

Cross-Functional Improvement

Behavior-based safety as a tool for organizational success

By Thomas R. Krause

WHEN COMPANIES ACHIEVE SUSTAINED improvement in safety performance, they also necessarily improve functions throughout the larger organization. In fact, some management teams are purposely using behavior-based safety (BBS) methods to lead cross-functional improvement initiatives. This article expands on lessons learned by the author and his associates. It addresses the organizational rationale for “leading with safety”; discusses how to bridge from safety to more general performance improvement using “organizational functioning” as a core methodology; and reviews case histories of organizations using this approach.

Why Lead with Safety?

One can cite several good reasons to lead overall performance improvement with a dynamic safety improvement process. Compared to other areas of group performance improvement, safety has an immediate value for all levels throughout an organization, a nationally recognized standard of measurement and demonstrated long-term results.

Immediate value for all levels. Employees may buy into a safety initiative more readily than most other performance improvement targets. Health and well-being have immediate universal appeal in a way that improved productivity may not—employees recognize the natural benefit safety improvement provides. Of course, this natural connection and interest can be squandered by misguided approaches that are poorly attuned to underlying principles of human behavior.

Nationally recognized measure. Another reason to lead improvement with safety is the existence of a nationally established outcome measure (OSHA recordable rate) that organizations are used to paying attention to. Regular progress updates maintain awareness of the improvement effort and help motivate management to maintain support for that effort.

Although the OSHA measure has come under criticism (much of it valid) in recent years, it is rare to find a clean outcome measure in other areas (such as quality) that is in the line-of-sight of most employees and is predicted by a set of behaviors. Furthermore, the lack of such a measure causes problems

much greater than those caused by the misuse of existing safety measurement systems.

Demonstrated long-term results. The third reason to lead organizational improvement with safety is that demonstrated results show that with the proper methodology, safety can be improved dramatically in a long-lasting way, while other kinds of organization-change initiatives are often short-lived. Recent studies on the effectiveness of BBS include an in-depth survey by Sulzer-Azaroff and Austin (19+) and a five-year follow-up study by the author with 73 clients (Krause, et al).

Defining BBS

With so many different initiatives being referred to as “behavior-based safety,” it is important to discuss criteria for the definition of the activity. In the author’s view, the most effective way to approach BBS is as an integrated, interdisciplinary activity, drawing not only from applied behavior analysis, but from quality management, organization development, and safety and risk management. The four key activities are 1) identify critical behaviors; 2) gather data on those behaviors; 3) provide ongoing, two-way feedback; and 4) remove barriers to safe behavior. Although this list may seem familiar, the fourth activity is the least understood and the most important for long-term success. Companies must understand the significance of using data gathered during observations to continuously improve the facility and the work process (Krause).

Five-Point Checklist for BBS

The following checklist can be used to evaluate whether a particular BBS initiative is likely to be worthwhile.

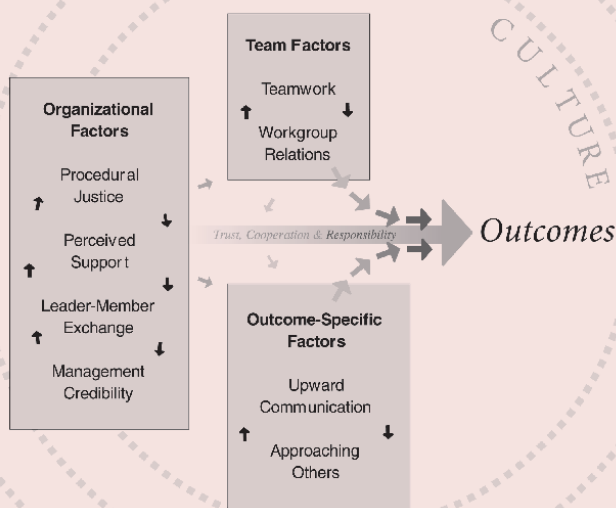
1) Does the initiative have an inappropriate focus on the worker? This not only creates the implication that the initiative “blames the worker,” it prevents an appropriate focus on the system.

2) Is observation data used to improve facilities? Good observation data reveal where barriers to safe work exist; action plans that use this data

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Figure 1

Organization Qualities that Contribute to Outcomes



improve the working interface and have a significant impact on facilities, design, equipment and how work is performed.

