



Relationship- Based Safety

Moving Beyond Culture & Behavior

By Rosa Antonia Carrillo

Maintaining safety as a priority in people's minds is a leadership challenge. Research points to several organizational influences such as leadership style, supervisor involvement and communication systems that determine the importance allocated to safety (Janssens, Brett & Smith, 1995; Singer & Tucker, 2006). Lessons from the BP oil spill and other disasters reconfirm that complex multiple demands from stakeholders play a key role in system failures. Deadlines and goals must be evaluated and communicated repeatedly because priorities compete for time and attention in today's ever-changing environment.

Complexity management theory (CMT) and relationship psychology offer new ways of understanding this dilemma in high-risk, rapidly changing environments. Because change is continuous, static approaches such as rules and procedures do not influence people's priorities. These disciplines propose that people's decisions and actions—how they determine what is important—are influenced through their interactions and relationships. Thus, social interaction and relationships are seen as powerful vehicles to transmit information and influence behavior.

Based on these assumptions, two important implications emerge. First, CMT would suggest that safety maintains priority status as long as relationships and

social interactions support it. Second, it is vital for management to recognize that the quality of relationships and how people interact within and across departmental lines is an indicator of the organization's ability to prevent failure. Later, we will discuss the nature of these quality relationships and how to support and develop them.

This article recommends practical application of these theories in the form of management tools that leverage human capability and social interaction to identify problems while they are still faint signals. Early warning communication systems to recognize deviances as they first appear can help regain loss of control quickly when necessary. Within these perspectives, three central areas emerged as essential to leveraging organizational relationships to create greater safety awareness and resilience in responding to potential dangers:

- 1) continual reinforcement;
- 2) repetitive communication;
- 3) perpetual assessment.

Rosa Antonia Carrillo, president of Carrillo & Associates Consulting, is a thought leader in transformational leadership for SH&E. She brings 20 years' industry experience with all levels of the organization and from many countries including Asia, the Middle East and the Americas. As a frequent author, her understanding of safety culture and complex environments is translated into direct and concrete recommendations and tools to manage environmental protection and safety performance.

IN BRIEF

• Many organizations struggle to communicate that safety is a priority over production. This article examines the literature on complexity management and relationship psychology theory to find applications to meet this challenge. These disciplines offer new ways to approach the dilemma of maintaining safety as a priority in people's minds when competing with day-to-day pressures and multiple demands.

• A key lesson from the growing field of complexity management literature is how people, their ways of thinking and their relationships create unpredictable outcomes (constructive and destructive) that cannot be changed or controlled through static programs and procedures. Instead, social interaction and relationships serve as the vehicle to transmit information and influence decisions.

• This article recommends management tools that leverage human capability and social interaction to identify problems before they lead to injuries and the destruction of property. Recommendations fall in three areas: continual reinforcement, repeated communication and perpetual assessment.

Complexity Management & Relationship Psychology

Investigation reports on the Gulf oil spill on April 20, 2010, may help illustrate some key concepts that have emerged from CMT and relationship psychology. These insights could help address the question of how to maintain safety as a priority in the day-to-day decision making of employees and managers at all levels.

Key Concepts From the 2010 Gulf Oil Spill

Expect the unexpected (Weick & Sutcliffe, 2001). People working on the Macondo oil well that day did not expect an explosion. The unexpected arrived and their systems failed, resulting in loss of life, and extensive damage to the environment and the economy. Some people were directly responsible for anticipating and preventing such disasters, experts in what Weick, a thought leader in high reliability organizations (HRO), calls "managing the unexpected." In retrospect, the warning signs were there. Recognizing them beforehand is the goal of safety efforts based on complexity (Dekker, 2005).

Nothing happens by accident, and it is unpredictable (Pidgeon, 2011; Sagan, 1993). The report on the disaster states, "Most of the mistakes and oversights at Macondo can be traced back to a single overarching failure—a failure of management. Better management by BP, Halliburton and Transocean would almost certainly have prevented the blowout by improving the ability of individuals involved to identify the risks they faced, and to properly evaluate, communicate and address them. A

blowout in deepwater was not a statistical inevitability (National Commission, 2011, p. 90).

CMT might disagree that it was not inevitable (Perrow, 1984), but it would agree that a series of decisions, interactions and events led to that disastrous outcome. However, CMT differs in that blame is not assigned to human error, thus managers are not blamed but are tasked with the responsibility to prevent these events and must seek frameworks outside their established views if they are to manage the unexpected.

A mind-set of constant awareness and inquiry are the strongest preventive measures (Weick, 1999). To this point, Hopkins (2011) examined an inquiry held by the U.S. Coast Guard and U.S. Department of Interior and found that a management visit to the drilling rig at the time of the well blowout highlighted how senior management focused on spills, trips and falls while entirely missing the signs of pending disaster. Members on the executive team present that day had knowledge that might have helped

to avert the explosion. Unfortunately, the engineers working on the problem misinterpreted test results and managers up the line did not verify test results against real-time data, so no questions were asked. Hopkins summarized his criticism saying that the focus of safety for these VIPs, as well for their companies, was on managing conventional safety hazards, not major process safety hazards.

Accidents come from relationships, not broken parts (Dekker, 2005). It also was reported that 4 days before the April 20 explosion, an e-mail noted that engineers had not taken all the usual steps to center the steel pipe in the drill hole, a standard procedure designed to ensure that the pipe would be properly cemented in place. "(W)ho cares, it's done, end of story, will probably be fine and we'll get a good cement job," (Mufson & Kornblut, 2010).

Dekker challenges the current prevalent notions about accident causation and system safety. He argues that even now, what profess to be systemic approaches to explaining incidents are still caught within a limited framework of cause-and-effect thinking, with its origins in the work of Descartes and Newton. Instead, Dekker draws his inspiration from the science of complexity and notes how seemingly reasonable actions at a local level may have unseen (and unknowable) effects that ultimately results in system failure.

Competition and scarcity of resources is a constant influence on where people focus their attention and resources (Dekker, 2005, 2006). In another investigation, the National Commission (2011) report on the Gulf oil spill states, "BP engineers focused heavily on the biggest challenge: the risk of fracturing the formation and losing returns," (p. 99). The message was amplified in the *New York Times*:

Did financial pressure compromise safety, especially when BP chose riskier equipment? The longer the drilling of the oil well continued, the more expensive it became. The total cost of the project swelled to \$140 million from \$96 million as delays ensued. Additionally, by the day of the disaster, BP was 43 days behind schedule, costing the company at least \$40 million more.

Amid these setbacks, BP selected riskier and less expensive equipment, including a type of metal casing that would save the company \$7 million to \$10 million, witnesses say. For the first time, on Thursday, a BP official acknowledged that price mattered in the well's operation. "Every conversation, every decision has a cost factor," said David Sims, a vice president. (Brown & Fountain, 2010)

In summary, management's control over people's behavior, complex technology or the environment (ecological, economic or political) is severely limited. CMT switches leadership attention from controlling to maintaining awareness, continuous learning and adaptation. Awareness refers to staying in the present, looking for the unexpected and remaining mindful that personal expectations

limit one's ability to see reality. Learning is gaining knowledge through experience (mistakes and successes) and through interactions with trusted individuals. Adaptation is the ability to accurately interpret data and acquire the capabilities to act on the data to correctly adjust to changing conditions.

