Managing the Behavior/Systems Interface

Another Perspective on the Effectiveness of Behavior-Based Safety

By DONALD R. GROOVER

In the early 1980s, I was new to the field of industrial health and safety. My undergraduate college degree had prepared me to be a high-school science teacher. Instead, I found my way into the chemical-manufacturing environment, then ultimately into the field of industrial hygiene and safety in the chemical industry.

My lack of formal college training in safety and health had advantages and disadvantages. One advantage: I was acutely aware that I had much to learn, so I was open to ideas—old and new. The disadvantage: I had a lot to learn, which led to trial-and-error attempts to improve the facility's safety and health performance.

It quickly became clear that conditions and systems were crucial elements in improving safety and health performance, but it took longer to discover that continuous improvement in safety performance involves more than fixing every problem with an engineering control, or writing volumes of rules and procedures to cover every facet of the operation. How did I learn this? The company went to great lengths to fix equipment, write procedures and provide training, yet these initiatives did not consistently lead to the desired outcome—a reduction in exposure.

In the early 1980s, continuous improvement was emerging as an important standard for evaluating safety methodologies. By walking through the plant, noting actual practice and talking with shopfloor personnel, it became obvious that although engineering controls, procedures and training were necessary, they were not sufficient to achieve the desired outcome.

In the field, I often observed employees who had been trained, yet did not use engineering controls, took shortcuts on written procedures (which they had helped write) and used improper personal protective equipment. Of course, things were not all bad. Some employees did apply their training, and many used engineering controls and followed rules and procedures.

Still, I was perplexed. On one hand, engineering controls, procedures and safety training were necessary. On the other hand, by treating those initiatives as though they were sufficient to produce continuous improvement, the company had grown complacent. People claimed to know how to achieve continuous improvement (add more controls, procedures, training), yet the firm's safety performance was stagnant—and had been so for four years.

By industry standards, the company was average to better-than-average, depending on the comparison measure. The goal was to move into the top quartile in EH&S performance, but this simply was not happening.

Initially, I concluded that management—and in particular first-line supervision—was not doing its job. I was sure performance would improve if these supervisors would just enforce the rules. So, I looked to punishment as the answer. Instead of asking the tough question, "What causes well-trained, responsible workers to take actions that put them at risk for injury?" I expected a one-dimensional solution to deal with this complicated issue. In hindsight, I was actually thinking about the right issue—motivation—but was naive about how to effectively combine engineering and systems controls with motivation.

LESSONS FROM AN INVESTIGATION

Investigation of an environmental release that had significant safety and health implications forced me to learn why people take actions contrary to training and safety systems. In this case, an operator allowed a chemical reactor unit to run at unacceptably high pressure and temperature until a rupture disc blew.

The disc did its job, venting the reactor contents and releasing the pressure in the vessel before the vessel itself exploded. Investigators found that the operator, who had 20 years' experience, clearly knew and understood the consequences of allowing the unit to operate in an unstable condition. He also knew that shutting down the unit required little effort—a simple push of one button, which activated an automated shutdown procedure.

The review also found the operating

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procedures to be well written; in fact, an operator had helped write and validate them. The procedures prescribed actions to be taken in the exact situation faced by this operator. Finally, the investigators learned that shutting down the reactor was within this operator's authority. Although this had not always been the case (in the past, only a shift supervisor could shut down a reactor), about two years before the incident, the company had moved to change the culture to authorize operators to take such an action.

Given these findings, the investigating team was ready to recommend that the operator be temporarily suspended. However, one question remained: Why did this serious failure occur when the systems in place would pass any typical audit or inspection? The investigation could not be closed until the team learned why the operator had not shut down the unit. When asked why he kept it running, the operator provided a direct and insightful answer: "You [meaning the company] didn't want me to shut down the reactor."

Startled, the team asked who had told him that. Although no one had said it explicitly, he explained that he had received the message between the lines. As he noted, when the rupture disc blew, the unit was operating at 130 percent of capacity, as it had been for the past nine months, with no end in sight. According to the operator, the foreperson stopped by the control room each day and told the crew the company had more orders for the product—more than the unit could produce—and reminded the crew that the unit was making a profit of $50K per day.

