Safety in the OilField:
Elements of a Comprehensive Approach

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Safety outcomes in the oilfield, as in other industrial settings, is never a standalone proposition. The extent to which procedures are followed in the field—and to which safety enabling systems function—depend upon a complex interaction between field-level activity, and the culture, climate, and leadership of an organization. Case studies of oilfield disasters illustrate this principle well; oftentimes the action that set off a cascade of catastrophic events was rooted in cultural and organizational factors that existed for months, sometimes years, leading up to the incident. In these cases, refining the safety systems is only part of the solution. This article draws on our experience with thousands of worksites in 49 countries to suggest key elements that must be considered in building a comprehensive approach to oilfield safety.

Why Safety Systems Are Not Enough

Oil and gas organizations face a number of EHS challenges in today’s business landscape. Fatality prevention, the changing role of safety professionals, managing behavioral reliability among increasingly globalized operations, and maintaining a focus on process and personal safety are some of the most common issues we hear about. Addressing each of these issues requires a systematic look at the fabric of the organization itself. For example, when fatalities occur, investigations often show that they did not result from any unknown or unpredictable occurrences – rather they resulted from normalization of deviation, failure in the management of control systems, and acceptance of substandard processes. In other words, the safety systems in place were not sufficiently used.

This is not to say that safety systems are not important; indeed, they are an imperative. Rather, this is to say that safety systems are not self-contained. They’re subject to the same pull of activities, conditions, and events that influence other business systems. For example, the use of procedures is dependent on how they’re seen in the organization: is following them a part of how we do things here, or is it okay to let them slide once in a while? Hazard removal is as good as the infrastructure that supports it: is it easy or hard to get this equipment replaced? The longevity of training depends on alignment with organizational priorities and practices: does my supervisor support this new way of doing things or will I meet resistance? To be effective, safety systems must be in alignment with, and supported by, other elements of the organization.

Safety systems are also tactical, rather than strategic. They directly remove exposures and enable safe work; yet they do so on behalf of a bigger objective, making a safe workplace. Few systems (if any) can do all things necessary to make this happen. Just as no one would expect even the most sophisticated accounting system to make a company profitable, no one could expect a hazard removal process by itself to create a culture in which injuries are unacceptable. Safety systems thrive when they are part of the larger organizational system: when safety systems are a part of how we work and how we see ourselves. Viewed as something other than the organization’s objectives generally, safety systems can become isolated and ineffective.
A New Blueprint Key Elements

1. The Working Interface
Typically injuries are caused by exposure created by an unsafe condition or an employee who is placed into an at-risk situation. The more exposure, the higher the probability of an undesired event. Exposure is a reflection of the alignment at the working interface, the intersection of facilities and equipment, procedures, and the employee. When we connect the right tools and equipment in good working condition with a knowledgeable, skilled, and motivated employee following a current and accurate procedure, the probability of an undesired event is low, not zero, but extremely low.

Exposure measurement typically takes the form of an observation and feedback system, sometimes called behavior-based safety or employee engagement system, that enlists employees in capturing data on exposures at the working interface. The employees are trained to openly observe their peers and conduct two-way feedback to capture the number and nature of exposures in the interface and document the factors creating them.

As opposed to injury data, which is subject to natural variation, exposure measurement provides predictive data that allows organizations to design and justify precise interventions upstream of injuries.

The largest study of this approach ever published (Krause et al, 1999) is based on a sample of 153 locations, and shows that the average site achieves a 25% improvement in injury rate over baseline in the first year, increasing to 55% improvement over baseline in the fifth year. Figure 1 shows results from a sub study of 33 client organizations in oil and gas production settings who used our employee engagement methods for at least one year. On average, these organizations achieved 26% improvement in the first year (more improvement than the average client achieved).

2. Safety Enabling Systems
Enabling systems are the basic mechanisms that assure adequate safety functioning. A comprehensive approach accounts for what these systems are, how they are audited, and how effective they are. More importantly, organizations need to see that enabling systems are part of a larger whole, and not sufficient in themselves for safety improvement. These programs are designed to deliver and assure alignment at the working interface and typically fall into the several categories that cover both personal and process safety elements:

• Hazard Recognition & Mitigation
• Skills, Knowledge, & Training
• Policies & Standards
• Exposure reduction mechanisms

A comprehensive safety approach would look at whether the organization has implemented the necessary programs and whether these programs are having the desired result in reducing exposure. One interesting and frustrating finding for many organizations is that sites with identical system configuration and independent audit scores often realize widely different outcomes. The answer to this problem leads us to our next element.
3. Organizational Culture

Safety and health programs function within the broader context of culture and safety climate. Safety climate refers to the level of interest and importance placed on safety by the organization’s leadership. Culture refers to the unwritten assumptions that influence decision making, attitudes and beliefs, and guides the behavior of those in the culture. Sustained over a long enough period of time, safety climate can become part of the culture.