3) Are incident-based incentives used to motivate participation? Incentives are another form of inappropriate focus on the worker; they can create a culture that drives data underground; divert attention from facility safety issues; and cast doubt on whether the organization truly cares about safety.

4) Are SH&E professionals used appropriately? SH&E professionals should primarily focus on identifying and remediating hazards and conducting root-cause analysis, while front-line employees, as well as managers and supervisors, must be engaged in the process itself.

5) Does the initiative supplement or replace the safety system? The role of BBS is to function as one component of a comprehensive safety system; it is not designed to replace the overall safety system.

These five criteria can help companies that want to distinguish those initiatives which are likely to be lasting and useful from those that are likely to be temporary and not useful.

To truly improve safety, one must also improve the larger organization. SH&E professionals have long known and advocated this approach, but it is difficult to convince management. It means that the way in which an organization functions with respect to safety is indicative of the way that it functions more generally. As organizational functioning improves, so

does safety functioning; and, as safety improves, organizational effectiveness improves. It is naïve to think one can significantly improve safety functioning without addressing organizational issues.

The Bridge from Safety to Improved Organizational Function

Since 1985, the author and his associates have explored the link between organizational effectiveness and performance improvement. What is that link and how can it be assessed and improved? One visible example of this strategy is Paul O'Neill, the current U.S. Secretary of Treasury. He is the former CEO of Alcoa and a former president of International Paper Co., where his overall strategy was to make safety improvement the focus of his leadership efforts. O'Neill holds that when organizations function at a high level in safety, many positive things follow, including improvements in morale, communication and a sense of cohesiveness within the organization. During his tenure at these two firms, safety performance improved dramatically and the companies prospered (Wayne).

Assessing organizational functioning. Several related questions are implied in this process: What is organizational functioning? How is it related to performance? How can its concepts be used

to set the stage for cross-functional performance improvement? Based on experience and existing research literature, nine causal factors that contribute to powerful organizational qualities which are upstream indicators of performance outcomes have been identified (Figure 1).

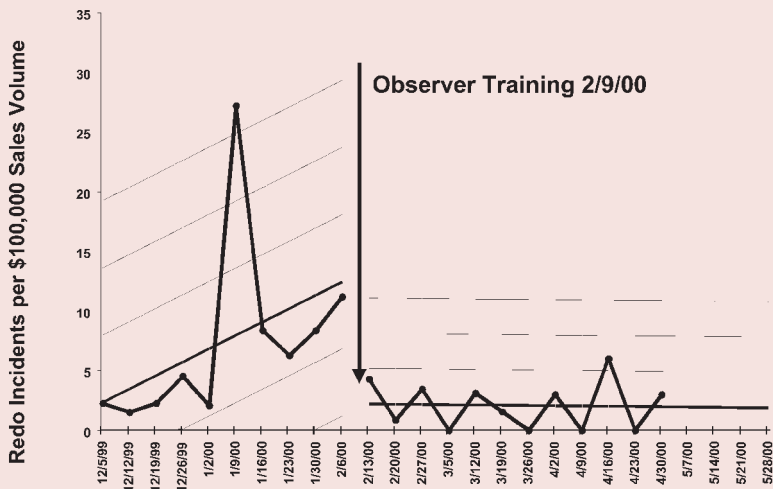
Outcomes. To assess organizational functioning, one must understand three categories: causes, qualities and outcomes. Outcomes refer to "end of the pipe" measures that tell a company how it is doing in a particular performance area. In safety, this outcome is typically injury frequency rate or the frequency with which the workforce uses identified safe behavior. In quality, the outcome measure may be a customer service rating, or rates of throughput efficiency indicating reductions in errors, rework or scrap.

Organizational qualities. Upstream from outcomes, one must identify which organizational qualities contribute to desired outcomes. These include:

- organizational commitment;
- openness to change;
- job satisfaction level of individual employees (extent to which they feel organizational commitment to them, which affects their willingness to change instead of resist change initiatives);
- trust and respect levels between supervisors and workers;
- organizational citizenship behavior (extent to which employees feel free to do things above and beyond actual job requirements);

Figure 2

Behavior-Based Improvement in Redo Rate



- communication and cooperation level between employees.

