

# Applying Systems Thinking to Safety

*A case study of success*

**By F. David Pierce**

A SYSTEMS APPROACH WAS USED in an attempt to turn around a failing safety program at a mid-sized manufacturing company. Emphasis was placed on building leadership skills, implementing clear visions for success, removing communication barriers, building dynamic measurement, and inviting and valuing employee participation in order to balance the system's parts and subsystems. Effects were not immediate and required continued vigilance and strong leadership, but gradually all aspects—including safety—began to improve. This site is now leading its corporation in many business aspects, including safety performance, and has become the model on which the corporation is building like successes.

When introducing systems thinking to safety professionals, much confusion results. Often, it is confused with system safety or simply not understood. Factually, systems thinking requires that people approach problem solving and day-to-day decision making differently. It requires new skills and long-term goals (Markides). It does not sacrifice today, but realizes that today is merely the first step to tomorrow. Systems thinking realizes this is not a race to win because there is no finish line. It is a challenge that requires SH&E professionals to always be at the front of the pack in a race that never finishes (Senge).

Traditionally, SH&E professionals think in "parts" not "systems." Trusted problem-solving techniques guide practitioners to determine causes (obvious and underlying) that require "fixing"; this is parts thinking. Systems thinking broadens this perspective so

that people have a better understanding and appreciation for the balance of the interrelated and interdependent parts of a system and an understanding of the fragile dynamics of successful change.

Systems thinkers see things differently. They realize that everything is arranged in systems and that each system is comprised of interrelated and interdependent parts or subsystems. Each system exists to accomplish a purpose—and it requires all of the parts to accomplish it. Any imbalance diminishes the system's ability to effectively accomplish its purpose and causes conflict within the system. Systems thinkers recognize that no part fails alone because it is interrelated to other parts. Systems thinkers also realize that no part can accomplish the system's purpose alone. The purpose can only be accomplished in balance with all system parts (Scholtes).

An automobile is a good example of a system. An auto has one true purpose: transportation. It is made up of many subsystems and parts, all of which are interrelated and interdependent; through the orchestrated interaction of all, the system accomplishes its purpose. None of the individual parts or subsystems can accomplish that purpose alone.

Traditional approaches to safety cause practitioners to be parts thinkers. If a part fails

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and causes an injury or near-hit, the tendency is to stop looking and simply replace the failed part with a new part, believing that that will solve the problem. This approach ignores the fact that systems always follow Newton's third law of motion, "For every action there is an equal and opposite reaction." This means that if not all interrelated and interdependent parts of the system are assessed during the problem-solving process, the solution "pushes in here" and something "pushes out over there." In other words, the balance is interrupted, which sends cause-and-effect ripples throughout the system that only create a new problem or hazard somewhere else or to someone else (Hammond, et al). As a result, the system never truly improves.

Examples of parts thinking include installing interlocks or enabling two-hand operation where they may not be effective or are routinely overridden by workers; creating safe pathways in hazardous work areas that are rarely used by workers; disciplining workers for safety infractions and getting bad attitudes, and supervisors who will not enforce rules; creating safety policies to solve nonproblems and further entrench workers' perception of the SH&E professional as "safety cop"; trying to implement safety solutions and finding no management support.

Parts thinking coaxes practitioners to follow the traditional "fix the worker" focus. The long-term and continual frustrations experienced chasing this focus suggest that there must be a better way. Multiple options have surfaced out of this approach, all aimed at "fixing" the worker; these include increased training, changing behavior, increasing peer pressure, improving activators and providing safety incentives. These strategies have had mixed results, which has led to continuing debate about them. Systems thinking pulls toward balancing the system, in which the worker is but one of the many interrelated and interdependent parts. This fundamental difference demands vastly different approaches, many of which (at least from a parts-thinking perspective) are not even related to safety improvement.

Safety encompasses another important aspect of systems thinking. Despite customer requests, manufacturers will not necessarily implement all suggested changes. For example, auto manufacturers will never make a car's braking subsystem operate like its steering subsystem. They are what they are and it is because of their differences that the system works. Translated to safety, SH&E professionals can focus on changing workers' basic behavior patterns, but they cannot change the hardwired reflex arcs that have been developed over many years. Instead, practitioners need to appreciate the way this part—the worker—in the system, company or job, operates and learn how to use these natural hardwired pathways to advantage by system balancing, not parts retooling. This is systems thinking.