Theoretical Background & Application of Complexity to Day-to-Day Work

The human factor is one of the most important elements of an incident prevention program (Alston, 2003; Fukui, 2001; Hollnagel, 2009). CMT and relationship psychology research offer new frameworks to understand and leverage the human component in organizational systems. Both draw analogies from chaos theory (Waldrop, 1993). According to Capra (2007), complexity's underlying principles offer new insights for understanding why change efforts fail and how to design change strategies for a constantly changing environment.

In nature, order emerges from disorder through processes of spontaneous self-organization in absence of direction (Stacey, Griffin & Shaw, 2002). Yet, the management sciences focus on planning, control and measurement as the means of achieving outcomes. It is based on the principle of causality, considered to be the ultimate form of reason.

However, a great change is setting in. According to quantum physics, under natural circumstances outcomes absolutely conforming to specific theories are almost an exception due to unpredictable influences. One can cite many examples of theories firmly established through the scientific method that declined in replicability over time, and often when new findings disprove a theory, research journals tend not to publish the results (Lehrer, 2010).

Stacey (2007) concluded that organizational results stem from the quality of interaction and communication between individuals and groups. He calls this theory "relationship psychology," and it rocks the foundation of popular approaches to accident prevention because it takes the focus away from individuals to organizational relationships in all forms. It considers human interaction as the primary influencer in organizations. Systems such as rewards, measurements or rules do not control outcomes. Instead, outcomes are influenced by 1) the human tendency for self-interest and relating everything to their own experience; 2) conversations that shape people's understanding of what is true and what is appropriate action (although sometimes the conversation takes place silently within); and 3) the radical unpredictability of the direction in which connections and relationships evolve (Stacey).

For those thinking that this outlook on organizations sounds far-fetched, consider Rock's (2008) work in neuroscience. His SCARF (status, certainty, autonomy, relatedness, fairness) model describes five domains of social experience that the brain treats as survival issues. This research revised Maslow's hierarchy. It appears that people's need for relationship and to be fairly treated triggers the

same areas of the brain as the need for food and shelter. This could provide scientific evidence to justify paying attention to quality of relationships in organizations.

How Does This Apply in Day-to-Day Work?

Gittell (2003, 2009) presents extensive evidence that in healthcare the quality of relationships among staff members correlates with the quality of healthcare they deliver. Patient satisfaction improved and operational costs lowered through improved coworker relationships (Andersen, Ammarell, Bailey, et al., 2005; Ellingson, 2002; Gittell, 2003, 2009; Godwyn & Gittell, 2011). In particular Gittell's (2003, 2009) theory of relational coordination brought about practical application. She developed an organizational assessment to measure the quality of relationships and correlate them to organizational results, including lower accident rates. (The survey and its use to create change may be viewed at www.rccr.brandeis.edu.)

In addition, while Gittell's research focused on intact workgroups and collaboration across functions, Simard and Marchand (1994) cemented earlier research finding that supervisory participative management of safety and the quality of interaction was the best predictor of work groups to take on safety initiatives and correlated to lower lost-time accident rates.

Continual Reinforcement

Leaders face many obstacles in maintaining safety as a priority. Companies today live in an aggressive, competitive environment that focuses decision makers on short-term financial criteria during economic crisis rather than on long-term criteria concerning welfare, safety and environmental impact (Rasmussen & Svedung, 2000). Maintaining safety as a priority requires continual reinforcement and assessment of the communication process because obstacles to trust and miscommunications constantly arise.

In the absence of reinforcement, competing demands begin to win influence over safety. Open dialogue and communication about conflicting priorities is important because their suppression means management no longer has access to the information it needs to course correct decision making that overrides safety as a priority. Unfortunately, the very presence of a leader can suppress information (Tost, Gino & Larrick, 2011, 2012). Therefore, they have to actively seek disconfirming information through multiple sources.

Conversation as a Tool for Reinforcement

Conversations in which divergent perspectives are heard and result in correct action are not only the result of established protocols but also of a culture that breeds trust. This level of communication requires the investment of time, good listening skills and openness to different perspectives. Nuclear power plants have an employee-concerns department that ensures total protection for an employee who has a concern and does not feel heard



Complexity management theory switches leadership attention from controlling to maintaining awareness, continuous learning and adaption. Awareness refers to staying in the present, looking for the unexpected and remaining mindful that personal expectations limit one's ability to see reality.

by management. Yet, some workers still report fear of speaking up. Nuclear Regulatory Commission considers to be a “chilled work environment” (employees feel management represses reporting concerns) one of the most serious safety hazards. The first trait the agency looks for in a safety culture is the existence of a safety-conscious, collaborative work environment.

Maintaining trust and open communication require constant reinforcement. The underpinning is the nature of the relationships between crewmembers, across departments and in employee-management relations. Friendliness and interpersonal skills are assets in building trust (Schulman, 1993). Neither legal protections nor formal concerns programs are sufficient to ensure the free flow of information from the front lines to management. Research has shown that trust levels affect an organization’s ability to give and receive information. Trust also has been demonstrated to have positive impacts on organizational safety and safety performance (Burns, Mearns & McGeorge, 2006; Conchie & Donald, 2008; Conchie, Donald & Taylor, 2006; Hale, 2000; Reason, 1997). Without trust, no communication occurs; no communication means failure (Schein, 2011).

Behavioral Observation

Behavior observation programs are based on reinforcement theory and are designed to encourage the development of safe behavior. This process has many reported benefits per users (Marsik, 2004; Mettert, 2006;) as well as consultants (Krause, Seymour & Sloat, 1999; DePasquale & Geller, 1999). Per Krause, et al. (1999), no direct evidence was found that observations could be entirely responsible for the positive results because the program encompassed multiple elements including leadership involvement and an emphasis on communication. However, the number of observations seemed to correlate to lower injury rates.

CMT would hold that the observation is not the change agent because it takes place in a specific point in time then ends. Continuous reinforcement is needed to change behavior. Without it, too many variables are influencing an individual, some of which may have greater influence than random, periodic observations. The following interviews may illustrate why the observation itself may fail:

Interview I

Q: Did you ever approach Joe to ask him to follow the proper scaffolding before his accident?

A: Yes, he thanked me and stopped. When I saw him again he had gone back to doing it his own way.

Interview II

Q: Do you feel comfortable approaching peers to stop an unsafe act or situation?

A: Yes, but they don’t always listen. Sometimes they tell me to mind my own business (Carrillo, 2012).

