



USING LEADING AND LAGGING SAFETY INDICATORS TO MANAGE WORKPLACE HEALTH AND SAFETY RISK





Using Leading and Lagging Safety Indicators to Manage Workplace Health and Safety Risk

Most organizations continuously strive to improve the safety of their workplace and reduce instances of workplace injuries among employees. However, despite these focused efforts, instances of sustained improvement in workplace safety, as reflected in reduced workplace incident rates, lost days due to injuries and other measures, are generally the exception rather than the rule. In some organizations, graphing key safety metrics over time often reveals a series of peaks and valleys in actual safety performance. In other instances, an organization achieves a safety performance plateau, but struggles to improve beyond that point.

Often, the key obstacle to improvement is a singular focus on lagging indicators of workplace safety. The number of accidents incurred, injury rates, and lost work costs are important indications of the safety of a given workplace. However, this type of data reflects only the consequence of an unsafe workplace and provides little insight into the root causes actually responsible for safety incidents. Leading indicators, on the other hand, focus on those steps and processes that are designed to prevent an accident or loss from happening in the first place. When used in combination, leading and lagging indicators can foster sustained improvement in overall workplace safety efforts.

This UL white paper discusses the importance of leading and lagging indicators in effectively managing workplace health and safety issues, and provides a reporting framework for evaluating critical safety elements. The paper begins by defining leading indicators and identifying the characteristics of good leading indicators. It then discusses the value of using leading and lagging indicators together to evaluate safety performance, and presents results from a recent UL survey of organizations that manage workplace safety using such indicators. The paper concludes with details about the UL Safety Scorecard, a template for tracking safety activities and performance results.





The Challenges of Improving Workplace Safety

The commitment to safety in the modern workplace has never been stronger. Certainly, increased oversight by federal and state regulators has served as an important impetus for employers to address workplace safety risks. But organizations in every industry are making the connection between maintaining a safe work environment and improved productivity and profitability. Indeed, a safer workplace can be an instrumental element in efforts to develop “habits of excellence,” and an organizational culture of continuous improvement.

Despite this commitment, however, genuine improvements in workplace safety are difficult to achieve. And, even for those organizations that achieve initial success, sustaining continuous improvements remains an elusive goal. As many as 70 percent of business improvement programs reportedly fail to achieve their intended goal, and at least 50 percent of business improvement programs fail over the long term.

There are a number of causes for the failure to sustain continuous improvement in workplace safety. These include managerial directives and policies that conflict with the goals of a safe workplace, inadequate training of employees on safe work procedures, failure to respond adequately when potential causes of injuries are identified, and ineffective communications. These and other “human limitations” can derail even the most thoughtful and well-planned workplace safety programs.

Yet the failure to achieve workplace safety goals or to sustain efforts at continuous improvement often has its roots in the simple choice of metrics used by organizations to measure individual aspects of a workplace safety program. Indicators such as the number or location of workplace accidents, employee injury rates, or the costs associated with remedying unsafe conditions can be important measurements of the overall results of workplace safety initiatives. But an exclusive focus on these so-called lagging indicators provides little direction or insight into the specific behaviors that produce desired outcomes.

The Importance of Leading Indicators

On the other hand, benchmarks that focus on specific safety process-related behaviors and activities are more likely to have a positive influence on workplace safety. These leading indicators provide employees and managers with immediate feedback on actions that can result in unsafe workplace conditions or lead to incidents or injuries. Equally important, leading indicators offer an important check on the integrity of systems and processes designed to foster safe working conditions.

All effective leading indicators share the following characteristics:

- They measure those behaviors and activities that can directly lead to improved workplace safety.
- They are understood and accepted by employees and managers

as directly relevant to workplace safety.

- Their focus and intent is closely aligned with an organization’s strategic goals and objectives.
- They are cost-effective, and easy to measure and use.

Unlike lagging indicators that measure the impact of workplace safety incidents after the fact, leading indicators proactively draw attention to specific behaviors and activities. This focus enables employees and managers to modify behaviors before incidents or accidents occur. Accordingly, leading indicators serve as an effective warning mechanism, enabling employees and managers to take action in advance of damage, injuries or other harms.

In addition, lagging indicators typically fail to provide sufficient information on the actual causes of workplace safety. This shortcoming forces organizations to conduct further investigation and analysis to determine the real reasons behind safety incidents. Because of their focus on behaviors and activities, leading indicators enable employees and managers to monitor the effectiveness of safety systems and processes, and to quickly identify root causes of workplace safety failures.

Applying Leading and Lagging Indicators to Workplace Safety Programs

Despite their usefulness in efforts to improve workplace safety, however, leading indicators also have their



limitations, and can be misapplied or misused. For example, an organization can choose subjective measurements that are completely unrelated to the real causes of safety issues. In other cases, an organization can mistakenly identify behaviors and activities that don't directly correlate with preferred safety outcomes, or that only partially account for safety performance results. Finally, data collection alone does not improve safety performance and requires the implementation of corrective actions to address underlying safety deficiencies.