A relationship exists between these organizational effects and performance outcomes; levels of job satisfaction, commitment, resistance to change, trust and respect, and cooperation are correlated. Clearly, performance will be higher with these organizational effects than without them. The challenge is to identify and foster root causes that produce positive organizational effects.

Root causes. Based on extensive review of the research literature, nine causal factors have been identified, distributed across three categories: structural factors, team factors and performance-specific factors.

Structural factors. This encompasses procedural justice, leader-member exchange, management credibility and perceived organizational support. Procedural justice refers to perceived fairness in the actions of first-level supervisors. Do employees think that supervisors are fair in the way they make decisions that have impact on employees' work life?

Leader-member exchange refers to whether employees believe their relationship with their supervisors is strong. For example, do employees think the supervisor will "go to bat" for them or will the supervisor leave them "out on a limb"? Management credibility reflects whether employees believe that upper management uses honesty, consistency and fairness in dealing with workers. Note that this refers to managers where previous factors referred to supervisors. Perceived organizational support refers to whether employees believe that the organization is concerned with their needs and interests, and is available to support them.

Team factors. The second group of factors involves team relations. It covers causal factors of workgroup relations and teamwork. Workgroup relations refers to perceptions about the degree to which coworkers treat each other with respect, listen to each other, help each other and deliver on commitments. Teamwork refers to the perceived effectiveness of workgroups.

Performance-specific factors. This category varies with the targeted area of performance—customer

success, productivity, safety, quality, employee satisfaction, decision making, etc. The first six causal factors affect performance generally—their impact is not limited to a particular area (such as safety performance). The model includes the following performance-specific factors: organizational value for performance improvement, ease of upward communication and ease of approaching others.

For safety performance, organizational value of performance improvement refers to the perception of how the organization gener-

ally values safety. This is shown by the priority given to safety, the character of information shared, and management's willingness to invest in safety issues. Upward safety communication refers to the quality and quantity of upward messages about safety. Approaching others refers to the likelihood that workers will speak to coworkers when they are thought to be at risk; this is related to a level of safe behavior in a workgroup.

Steps of Cross-Functional Improvement

To drive cross-functional performance improvement by leading with safety, the organization must know where it wants to go.

1) **Define the objective.** Safety performance objectives and related specific outcome criteria must be defined and announced at the beginning of the project. This establishes a clear-cut baseline that is crucial for analyzing results. Without such outcome criteria, one cannot measure success with clarity and certainty.

2) **Assess organization function.** The second step is to assess overall organization function specifically for each of the nine factors described earlier. This can be accomplished through interviews, surveys or focus groups.

3) **Design an implementation plan.** An implementation plan is then designed based on the findings of the assessment. If organizational functioning is high, the initial implementation can be more ambitious with a wider scope and will require fewer resources. However, if functioning is weak, initiative goals, scope and objectives, as well as resources, should be adjusted accordingly.

4) **Demonstrate success.** Outcome criteria are tracked as the initiative unfolds. When success has been demonstrated, new performance targets are specified.

5) **Define new objectives.** For example, a first objective might be to establish a continuous improvement mechanism for safety performance and to set the stage for expansion into quality.

Step 1 would identify measures for such an approach; these may include incident rate, safe

Employees may buy into a safety initiative more readily than other performance improvement targets.

behavior percentage, observation frequency and action planning frequency. In Step 2, the firm measures its overall function and completes and analyzes management surveys. In Step 3, the primary BBS process is implemented in a way that sets the stage for a subsequent improvement effort aimed at error reduction. This process involves several steps including talking with people about the importance of error reduction; emphasizing the relationship between safety and quality; beginning to assess quality outcome measures; and having observers note actions seen when observing behavior that has an impact on error reduction.

In Step 4, after the initial project is a demonstrated success, new outcome targets for error reduction (or customer service) are defined in terms of specific outcome criteria. At this stage, particular aspects of organizational functioning may be targeted. For example, if the assessment showed weaknesses in teamwork, and teamwork hindered the initial implementation, a specific intervention might be developed to improve this function.

Case Histories

Any type of performance improvement can be pursued using the approach presented in this article. This may include quality, customer service, environmental events and patient safety as well as decision making, and alignment of managerial and supervisory objectives. Target selection depends on specific priorities and resources. The following four case histories illustrate the experience of the author and his associates.

