Strategic
Safety Measures
Seven Key Benefits

By Earl Blair

The culture of an organization can be partially defined by the collective practices employees follow (Hopkins, 2005). People's practices within organizations are strongly influenced by management's expectations and the specific measures it implements. Manuele (2014) notes, "Safety is culture driven, and the board of directors and senior management define the culture and the *system of expected performance*" (p. 144). The safety measures chosen promote management's expectations regarding safety performance. When these measures are well executed, they have a powerful influence on the development of an organization's safety culture (Blair & O'Toole, 2010).

Strategy, Safety & Measure Defined

Strategy is a careful plan or method for achieving a particular goal usually over a long period. Synonyms include *blueprint*, *game plan*, *road map*, *scheme* and *system*.

Strategic is defined as relating to a general plan that is created to achieve a goal in war, politics, etc., usually over a long period.

Safety is defined as "the control of recognized hazards to achieve an acceptable level of risk" (Lack, 2001, p. 89). Conklin (2012) provides a practical definition of *safety*: "Safety is not the absence of events; safety is the presence of defenses" (p. 8).

One component of the definition of *measure* (n.) is an estimate of what is to be expected of a person or situation. Synonyms include *expedient*, *means*, *move*, *shift*, *step* and *gauge*.

Strategic Safety Measures Defined

Strategic safety measures are related to the concept of leading indicators. The term *leading indicators* has not been clearly defined in a way that has been broadly accepted in the safety profession. Manuele (2003) suggests considering the following elements for leading indicators offered by various speakers and writers:

- Having defined the problems, through analyses of hazards and risk assessments, leading indicators are those actions that point you to where you want to be in relation to the problems identified.
- Leading indicators are the quantifiable measures of the efforts being made to prevent accidents.
- Leading indicators are measurements linked to actions taken to prevent accidents; trailing or lagging indicators are measurements linked to the outcomes of accidents.
- Leading indicators are those safety activities that favorably impact on trailing indicators, and

Earl Blair, CSP, teaches safety management courses at Eastern Kentucky University in Richmond, KY. He has worked as a safety professional in various industries and is a past director of the safety management program at Indiana University. Blair conducts research and educates safety professionals in safety management, leadership and measurement. He is a professional member of ASSE's Louisville Chapter and a member of the Society's Consultants Practice Specialty.

thereby validate the financial business case for the efforts being undertaken.

•Leading indicators are the performance drivers that communicate how outcome measures are to be achieved. (Manuele, 2003, pp. 438-439)

From suggestions provided by Manuele (2001), the following definition of *strategic safety measures* is offered:

Strategic safety measures are selected through risk assessment prioritization and developed by identifying the relevant safety needs of an organization; appropriate control methods are established to eliminate or reduce the likelihood of injuries and illnesses.

Strategic safety measures further encompass the concepts of:
•predicting future safety performance;
•impacting an organization's safety culture;
•focusing on preventing serious injuries and fatalities;
•providing prescriptive solutions for reducing injuries.

Criteria for effective strategic safety measures include the following:

1) Customized measures: Strategic measures are customized and relevant for specific sites; customizing measures means that risk assessment is conducted to select measures and specific actions that minimize injuries and reduce exposures.

2) Targets established: Each measure includes specific targets or SMART goals as defined in ANSI/ASSE Z10-2012 Appendix E (p. 42). SMART goals are specific, measurable, actionable, realistic and time-oriented. They clearly identify elements such as:
•outcome;
•parties involved;
•goals;
•current and target status/position (i.e., where are we now, where do we want to be);
•timeline;
•requirements and constraints;
•specific reasons, purpose or benefits.

Example: "Increase daily production of widgets by 100" is more effective than "Do your best to improve productivity," which is a vague objective.

3) Success measures: Strategic measures are success measures rather than failure measures. Success ultimately involves favorable correlation between the implementation of strategic measures and the reduction of outcomes in trailing indicators such as numbers of injuries and incident rates related to the measure.

4) Communication and feedback: Employees are provided with regular and current feedback on strategic safety measures.

IN BRIEF
•Safety measures that are strategically planned and effectively implemented can greatly improve performance and influence the development of safety culture.
•This article defines strategies for measuring the safety issues that matter most and highlights the expected benefits of deploying strategic safety measures.
•It discusses practical applications of strategic safety measures for consideration in selecting and implementing the best safety measures for an organization. Seven benefits of strategic safety measures are analyzed.