James Howe, former assistant director of health

and safety for UAW and currently president of Safety Solutions, revealed that he has been conducting surveys on the use of safety observation programs for several years (J. Howe, personal communication, April 9, 2012). His audiences consist of safety managers and employees representing many industries that were using or are using observation programs. The question he asks is, “What percent of the observations that you collect do you suspect are pencil whipped?”

The average response per audience is that more than 52% of the forms do not represent real data. Thirty-two percent of the audience estimates that 75% or more of observations submitted are filled out without an actual observation. Howe noted that thousands of dollars and many hours are spent collecting data that are 50% to 75% invalid. Some users may say that is acceptable since injury rates are down and workers are thinking about safety and doing something tangible. As Howe explains, however, “Since a sizeable investment is being made to collect largely inaccurate data, why don’t we invest in involving employees to collect data that will actually help us? Is there a way to make observation programs useful?”

Eckenfelder (2003) stated:

Behavior-based safety (BBS) places behaviors in the wrong place. It suggests they are at the core or foundation of loss prevention. They are in fact only one part of an elaborate set of interrelationships where the more critical or foundation concepts are culture and processes or programs. BBS largely ignores the fact that loss prevention is not primarily a technical or behavioral problem: It is primarily a social or cultural problem.

Despite this, many BBS users report improvement. A clue may lie in the research conducted to identify key success factors in successfully implemented programs. The elements found consisted of intense communication forums, training on proper social interaction, and management commitment that appears to result in increased trust in management, trust in coworkers and fewer injuries (DePasquale & Geller, 1999). Within the context of CMT, one would expect that a behavior observation could change a person’s behavior at a specific point in time. However, without ongoing interaction, assessment and real-time vigilance, the behavior will revert. In organizations where BBS includes much conversation and engagement, it could be that the interaction and communication these programs engender is far more important than the number of safe or unsafe behaviors observed.

Repeated Communication

The challenge of communicating the same message across the organization is enormous because multiple subcultures exist, each with its own language and assumptions (Schein, 2010). At times, a manager may feel s/he has been clear on what should be done or corrected only to learn later that the requests have not been fulfilled. Ineffective reac-

tions include withdrawal, anger or attempts to exert tighter control over people who are not complying. Managers often misunderstand the reasons behind noncompliance, which may have much to do with competing priorities. Aggressive action toward the other party may block communication and the very information that is needed to avert a failure (Weick & Sutcliffe, 2001).

Reinforcing safety as a priority is a constant, two-way communication effort. A leader cannot decide priorities in isolation. As Magnusson (2010) noted, "Other factors, such as the commitment and willingness from employees to accept and understand which factor should be in first hand between safety and production, are also seen as determinants of the safety success in the company" (p. 22). Relationship psychology proposes that people decide what they believe based on conversations with people they trust. In other words, hold regularly scheduled meetings that include employees and leader/supervisors to help people agree what safety as a priority means in the context of the work that must get done.

This approach faces some challenges because the content and outcome of conversations cannot be fully controlled. People tend to believe that they can set a clear direction, then everyone executes from the same page. More time in conversation or questioning priorities is seen as inefficient especially if it leads to changing the plan. In reality, however, both the environment and people's understanding of the situation constantly shift. Instituting the expectation that the plan can be and should be revisited opens the gate for important preventive information.

Factors That Influence Priorities

Communication and social interaction influence behavior with unpredictable outcomes. Management cannot control interactions or outcomes (Stacey, 2007; Stacey, et al., 2002). In Stacey's model, the powerful influences on behavior are politics, threat of exclusion or loss, rewards, acceptance, security and protection. These influences operate consciously and unconsciously, overriding any formal policy or organizational structure. Empowerment and flat organizational structures try to address this issue but do not change the reality that power sets priorities.

Because multiple stakeholders influence priorities, repeated face-to-face communication is considered the most effective way to maintain attention because of its nonverbal cues and its ability to build connections among participants (Weick & Sutcliffe, 2001). It is estimated that up to 93% of a message is nonverbal. This means that e-mail is the most limited. If conversation is the main agent of change in belief systems, a manager's time should be allocated accordingly. Instead, managers and supervisors spend most of their time in meetings, reading/sending e-mail, making calls and extinguishing fires (Bruch & Ghoshal, 2002). This negatively affects a manager's ability to influence the way people think and feel about organizational

priorities. Managers may feel that they have clearly defined the priorities, but life in the field tells a different story.

Invisible Safety Trade-Offs

Interview With Plant Manager

Q: Do you feel that people understand that safety is a priority even though sometimes they have to make tough trade-offs?

A: There are never trade-offs. Safety is always the number one priority and everyone here knows it.

Interview With a Mechanic in Same Plant

Q: Has management communicated that safety is a priority over production?

A: Yes.

Q: Do you believe it?

A: Yes. I've never worked at a safer plant.

Q: Do you think safety is always a priority over production?

A: In training sessions and meetings, safety over production is always more important. In the field, it is applied on a sliding scale based on who is involved and how bad the job needs to be done. People take risks, and I've seen managers walk by and say nothing (Carrillo, 2012).

Not recognizing the trade-off is one problem; another is when management decides to make exceptions to an established safety procedure. For example, an operator reported that certain redundant checks that were mandatory during normal operations were dropped during outages when time was running short. "If it's safe during outages, why isn't it always safe?" The impression left was that management was inconsistent. Management replied, "If we were to follow every step of what corporate asks us to do we would add 25% to the overall workload. Corporate doesn't want more overhead. Exceptions must sometimes be made."

Workers are quick to note when management ignores a safety violation or makes an exception to a rule. Often, neither operators nor managers are aware that they are making trade-offs (Perrow, 1984; Vaughan, 1996). The dilemma is that workers want certainty and consistency from management, but the environment is ever-changing, and rules may not always apply. If management wants this leeway, employees expect it as well. The fear is that all will fall into chaos and incidents will propagate.

Although difficult, in defining safety as a priority, the notion of continuous evaluation and questioning must be included. Instead of frameworks where rules are static and a worker who breaks them is in trouble, an organization could benefit from a set of assumptions that starts with the understanding that the rule was created for a reason, that this rule is open to question, and that an established process exists in which the questioning can occur. This requires investment in skill development and time for frank conversation.

Technology & Social Interaction

A strategy that utilizes the dynamics of relationship psychology is collaborative learning. Shook



Relationship psychology proposes that people decide what they believe based on conversations with people they trust. In other words, hold regularly scheduled meetings that include employees and leader/supervisors to help people agree what safety as a priority means in the context of the work that must get done.

(2012) explained that learning collaboratively means more than each person learning individually while occupying a shared space. Collaborative learning is two or more partners who actively endeavor to learn together through shared experience. The power of learning collaboratively is that it is a way to achieve economies of scale in learning—spreading lessons within an organization and beyond (Shook).

