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Next Generation Safety Metrics: Using the Leading Indicators in Your Observations

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Introduction

How safe of a company are we? If one were to ask his employees this question, how would they respond? Most likely, the employee would respond by quoting one of many "safety" statistics that have been tracked for generations by organizations and our government (NSC, 1955). Too often, organizations rate their safety performance solely on lagging metrics like recordable rate, total recordable rate, lost workday rate, DART rate, EMR, and fatalities to name a few (BLS, 2006). But, does this tell us how safe of an organization we have? It might tell us how risky of an organization we have, but it does not tell us how safe of an organization we have. After all, is it not possible to have no reported incidents and still have risky behavior occurring on a regular basis? So, I would put forth that many organizations are only using injury metrics and are rarely using safety metrics. Many organizations, and their safety professionals, struggle with finding the "next generation" of metrics that will reliably represent their companies' safety performance while guiding the allocation of resources to appropriate areas in order to prevent incidents.

Though we may never move totally away from reactive lagging indicators like injury rate, more and more organizations are looking toward proactive leading indicators to judge their safety performance. Unlike lagging indicators that generally measure undesirable events that have already occurred, leading indicators are generally activities or conditions that are desirable and if completed will prevent or alert us to potential lagging indicators. A focus on leading indicators is desirable for three reasons: 1) leading indicators keeps organizations in a "preventative" or "predictive" mindset, 2) leading indicators are achievement oriented whereas lagging metrics are avoidance oriented (Geller, 1996), and 3) many organizations have hit a "basement effect" when it comes to injury rates (they are at such a low level and the metric happens at such a low frequency, that one occurrence is seen as a "special circumstance" and is difficult to draw statistical conclusions). One common leading metric used by many organizations is information from safety inspections, audits, and behavioral observations. Even though inspections are a common aspect of safety processes, organizations struggle with: 1) collecting quality information regarding the health of their safety systems, and 2) using this intelligence to reduce error-likely situations and/or mitigate the consequences of those errors.

For many years, organizations have established some form of inspection process to assess compliance with rules/regulations and policies/procedures (See Factories Act of 1833; Raouf, & Dhillon, 1994; Weindling, 1985; Wilson, 1985). More recently, companies have begun to add an observation process to focus on safety-related behaviors (Geller, 1996; Komaki, Barwick, & Scott, 1978; Krause, Hidley, & Hodson, 1996). Having an inspection and observation process

can, by themselves, increase safety awareness and impact the organization's safety culture (Tuncel, Lotlikar, Salem, & Daraiseh, 2006). But while these methodologies are an essential part of a dynamic proactive safety culture, they do not guarantee world-class safety performance. In fact, some practitioners question the validity and effectiveness of the intelligence collected from their inspections/observations (Guastello, 1993). The following sections will discuss the next generation safety metrics made possible by using the leading indicators within your inspection, and/or observation processes.

Inspections and Observations: Keys to Assessing the Health of Your Safety Systems

James Reason (1990) envisioned safety as progressive layers of barriers or defenses that organizations put in place to prevent defect, property damage, human error, or injury. An example of one such barrier would be an organization's policy and procedures, followed by engineering barriers such as guards or sensors, followed by personal protective equipment. Reason hypothesizes that each of these barriers has inherent weaknesses (active and latent) that place cracks or holes in these defenses (thus referred to as the Swiss cheese model; see Exhibit 1. from http://patientsafetyed.duhs.duke.edu/module_e/swiss_cheese.html). These holes present an opportunity for error. However, because there are typically many layers or barriers in place to