Traditional lagging safety measures are not safety measures at all, but rather a measure of the lack of safety. Injuries and mistakes are measures of unwanted events, not a measure of actions taken to make the workplace safer.

5) Implementation and execution: The measures are meticulously implemented and consistently executed over time.

6) Evaluation and improvement: The measures are periodically evaluated for effectiveness such as comparing to traditional lagging measures for positive correlation.

7) Flexible and progressive: The measures are modified and improved as needed. As situations change measures may be replaced by more relevant measures. Keeping strategic measures flexible and progressive allows for safety measures to evolve over time.

How Are Strategic Safety Measures Different From Traditional Safety Measures?

Traditional lagging safety measures are not safety measures at all, but rather a measure of the lack of safety. Essentially, these are injury measures. These traditional measures are negative and report an organization's mistakes and injuries. Injuries and mistakes are measures of unwanted events, not a measure of actions taken to make the workplace safer. Bradford (2001) addresses this concern precisely:

The term *safety statistics* is technically a misstatement. The statistics referred to are, in fact, injury statistics, since the numbers reflect the aftermath or results of *unsafe* events, not safe ones. Without precise and objective definitions of what constitutes safe performance, individuals are left to conclude that any and all actions that do not result in injury are accepted as safe. Injury statistics, while valid measures of failure, are invalid measures of *safe* performance. (p. 69)

As Mathis and Galloway (2013) state:

The lagging indicators are important, but they do not tell the big picture nor are they prescriptive. They tell you if you have a problem, but they do not diagnose the problem or reveal the solution very effectively. . . . It is not just a matter of leading and lagging indicators. It is a matter of failure and success metrics. We tend to measure what we do not want and fail to measure what we do want. Good measures aid improvement

and motivate people to want to improve. How excited are the individuals in your organization about your current measurements? Do your measurements prescribe how to get better and describe precisely why you are achieving your current goals? (p. 98)

Mathis and Galloway (2013) believe the trends in safety metrics are moving toward a balanced scorecard approach to safety measurement. They describe this approach in the book, *Steps to Safety Culture Excellence* (pp. 102-104).

How Strategic Safety Measures Improve Safety Performance

The remainder of this article describes seven expected benefits of strategic safety measures when they are thoughtfully selected, carefully developed and meticulously implemented. These benefits show how strategic safety measures have the potential to seriously impact safety performance and lead to long-term safety culture development.

1) Illuminate an Organization's Safety Expectations

The development and implementation of good leading safety indicators make explicit the organization's safety expectations. Management can clearly communicate its expectations through the specific measures and targets established.

Employees will strive to accomplish targets that are included in the strategic safety measures. It has been said that people will do what management measures, not necessarily what management expects. Ideally, management's safety expectations are encoded in the measures advanced. If management does not measure for safety performance or is vague about what it expects, the result is a lack of accountability for safety and lack of clarity regarding the safety roles among the workforce.

For example, if management targets a single lagging measure (e.g., zero injuries), this is an outcome measure that, used alone, fails to illuminate and measure the specific path on how to achieve zero injuries. Different people will interpret the meaning of a zero-injury measure in different ways. For example, since many employees may not believe it is possible to go from numerous injuries to zero over a short time, they may believe the way to achieve the goal is to report no work-related injuries. Others may think the way to reach the goal is to continue taking behavioral risks that have been taken for years and that save time, but to simply stay more focused on the task while simultaneously taking risks. However, well-defined measures get right to the point of what employees need to do for safety and tend to cut through the vagueness.

Well-defined strategic measures make safety performance more visible, especially regarding what people are doing for safety. Leading measures assess activities, behaviors and processes. Relevant measures enhance the visibility of the actions an organization takes for safety. OSH professionals can and should measure difficult-to-measure, yet desirable intangibles in safety. Developing mea-

sures for these core intangibles is vital to safety performance; these measures include elements such as management commitment and support, employee involvement and engagement, and actions taken to eliminate or reduce existing risks, hazards and exposures.

Practical Application: Measures to Make the Safety Effort More Visible

For management, a self-administered safety measure for influencing the safety culture is to walk around. This involves organizational leaders purposefully walking the workplace to monitor, listen, advise and address issues related to safety. The effect is powerful. In the author's opinion, demonstrating safety leadership by walking around is the single best way to develop the safety culture (for more on this technique, see Blair, 2013).

