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More effective use of Leading Indicators

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Abstract

Leading indicators are all the rage for managing not only Process Safety but all aspects of EHS performance. However; chances are, you are not truly harnessing the power of leading indicators because you do not clearly understand how leading indicators are best used to drive performance improvement. Misuse of leading indicators includes the choice of which indicators to measure / manage and how to use the information obtained from the indicators. This paper will explore the little-known purpose and best use of leading indicators including how to choose the right leading indicators for your facility and team to maximize the impact, how many indicators to measure, how long to use a specific leading indicator, and how to best drive performance improvement from the indicators.

Keywords: Leading Indicators, KPI

Brief Discussion of Indicators

"To measure is to know. If you cannot measure it, you cannot improve it." Lord Kelvin

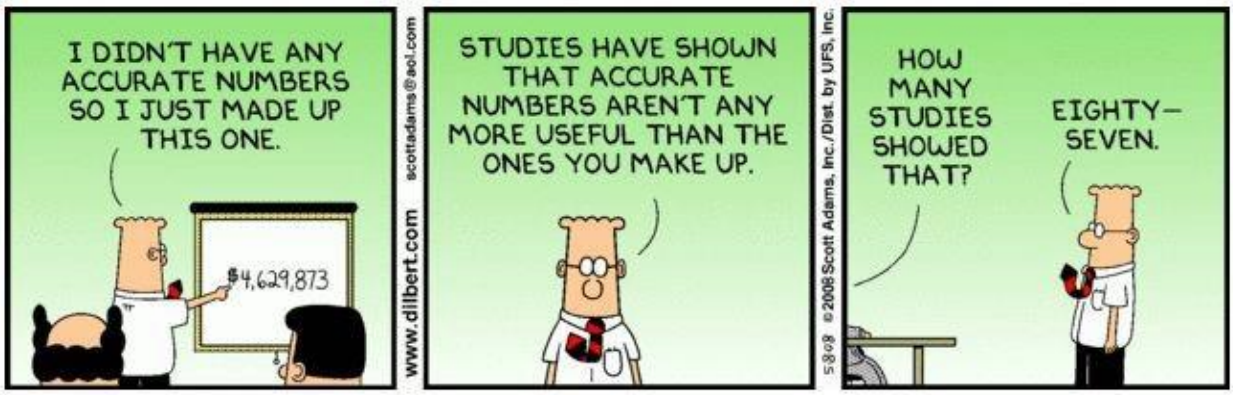
"You can't manage what you don't measure." Peter Drucker, Edwards Deming, et al.

If you don't measure it, you can't manage it.

If you don't measure it, you can't improve it.

If you don't measure it, you probably don't care.

If you can't influence it, then don't measure it. – Introduction to ITIL



Indicators, also known as Key Performance Indicators (KPIs), are those activities or results which people and organizations use to measure performance and/or progress toward a goal. For example, a car is equipped with a speedometer to give real time feedback regarding the car's speed. This is used by the driver to gauge compliance with speed limits (posted or enforced) and to determine approximate estimated time of reaching the destination. Alternatively, a person with a goal of losing weight might stand on a scale each morning to determine progress toward that goal. In the case of the speedometer, the feedback is almost instantaneous based on the actions taken by the driver, whereas the feedback from the scale is somewhat lagging and may not directly correlate to an individual action.

Based on the quotes above, since many managers want to be able to manage or improve every aspect of their operations, they may be using dozens of different indicators.

Within the field of Safety, lagging indicators such as OSHA's Total Recordable Incident Rate (TRIR) or the more international Lost Time Incident (LTI) Rate have been used for decades to rate and compare industrial safety performance. More recently, in the field of Process Safety, companies have been measuring the number of process related incidents, typically fires, explosions and releases (loss of containment events) also often expressed as a function of hours worked. This Process Safety Incident (PSI) rate has become the standard for measuring process safety performance with the publishing of API's Recommended Practice 754 and other international equivalents such as the guidance published by the International Council of Chemical Associations (ICCA).

API 754 has set the industry standard for classifying the types of process safety indicators into one of four buckets or Tiers.

- **Tier 1** events are significant process safety incidents that signify a greater potential for damage to people, plants, communities and reputation – analogous to a Lost-time injury or worse. These are the most lagging of the process safety related KPIs.
- **Tier 2** events are more minor process safety incidents analogous to a first-aid or recordable injury.
- **Tier 3** events are those upsets that challenge a safety system (layer of protection), but do not result in a fire, explosion or release. These are less-lagging indicators, but still lag the conditions that allowed the event to occur.

- **Tier 4** events are the true leading indicators, measuring operating discipline and management systems.