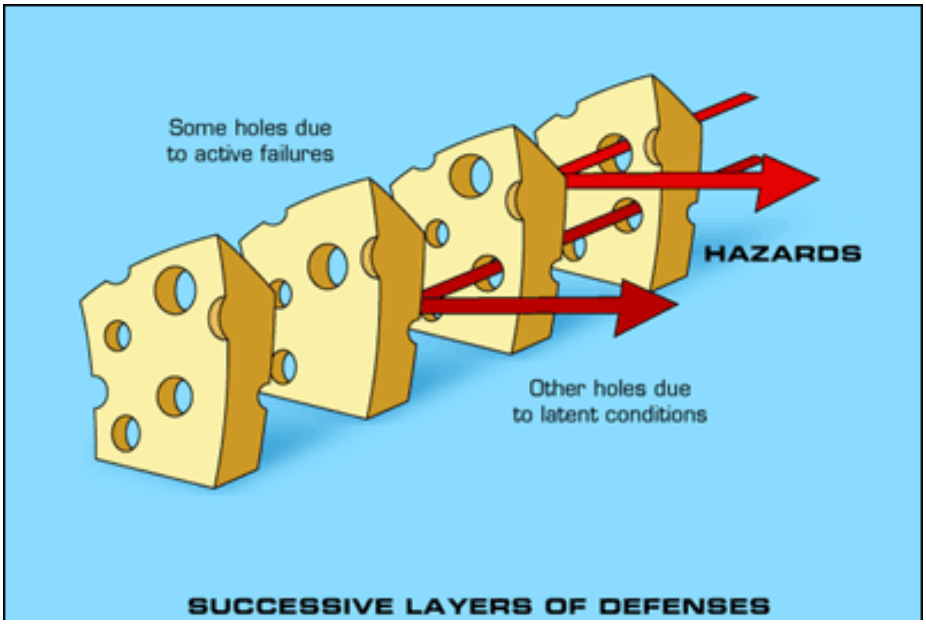


Exhibit 1. The Swiss Cheese Model adapted from Reason (1990) by DUMC (2005)

prevent incidents, it is only when all the holes line up that Reason predicts the occurrence of an incident. Over the past few decades, safety professionals, engineers, and employees have been effective at identifying when and where a new safety "barrier" is needed. Then organizations design, manufacture, and implement the new barrier to prevent future incidents or reduce the consequences of an incident if it were to occur. However, the employees' perspective is that the

safety department is just adding “one more safety rule to make my job more difficult” or they are “wrapping us up in a cocoon of PPE to try to keep us safe.” In many instances, a new process, rule, requirement, or task is added to the safety system without first looking at the existing barriers for deficiencies. Thus, it is the safety professional’s challenge to identify the “holes” in their safety systems and redesign the circumstances that place employees in situations that are either error-likely, or that encourage risky behavior (Rasmussen, 2003).

Compliance-Based Inspections

To proactively identify holes in organizations safety systems, practitioners typically institute an inspection process. The most fundamental inspection process has the safety professional walking the organization and checking off boxes on a paper checklist to indicate compliance with policies, procedures, rules, and regulations. In some cases, the organization’s leadership team or formal safety committee is also tasked with performing compliance inspections. Following the inspections, the information gathered is either filed away in case it is needed to demonstrate due diligence, or is entered into some form of a database for analysis and examination for potential trends (i.e., holes in safety systems).

There are many benefits of a well implemented safety inspection process. First, the simple act of using a checklist as a guide (or activator) helps the safety practitioner focus on critically important safety systems and assess their health. An additional benefit is the visibility of the inspectors. The simple act of walking the work floor, performing a ride-a-long, or inspecting the project can send a strong message to all employees that safety is a critical business issue while acting as a safety reminder. Furthermore, the information gathered can not only identify holes in your safety systems, but it can also be used as a positive safety metric to be shared with employees.

However, not all inspection processes are well implemented. Many, in fact, have little or no impact of the health and safety of their organizations. Guastello (1993) found that management inspections alone only reduced injuries by 19%. One explanation for the low impact of inspections may be the simple quantity of inspections completed. If safety personnel only perform monthly (announced) inspections, we only capture a small percentage of the opportunity for errors and thus limit our analysis of those safety systems keeping our employees safe. One additional issue with many inspection processes is that the information obtained is seldom used to address system-wide issues and thus demonstrate value to the inspectors walking the site. For instance, Manager A might be well intentioned and complete a detailed inspection noting many risky issues and many safe observations as well. Manager A writes several comments detailing the issues and creates action items for follow-up. From that point two things can happen to derail an inspection process. The most common problem is the issues are never followed up on and/or action items are not closed out (or neither of these is communicated back to Manager A). This lack of communication is systemic in organizations and dramatically decreases the quality of future inspections performed by Manager A. The second thing to derail the inspection process is that instead of getting praised for finding potential holes in our safety systems, well intentioned Manager A gets the critical eye turned toward his department and as a result gets either more work, or more visits from the corporate office…either of which will decrease the probability of Manager A ever turning in anything other than a sterling inspection!

Behavior-Based Observations

The second methodology used by a growing number of companies to help assess weaknesses in safety systems are behavioral observations (Geller, 1996; Komaki, Heinzmann, Lawson, 1980; Krause, Hidley, & Hodson, 1996). Unlike inspections, observations specifically focus on the

observable acts of the employees, not whether they are in compliance with rules or regulations. This is an important distinction in that it is possible for an employee to follow all the rules, regulations, policies, and procedures and still be doing something that is putting himself at risk for an injury. Thus, observations fill the gap inspections may create by focusing on what the employee does, not on whether rules are being followed. Another distinction between inspection and observation processes is that the observers tend to be hourly employees rather than members of the management team. Many organizations are now supplementing their management inspection checklists with behavior items, or adding a completely separate behavioral checklist. The final distinction is the addition of a one-on-one feedback. This is not to say that compliance-based inspections don't provide feedback, many do. However, feedback is an integral component of a behavioral observation process (Daniels, 1989; Petersen, 1989).