For associates, measurement choices can provide various ways to support the safety effort based on individual strengths and interests. These may include participating in safety meetings to solve issues related to safety performance, or participating in hazard identification. Many ways exist for employees to be involved in safety and to contribute to the effectiveness of safety inspections, training and committees. Finding specific ways to incorporate employee involvement and measuring that involvement is an important part of making safety visible and developing the safety culture.

2) Improve Objectivity & Fairness

Spitzer (2007) states that people like measuring and being measured, but they do not like to be judged, especially when that judgment is based on subjective opinion. Many managers have been judged on their safety performance based solely on injuries. This may occur even in a relatively small department in which a single injury skews the incident rate. It may be that the manager or supervisor is doing many of the right things to impact future safety performance, but they may be evaluated simply on the injury results.

While some employees may believe this is unfair, it is simply how business is conducted for some companies. Generally, how employees perceive measurement depends on the purpose of the measure (e.g., when objective measures are used to learn and improve the measures are positively viewed by employees).

McKnight (2015) offers a formula to determine the safety assurance factor in the construction industry. The lagging events are tallied and tracked since the total recordable incident frequency (TRIF, Canada) is a formal measure of lagging events and "TRIF is a poor measure of what workers do every day to prevent incidents."

In this construction case, McKnight relates that leading actions are weighted and include the number of daily equipment inspections, tailgate meetings, field-level hazard assessments and observations. Weekly actions include site inspections and safety meetings. Lagging events include lost-time injuries, medical-aid injuries (Canada), near-hits, security incidents and property damage.

These leading actions empower the construction workers and engage the frontline leaders, sending a message that taking action to work safely is important to the organization. A balance of leading actions and lagging events is a more accurate and fair measure of what an organization is doing for safety than simply relying on outcome or lagging events. The resulting scoreboard includes this mix of leading actions and lagging events, and creates a more comprehensive picture of the company's safety performance.

3) Increase Safety Awareness

Some organizations report that before implementing leading safety measures, safety conversations were primarily about numbers (e.g., incident rates). Once leading measures are implemented, however, employees often discuss specific details of how they are making the workplace safer. This is a logical progression of safety since managers and employees are now being measured and held accountable for the substance of what they are doing to improve safety performance.

An organization may have goals regarding incident rates and other traditional measures. Since strategic safety measures are success measures that deal with eliminating hazards and reducing exposures, these measures clarify how to meet the expectations established through lagging measures. Put another way, strategic measures focus on the process that affects the results rather than focusing solely on the results. This clarity increases safety awareness for both managers and employees.

Well-designed measures help employees focus on the important safety interventions that are being measured. This is important for safety performance because employees have many things competing for their time and attention. In the absence of good measurement, it is human nature to pay attention to the unusual or the annoying. The time for employees to be focused on safety is before injuries occur; serious injuries are an undesirable way for employees to become more aware of safety.

### Practical Application: Measures to Increase Safety Awareness

Perhaps the best way to increase safety awareness is through communication and conversations. Petersen (2005) provides an example of objective indicators/measures for the communication element of safety:

Objective: Establish methods for communicating between all levels and functions of the organization.
   Indicators/measures:
   •Systems are established for employee reporting of safety issues and concerns without fear of reprisal and there is a process for management response and feedback.
   •Methods are established for communicating goals and objectives, safety performance (trailing indicators), incident prevention activities (leading indicators), opportunities for improvement, successes and recognition and other safety/health information.
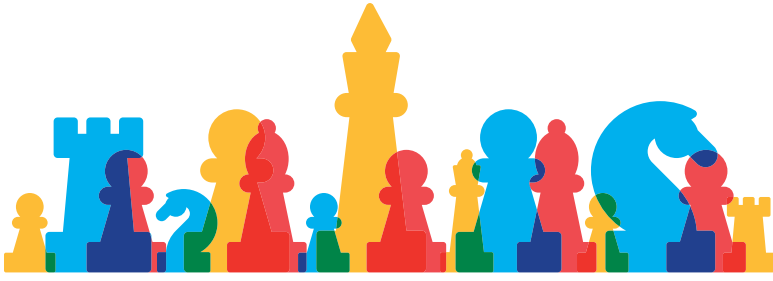
Strategic safety measures are early warning signs of full-blown problems. These red flags enable an organization to prioritize and focus on problem areas. When safety issues are not addressed early on the long-term consequences will likely be more severe.