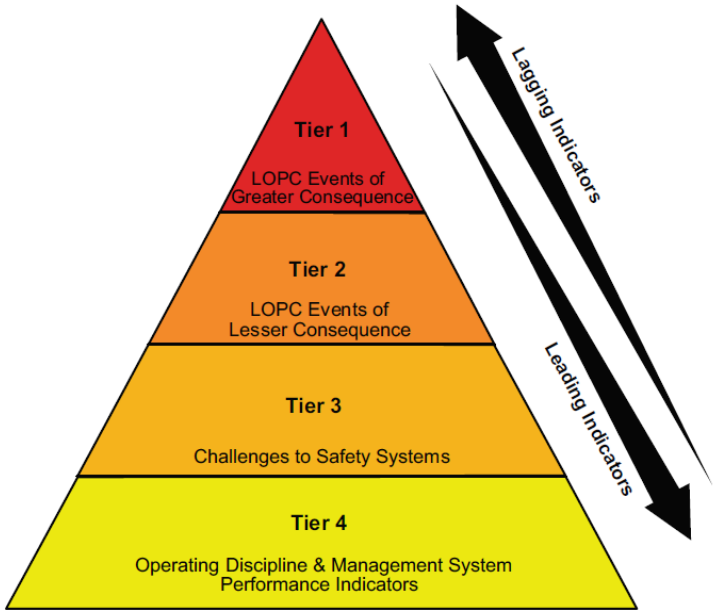


Figure 1 - Process Safety Indicator Pyramid

Typical Uses of Indicators

As with other indicators, Process Safety indicators are useful for identifying when and where attention is needed to correct negative trends in performance.

Lagging indicators are typically used to compare performance among different units, sites, and regions, as well as comparing a company's performance to industry or peer group averages. Often the most lagging indicators are used when a company is early in their journey to performance improvement, but as fewer Tier 1 incidents occur, then focus shifts to Tier 2 events.

Process Safety Incidents (PSIs) are a common measure of process safety performance. But what is it actually being measured…the number of times something fails, namely loss of containment events, fires and explosions. As a lagging indicator, PSIs only tell us when something already went wrong…so how do we use KPIs to help us improve?

Conventional wisdom tells us to use leading measures to more proactively manage performance, but what does that really look like? Tier 3 indicators such as activations or failures of protective devices are good measures, but still telling us what has already happened. These are 'less lagging measures.' Tier 3 events are useful for identifying weaknesses in specific layers of protection and directing efforts to remediate or improve those areas identified; however, Tier 3 events should not

be used to compare separate units, especially when they operate different technologies, processes and equipment. This results in the proverbial Apples to Oranges comparison.

Tier 4 events or Leading Indicators are the focus of this paper. These typically measure specific aspects of a management system performance, often in terms of percentages of activities completed successfully or on time, or more pessimistically, the percentage of non-conformances, such as Mechanical Integrity Inspections, Action Item Closure, MOC system compliance. These are all very important activities, but how do you know if you are measuring the right action? How do you know when to act? Are you influencing the leading indicators?

Challenges to effective use of Leading indicators

Leading indicators are popular for performance management because if chosen properly, they measure activities which may effectively influence the outcome of important lagging performance measures. At the same time, many organizations struggle to use leading measures appropriately often due to a lack of understanding of how they should be used.

Many organizations, feeling pressure to measure leading indicators, will select a handful of leading indicators from an industry standard list, based on what information they can most easily measure or because the general topic, e.g. Action Items or Management of Change, seems to be important; however, they fail to understand what exactly is being measured and what to do with that information.

Some organizations will develop global leading indicators which are measured across every facility in the organization, then used to rate the performance of those facilities without understanding what the KPI is communicating. Inappropriate responses to the leading indicators are also common. One organization was measuring Loss of Containment (LOC) events in an effort to increase awareness and reporting. So theoretically, rising numbers of events reported would indicate that the indicator was having the desired effect. However, management decided to recognize sites with fewer LOC events as having better performance.

“Whatever is measured will be managed” …or put another way, “Whatever is measured will be manipulated.” Care should be taken to communicate the intent of leading measures so that facility and unit leadership can support the development of appropriate behaviors instead of only managing the numbers to look best in the KPI “beauty contest.”

A different way of using Leading indicators… to proactively shape Behaviors and Culture

- Identify the desired change / goal
- Determine specific desired Behaviors that will achieve the change / goal
- Develop Leading indicators to measure / encourage that behavior
- Set targets (Don’t make it easy!)
- Measure & communicate performance regularly (daily, weekly, monthly)
- Don’t be afraid to encourage competition

I submit that the best use of leading indicators is not just to measure activities, but to drive culture change by changing behaviors, by creating good habits and breaking bad ones. In other words, to disrupt the normalization of deviation and drive the normalization of excellence.

Leading Indicators Around Us

But how do we make this work in practice? A top down edict often fails because there is no engagement or ownership at the individual level. So how can this be achieved? Let's look at an example…

Years ago, one could track driving fuel economy periodically when refueling the vehicle, by dividing miles driven by gallons of fuel consumed, or more accurately, by gallons of fuel that it took to fill the tank. This only gave a lagging indication of the fuel economy achieved over the last days or even weeks of driving. Newer cars are equipped with a trip computer measuring real-time fuel consumption and vehicle speed to calculate and average or instantaneous fuel economy, but even this is a "less-lagging measure" as it measures results but does not specifically impact behaviors.