For these reasons, a comprehensive workplace safety program should employ both leading and lagging indicators. Leading indicators are proactive by nature and provide a framework for benchmark behaviors and activities prescribed by workplace safety programs. Lagging indicators measure the relevance of those behaviors and activities in driving specific safety-related outcomes. In other words, leading indicators dictate the action plan while lagging indicators measure the effectiveness of that plan in achieving the desired workplace safety outcomes.

As an illustration of the beneficial cause and effect dynamic created by the use of both leading and lagging indicators, Table 1 depicts correlating leading and lagging indicators for six commonly-used workplace safety program elements.

PROGRAM ELEMENT	LEADING INDICATORS	LAGGING INDICATORS
Management Support and Accountability	<ul style="list-style-type: none"> • % of goals/objectives incorporating safety • % of jobs preplanned • Average # of corrective actions per submission (incidents, near misses, observation, inspections) 	<ul style="list-style-type: none"> • % of projects that work without incidents • documented meetings, metrics used compared to plan (+/-) • preplan verified and onsite • participation in safety meetings, budgets for safety, safety metrics communicated
Employee Participation and Involvement	<ul style="list-style-type: none"> • % of employees involved in safety decision making process • %-age of workforce submitting safe and/or at risk behaviors weekly • Tracking %-age increase (or decrease) in the # of submissions being submitted by the workforce 	<ul style="list-style-type: none"> • # of work method changes • average time to implement suggestions and/or corrective action
New Hire Orientation, Training and Learning	<ul style="list-style-type: none"> • % of employees trained prior to start of work • % of employees /management trained 	<ul style="list-style-type: none"> • # of incidents related to training • % of training on time following observation or incident • # of training classes conducted
Inspections/Audits/Observations	<ul style="list-style-type: none"> • # of inspections and observations • % of compliant/safe conditions • % of deficiencies • % of severe/imminent of risk severity index • % completion of corrective actions within timeline 	<ul style="list-style-type: none"> • Near misses • Incident rate (frequency and severity) • Loss costs • Average time for corrective actions to be completed
Incident, Near Miss and Observation Investigations	<ul style="list-style-type: none"> • Average time to complete investigations • Root cause(s) for loss identified • # of near misses investigated/tracking • # of observations investigated/tracking 	<ul style="list-style-type: none"> • Average time for corrective actions to be implemented • Repeat accident types and/or offenders
Performance Management Systems/Safety Related	<ul style="list-style-type: none"> • % of performance reviews measuring success in achieving results • # inspections compared to individual objective • # of safety meetings conducted compared to individual objective • # of one-on-one contacts • % of losses tied to projects and individual objectives 	<ul style="list-style-type: none"> • Near misses • Incidence rate (frequency and severity) • Loss costs • %-age of overall rating related to safety performance/metrics • Project profitability

Table 1: Correlating leading and lagging indicators



Leading and Lagging Indicators in Action

In 2012, UL conducted a survey on the use of leading and lagging indicators in industry as part of its broader effort to assess key factors in successful workplace safety programs. Survey participants were representative of a wide range of industries. More than half (58 percent) of all respondents represented industries with a history of increased workplace safety risks, such as construction, manufacturing and healthcare.

Among survey respondents, the use of leading indicators in conjunction with lagging indicators had a direct impact on the effectiveness of their workplace safety programs. More than 70 percent of respondents stated that their leading indicator programs were either very successful in their current form, or working well and could be even more effective with minor changes. Less than five percent of respondents reported that their leading indicator program failed to produce the anticipated improvements in their organization's workplace safety efforts.

The positive impact from the use of both leading and lagging indicators is affirmed by recordable incident rates as required by the U.S. Occupational Safety and Health Administration (OSHA). More than 40 percent of survey respondents indicated that their OSHA recordable incident rate for every 200,000 hours worked was one percent or less, with a combined 64 percent of respondents reporting an incident rate of two-and-a-half percent

or less. Experience modification rates assigned to respondent organizations by workers' compensation insurance carriers were equally impressive. A measure of insurance claims filed by employees as a result of injuries sustained in work-related activities, modification rates were less than one (1.0) for nearly 65 percent of respondents.

The majority of survey respondents were also able to correlate their use of leading and lagging indicators with favorable safety outcomes. More than 32 percent of respondents reported that favorable outcomes were definitely related to the use of leading indicators. An additional 42 percent reported that favorable outcomes were at least somewhat related to the use of leading indicators.