There are many organizations that have found much success with behavioral observations. In the infancy of behavioral safety, Guastello (1993) found a dramatic 60% reduction in injury rates by using a behavioral observation process. Additionally, a well-designed behavioral observation process has many benefits. One of the largest benefits is the opportunity for employee engagement. As opposed to the compliance-based inspections, which can be misinterpreted as a method for catching an employee doing something wrong, behavioral-based observations focus on looking out for the health and safety of your coworker (e.g., Actively Caring, see Geller, 1991). Another benefit is that the observers are the ones who are most likely performing the work and know where some "holes" may be hiding and thus be in a better position to recommend solutions. The final benefit of a behavioral observation process is the quantity of observations completed. In general, behavioral observation processes encompass many different employees who observe many different tasks, and the resulting behaviors help assess the health of their safety systems. On the other hand, an inspection process is typically done less frequently, by a limited number of inspectors.

As with an inspection process, behavioral safety processes can have their challenges. Similar to inspection processes, if the information collected by behavioral observations is not used, or used in a way to blame employees, the subsequent observations will be of lesser quality and even may be "pencil-whipped" (or made up on the spot). This "downward spiral" effect can dramatically impact the reliability of information collected, as well as the potential for analysis. Take these two scenarios for example; one where the Employee A has just finished conducting his observation and another where Manager A is in the process of reviewing his inspections. Observer A may be thinking "I'm tired of collecting observations that no one does anything with. Why do I need to write this stuff down? It just wastes time in my already busy day." Similarly, Manager A could be thinking: "I don't know if I can trust this information. Is it really possible that this group has not found a single at-risk behavior in over six weeks? What are we doing with all these observations anyway?" This downward spiral of frustration repeats itself thousands of times daily in well-intentioned organizations. Over time, this leads to disillusionment, decreasing participation and deteriorated observation quality with the result that the safety professional must go back to begging employees and his fellow managers to observe and pleading with managers to act on the information they do not trust.

Next Generation Safety Metrics: Lead Your Industry by Using Leading Indicators

By considering inspection and observation information as leading indicators, organizations can move beyond lagging indicators to measure the health of the organization's safety systems.

Only recently has technology evolved to the point where we can start to review leading indicators in real time, providing safety professionals with a new perspective and suite of tools from which to work.

Lagging indicators are the loss metrics that are already captured and recorded today by many organizations. These are your incidents, recordable incident rates, lost-time accidents, etc. In one sense, lagging indicators measure an organization's safety consequences in the form of past accident statistics. On the other hand, leading indicators are the precursors that may "lead" to property damage, risky behavior, or incidents.

Some examples of leading indicators relative to inspection and observations include at-risk conditions per inspection, rate of closing open issues or items, and the severity of an at-risk condition or behavior. These leading metrics can be used today to measure the "holes" in an organizations safety defenses and better allocate scarce resources. Furthermore, conditions and behaviors observed tend to be "proxies" for organizational discipline and cultural evolution, and thus represent good leading metrics of the overall health of your safety culture. Since cultures cannot be measured, we define certain activities as reflective of culture change and track and trend our culture improvements by way of those leading indicators.

Add Severity to Your Inspections & Observations

When individuals observe a risky behavior or condition, this is a perfect opportunity for the person to do a simple hazard analysis and rate the riskiness of the observation. For instance, when Employee A records an at-risk behavior, he or she assigns a severity level of low, medium, high, or life threatening to this behavior. As we know, not all at-risk behaviors are the equivalent. With this added degree of sensitivity, many safety professionals can more effectively assign resources to address the at-risk behavior before it turns into a near-miss or severe incident. Furthermore, the willingness for inspectors and observers to record a severe or life-threatening at-risk behavior is a good example of the aforementioned "cultural proxy." When employees or managers have enough trust in the system that they fear no repercussions for recording a severe or life-threat behavior, this signals that the organization's safety culture is focused more on fact-finding rather on fault-finding.