In 1999 BST identified nine factors in the research literature that independently correlate to safety performance and which make up the Organizational Culture Diagnostic Instrument (OCDI). Interestingly, only three of the six dimensions are safety specific:

- **Procedural Justice** – The extent to which the individual worker perceives fairness in the supervisor’s decision-making process.
- **Leader-Member Exchange** – The relationship the employee has with his or her supervisor. In particular, this scale measures employees’ level of confidence that their supervisor will advocate for them and look out for their interests.
- **Management Credibility** – A perception of the employee that what management says is consistent with what management does.
- **Perceived Organizational Support** – The perception of employees that the organization cares about them, values them, and supports them.
- **Workgroup Relations** – The perception the employee has of his or her relationship with coworkers. How well do they get along? To what degree do they treat each other with respect, listen to each other’s ideas, help one another out, and follow through on commitments made?
- **Teamwork** – The extent to which the employee perceives that working with team members is an effective way to get things done.
- **Safety Climate** – The safety climate scale measures the extent to which the employee perceives the organization has a value for safety performance improvement.
- **Upward Communication** – The extent to which communication about safety flows freely upward through the organization.
- **Approaching Others** – The extent to which employees feel free to speak to one another about safety concerns.

These nine factors can be measured and expressed as percentile scores contrasting one organization with many others. Based on the specific profile, the organization can develop interventions that leverage the high functioning areas to improve lower scoring areas. A proprietary study published in March 2006 shows the practical significance OCDI scores. This study included 94 organizations that used the OCDI and for which we tracked 12 months of occupational injury rate data. The top third of the organizations that scored consistently high across all OCDI scales averaged an occupational injury rate of 4.3 injuries per 100 employees per year, while bottom third averaged 8.5 (Figure 2). Clients in the middle third averaged 5.8 occupational injuries per 100 employees per year. The difference between the three groups is statistically significant: (df(94), -.331, p<.01). Clients in this study came from eight different countries and from 18 different industries.

![Figure 2. Higher culture scores predict lower occupational injury rates.](image-url)
4. Organizational Systems

The root cause of an incident may trace back years to a decision that was made at a very high level. What we determine about staffing levels, supervisory development, promotions, budgets or new projects all introduce changes into the systems that provide consequences for organizational behavior. When we separate consequences from our declared performance targets, we reinforce old ways of doing things and, in some cases, undermine the change we are trying to create, e.g. telling employees they must report all injuries at the same time as providing attractive incentives for workgroups without injuries.

A comprehensive safety system also includes measures of the level of alignment between values, words and systems. The systems to measure and assess include:

- Selection and development for all levels
- Organizational structure: Staff level versus expectations, leader to worker ratio, etc.
- Performance management: What is evaluated, the effectiveness of the process
- Rewards and recognition: How are heroes created in the organization? What behaviors and practices are recognized or compensated?

5. Leadership

Creating the kind of culture where safety is a driving value (or isn't), is something done by leaders through their day-to-day actions. Leaders make the decisions about the acceptable level of exposure, the safety climate and the type of culture that exists, and the systems to be implemented and that drive performance. In this case, it is helpful to narrow the focus to safety leadership. In the most effective safety leaders, certain behaviors have been seen to recur, including vision, credibility, action-orientation, collaboration, communication, recognition and feedback, and accountability (Krause & Weekley, 2005). In a study examining top site-level leader's best practices and site-level culture, we found that leadership practices overall score (the aggregate of the seven best practices) predicted culture overall (Figure 3).

Our experience has shown that these characteristics can be developed among leaders wishing to become more effective safety leaders. A 2005 study shows that companies that develop leaders alongside their BBS implementations realize a substantially higher first-year improvement in injury rates (40%) over companies implementing BBS alone (25%).
The Comprehensive Approach to Safety

High-functioning safety organizations recognize that getting safety right means designing and influencing systems that reduce and eliminate exposure. The five elements outlined here provide a systematic way to think about the design of intervention strategies for safety improvement. This blueprint explains what many leaders already know from experience; that exposure reduction requires more than the right set of safety systems, it takes a highly-functioning network as broad as the organization itself. As with all blueprints, these elements are derivative. The live workplace is complex: technology changes, organizations change, operation pressures exist, culture factors may not be ideal, and so on. In the real world, improvement takes leaders with both a commitment to safety excellence and a vision of how to get there.

Bibliography