According to survey respondents, the use of even a relatively small number of leading indicators can contribute to these favorable outcomes. A little more than 74 percent of respondents reported using not more than five leading indicators, with almost 42 percent using three or less. However, nearly half (48 percent) of respondents reported that four to five leading indicators were the "right amount" for an effective workplace safety program.

Importantly, collecting and reporting leading and lagging indicator data need not be a time consuming process. More than half of all respondents (51 percent) reported spending between just one and five hours a month collecting and reporting data, with an additional six percent of respondents reported spending less than one hour per month. Only 16 percent of respondents reported spending more than 11 hours per month collecting and reporting data.

Critical Leading and Lagging Indicators

The UL survey also asked respondents to identify the leading and lagging indicators of greatest importance to a successful workplace safety program. Responses were organized in a number of key categories, including governance, risk assessment, activity metrics, loss statistics and cultural indicators.

Survey respondents identified the most important leading and lagging indicators by category in rank order, as follows:

- **Governance** — The number of investigations that are being examined by an organization's safety team and the number of urgent submissions that are being recorded by employees.
 1. Overdue tasks – Tasks not completed by the required due date
 2. Open investigations – Number of investigations currently under review
 3. Open events – Events reported but not yet under investigation
- **Risk Assessment** – The relative risk of issues being reported, and assessing whether submissions and events present a high, medium, low or negligible risk to employees.
 1. Submissions on observations of safe and at risk conditions reported
 2. Near misses – Report of incident that does not result in injury
 3. Injury – Report of an incident that results in an employee injury
- **Activity Metrics** – Statistics about the specific kinds of submissions being reported, such as general



observations, near misses or actual injuries or losses.

1. Percentage breakdown of submissions by type
 2. Percentage of near misses receiving a formal investigation
 3. Percentage of incidents with loss receiving a formal investigation
- **Loss Statistics** – The types of losses experienced by an organization, including injured employees, lost work days or property damage.
 1. Average number of days employees are absent due to work injuries
 2. Number of employees absent from work due to work injuries
 3. Injury events – Number of incidents that resulted in at least one injury
 - **Cultural Indicators** – An assessment of an organization’s overall safety culture with regard to employees’ commitment to workplace safety, the implementation of corrective actions, and ongoing training.
 1. Employee submissions – Number of employees who are recording submissions
 2. Overdue corrective actions – Percentage of corrective actions not resolved on time
 3. Average corrective actions/ submissions – Average number of corrective actions implemented as a result of a single event

Toward a Safety Scorecard Model

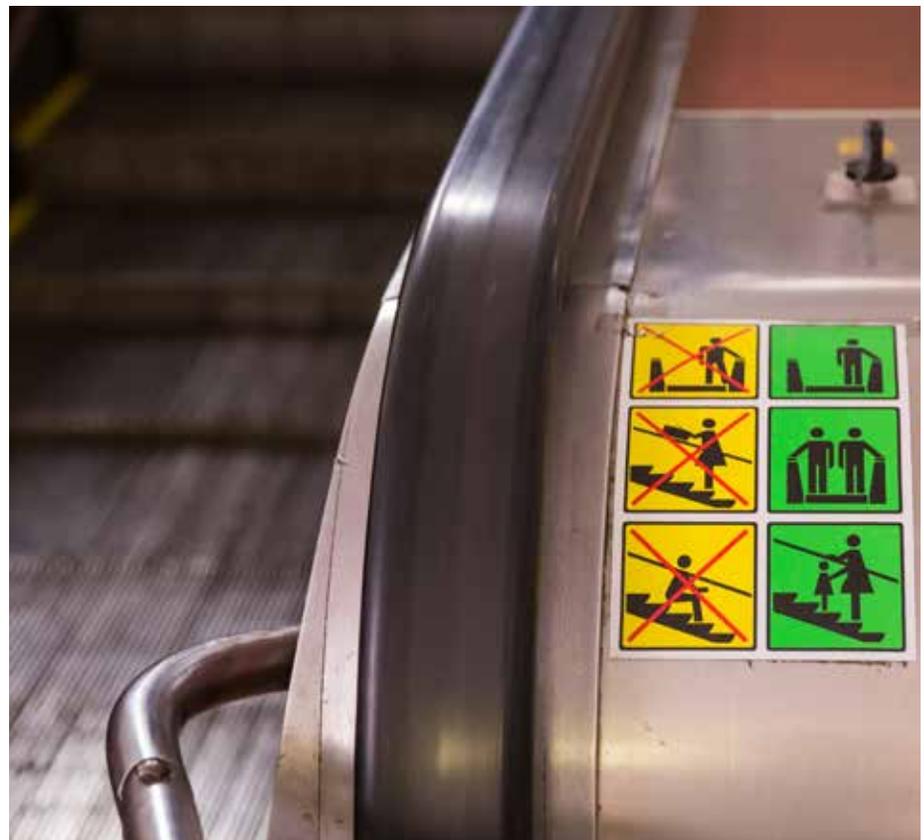
The UL survey provides compelling evidence of the value of using a combination of both leading and lagging indicators in building and sustaining

improvements in workplace safety. However, even organizations that understand the important link between leading and lagging indicators can be challenged to create a reporting structure that effectively tracks data on multiple leading and lagging indicators.