Diablo Canyon nuclear power plant is utilizing social networking technology to enhance learning on every aspect of the organization, including safety. Employees can upload videos of situations they are dealing with to seek input or they can post solutions they have discovered. Terry Musch, head coach for the executive team at Diablo, remarked that participation was the highest the site has ever experienced in any of its employee involvement programs. Encouraging innovation, communication and group learning play a key role in removing the obstructions to reporting deviations, which are also known as innovations (T. Musch, personal communication, March 24, 2011).

Perpetual Assessment: The Need to Be in the Present

Loss of communication or focus or misinterpretation of events can occur at any time (Schulman, 2004). That is why HROs are continuously monitoring and measuring their systems. Mechanical parts will eventually wear out, people become desensitized to risks and failures happen. Given the reality of a constantly changing environment where many of the changes are not visible, a constant state of awareness and assessment is necessary. Weick (1999) refers to this as mindfulness.

Unfortunately instead of awareness, a poor regulatory framework with conflicting inspections and audits produces long to-do lists, causing organizations to focus time, money and personnel on the must do rather than on the should do. Rather than basing decisions on real information, all levels of the organization are heavily influenced by perceptions of scarcity, competition and political pressure (Dekker, 2005; Hollnagel, Woods & Levenson, 2006). These things will not change and cannot be eliminated.

Senior management must establish a system to identify influences that might derail safety as a priority and address deficiencies in real time and on a continuous basis. However, it can be difficult to see these influences or define them in a convincing way as safety hazards. Resilience engineering and drift offer frameworks to recognize these signs, thus allowing for the development of processes to identify and correct deficiencies before failure (Dekker, 2005; Hollnagel, et al., 2006; Snook, 2000).

Drift: Natural Erosion of Procedure

Practical drift is “the slow uncoupling of local practice from written procedure,” (Snook, 2000, p. 225). Examples of drift can be seen everyday in the workplace as people skip steps in operational procedures or eliminate them altogether. Drift cannot be prevented. Hollnagel, et al. (2006) suggest

“that it is in these normal, day-to-day processes of organizational management and decision making that we can find the seeds of organizational failure and success” (p. 84). Vaughan (1996) spoke of “normal deviance” in her analysis of the NASA safety culture after the *Challenger* disaster.

When people do things out of scope long enough, it becomes the right way. Dekker (2005, 2006) goes well beyond normalization of deviance to show how none of the changes are ever recognized as deviance in the first place as demonstrated by the *Columbia* explosion. Apparently, NASA had not been able to address the tension between acute production goals and chronic safety risks that plagued the *Challenger* (CAIB, 2003).

In the complexity paradigm, these types of challenges cannot be eliminated. Drift can be noticed and addressed when it first appears if management continuously reinforces efforts to look for deviances and discuss them in nonpunitive conversations. This takes the most precious commodity—time—to engage in conversations with employees in various forums. Because the reinforcement must be continuous, it cannot be a sporadic or short-lived effort.

Measuring Drift

The message is to expect drift and continuously measure for it. Deviance cannot be seen unless one is looking for it because it emerges seamlessly as a logical solution. The lack of adverse consequence reinforces the belief that it is safe until the system fails. Gathering the data to detect drift in its beginnings, however, faces major obstacles. One is the challenge of maintaining a state of vigilance. Another is creating an environment in which people will admit errors or risk taking. Lastly, knowing what data to collect and how to interpret them are challenges. These capabilities may not be possible in an organization with low trust and poor communication (Whitener, Brodt, Korsgaard, et al., 2006).

Since successful companies have many forms of auditing, what is needed is a way to measure the first signs of drift, what the nuclear industry calls “faint signals” (Conner & Winters LLP, 2012). One approach that seems to work is the organizational culture barometer (Figure 1; Eckenfelder, 1996).

To create the barometer, Eckenfelder gathers people from all levels of an organization to consider what makes a safety culture work and how an organization knows it is working. Eckenfelder believes it is the process of developing the barometer and using it to guide discussions on a regular basis that helps course correct the organization before problems are visible as demonstrated in the Lincoln Paper case.

Lincoln Paper & Tissue: Case Example

Lincoln Paper and Tissue is a U.S. paper products manufacturer. According to Vice President of Human Resources Bill Peterson, the culture barometer survey has been used to structure monthly conversations between employees and supervisors where employees describe where the company is doing well or not doing well. These conversations