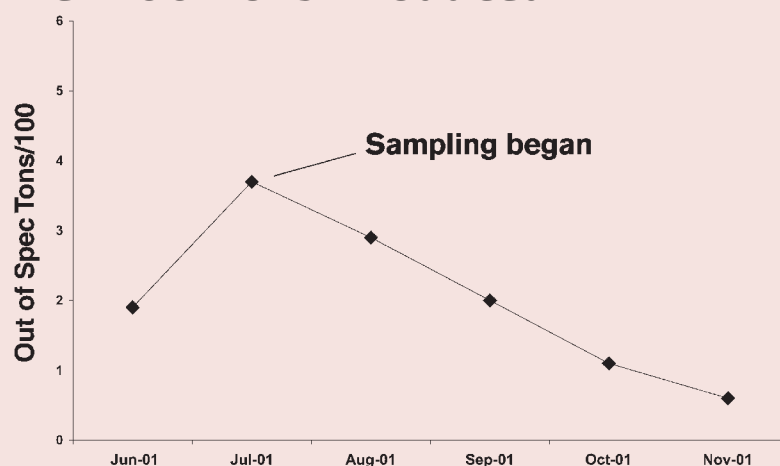
Quality Improvement

Quality improvement often naturally follows from safety improvement. It can be combined with safety from the beginning, or it can be a target following improvement in safety performance. Some critical behaviors for quality are not found in the safety arena. Critical quality-related behaviors mean much more than “checking for quality” and may include equipment and facilities aspects. Such behaviors are more likely to be job-specific than generic.

Identifying adequate outcome measures for quality is a challenge. Companies measure many different things relating to quality, but no single measure (like the OSHA recordable) is available to use as a baseline for comparison to determine performance improvement. This is a significant issue in terms of the strategy for performance improvement, which requires having a clear-cut outcome measure. Since this is a generic benefit to the organization, it is often a first priority to define a clear-cut outcome measure for quality. Observation strategy is also different in

Figure 3

Behavior-Based Improvement in Nonconforming Tons of Material Per 100 Tons Produced



quality in that more discussion and employee interviews are needed to determine whether critical points of intersection are working correctly.

Case Study 1: Reducing Rework in a National Printing Chain Store

A behavior-based customer service/quality model was developed for the flagship store of this corporate chain. While customer service is a high priority, most of the store’s production processes involve many hand-offs, which carry the associated possibilities of error and customer complaints. An initial review also showed that while employees were calibrated on what quality meant, they had no insight into actual rework levels.

The first step was to rework the tracking system to establish a meaningful outcome measure. With this downstream metric in place, focus shifted to establishing an upstream preventive intervention. An employee team captured workforce knowledge about behaviors that prevent rework at each point in the project flowchart. The team then created two data sheets of critical behaviors, one for the “place orders” station where work originates, and a second covering all other workstations. Key personnel were trained in observation and feedback, and data were entered into a tracking system.

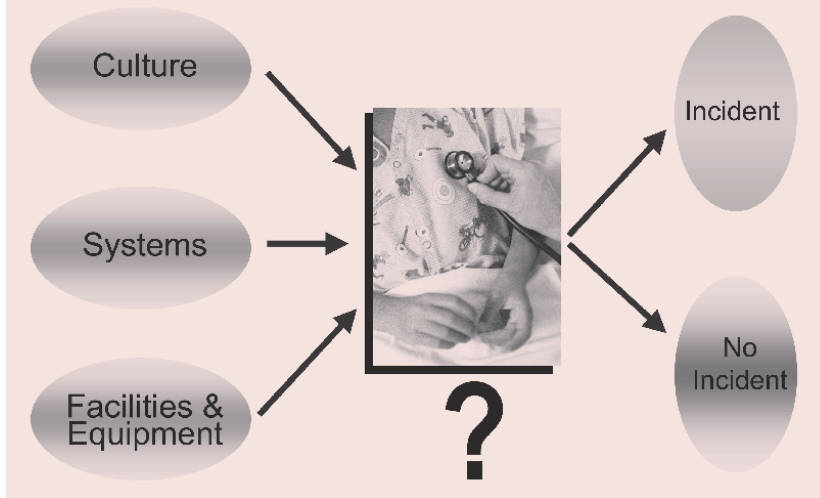
Figure 2 (pg. 29) shows the results of this intervention. In terms of statistical process control (SPC), the rework tracking system established that store production is in control—that the current rework rate is a function of underlying conditions and inputs at the store. To reduce the number of rework incidents, the store is systematically reinforcing behaviors that support quality and eliminating barriers to performing quality behaviors. Store personnel now understand the link between critical behaviors and rework incidents; as a result, the rework rate has dropped.