A scorecard is a convenient tool for monitoring and evaluating the activities and outcomes of an organization’s workplace safety program. UL’s Safety Scorecard (see Figure 1) is one such tool that offers a comprehensive review of the entries (or submissions) recorded in an organization’s incident management system (IMS), based on both leading and lagging indicators.

UL’s Safety Scorecard includes the following sections:

- **Headline** – The Safety Process Scorecard Headline is a dashboard-like display of information on a small number of key metrics about the current state of an organization’s overall safety effort. Key metrics include lagging indicators, such as days since last recorded injury, and percentage of incidents resulting in training. Leading indicators included in the Scorecard Headline include corrective action completion percentage, incident investigation completion percentage, and percentage of training completed.





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View Injury Trends

Report Parameters: Location(s): 11, 1, AP, Bangalore, Delhi, Noida, Noida Sec 59, Delhi 1, Colorado Springs, Nashville, Cool Springs, Murfreesboro Road, Floor 1, Floor 2, Floor 3, Floor 4, Prod Dev NW Corner, Java, UI

Figure 1 : UL's Safety Scorcard



- **Governance Overview** – The Governance Overview section of the Safety Process Scorecard provides a quick glance at the level of activity in connection with oversight tasks. The key leading indicator used in this section is open submissions marked urgent, while lagging indicators include data on open investigations, overdue tasks, injuries accruing lost work days, and injuries accruing restricted work days.
- **Risk Assessment** – The Risk Assessment section provides information about the relative risk of issues reported through the Incident Management System (IMS). Specific leading indicators in this section include submissions based on observations and near misses, while lagging indicators include submissions based on actual injuries as well as events based on observation, near misses and actual injuries.
- **Activity Metrics** – The Activity Metrics section of the Scorecard provides detailed information about the various types of submissions made by employees, categorized as observations, near misses and losses. Specific leading indicators include

submissions entered in the IMS on observations and near misses, submissions marked urgent, and submissions of near misses that have been investigated. Other leading indicators include the ratios between observations and injuries, and between near misses and injuries. Lagging indicators in this section include submissions entered or investigated in connection with actual losses.

- **Time Efficiency** – The Time Efficiency section consists entirely of leading indicators that evaluate how quickly action is taken on submissions and on follow-up activities, such as corrective actions or supplemental training. Performance is measured against specific benchmarks established by the organization.
- **Loss Statistics** – The Loss Statistics section of the Scorecard consists almost entirely of lagging indicators that provide details about the type of losses experienced by an organization as a result of recent incidents, such as injured employees, lost work days or property damage. The sole leading indicator tracked in this section is near miss events.

- **Culture Indicators** – The Cultural Indicators section includes a mix of leading and lagging indicators that evaluate an organization's overall safety culture. It tracks issues including responsiveness to required corrective actions, the effectiveness of employee training, and other actions undertaken to improve the safety of the workplace.
- **Top 5 Nature of Injuries** – This section of the Scorecard includes one lagging indicator regarding the types of injuries that occurred most often during the selected time period.
- **Top 5 Causal Factors** – This section includes one lagging indicator regarding the specific factors that resulted in the most injuries during the selected time period.

Each section of UL's Safety Scorecard includes data on the type of metric applied (leading or lagging), a description of each metric and how the results should be interpreted, and the method used to calculate that metric. Some individual metrics may also include subcategories that provide additional detail.



Summary and Conclusions

Many workplace safety programs focus attention on lagging indicators that report on the outcomes of safety initiatives, but fail to give equal consideration to leading indicators that measure the behaviors and activities necessary to achieve the desired results. A combination of leading and lagging indicators to support behavioral changes can lead to sustainable workplace safety levels over the long term. Combined with an effective scorecard for tracking activities and results, leading and lagging indicators are essential elements in a successful workplace safety program.

UL offers a range of consulting services and proprietary software systems to assist employers in their efforts to reduce workplace risk, manage safety initiatives and support training efforts. To learn more, contact ulworkplace@ul.com



¹ One of the most compelling examples of this is the story of Paul O'Neill's drive to improve worker safety as CEO of Alcoa Aluminum, as told in *The Power of Habit*, Duhigg, New York, Random House, 2012.

² *Staying Lean: Thriving, Not Just Surviving*, Hines, Harrison, Griffiths and Found, London, UK, Productivity Press, 2011. Web. 12 November 2013. <http://www.sapartners.com/portfolio/books/>.