A recent rental car included an Eco-Display on the dashboard, which measured real-time and cumulative for the trip, three different behaviors that influence fuel economy on a constantly updated "scoreboard," see Figure 2. The behaviors were 1) Acceleration – how quickly or evenly the driver accelerated, 2) Constant velocity – how much the car's speed varied over the course of driving, and 3) Coasting – a measure of whether the driver braked hard or allowed the vehicle to slow down more before braking. By watching these three icons over the course of the business trip, I became aware of certain driving habits that negatively and positively influenced my fuel economy and was able to begin changing my driving habits. These measures were influenceable, that is, I could impact the outcome, and indicative, by changing this behavior, I could measurably impact the outcome.

Figure 2: ECO-Display Leading Indicators

Like this example, effective leading indicators are those which the individuals or team can *influence*, and which clearly *impact* the desired result. In addition, this example shows the importance of keeping a simple, relevant scoreboard. I became so engaged in the 'competition' to improve my Eco score, that I missed my freeway exit.

Examples in Process Safety

How does this translate to the world of Process Safety and reducing the number of PSIs? Plants with a high number of PSIs often demonstrate a lower level of employee discipline, which often results from low levels of engagement and ownership. We found that one successful means of improving performance is to focus on the employees, making them aware of the issues. Several sites successfully implemented two simple leading indicators: Reporting all spills and Extreme Housekeeping.

Reporting All Spills

Employees are trained to report significant spills that occur during the course of their work; however, many other spills, such as small leaks and drips were common place and failed to register in their awareness. When implementing this KPI, our leaders were careful to point out that not only significant spills should be reported, but literally every time material left primary containment. Even minor drips were to be reported. At first, there was a general disbelief and feeling that this was another flavor of the day. However, one operator came across a gasket leak that had resulted in just a few drips. He reported the 'spill' to see if anything would be done. The plant leader took the report seriously and had the gasket replaced and flange retorqued at the first available opportunity. Immediately, the operators engaged and began 'hunting' for other leaks.

Within a few months, the spill reports were overwhelming the reporting system, so the plant had to modify the system. At the same time, they gathered information as never before about plant condition and leak causes. This information proved vital to proactively address weaknesses in the plant's systems, both operational and mechanical. In addition, the employees became hyper-aware of leaks and often spotted and stopped leaks long before they reached the tier 2 level. Plant leadership tracked the spills reported and regularly recognized employees for reporting.

Extreme Housekeeping

Another plant was experiencing a relatively high number of LOC events. The plant had a comprehensive 5S system used to manage plant condition and housekeeping, but plant tours showed minor issues with spills, leaks and cleanliness. The plant used a relatively relaxed set of criteria for the 5S scoring, and in the end, got what they expected. A new plant manager decided to significantly raise the expectations for the 5S scoring, and previous satisfactory scores were no longer acceptable. The scoreboards were updated with the new criteria and showed that much work was needed. In addition, the plant manager would at least weekly walk through the plant with a clipboard and trash bag, picking up zip-ties, bolts, bags and other trash, while making notes of plant condition. The employees quickly took notice and began cleaning the plant before the manager's routine walk throughs. In time, the employees started meeting the new 'extreme' 5S standards and developed a much greater sense of pride in the plant.

Both of these plants experienced a significant reduction in Process Safety Incidents because the leaders found a way to engage the employees and encourage greater ownership of the facility.

A Leader's Work

This sounds like a quick and easy way to reduce spills; however, it was anything but easy. This type of change always requires a significant amount of effort by the leaders, although the results are worth it.

For example, when requiring that employee report all spills, the leader must be willing to act on the spills that are reported and on the learnings from those spill reports. This must be a priority for you if you wish to make it a priority for your workers. One plant even adapted their spill reporting system because it was overwhelmed by the 10-fold increase in reporting. If the systems were not adapted, reporting likely would have returned to previous levels.

If you decide to require extreme housekeeping, the leader must be willing to join in the work. Setting the example and modeling the desired behavior. An improvement in housekeeping will often expose existing issues. The leader must be willing to address (fix) these issues as they are identified. Doing so will further encourage housekeeping improvements…but failing to fix issues will lead to a quick death of employee engagement.

Regardless of which measures are chosen, the leader must be dedicated to driving accountability by setting high expectations and routinely (weekly) following up, measuring, inspecting results and by requesting input for further improvements or actions.

In addition, leaders must be willing to take action from the learnings, involving the entire team: what did we learn, what can we do about it, and what should we do next?

Creating the momentum needed to bring about a significant change in performance is difficult, and just as challenging to maintain the focus and the momentum once the initial targets have been achieved. You and your teams are capable of significantly better performance, but you must be willing to find the levers to change the behaviors and ultimately the culture of your teams.

Conclusion

In summary, leading indicators are valuable tools for driving performance improvement, but only if appropriate indicators are chosen and used properly.

- Identify measures that
    - challenge the team
    - impact the performance goal,
    - can be directly influenced by the individuals or team.
- Visibly track progress with the teams and celebrate successes.
- Actively support the team's progress.
- Inspect, measure and follow-up at least weekly.

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