Figure 1
Organizational Culture Barometer

Organization Culture Barometer™	Values	Maturity Level	Value Not Held	Value is Controversial	Value is Validated	Value is Accepted	Value has True Meaning	We are the Value
			0	2	4	6	8	10
<p>Your Logo Here</p> <p>Our Culture</p> <p>What is this sheet trying to measure and why is it important?</p> <p>Culture is nothing more than a collection of day-to-day experiences. Not everybody sees these experiences in the same light. When trying to determine how common certain values are in a company's day-to-day culture, it is important to gather a wide range of viewpoints.</p> <p>The sheet presents 10 related values. Each of these values are followed by descriptions of six different day-to-day experiences that employees encounter as they go about their jobs.</p> <p>Based on your day-to-day experiences, you are being asked to score which level your company operates most of the time.</p> <p>Your score helps to determine which areas need the most help and which areas are the strongest.</p>	1	Never "Shoot the Messenger!"	Errors are ignored; mistakes are punished; reporting is discouraged.	Positive responses to negative results happen but infrequently.	The need to accept failures as opportunities is intellectually understood. Application of the knowledge is limited, but growing.	"Bad news" is now frequently responded to with improvement efforts. Punishment of the messenger is infrequent.	A vision of how to improve through deficiency detection and response is developing. It is getting clearer day-by-day.	Well intentioned mistakes are met with resources to capsize on the knowledge and get better. Good tries are often rewarded.
	2	Only Respond to Root Causes	Rewards correlate with action and reaction, not analysis and measured response.	Expressed interest in seeking true causes usually yields to emotion and "quick fixes."	Leadership understands the need to find root causes, but the tendency is still to jump to conclusions.	Management supports the expenditure of time and money to find underlying causes. But, they are often distracted.	Finding the proximate cause of system failures and addressing them is becoming the norm.	Management is relentlessly uncovering real causes. Then, they diligently redesign systems. They are almost never distracted.
	3	Do It Right the First Time	Speed and quantity are the watchwords. No one really cares about rework and its costs.	Quality is mostly a lot of talk. Rewards are not consistent with the talk. The talk doesn't help much.	Quality is mostly a lot of talk. Rewards are not consistent with the talk. Some people are starting to listen and act accordingly.	The culture is changing; "local" quality control. Emphasis on preplanning is increasing.	Workers have pride in their work. Finished product inspection is minimal. Workplace efficiency is near optimal.	No finished product inspection occurs. Quality is tops. Any errors are addressed promptly. Systems are adjusted to avoid recurrence.
	4	Everyone Needs to Buy-In	Mission and objectives are determined by a small group of leaders. Workers are viewed as sub-human. They are never consulted and rarely informed.	Efforts to involve employees in decision-making are tokenism. The efforts, when made, look like "talking down."	Concern for employees is mentioned. Their ideas are solicited, but rarely taken seriously.	Employees are starting to be listened to. Feedback is often provided. Concerns, at times, appear in business plans.	Employees are called "associates." They are partners, but limited partners. Full acceptance is often related to compatibility with management wishes.	All employees are seen as full partners. Everyone receives the same information; their ideas get the same respect and attention.
	5	Above All, Keep It Simple	Volume of words is valued above succinctness - complexity over clarity.	The need to simplify procedures and documentation is acknowledged, but it doesn't happen very often.	Efforts are being made to reduce all forms of bureaucracy, and some rewards are going to people who are complying.	The organization is committed to simplifying all forms of communication. It is catching on, and people are talking about it in the halls.	Beliefs and values relating to simplification are firmly established. The culture is changing and almost everyone is supportive.	Excessive communication is called into question. Management is compulsive about clarity of messages.
	6	You Should Lead With Safety	Safety is rarely discussed with mainstream interests. It is not associated with the "really important" aspects of business.	Safety is driven by obvious concerns, such as OSHA and insurance requirements. Injury costs are viewed as required overhead.	A "safety program" exists, but is separate from other business activities. Results are usually around average.	Safety is a part of every manager's responsibilities; it goes beyond compliance. Results are consistently better than the competition.	Safety's importance is firmly planted in the company psyche. We are below industry averages. Safety is being integrated into every facet of work.	We all recognize the benefits of world-class safety; nothing else is acceptable. Safety is seen as a profit center - and a way to beat the competition.
	7	Learn From Every Experience: Improve Every Day	Learning through trauma and knee jerk reaction is the predominant management method.	The organization is exhibiting enhanced approaches to learning from experiences; learning is confined to some specific areas.	"Wake-up" calls have heightened sensitivity. Process improvement based on experiences is becoming more normal.	The organization recognizes the need to change more frequently. It takes a few experiences; people are more willing to change.	In our business sector we are generally recognized as a leader. Occasionally, significant change signals are missed, but not very often.	Everyone recognizes the need to grow a little each day. A spirit of learning and inquisitiveness is pervasive. A disciplined response follows learning.
	8	Employ Healthy People or Help Get Them Healthy	Hiring is haphazard. Failing employees are jettisoned. Everyone is aware of the cannibalistic attitudes. Turnover is very high.	Human resource importance is largely talk. Exceptional hires and rehab efforts are usually the result of exceptional managers, not the process.	Awareness of the correlation between exceptional people and exceptional results is growing. HR miscues are frowned on. People skills are improving.	Hiring and screening processes are reasonably effective. Wellness and employee assistance programs are gaining favor.	Only top people are hired; they are judged on what they accomplish. Diversity is honored. EAP and wellness programs are maturing.	Excellence in obtaining and growing top employees is the hallmark of the organization. Turnover is nil.
	9	Inspire Someone-- Anyone-- Every Day	Working conditions are drab. Most people seem to be down most of the time. Only physical/tangible powers are recognized.	Intimacy is sparse. Complaints are abundant. The tone is agnostic. Efforts to make the work place pleasant are infrequent.	Management is waking up to the need to tap into the inherent goodness of employees. Creativity is periodically encouraged.	Management recognizes the need to uplift employees. Getting rid of aggravations and supporting families is becoming common.	Graciousness, gratitude, and good manners are proliferating. Bad behavior is becoming unpopular. A strong positive atmosphere is emerging.	Everyone enjoys coming to work. Work is a part of the solution to domestic challenges, not part of the problem. The workplace is an incubator for talents.
	10	Act On What is Likely to Happen, Not What has Happened	Discussions of the future are scoffed at. The culture is based on "What have you done for me lately."	Planning for the future is talked about but yields to the pressures of the day. "A day late and a dollar short" could be seen as our motto.	Efforts are being made to act more and react less. Management realizes that analysis and preplanning could predict important future events.	The organization is now routinely looking into the future and preparing. They have a growing vision of the importance of acting instead of reacting.	We are starting to look like a visionary company. We are becoming more confident, and every day we seem to be winning more often than the day before.	Our company is widely admired. Others say we have a crystal ball. We have a culture that knows how to predict future events and act on them.
Employee comments:								
<input type="checkbox"/> Hourly								
<input type="checkbox"/> Salaried								

Profit Protection Consultants © 2003

Note. From Values Driven Safety: Reengineering Loss Prevention Using Value-Inspired Resource Optimization, by D. Eckenfelder, 1996, MD: Government Institutes Inc. Copyright 1996 by D. Eckenfelder. Reprinted with permission.

have taken place once a month for an hour and 15 minutes and a cultural shift has begun.

"The supervisors used to put up slides or videos and talk to the screen with their backs to the audience. Now there is a vital conversation happening where everyone is involved," Peterson says. Since the scores indicated that more interaction was needed, they have held creative events. For example, one morning all the managers and supervisors stood at the front of the plant for a meet and greet and reminded workers that safety is an important priority. The employees were surprised, but it caught their attention. On another occasion, all the fire trucks were lined up with lights flashing so that everyone asked, "What's happened?" The answer was, "Nothing yet, but we have to stay alert."

These ideas are only a couple of many that have emerged from a continued conversation between managers and union leadership. Peterson continues, "We really haven't done anything else differently other than focus on getting people engaged in conversation, and we are seeing definite improvements."

Putting It All Into Practice

Top management commitment in occupational safety is viewed as a key factor in accident prevention (Chew, 1988; Cohen, 1977; Cohen & Cleveland, 1983; Davis & Stahl, 1967; Simard & Marchand, 1994; Simonds & Shafai-Sahrai, 1977).

Simard and Marchand (1995) also provided evidence that worker attention to safety is higher when the supervisor: 1) has some power and influence over decisions that affect the safety of a work group; 2) practices joint involvement with his/her work team in the conduct of accident prevention activities; and 3) participates in social interaction—particularly listening to employees. These three elements, based on data collected from 100 manufacturing plants with more than 23,000 employees support two CMT approaches:

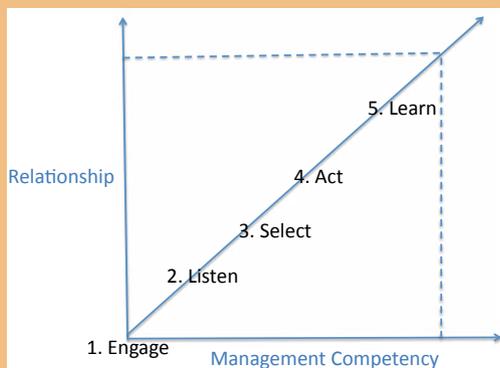
1) Safety management should be decentralized and allow more autonomy at the shop-floor level between supervisor and workers.

2) Managers and employees should be given opportunities to build the skills needed to develop relationships and understand the importance of social interaction.

The process of developing the barometer and using it to guide discussions on a regular basis helps course correct the organization before problems are visible.