Case Study 2: Finding Capacity in a Refining Operation

This supplier of specialty clay minerals has used various quality studies to improve product confor-

Figure 4

Incident Model for a Healthcare Organization



the industry lacking in understanding of the relationship between an organization's performance and its systems, behavior and culture.

Using the integrated behavior-based methodologies described in this article, medication error, patient falls, improvement in teamwork, culture change or various other indicators could be targeted. The incident model (Figure 4) illustrates the commonality between factors that produce incidents in industry and in healthcare organizations.

mance. Faced with growing market pressure and a corporate challenge to improve profit margins, the supplier decided to consider a new approach: to extend in-use BBS methods to the areas of optimizing output and "finding" production capacity.

An operations excellence team was charged with focusing on one of the site's clay processing plants. Combining data from process flows, quality reports and frontline interviews, this team developed a list of behaviors critical to producing conforming product. Data were gathered using both traditional and exploratory field techniques, delivering data that the team could use to remove barriers to "quality-critical" behaviors.

Figure 3 shows that nonconformance in the plant has dropped from 3.7 tons per hundred in July 2001 (when behavioral sampling began) to 0.6 tons per hundred in November 2001—an 80-percent improvement. This reduction is also a gain in effective capacity because production time not spent on rework equals "new" out-the-door production capacity.

Improving Patient Safety

Since late 1999, medical errors have garnered much national attention. The Institute of Medicine's report, "To Err is Human: Building a Safer Health System," drew attention to the challenge of reducing the frequency of medical errors in the delivery of healthcare throughout the U.S. The report suggested that "the medical profession should learn from industry" and further that "an error reduction program should use well-understood safety principles."

Since the basic systems found in healthcare delivery are structurally similar to those found in industry (van Vuuren 13+), it follows that methodologies from industry should be integrated into the healthcare system. However, based on the author's experience, the culture of healthcare systems is significantly different than the culture of industry with respect to the prevention of adverse events. In industry, management generally believes it is its responsibility and well within its power to prevent injuries. By contrast, in healthcare, the more common viewpoint is that "incidents will happen," which leaves

Case Study 3: Improving a Community Hospital's Quality of Care

This rural 110-bed hospital had a good patient safety record, but hospital leadership recognized that improved quality-of-care would directly benefit patients and enhance the hospital's reputation. With these goals in mind, the hospital initiated a behavior-based intervention aimed at improving quality-of-care and reducing the risk of adverse events. The site selected rare, high-risk events as the initial intervention area. A cross-functional team used data to identify specific high-risk clinical procedures that are not frequently performed. The group established a baseline against which to measure improvement, then defined the current state of preparedness. Once these parameters were established, this group identified and systematically measured behaviors that directly affect preparedness.

Although this process is in its early stages, the hospital has already achieved some significant benefits. For example, the group has used accumulated behavioral data to remove barriers to preparedness for high-risk events. Doctors, nurses, clinical technicians and administrative staff report improved communications. In addition, an independent evaluation of the facility noted that the initiative has placed the hospital ahead of others in its proactive approach, positioning it well to meet new accreditation standards on patient safety.

Improved Decision Making

Behavior-based methods can also be applied to alignment and cultural issues. One example is an organization that used behavior-based methods to improve operations-level decision making.

Case Study 4: Operations-Level Decision Making at a Petrochemical Company

The intervention at this facility was motivated by a small fire that got out of control, causing severe injuries and damage. Analysis showed that the decision-making process—in this case, the decision to shut down the unit and deal with the fire—did not

Leading with Safety Has Demonstrated Long-Term Results

Figure 5 shows that using BBS, companies improved, on average, 25 percent in Year 1 and this gradually improved to 55 percent improvement by Year 5.