•Safe work practices (e.g., safety rules) are consistently communicated to all employees and are actively monitored. (p. 156)

Regarding the use of conversations by management as a way to improve safety performance, Conklin (2012) provides the following advice based on concepts from the field of human performance improvement:

Probably the best advice that can be given when engaging management in the many discussions around changing the way they respond to human performance issues in your organization is to build relationships through conversations—not through browbeating and lecturing. Change happens through dialogue. (p. 93)

Conklin (2012) covers ways to identify pre-incidents, then asks a provocative, but highly relevant question to use during conversations conducted to encourage incident reporting:

Getting real information has more to do with trust and relationship building with those closest to the potential failure than it has to do with recordkeeping, computer systems and accounting.

Interview your workers: Ask workers what works and what does not work within your organization, then listen carefully to how they answer these questions. . . . This is a gold mine of data. Mostly, you are interviewing workers to ask them to tell you the story of working in your organization. This dialog will tell you where failures can happen before they happen.

Listen to your workers: Ask your workers where the next accident will happen; you will be surprised by what you will learn. They are brilliant at this CSI task. . . . Remember that when you ask workers for this type of input, you must then do something with this information. (pp. 47, 49).

Safety conversations such as those Conklin (2012) describes are important, perhaps enough so that an organization would want to develop a metric to encourage safety conversations to occur meaningfully and regularly.

4) Influence Supportive & Safe Behaviors

By definition, strategic safety measures emphasize behaviors and activities. As noted, behavior is affected by what is measured. When goals are established and process measures are implemented, then the behavior that follows can be predicted.

Good measures enhance safety execution. Good execution involves bridging the gap between knowing and doing, and is a prerequisite to reaching safety goals. It is important for organizations to both measure the right things and execute those measures well.

McSween (2001) makes a distinction between Type One measures (e.g., is the work being done safely?) and Type Two measures (e.g., are employees, including management, supporting the safety effort?) In many cases, management and employees should be performing Type One (working safely) and Type Two (supporting the safety effort) behaviors. However, the balance between these two measures is that management should be performing mostly Type Two behaviors, supporting the safety efforts, and employees should be expected to work safely (Type One behaviors).

A note about safety-related behavior: The behavior of management is generally more important than the behavior of employees to safety performance. Management sets the tone for safety, and management's behaviors and words are greatly leveraged compared to the average employee's behavior.

Well-chosen leading measures drive the right behaviors. Contrast this to incentive programs based on lagging indicators; most safety professionals, as well as OSHA, recognize that traditional safety incentive programs often reward the wrong behaviors (e.g. not reporting minor injuries).

Practical Application: Measures That Influence Management & Employee Behavior

Observational sampling or a form of observation and coaching may be implemented. Observations may be conducted from the supervisory level, or they may be conducted on a peer-to-peer basis among the workforce. These observations may work best as planned and structured observations. Appropriate education and training are required leading into such initiatives.

A large food manufacturing company provides a practical example of a safety-related measure that can positively influence both management and employee behavior. This metric evaluates the follow-up rates related to safety corrective actions. This leadership measure belongs to management. When management consistently follows up on correcting identified hazards, employees can witness this dedication and visible support for safety.

One way to assess the accomplishment of corrective action follow-up is to track the percentage of corrective actions completed over a rolling time frame, such as 30 days or 3 months. Then, the percentage of completed corrections from the number of submitted corrections can be calculated and scored using a visible system such as green light, yellow light and red light. For example:

•> 80% = green light
•> 60% completed = yellow light
•< 60% completed = red light

Although this point can be argued, theoretically, the number of safety corrective actions required would be reduced over time as this metric is successfully implemented.

5) Improve Identification of Priorities

Strategic safety measures are early warning signs of full-blown problems. For example, well-designed safety perception surveys may reveal important weaknesses or threats. These red flags enable an organization to prioritize and focus on problem areas. This is important because when safety issues are not addressed early on the long-term consequences will likely be more severe.

Once issues are identified and prioritized, strategic measures help an organization solve problems and improve decision making. Unsafe conditions and risky acts that occur in the workplace are symptoms of deeper issues. Many organizations deal with symptoms and consider the problem solved. However, the removal of a symptom generally does not solve the underlying problems. If an organization systematically measures its safety processes, then the primary causes are easier to identify, prioritize and solve.

Decisions based on the data collected from leading safety measures are often better choices. Decisions based on hard evidence are more effective than decisions based on intuition.