Capacity for leadership grows with increased management competency and the ability to build relationships.

Figure 2 Expanded Leadership Capability



Building Relationships to Expand Organizational Capability

The expanded leadership capability model (Figure 2) attempts to capture the skills for leadership development that build relationships and organizational competency. A successful leader must be competent both as a manager/supervisor and as a relationship builder.

As shown, capacity for leadership grows with increased management competency (horizontal axis), and the ability to build relationships (vertical axis). The vector represents five sets of sequential leadership actions that lead to expanded capability. Each set consists of leadership practices to increase both personal and organizational capacity to see reality, notice errors and hazards as they emerge, and take action to correct them before they become failures.

Five Leadership Actions to Expand Capability

1) **Engage.** Entering into interaction through conversation creates the relationships that determine outcomes.

2) **Listen.** The closed mind sees what it believes to be true. Listening with an open mind allows one to discover a larger truth through other perspectives. Inner perspective involves listening to the self—including feelings and intuitions; the outer perspective includes listening to others.

3) **Select.** Selecting correct actions involves interpreting data correctly through conversation. This is akin to achieving a common understanding of reality with others. Conditions for success include mutual respect, a common understanding of the data and mutual trust.

4) **Act.** Action takes people from the inner world to the outer world where their view of reality is tested. Leaders surround themselves with people willing to speak up and ask questions, and construct an environment that allows the truth to emerge. Only then do leaders take action.

5) **Learn.** Giving up placing blame for mistakes

makes it easier to face reality. Continuously observe the results of actions to add to the understanding of the truth.

Relationship-Based Change Model

When the idea of human error as the greatest contributor to incidents began to be reexamined, it became apparent that people provide a positive contribution to safety through their ability to adapt to changes, gaps in system design and unexpected situations (Hollnagel, 1993; Rasmussen, 1983). Organizations depend on people to solve problems and innovate when unexpected events occur (Hollnagel, et al., 2006; Schein, 1996). To fully utilize this human capability, social interaction is a necessary part of the problem-solving process.

The relationship-based change model framework (Figure 3) encompasses these elements and represents a unique and distinct approach to managing change. The model incorporates the concepts and insights provided by CMT and the past 50 years of organizational development experience. It focuses on establishing structures to ensure adaptive responses to change and the effective management of ambiguity. It encompasses strategies to build and maintain relationships, communication networks and processes, problem-solving and communication skills, and related competencies.

Conclusion

Neither complexity management nor relationship psychology theory claims to dethrone other management theories anymore than quantum physics has debunked Newton's laws of physics. Instead, these disciplines identify the limitations of those laws and seek to explain what lies beyond them. As long as people and the environment continue to be injured by the unintended outcomes of poor decisions and lack of understanding, SH&E professionals must keep asking questions. Professionals working with CMT (resilience engineering, drift) are asking many of the right questions.

The questions expressing doubt or concern are quiet compared to the cacophony of financial, competitive and political pressures. Failure, disaster, death, loss and injury are consequences of not hearing or listening to those concerns. A sense of humiliation is normal after disasters such as the BP oil rig explosion, but leadership can facilitate learning and progress with the right frameworks to understand what happened and the strategies to prevent recurrence.

Learning from failure and disaster is the only productive path to pursue. The bigger the failure, the greater the number of established beliefs that become open to question.

For example, success and reliability would seem to be a safer state, but it can metaphorically put people to sleep. People's guards go down and early signs of failure go unnoticed. Drift and deviance grow so subtle that they look normal and they are unconsciously accepted as the right way to do things. The U.S. cultural norms, "If it ain't broke don't fix it" and "Run it till it breaks, then we'll fix

it" are squarely opposite to preventive action, yet they are largely unquestioned and form the foundation of just-in-time maintenance.

Management must manage these realities and this article has proposed that an important strategy involves relationship building. Healthy relationships across all organization levels are an important component of strong positive safety cultures, but building a culture is fundamentally different from building airplanes. While both are complex, only

one is living, which means reactions and interactions always present an element of unpredictability. Thus, the importance of constant awareness and keeping a pulse on what is being talked about or not becomes critical. Therefore, leaders must maintain open communication and trust.

Investing in the development of relationships building skills does not mean an organization should stop training, hazard analysis or operational procedures. It means opening eyes to the whole story of influences on human behavior. It means considering how communication affects emotions and, therefore, awareness so that better actions and more effective corrective actions can be taken before deficiencies create failure.

Incidents are not just the consequences of technology failures, but also a result of complex interrelated social and organizational factors. Today's challenges can no longer be met by addressing the human-machine interface with training and procedures. Workers' sense of values (derived from their identity), their ways of thinking and their ability to solve unforeseen problems may hold keys to preventing incidents. Safety is sustained as a priority within the context of relationships, making the creation of high-trust working environments among members and across functions of the organization highly important. **PS**

(References appear on pp. 44 and 45.)

Figure 3
Relationship-Based Change Model



The relationship-based model encompasses strategies to build and maintain relationships, communication networks and processes, problem solving and communication skills.

Table 1

A Look at Two Stages of the Relationship-Based Change Model

Step	Process description	Change agent actions
1) Dissatisfaction	<ul style="list-style-type: none"> •Dissatisfaction with the current experience is creating a desire for change. Neither the preferred outcomes nor the nature of the obstacles is yet clear. The beginning is a time for mental preparation including the awareness that what you have believed to be true could keep you from seeing the truth now and shedding expectations about the situation or potential outcomes. Judging and blaming are obstacles to freedom of expression. •The leadership actions to embed new values lie primarily in the hands of management. SH&E staff authority lies in technical expertise, interpersonal skills and ability to help the organization be clear about who is sponsoring the pursuit of excellence in SH&E. Staff members do not have programs—sponsors do. The staff helps others achieve their goals. 	<ul style="list-style-type: none"> •Get clear on the impact of the problem and its consequences. •Enlist allies who agree. •Enlist sponsors for change (line managers only).
2) Engagement	<ul style="list-style-type: none"> •Engagement is the path to developing a common understanding of the problem and acceptable approaches to solutions. To do this the questions must go beyond what is/is not working to uncovering the beliefs that have formed around why things do/do not work. Arriving at a common sense of the problem allows for the development of common-sense solutions that are more likely to be embraced. Training supervisors to listen, act, and give and receive feedback, along with repeated demonstrations of commitment eventually enroll engagement. •Face-to-face communication is most effective. When working with virtual teams and to control costs, use interactive technology. 	<ul style="list-style-type: none"> •Face-to-face communication. •Educational seminars on impact of relationships, drift and communication on safety. •Teach supervisors and their direct reports communication skills for everyday work. •Institute skills into job planning and safety meetings.



View more examples from the other five stages of the relationship-based model at www.asse.org/psextra.