Figure 6 shows a multiple baseline design in which two companies were studied (Group A) and three companies were studied (Group B). Group A companies established a baseline, then initiated their BBS intervention. One year later, Group B companies initiated their implementations after having established a baseline. Two effects can be seen by these data: 1) Continuous improvement occurred from the start of intervention to five years later in both groups. 2) The intervention was indeed likely the reason that injury frequencies improved, as shown by the fact that the baseline is stable and the changes seen after the intervention introduced at different times.

Figure 7 shows indirect effects of BBS implementations. These data are gathered from managers of sites that have implemented BBS, who are asked about the effect of the implementation on areas outside safety—from quality and productivity to facility conditions and communications. Managers perceive that introducing these principles has widespread effects on overall factors.

Figure 8 shows that BBS processes implemented over the past 13 years have sustained themselves well. On average, 93 percent of 566 processes started in this timeframe are ongoing. True, there is variability in the sustainability of processes—from 73 to 100 percent—and the number of processes started in the early years was relatively small. Overall, however, 566 is an adequate sample size and 93 percent is a remarkable level of sustained implementation.

function properly. The organization had pushed this type of decision making downward. However, the quality of the decision made in this case demonstrated that the site needed to improve the decision-making process.

An assessment revealed significant communications and cultural issues. Employees were unsure what situations required them to shut down the unit even though they knew they had the authority to take such action. They also felt strong cultural pressure to keep the unit running. The improvement

Figure 5

Results in Year 1 Through Year 5 of Implementation

Average & Top 25%

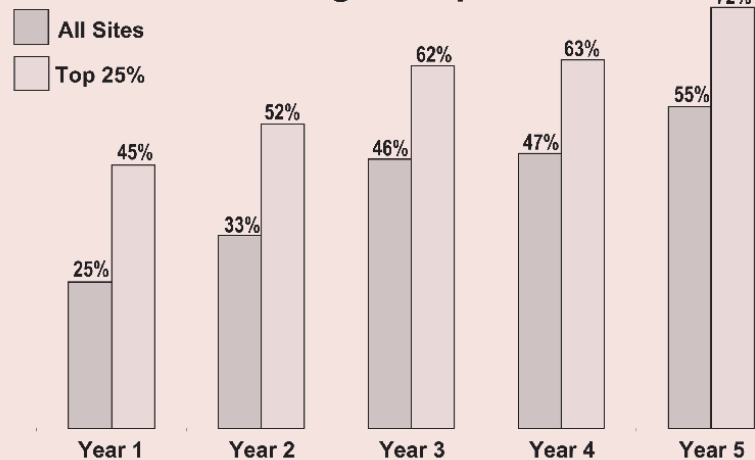
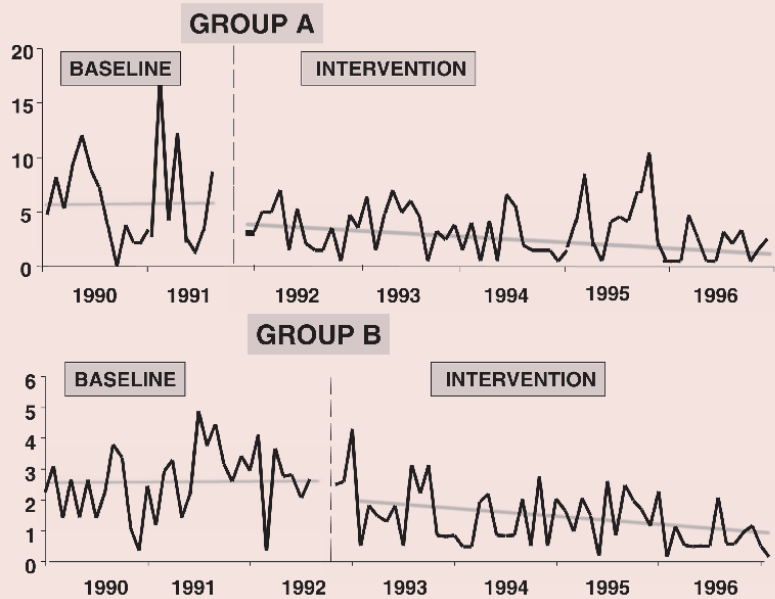