Everyone knew the unit could not be further modified to produce more product; an earlier change had removed a bottleneck so the unit could exceed its rated capacity. The operator also noted that the operations manager and plant manager frequently visited the unit, and when operators submitted work orders for repairs, money was no concern. In addition, the crew routinely had celebrations for meeting production quotas. The message was clear: Keep the unit running.

The operator then shared the story of another operator who, six months earlier, had shut the unit down for safety reasons. His "reward" was a four-hour investigation, conducted after his normal 12-hour shift. That investigation was framed as an inquiry into why the operator's "poor operating skills had led to the situation where the unit had to be shut down." Furthermore, every senior leadership person at the site observed while maintenance and operations worked to bring it back on-line. The scrutiny and pressure were intense.

This was the turning point in my career. I realized that continuous improvement in performance takes more than engineering design, procedures and rules, adequate training or discipline. Certainly, these measures are important. In fact, following this incident, the shutdown system was revised so that a computer would automatically shut down the unit under certain conditions. Although this was possible given very specific criteria, in other situations, complete decision-making authority simply could not belong to the computer alone. Operators were needed to make sound decisions.

This investigation confirmed my suspicion that I was overlooking some factor in developing a clear understanding of performance variation.

CONDITIONS, SYSTEMS & PEOPLE

In any particular work situation, performance depends on the interaction of three factors: conditions, systems and people. Design and maintenance of the physical environment, along with available tools, equipment and general housekeeping, determine organizational conditions. Conditions provide the means by which a person can be successful. Systems such as work permit procedures, job safety analyses, training, rules and procedures set the expectations. Finally, people, their beliefs, values and motivation provide the application—how people perform relative to a set of expectations.

This was the last piece of the puzzle. I needed to understand which company actions motivated employees to work safely and which ones encouraged them to "accept" risk as part of the job.

WHEN THE INTERFACE IS WORKING WELL

Consider this example in which these factors are working in harmony. It involves de-energizing equipment, a critical safety action in almost every work setting.

Conditions

Proper lockout/tagout devices are located near the equipment to be de-energized so employees can easily attach locks or tags. Equipment is clearly labeled so workers can quickly determine whether they are locking out the proper equipment. In this environment, safety performance is easy to accomplish. The company might even install light curtains that automatically shut off equipment when a worker is in close proximity.

Systems

In this setting, systems are aligned with a value for safety and, therefore, support the de-energizing process. For example, a written procedure outlines the steps of lockout/tagout. Employees receive classroom (conceptual) training on the procedure, followed by field training during which they practice the procedure on equipment in their respective areas. Where expectations are made explicit, skills are provided and systems are coupled with favorable conditions, good safety performance is likely to occur more often.

Performance

With conditions set and systems established, it is easy to assume the job is done. However, a progressive organization—one that truly understands and supports the continuous-improvement process—takes yet another step. It does not rely on chance, simplistic reinforcement strategies or fear-based approaches to achieve continuous safe performance or continuous improvement in performance. Instead, it establishes mechanisms that engage employees in understanding the value of performing safely and develop within each employee the desire to perform safely. Motivational approaches are selected based on their appropriateness to the culture and organizational direction.

Such an organization also ensures that employees value the mechanisms. In a fully functioning system, performance of this critical procedure is measured and performance feedback is provided. Performance data are shared throughout the organization and when performance variation is identified, the root cause is identified and addressed. This is the final piece of the puzzle—it allows a company to measure the effectiveness and efficiency of conditions and systems in place and facilitates its efforts to manage the interface between people, conditions and systems.

A crucial trait of such an organization is that it knows it is dynamic, not static. Factors are always changing, sometimes rapidly. These changes include new employees, new job assignments for existing employees, new equipment installation, equipment modifications, and shifting priorities based on production, quality and cost concerns.

Often, any one of these "shifts" can contribute unintended "support" for taking risks. After all, employees seek to please their employer and are driven by an internal motivation to do a good job. An effective organization strives to leverage this underlying motivation in a positive way. It establishes mechanisms to systematically measure performance of critical safety processes and to provide feedback on performance. This ongoing measurement allows the company to detect negative influences *before* they have any adverse impact on safety performance.

WHEN MISALIGNMENT EXISTS

When conflict or misalignment exists among conditions, systems and people, it emerges at the interface among them. As a result, personnel are at-risk for injury, and equipment or conditions are at-risk for damage. When risk is present but behavior/systems management mechanisms are not deployed or are not in place, "accidents" are waiting to happen.