References

- Alston, G.** (2003). *How safe is safe enough? Leadership, safety and risk management*. London, U.K.: Ashgate Publishing Ltd.
- Anderson, R.A., Ammarell, N., Bailey, D.E., et al.** (2005). The power of relationship for high-quality long-term care. *Journal of Nurse Care Quality*, 20(2), 103-106.
- Beer, M., Eisenstat, R.A. & Spector, B.** (1990). Why change programs don't produce change. *Harvard Business Review*, 68(6), 158-166.
- Brown, R. & Fountain, H.** (2010, Aug. 27). In oil inquiry, panel sees no single smoking gun. *The New York Times*. Retrieved from www.nytimes.com/2010/08/28/us/28hearings.html
- Bruch, H. & Ghoshal, S.** (2002). Beware of the busy manager. *Harvard Business Review*, 80(2), 62-69.
- Burns, C., Mearns, K. & McGeorge, P.** (2006). Explicit and implicit trust within safety culture. *Risk Analysis*, 26(5), 1139-1150.
- Capra, F.** (2007). Complexity and life. *Systems Research and Behavioral Science*, 24, 475-479.
- Carrillo, R.A.** (2011). Complexity and safety. *Journal of Safety Research*, 42(4), 293-300.
- Carrillo, R.A.** (2012). Internal company documents for assessments conducted in 2012 with three facilities and 160 employees.
- Carroll, J., Rudolph, J.W. & Hatakenaka, S.** (2003). Learning from organizational experience. In M. Easterby-Smith and J.A. Lyles (Eds.), *The Blackwell handbook of organizational learning and knowledge*. Hoboken, NH: Wiley Blackwell.
- Chew, D.** (1988). Effective occupational safety activities: Findings in three Asian developing countries. *International Labor Review*, 127(1), 111-125.
- Cohen, A.** (1977). Factors in successful occupational safety programs. *Journal of Safety Research*, 9(4), 168-178.
- Cohen, A. & Cleveland, R.J.** (1983, April). Safety practices in record-holding plants. *Professional Safety*, 28(4), 26-33.
- Conchie, S.M. & Burns, C.** (2008). Trust and risk communication in high-risk organizations: A test of principles from social risk research. *Risk Analysis*, 28(1), 141-149.
- Conchie, S.M. & Donald, I.J.** (2008). The functions and development of safety-specific trust and distrust. *Safety Science*, 46, 92-103.
- Conchie, S.M., Donald, I.J. & Taylor, P.J.** (2006). Trust: Missing piece(s) in the safety puzzle. *Risk Analysis*, 26(5), 1097-1104.
- Conner & Winters LLP.** (2012). Safety culture: Faint signals from human interactions. Retrieved from www.cwlaw.com/wp-content/uploads/2010/03/Safety-Culture-Faint-Signals-2-16-12b.pdf
- Davis, R.T. & Stahl, R.W.** (1967). Safety organization and activities of award-winning companies in the coal mining industry. Washington, DC: U.S. Department of Interior, Bureau of Mines.
- Dekker, S.** (2005). *Why we need new accident models* [School of Aviation Lund University Technical Report No. 2005-02]. Retrieved from www.naturvetenskap.lu.se/upload/Trafikflyghogskolan/TR2005-02_NewAccidentModels.pdf
- Dekker, S.** (2006). Resilience engineering: Chronically the emergence of confused consensus. In E. Hollnagel, D. Woods & N. Leveson (Eds.), *Resilience engineering: Concepts and precepts* (pp. 77-92). London, U.K.: Ashgate Publishing.
- Eckenfelder, D.** (1996) *Values driven safety: Reengineering loss prevention using value-inspired resource optimization*. Lanham, MD: Government Institutes.
- Eckenfelder, D.** (2003). The antidote for behavior-based safety: The virtue and vices associated with BBS and the cure. *Proceedings of ASSE's Safety 2003*, Denver, CO, USA.
- Ellingson, L.L.** (2002). Communication, collaboration and teamwork among healthcare professionals. *Communication Research Trends*, 21(3), 3-21.
- Fukui, H.** (2001). Safety climate at nuclear power plants. *Electrical Review*, 86(5), 31-35.
- DePasquale, J. & Geller, E.S.** (1999). Critical success factors for behavior-based safety: A study of 20 industry-wide applications. *Journal of Safety Research*, 30(4), 237-249.
- Gittell, J.H.** (2009). *High performance healthcare: Using the power of relationships to achieve quality, efficiency and resilience*. New York, NY: McGraw-Hill.
- Gittell, J.H.** (2003). *The Southwest Airlines way: Using the power of relationship to achieve higher performance*. New York, NY: McGraw Hill.
- Godwyn, M. & Gittell, J.H.** (2011). *Sociology of organizations: Structures and relationships*. Thousand Oaks, CA: Sage Publications.
- Hale, A.** (2000). Editorial: Culture confusion. *Safety Science*, 34, 1-14.
- Hidley, J.H.** (1998, July). Seven critical success factors for behavior-based safety: Avoiding common pitfalls and achieving real gains. *Professional Safety*, 43(7), 30-34.
- Hollnagel, E.** (1993). Human reliability analysis: Context and control. In B.R. Gaines & A. Monk (Eds.), *Computers and people series*. New York, NY: Academic Press.
- Hollnagel, E. (Ed.)**. (2009) *Safer complex industrial environments: A human factors approach*. Boca Raton, FL: CRC Press.
- Hollnagel, E., Woods, D.D. & Levenson, N.G. (Eds.)**. (2006). *Resilience engineering: concepts and precepts*. London, U.K.: Ashgate Publishing.
- Hopkins, A.** (2011). Management walk-arounds: Lessons from the Gulf of Mexico oil well blow out. *Safety Science*, 49, 1421-1425.
- Columbia Accident Investigation Board.** (2003). *History as cause: Columbia and Challenger. CAIB report: Volume 1*. Arlington, VA: Author. Retrieved from <http://caib.nasa.gov/news/report/pdf/vol1/chapters/chapter8.pdf>
- Janssens, M., Brett, J.M. & Smith, F.J.** (1995). Confirmatory cross-cultural research: Testing the viability of a corporation-wide safety policy. *Academy of Management Journal*, 38(2), 364-382.
- Klein, G., Pliske, R., Crandall, B., et al.** (2005). Problem detection. *Cognition, Technology & Work*, 9(1), 14-28.
- Kotter, J.P.** (1995). Leading change: Why transformation efforts fail. *Harvard Business Review*, 73(2), 59-67.
- Krause, T.R., Seymour, K.J. & Sloat, K.** (1999). Long-term evaluation of a behavior-based method for improving safety performance: A meta-analysis of 73 interrupted time-series replications. *Safety Science*, 32(1), 1-18.
- Lehrer, J.** (2010, Dec. 13). The truth wears off: Is there something wrong with the scientific method? *The New Yorker*. Retrieved from www.Newyorker.com
- Leonardi, P.M., Neeley, T.B. & Gerber, E.M.** (2012). How managers use multiple media: Discrepant events, power and timing in redundant communication. *Organization Science*, 23(1), 98-117.
- Lewis, L.K.** (2011). *Organizational change: Creating change through strategic communication*. New York, NY: Wiley.
- Magnusson, H.** (2010). *Did the message go through? A*

qualitative study on communication-mapping as a safety assessment and development tool at LKAB (Master's thesis). Lulea University of Technology, Lulea, Sweden.