Figure 6

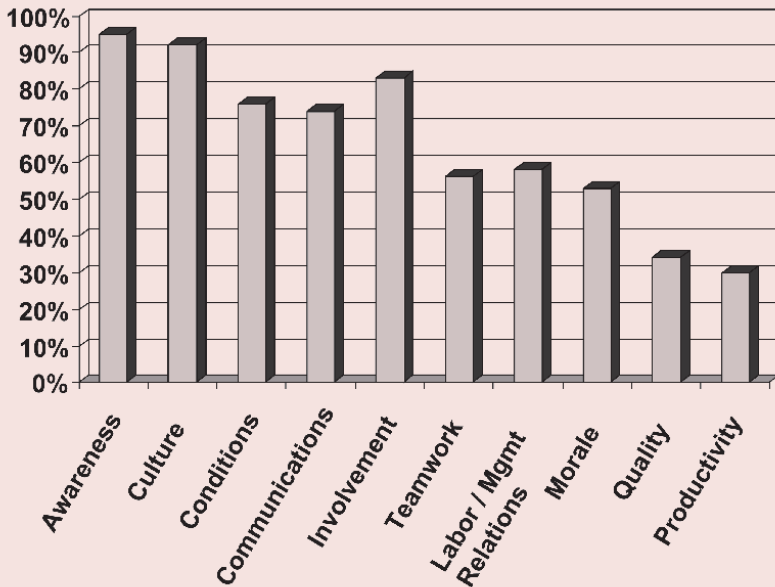
A Multiple Baseline Study



team delineated three categories of decision points, then developed a measurement tool that site personnel could use to provide feedback on the frequency of those decision points and how well the workforce was making those decisions. As this effort continues, those involved report that decision making on all shifts has a high degree of success. High alignment also exists across all levels and locations on how decisions are made, with a related increase in rela-

Figure 7

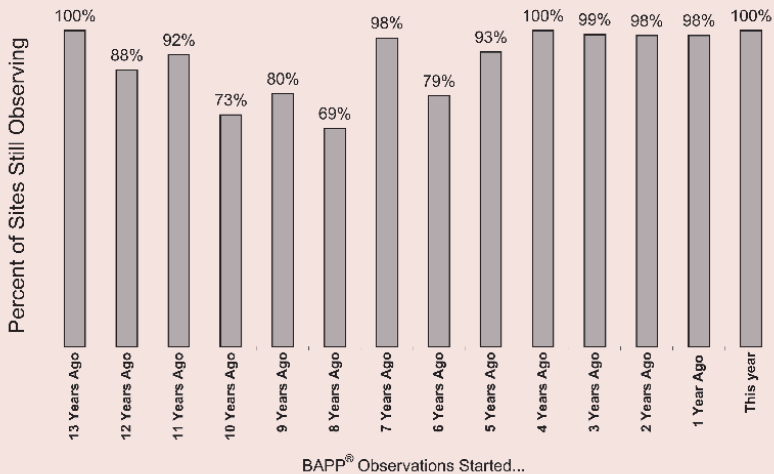
Nontargeted Benefits of Behavior-Based Safety



Data gathered from managers of sites that have implemented behavior-based safety.

Figure 8

Sustainability as a Behavioral Process



On average, 93 percent of 566 implementations started in the last 13 years are still going.

bility around total business objectives. The data collection and feedback component of the implementation delivers continuing reinforcement for the change effort. In short, people at all levels on all shifts now know “when to say when.”

Conclusion

In unsettled times, organizational functioning has surfaced as an important dimension of the workplace. The question now is how to effectively drive improvement in functioning when many performance areas lack conventional measures or immediate value to

employees. For many organizations, an answer is emerging in the natural connection between sustainable safety improvement and performance excellence in general. The case studies illustrate how BBS principles can be adapted to improve performance in areas as broad as error reduction, productivity and patient safety, as well as in areas as specific as decision making. To effectively transfer these principles, a site must clearly define the objective and design an implementation plan that accommodates its current functioning. Just as in BBS, these initiatives become sustainable through demonstrating success and defining new objectives.

As organizations take on new challenges, more opportunities arise to realize significant advancements in cross-functional performance. With safety’s advantages over other areas of group performance improvement (recognized standard of measurement, demonstrated long-term results and immediate value for all levels), SH&E professionals are emerging as key players in the advancement of the organization as a whole. ■

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Compared to other areas of group performance improvement, safety has an immediate value for all levels throughout a company.

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