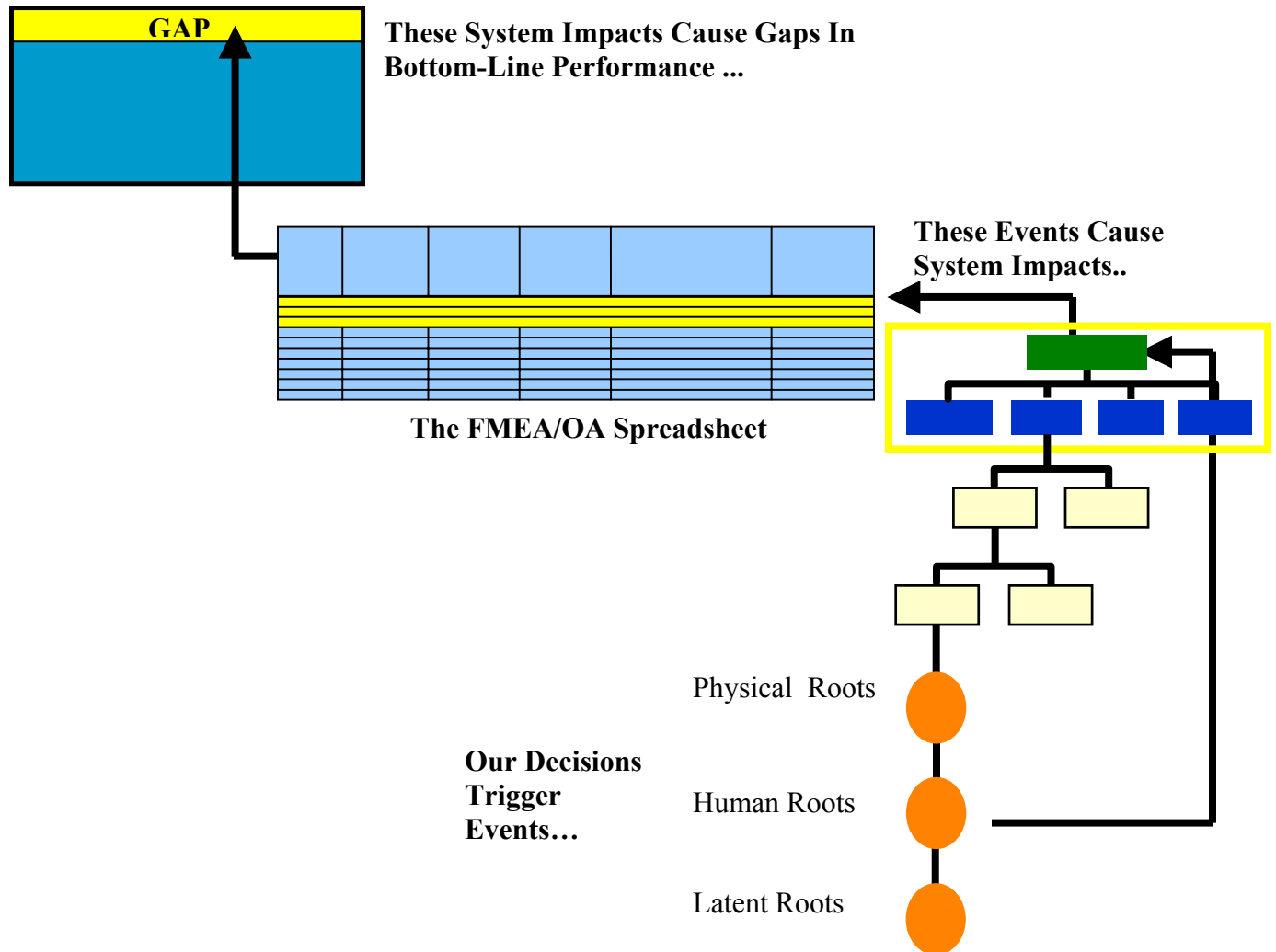


Figure 8 – How Work Level Decisions Impact the Bottom Line

What we have presented here is not rocket science. Once one overcomes the terminology barrier, it is easy to understand. However, it is difficult to apply because it is often used to denigrate people who make mistakes. This is extremely interesting because we should say, “like sin, the person who never makes an error should begin the accusations”. Additionally the results of Root Cause Analysis are used in claim settlements where punitive and costly sentences are assessed. This is also interesting because the imposition of guilt often negates the potential for learning how to avoid future problems that may be similar in nature.

The process described, if used properly, will propel a damaged reactive system into an extremely profitable proactive one. Doing it properly takes leadership from management. This means that they must withhold punishment for chronic events that eventually lead to Sentinel occurrences, no matter how tempting it is to place blame. They must be steadfast in their demand for answers based on logic and investigation. And finally, they must set-up a score board so that everyone can visually see improvements.

If the leadership can accomplish the above paradigm shift from defining success as “just passing a JCAHO audit” to “material improvement in patient safety”, the by-products will be a safer hospital, improved reputation, a healthy drop in claims and increased profitability.

Robert J. Latino is Sr. Vice-President of Strategic Development for Reliability Center, Inc. (RCI). RCI is a Reliability Engineering firm specializing in improving Equipment, Process and Human Reliability. Mr. Latino received his Bachelor’s degree in Business Administration and Management from Virginia Commonwealth University.

Mr. Latino is an author, educator and practitioner of Root Cause Analysis (RCA) and Failure Modes and Effects Analysis (FMEA) with his clientele. Mr. Latino works in organizations ranging from Healthcare to Continuous Process Manufacturing to Homeland Security. Mr. Latino has a special interest in the theory of human error as applied to RCA in any application.

Mr. Latino is also co-author of *Root Cause Analysis Improving Performance for Bottom Line Results* (2nd Edition, 2002, c. 264 pp., ISBN: 0:8493-1318-X, CRC Press) and contributing author of *Error Reduction in Healthcare: A Systems Approach to Improving Patient Safety* (1999, c. 284, ISBN: 1-55648-271-X, AHA Press). Mr. Latino has been published in numerous trade magazines on the topic of RCA as well as a frequent speaker on the topic at trade conferences and meetings.

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