Marsick, D. (2004). Behavioral interventions at DOE sites in 2004. Retrieved from http://s3.amazonaws.com/zanran_storage/energy.gov/ContentPages/108861021.pdf

Mettert, T.A. (2006). The effectiveness of the behavior-based safety program at Jacobs Sverdrup's NASA Langley Rome contract. Retrieved from http://digital.lib.odu.edu:8000/dspace/bitstream/123456789/439/1/Mettert_Tony.pdf

Muczyk, J.P. & Steel, R.P. (1998). Leadership style and the turnaround executive. *Business Horizons*, 41(2), 39-46.

Mufson, S. & Kornblut, A.E. (2010, June 16). Obama speech from Oval Office urges action on clean energy bill. *The Washington Post*. Retrieved from www.washingtonpost.com/wp-dyn/content/story/2010/06/15/ST2010061505674.html?sid=ST2010061505674

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. (2011). *Deep water: The Gulf oil disaster and the future of offshore drilling*. Retrieved from www.oilspillcommission.gov/sites/default/files/documents/Chapter4.pdf

Perrow, C. (1984). *Normal accidents: Living with high-risk technologies*. Princeton, NJ: Princeton University Press.

Pidgeon, N. (2010). Systems thinking, culture of reliability and safety. *Civil Engineering and Environmental Systems*, 27(3), 211-217.

Pidgeon, N. (2011) In retrospect: Normal accidents. *Nature International Weekly Journal of Science*, 477, 7365.

Poortinga, W. & Pidgeon, N.F. (2004). Trust, the Assymetri Principle and the role of prior beliefs. *Risk Analysis*, 24(6), 1475-1486.

Rasmussen, J. (1983). Skills, rules and knowledge: Signals, signs and symbols, and other distinctions in human performance models. *IEEE Transactions on Systems, Man and Cybernetics*, 13, 257-266.

Rasmussen, J. & Svedung, I. (2000). Proactive risk management in a dynamic society. Karlstad, Sweden: Swedish Rescue Services Agency. Retrieved from www.msb.se/RibData/Filer/pdf/16252.pdf

Reason, J. (1997). *Managing the risk of organizational accidents*. London, U.K.: Ashgate Publishing.

Rock, D. (2008) SCARF: A brain-based model for collaborating with and influencing others. *NeuroLeadership Journal*, 1, 44-52.

Sagan, S. (1993). *The limits of safety: Organizations, accidents and nuclear weapons*. Princeton, NJ: Princeton University Press.

Schein, E. (1996). Three cultures of management: The key to organizational learning. *Sloan Management Review*, 38, 9-21.

Schein, E. (2010). *Organizational culture and leadership* (4th ed.). San Francisco, CA: Jossey-Bass.

Schein, E. (2011). Commentary on complexity and safety by Rosa Antonia Carrillo. *Journal of Safety Research*, 42(4), 301.

Schulman, P.R. (1993). The analysis of high reliability organizations: A comparative framework. In K.H. Roberts (Ed.), *New challenges to understanding organizations* (pp. 33-53). New York, NY: Macmillan.

Schulman, P.R. (2004). General attributes of safe organizations. *Quality and Safety in Healthcare*, 13, ii39-ii44.

Shook, J. (2010). How to change a culture: Lessons from NUMMI. *MIT Sloan Management Review*. Retrieved from <http://rsworldwideconsulting.com/wp-content/uploads/2011/01/Corporate-Culture-Case-Study.pdf>

Simard, M. & Marchand, A. (1994). Tile behavior of first-line supervisors in accident prevention and effectiveness in occupational safety. *Safety Science*, 17, 169-185.

Simard, M. & Marchand, A. (1995). A multilevel analysis of organizational factors related to the taking of safety initiatives by work groups. *Safety Science*, 21, 113-129.

Simon, R.A. (1995). Innovative applications of organization development technologies for improving safety performance. *Proceedings from ASSE's Safety Technology Conference Symposium*.

Simon, R.A. (1996, Oct.). The trust factor in safety performance. *Professional Safety*, 41(10), 28-33.

Simonds, R.H. & Shafai-Sahrai, Y. (1977). Factors apparently affecting injury frequency in 111 matched pairs of companies. *Journal of Safety Research*, 9(3), 120-127.

Singer, S.J. & Tucker, A.L. (2006). Creating a culture of safety in hospitals [Preliminary research]. Palo Alto, CA: Center for Health Policy.

Snook, S.A. (2000). *Friendly fire: The accidental shoot-down of U.S. Black Hawks over Northern Iraq*. Princeton, NJ: Princeton University Press.

Stacey, R.D. (2007). *Strategic management and organizational dynamics*. Upper Saddle River, NJ: Prentice Hall.

Stacey, R.D., Griffin, D. & Shaw, P. (2002). *Complexity and management: Fad or radical challenge to systems thinking?* New York, NY: Routledge.

Strebel, P. (1996). Why do employees resist change? *Harvard Business Review*, 74(3), 86-92.

Tost, L.P., Gino, F. & Larrick, R.R. (2011). When power makes others speechless: The negative impact of leader power on team performance (Working Paper 11-087). Cambridge, MA: Harvard Business School. Retrieved from www.hbs.edu/research/pdf/11-087.pdf

Tost, L.P., Gino, F. & Larrick, R.R. (2012). Power, competitiveness, and advice taking: Why the powerful don't listen. *Organizational Behavior and Human Decision Processes*, 117(1), 53-65.

Vaughan, D. (1996). *The Challenger launch decision: Risky technology, culture and deviance at NASA*. Chicago, IL: University of Chicago Press.

Vollmer, T.R. & Hackenberg, T.D. (2001). Reinforcement contingencies and social reinforcement: Some reciprocal relations between basic and applied research. *Journal of Applied Behavior Analysis*, 34, 241-253.

Waldrop, M.M. (1993). *Complexity: The emerging science of the edge of order and chaos*. New York, NY: Simon & Schuster.

Weick, K.E. (1999). Organizing for high reliability: Processes of collective mindfulness. *Research in Organizational Behavior*, 81-125.

Weick, K. & Sutcliffe, K. (2001). *Managing the unexpected*. San Francisco, CA: Jossey Boss.

Weick, K.E., Sutcliffe, K.M. & Obstfeld, D. (2005) Organizing and the process of sensemaking. *Organization Science*, 16(4), 409-421.

Whitener, E.M., Brodt, S.E., Korsgaard, M.A., et al. (2006). Managers as initiators of trust: An exchange relationship framework for understanding managerial trustworthy behavior. In R.M. Kramer (Ed.), *Organizational trust: A reader*. Oxford, U.K.: University Press.