Applying this approach requires effective long-range change dynamics and the realization that change cannot be managed, it must be led. From the inception of the term "manager" in the mid-1800s,

the purpose was to keep order, maintain operation and keep operations going (Scholtes)—or, to use a Peter Druckerism, "to manage the work." Leadership is not about today or "managing the work." Leadership is about tomorrow, recognizing that today is the first step to tomorrow. Because of this, a key element of any systems-thinking implementation is to change the way the organization is powered (Drucker), moving away from predominant management to synergizing leadership.

Another key understanding in systems thinking focuses on variation (Scholtes). W. Edwards Deming tried to teach businesses about variation—how it exists naturally within each system, and how the extent of it depends on the balance (or lack thereof) of system parts (Deming). For example, the case-study company had wide swings in recordable injury experience from month to month. One month, it would experience one recordable, the next four, the following eight and the next zero. Using parts thinking, the firm sought to "fix" the unacceptable outlier—the eight recordable injuries that occurred in one month. This common start-stop management technique created a "now its hot, next month its cold" zig-zag emphasis on safety. If the previous month was a bad safety month, everyone was focused on safety. However, if the next month was great for safety, congratulations were shared and the emphasis on safety was softened. This is parts thinking.

Systems thinking looks at this month-to-month injury experience differently. It recognizes that such variation is merely a measurable result of a system's imbalance; if not corrected, the company can expect the results to recur. In other words, having up to eight recordable injuries each month (perhaps more) is an "expected" range given the culture and imbalance of the organizational system.

### **Safety's Role in the Organizational System**

Often, SH&E professionals try to force-fit safety into being a system in itself with the purpose of accident prevention. The sad truth is that this fails the "so what" test. Safety is only one part of an organizational system; if that system ceased, accident prevention would be purposeless; thus it fails the "so what" test. This is an important realization. Safety does not stand alone; it must operate effectively (in balance) with other parts for the system to accomplish its purpose. In the business world, that purpose would be to make a profit, increase shareholder equity or, in the case of a nonenterprise, accomplish the chartered purpose within budget.

Therefore, a systems approach to fixing any part of the system, safety included, must focus on the system as a whole, not just the failing part. An analogy would be comparing an "underpowered" safety program to an underpowered automobile. Merely installing a more-powerful engine in a car (like supercharging the safety program alone) will not likely produce the desired result; this approach ignores the other interdependent and interrelated parts of the car. In the underpowered vehicle, a better transmission will be needed, as will a heftier

driveline and differential; larger wheels and tires may be a good idea as would an improved braking subsystem. Systems fixes require that all parts be improved or adjusted (balanced) so that a part's performance, like safety, can be improved.

### The Case Study: Prechange Efforts

Successful change must be led (Pierce). The company hired a systems consultant to orchestrate the change dynamics and plan, mentor the process, teach systems thinking and build leadership skills. Recognizing that each system is different, has different subsystems and parts, different dynamics and unique imbalances, the consultant "fingerprinted" the organization. In addition, to help focus the plan, a baseline survey of one-third of all workers was conducted; this effort was designed to sample the organization's culture, emphasizing the systems aspects to safety. The simple but comprehensive nine-question survey was distributed randomly and gathered by consulting staff. The survey had been developed over many years and diverse applications as a means of "sampling" key elements of organizational culture that would provide a fingerprint of system imbalances. Results of the survey were informative.

- 64 percent felt management was confused and visionless (a leadership issue).

- 57 percent felt their job was not great and the only reason they worked was to pay bills (a communication and leadership issue).

- 72 percent felt the top priority was to keep their machines up and accomplish the production schedule any way necessary (a leadership and safety culture issue).

- 35 percent felt they were present only to do their work function and that management often made them feel stupid (a leadership and communication issue).

- 70 percent felt they would receive greater rewards if they kept quiet and didn't make waves (a safety culture, leadership and communication issue).

- 58 percent felt communication was poor and said they only heard things if a problem arose (a communication issue).

Concerning employees' feelings about management competency, the leading belief was that management needed significant training; workers also said that management cared only about production and did not manage the work well. With respect to first-line supervisor competency, workers believed that they (supervisors) did not manage the work well, have no idea what was best for the company and needed training.