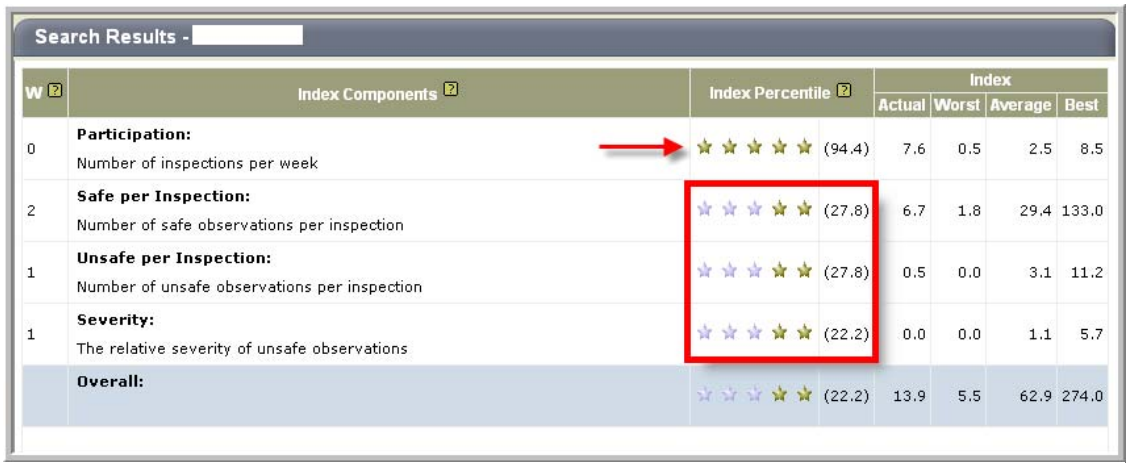
Assessing Inspection & Observation Quality

One way to stop the downward spiral of mistrust in the gathered information is to develop a method for assessing the "quality" of your inspections and observations. Many safety practitioners are often asked by their management counterparts: "can we trust this data?" or "…if we are 98% safe, why are we still having incidents?" One method to address the accuracy of the inspection/observation information is to develop quality criteria. The best examples of observation quality incorporate the following criteria:

- The number of at-risk behaviors per inspection/observation card
- The number of safe behaviors per inspection/observation card
- The number of comments per inspection/observation card
- The number of medium or higher severity inspection/observation per observation card
- Amount of time between the inspections/observations
- How quickly open action-items are resolved and closed

Quality Benchmarking

To gather further information regarding the quality of your inspections/observations, organizations need to develop what a "average" pattern of safe and at-risk conditions/behaviors typically look like. This benchmarking tool will have an enormous impact. First of all, it tells leadership team what to expect and therefore, when and where to act. It also helps, pinpoint specific observers or observation patterns that require further analysis (see Exhibit 2 below for an



W	Index Components	Index Percentile	Index Actual	Index Worst	Index Average	Index Best
0	**Participation:** Number of inspections per week	(94.4)	7.6	0.5	2.5	8.5
2	**Safe per Inspection:** Number of safe observations per inspection	(27.8)	6.7	1.8	29.4	133.0
1	**Unsafe per Inspection:** Number of unsafe observations per inspection	(27.8)	0.5	0.0	3.1	11.2
1	**Severity:** The relative severity of unsafe observations	(22.2)	0.0	0.0	1.1	5.7
	Overall:	(22.2)	13.9	5.5	62.9	274.0

Exhibit 2. Electronic scoreboards make it easy for safety professionals to assess the quality of their inspection/observations.

example of an electronic quality scoreboard).

You can use these observation quality metrics to compare one group against another. For instance, compare a group of high quality observers (the informal safety "champions" or managers you know are conducting thorough inspections) with a random group of observers. Or, compare safety professionals against the hourly employees. One should assess the average number of at-risk behaviors observed by each group, the number of safes, number of comments, the severity of the behaviors observed and the average time between observations. With this information, safety practitioners are in a better place to assess the quality of their processes. More importantly, the leadership team will have much more trust in the information presented to them.

Tie Inspections and Observations to Lagging Indicators

Some organizations fail to trend their inspections/observation intelligence against their incidents (or near-misses). This may be for several reasons; there is no way to merge the information from different system, the merged information does not make intuitive sense, or there are so few incidents that no reliable correlation could be drawn. It is not uncommon for organizations to have great participation in their behavioral observation process, but still see no impact on incident rate. However, by using observation quality metrics, organizations gain an in-depth analysis into the nature of that participation. Some organizations have few incidents and therefore rely on leading indicators to help assess the health of their safety culture. One common leading indicator is near-misses. By tracking observations against near-misses, safety practitioners can add a meaningful layer of analysis to assess whether risky behaviors observed correlate to reported near-misses.

In Summary

Many organizations look to lagging indicators to assess the health of their safety systems. While injury rate is a metric, many organization search for other safety statistics that can help predict and prevent incidents and improve their safety cultures. These "next-generation" leading indicators help safety professionals assess their systems to look for error-likely situations and other potentials for incidents. By taking your inspection and/or observation processes and adding more details like severity, organizations can gain a better understanding of where to focus their resources to make a difference in their safety culture. Furthermore, by assessing the quality of your inspections and observations, you can use this proactive information with additional confidence, especially when benchmarked against standard lagging indicators to demonstrate safety improvements.

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