Once safety priorities are established from a thorough risk assessment, OSH professionals must ensure through their related measures or systems that management follows up to address those priorities. Ideally, management will eliminate some top-priority hazards. When elimination is not possible, alternative interventions may exist (e.g., substitution, engineering controls, administrative controls).

Practical Application: Measure for Determining Safety Priorities

Determining which strategic measures to select should probably begin with risk assessment. Since the hazards, exposures and risks differ from one organization to another, strategic measures are best customized by site and tailored to actions an organization takes to eliminate or reduce risks.

ANSI/ASSE Z10-2012, Standard on Occupational Health and Safety Management Systems, delineates the requirements for risk assessment and prioritization in safety management systems:

> Processes are to be in place to: assess management system issues and assess the level of risk for identified hazards; establish priorities based on factors such as the level of risk; and identify underlying causes and other contributing factors related to system deficiencies that lead to hazards and risks. (Section 4.2)

Manuele (2009) suggests:

> In communicating with decision makers on risk levels and proposed interventions in safety management systems, a risk assess-

Accuracy of Prediction
Selecting Leading Measures Is a Hypothesis That Specific Activities Will Produce Results

We cannot predict the future. When an organization does a thorough job of developing the measures it believes will reduce injuries, the measures are akin to a prediction that achieving the goals tied to the leading measures will reduce injuries. This hypothesis is based on evidence related to the fact that effective safety management is both an art and a science.

The science may correlate with existing metrics, such as the trends and priorities that appear over time in lagging measures. Based on injury rates and specific types of injuries that occur, one might develop a hypothesis about the kinds of interventions needed to reduce or eliminate those injuries. Once interventions are analyzed (the art), specific interventions may be chosen as ongoing measures for safety improvement.

The art of designing effective leading measures could involve the knowledge gained by the safety professional through extensive field experience, education and reading safety-related literature.

Why are predictive safety measures essential to safety performance? Leadership in safety requires a clear understanding of:
1) where the organization currently stands regarding safety performance;
2) where the organization desires to go in safety performance;
3) how to provide the will and knowledge to get there.

Effective safety leaders clearly see these elements and hold a vivid vision for the goal. Although no one can predict the future with 100% accuracy, leaders and safety professionals may be able to predict what the future holds for an organization based on the current culture, systems, behaviors, trends and initiatives. The art of selecting and designing measures that will affect the future includes an element of science based on current statistics and an element of art based on prediction.

ment matrix should be used. A matrix provides methods to categorize combinations of probability of occurrence and severity of harm, thus establishing risk levels. It provides a base from which to determine the extent of the risk reduction to be achieved from the actions taken on hazard/risk recommendations being considered.
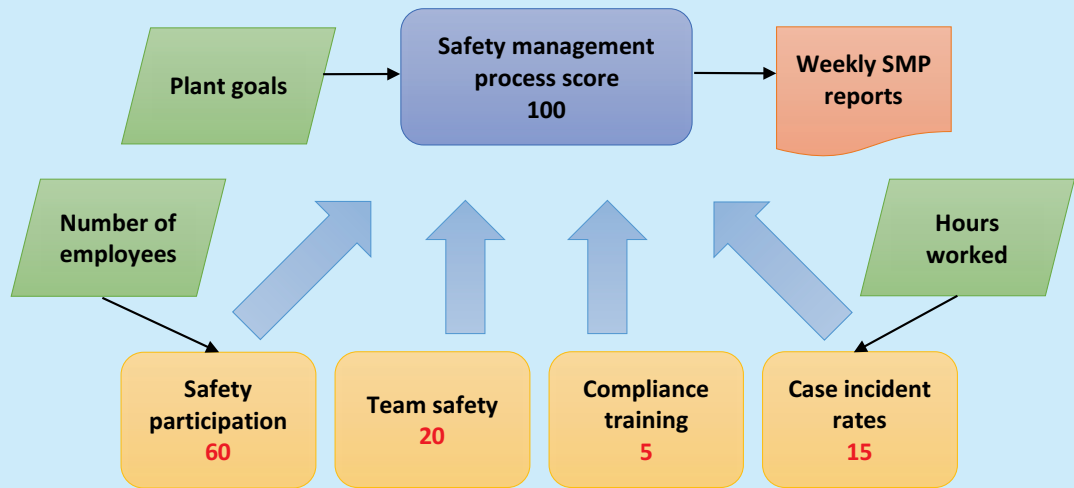
Also, a risk matrix can be used to compare and prioritize risks, and to effectively allocate mitigation resources. . . . It should be noted that the numbers presented are arrived at judgmentally and are qualitative. They are not quantitative. The numbers are significant only in relation to each other. (p. 33)