Excellent safety processes and programs measure the interface and identify what barriers exist to eliminating friction points at this interface. Consider this simple example of an interface. Reach out and grab the air in front of you. You are likely at little risk of injury and could continue this action without worrying about injury. Now, imagine that same action, but instead of grabbing air you are reaching for a part jammed in a piece of equipment. The action can now be put into a context of exposure. Such risk taking must be explored to determine why an employee took this action rather than shut down the machine to clear the jam.

This brings the discussion back to the central question: Why do employees who obviously do not wish to get hurt nonetheless take risks that could lead to injury (and possibly discipline)? An effective behavior-based safety system is used to answer this question.

The first step is to expose problems at the conditions-systems-people interface. This sets the stage for discovering what is influencing employee decision making. Typically, this reveals deeper issues, such as a breakdown in training or a conflict between production values and safety. It provides site personnel with the whole story, and reveals mechanisms for creating change. Such interactive, interface-based knowledge and engagement is crucial for continuous improvement.

Well-designed and maintained equipment and facilities encourage and precipitate safe behavior. When conditions or equipment create exposure and make exposure-reducing actions difficult or impossible to achieve, risk taking increases. In a related (although different) way, systems also precipitate behavior by providing a set of performance expectations. Matching up systems to all types of conditions is a challenge. Unfortunately, conditions can change dramatically, yet facilities often continue to rely on a set of behaviors developed for a set of pre-established expectations.

For example, your automobile is in excellent mechanical condition and includes key safety features. The road is free of serious defects. Combine these conditions with a system that informs you about the laws that govern use of vehicles on the freeway (e.g., speed limit, maintaining a safe distance from other cars, proper lane changes) and the stage is set for a safe trip.

However, what happens when the situation changes? For example, suppose you encounter drizzle or fog. Should you continue to follow the same standards as you would if conditions were ideal? No. Exposure is significantly increased if you continue to follow laws and habits designed for normal conditions. Clearly, a change in conditions should trigger a change that reduces exposure. Performing the task "the way it's always been done" puts people in an at-risk situation.

Instead of focusing on behavior change, could this situation be addressed by improving the systems? To do so, one must consider every possible set of conditions that might exist. The next step would be to write specific guidelines to address those situations. The book covering just those procedures on driving to and from work would be quite large.

Now consider tackling this task for the use of safety glasses. Rather than write volumes of safety rules and procedures to cover every situation that could arise, most sites choose to develop a blanket rule about eye protection. Although this may work with something as basic as eye protection, it may not be so effective with other critical performance indicators.

Must employers wait until failures occur before upgrading conditions? Must rules and procedures cover every possible nuisance? No, since conditions and systems constantly precipitate exposure potential, in advance of any incident, the exposure can be monitored to discover whether these influences trigger risky behavior. Exposure is the litmus paper, gauge and indicator. It can serve this function because it is where the person interacts and interfaces directly with established conditions and systems.

Pivotal to success are efforts to develop employees who do not merely blindly follow rules and procedures, but who are engaged, motivated and equipped to see and continuously evaluate risk. Workers seldom reject this responsibility because it represents a situation where management is asking them to think critically. At this point, an organization must make sure employees understand the limits of their authority and managers recognize that when people make decisions, they will not always be correct. The concern here is that if only poor decisions are recognized, the organization will revert to a situation in which employees are unwilling to make decisions.

CONCLUSION

Integrated behavior-based safety is not about changing people's behavior. Traditional behavior-based safety modeled after behavior modification is about changing behavior. An integrated strategy entails seeking out what is causing the exposure and addressing those weaknesses. Once systems and conditions are sound, feedback is provided on how well exposure is being reduced. All levels within an organization need such feedback, and each level must know which performance barriers it is targeting. When deployed with this goal in mind, integrated behavior-based safety connects a site's other safety systems in a powerful way.

Achieving continuous improvement in safety is a challenge—but a path to progress exists. By recognizing the need to manage the interface, using appropriate tools to do so and engaging employees at all levels in the effort, a company can take a holistic, integrated approach that leads to ongoing success. By focusing on the interface, a company learns how well—or poorly—it is reducing exposure. Key leverage points can then be identified, which facilitates efforts to continuously improve performance. ■

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