For more information on conducting hazard analysis and risk assessments, Manuele's (2014), *Advanced Safety Management* (2nd ed.) is recommended. Chapters 11, 12 and 13 provide a primer on hazard analysis and risk assessment with numerous examples of three- and four-dimensional risk scoring systems. Since the book focuses on ANSI/ASSE Z10-2012, an organization that follows Manuele's (2014) counsel will be aligning with a state-of-the-art standard.

6) Affect Accuracy of Prediction

It is not possible to predict the future with 100% accuracy. However, strategic safety measures en-

FIGURE 1
Safety Management Process

Plant goals → **Safety management process score 100** → **Weekly SMP reports**

Number of employees

Hours worked

Safety participation 60   **Team safety 20**   **Compliance training 5**   **Case incident rates 15**

Note. Adapted from "Safety Management Process: Proactive Safety Metrics That Drive Performance in Manufacturing Facilities," by A.M. Bevington, 2006, Proceedings of the 2006 ASSE Professional Development Conference, Seattle, WA.

able some prediction. Safety professionals add value to an organization when they explain where the organization is headed based on current information. Strategically selected safety measures can provide predictive information.

Spitzer (2007) says:

Prediction is essential for effective management. In fact, as Deming said, "Management is prediction." One of the most important functions of measurement is to enable prediction. . . . Almost everything we do involves some form of prediction, according to some theory of action. A theory is nothing more than a cause-and-effect prediction about how planned actions lead to expected outcomes. . . . Without theory, we have nothing to revise and nothing to learn. We learn by comparing predictions from theory with actual data. (pp. 154-155)

Spitzer (2007) further makes the case for predictive measurement. This information is highly applicable and needed for strategic safety measures:

Today, most measurement still focuses on the past and the present, and it does not serve effectively as a guide for the future. This is because traditional measurement can do nothing except collect data on what has already happened. The winners in business must be able to see beyond the obvious, and be able to manage the future.

I see blindness to the obvious all the time when leaders are steering their organizations through the turbulent seas with their eyes fixed on the rearview-mirror of their financial statements and antiquated assumptions. Our mental models and existing measures keep us stuck in the past.

Most of the future is fairly predictable (I'd say about 90%). There is some future that is almost

unpredictable, but new measures and new mental models can help us prepare better for that future. (pp. 209-210)

7) Include Opportunities for Employee Learning, Growth & Engagement

Employees embrace measures that present growth opportunity. They generally dislike measures that are implemented primarily to inspect, judge or discipline them. Positive measures that make a difference are more likely to be accepted and even enthusiastically enacted by many, especially when employees have a voice in developing the measure.

Safety can be a starting point for both individual growth and organizational development. Well-developed safety measures offer this opportunity for personal and organizational growth. The benefits of focusing on strategic measures to improve safety performance can spread beyond safety.

Blair and O'Toole (2010) suggest that leading safety measures can be the catalyst for developing an organization's safety climate and culture. While acknowledging that both organizational culture and safety culture are influenced primarily by leadership, another way to influence safety culture is to establish and implement metrics that drive safety performance. When leadership embraces strategic safety measures and promotes the clear expectation for the achievement of those measures, the safety culture will advance as the resulting practices are followed.

Leading measures give an opportunity for setting realistic yet challenging goals that require individuals and teams to stretch. Spitzer (2007) explains, "Few people realize that a goal is really nothing more than a 'target value' established on a particular measurement scale" (p. 17). The organization must specifically define that scale. Each

measure should include a relevant goal. Having a measure without a goal is like getting into a vehicle without a destination in mind.

Can an organization expect a reduction in injuries if it implements strategic measures that engage employees in supporting the safety process? Bevington (2006) designed a computer-based, proactive safety metric tool to drive performance in manufacturing facilities that she called the Safety Management Process (SMP). This case study in a large beverage facility provides a practical example of how one company developed an expectation that employees would participate in five safety-related activities per month.

The organization began with the hypothesis that proactive involvement in safety would result in fewer injuries and defined specific ways for employees to be engaged in safety. Employees could choose which activities to participate in to meet a quota of activities to support safety efforts. Their options included:
• safety observations;
• safety inspections;
• initiating a safety work order;
• hazard hunts;
• participate in safety meeting;
• lead a stretching session.
Bevington (2006) believed this metric could succeed because employees could choose their options.

Overall, the SMP was a weighted metric based on a total of 100 points. Employee participation was 60% of the total weight, and the 60 possible points for each individual was based on participating in five safety-related activities per month for 12 months (12 months x 5 activities = 60 possible points). Team projects to improve safety were weighted at 20%, compliance training at 5% for a total weight of 85% for leading measures. The remaining 15% of the SMP score was based on trailing indicators. Bevington (2006) was especially pleased that the SMP was based on 85% proactive measures and just 15% reactive measures. Figure 1 shows a graphic of each elements' weightings.

The SMP scores revealed a high level of employee participation in safety and a large number of team safety projects completed. The percentage of employees attending all compliance training programs each year increased from 40% before the SMP implementation to more than 99%. Perhaps most importantly during the 4-year period when the SMP was implemented, the total case incident rate dropped approximately 50%.

Conclusion

The benefits outlined here are merely a starting point, as an organization can reap other benefits. Use of strategic safety measures does not negate trailing measures or the value they provide.

Strategic safety measures assess efforts to reduce hazards and exposures, and ultimately can help an organization significantly reduce workplace injuries.

Ideally strategic safety measures are preventive, predictive and prescriptive. They also influence the long-term development of safety culture. Their se-

lection, development and delivery are both an art and science. Arriving at the most effective safety measures for the organization can be challenging, yet it is ultimately rewarding once safety performance improves.

Well-chosen and meticulously implemented strategic safety measures can greatly improve an organization's safety performance and safety culture. Strategic safety measures provide a solid method to help organizations and safety professionals get to where they want to go. **PS**

References

ANSI/ASSE. (2012). Occupational Health and Safety Management Systems (ANSI/ASSE Standard No. Z10-2012). Retrieved from www.asse.org/ansiaihaasse-z10-2012-occupational-health-safety-management-systems

Bevington, A.M. (2006). Safety management process: Proactive safety metrics that drive performance in manufacturing facilities (Session No. 542). *Proceedings of the 2006 ASSE Professional Development Conference, Seattle, WA.*

Blair, E.H. (2013, Nov.). Building safety culture: Three practical strategies. *Professional Safety, 58*(11), 59-65.

Blair, E.H. & O'Toole, M. (2010, Aug.). Leading measures: Enhancing safety climate and driving safety performance. *Professional Safety, 55*(8), 29-34.

Bradford, D. (2001). Eliminating the causes of human error: The key to sustaining injury-free performance. *Proceedings of the ASSE Behavioral Safety Symposium: The Next Step, Orlando, FL.*

Conklin, T. (2012). *Pre-accident investigations: An introduction to organizational safety.* Boca Raton, FL: CRC Press.

Hopkins, A. (2005). *Safety, culture and risk: The organizational causes of disasters.* Sydney, Australia: CCH.

Lack, R.W. (Ed.). (2001). *The dictionary of terms used in the safety profession* (4th ed.). Des Plaines, IL: ASSE.

Manuele, F.A. (2001). *Innovations in safety management: Addressing career knowledge needs.* Hoboken, NJ: John Wiley & Sons.

Manuele, F.A. (2003). *On the practice of safety* (3rd ed.). Hoboken, NJ: John Wiley & Sons.

Manuele, F.A. (2009, Dec.). Leading and lagging indicators: Do they add value to the practice of safety? *Professional Safety, 59*(12), 28-33.

Manuele, F.A. (2014). *Advanced safety management: Focusing on Z10 and serious injury prevention* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Mathis, T.L. & Galloway, S.M. (2013). *Steps to safety culture excellence.* Hoboken, NJ: John Wiley & Sons.

McKnight, R. (2015, May). Leading actions and lagging events: Finding the right balance. *Professional Safety, 60*(5), 65-67.

McSween, T. (2001). Measure up! Promoting improvement through behavioral safety. *Proceedings of the ASSE Behavioral Safety Symposium: The Next Step, Orlando, FL.*

Petersen, D. (2005). *Measurement of safety performance.* Des Plaines, IL: ASSE.

Spitzer, D. (2007). *Transforming performance measurement: Rethinking the way we measure and drive organizational success.* New York, NY: AMACOM.