Clearly, this company's culture was repressive. A serious deficiency was noted in the perception of management competency, a significant problem because that same leadership team must lead change (Pierce). Communication was closed, both up and down the organization. Feelings of disempowerment were rampant among workers (Pfeffer). Furthermore, the culture clearly said that safety was a distant priority to production and doing whatever necessary to keep operations going.

Based on these results, implementation priorities were derived.

- 1) Teach systems thinking and convert managers to leaders (Ciampa and Watkins).

- 2) Create and communicate the system's purpose and vision of a successful future.

- 3) Open and free downward communication and information.

- 4) Teach leadership how to open the door to feedback rather than feel threatened by it.

- 5) Create and implement employee recognition programs and participation opportunities.

- 6) Identify and implement objective and dynamic system measures.

- 7) Restructure and teach new problem investigation methods and communication (including accident investigation).

Knowing that the original "on the surface" goal of this change effort was to improve safety performance, the natural and immediate observation a parts thinker makes is, "Safety isn't addressed until number 7, and then only as an 'included' item." Certainly, this approach seems odd from the traditional parts-thinking perspective. But the problem was not excessive injuries. Injury performance was merely the one measured index that appeared to be out of control. In reality, given the system imbalance, it was not out of control; it was merely an expected variance of the system as it operated. Had the company had extensive measures throughout its many subsystems, many, if not all, indexes would have shown this same wide variation in performance, reflecting the same imbalance. But like most organizations, this company's use of objective performance measures was limited.

### The Case Study: Change Implementation

A diverse leadership team was created; it included all upper management, department managers, supervisors, team leaders and employee leaders. A structured and aggressive "in your face" series of weekly four-hour training/discussion sessions (Leonard and Swap) was initiated, following the derived priority list as goals. The key agreed-upon rules for these sessions were:

- Leave your ego at the door.
- There is no rank in this room.
- Whatever you are feeling from the sessions, leave it here.
- We always participate and do our homework.
- We always tell it like it is.
- As an organization and individually, we are all committed to change.
- No one is sacrificed—either we all make it or none of us make it.

More than 30 objective measures of system performance were created and implemented; these included efficiency of utilization, efficiency of operation, workforce stability, costs, participation and standardization (Smith). At first, most measures reflected what was feared—wide variation in performance. Communication and leadership tools were

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implemented to facilitate the cultural change process; these included daily team huddles, feedback lines, daily leadership by walking around, all-employee meetings, employee participation in upper leadership strategy and review meetings, and employee participation in problem investigations (including accident investigations).

For three months, the leadership team met each week, learning new thinking patterns and skills, openness, appreciation for others, team dynamics and how important each was to company success. Individual change was rapid in some team members, slow and resisted in others. The continual invitation to explore individual change and growth together with the exchange of individual successes and enthusiasm eventually brought all team members to a unified vision using learned leadership techniques (Doyle).

Performance measures (including injury performance) showed results that remained well within expected variation (that is, injury rates fluctuated as normal). Walking through the plant, observing workers and supervisors, and talking with employees, however, one could sense a change in the culture, an awakening openness. Workers were more optimistic; they felt they knew more about what was happening, felt more valued and believed everyone was coming together rather than moving apart. After three months, the leadership meeting frequency was changed to four hours every other week.

Six months into the process, the nine-question employee survey was conducted again. Results reveal several key changes.

- 18 percent felt management was confused and visionless (down from 64 percent).

- 22 percent felt their job was not great and the only reason they worked was to pay bills (down from 57 percent).

- 28 percent felt the leading priority was to keep their machines up and accomplish the production schedule any way necessary (down from 72 percent).

- 8 percent felt they were present only to do their work and that management often made them feel stupid (down from 35 percent).

- 21 percent felt they would receive greater rewards if they kept quiet and didn't make waves (down from 70 percent).

- 12 percent felt communication was poor and they only heard things if a problem arose (down from 58 percent).

Regarding management competency, employees believed that management was trying to improve, knew where the company was headed and cared about worker safety. With respect to first-line supervisor competency, workers believed that their supervisors cared about safety, were trying to improve the workplace and truly wanted to make workers happy.

#### Case Study: Results

After six months, injury performance and other performance measures appeared to be tightening and lowering in range or variance. By nine months, the monthly expected variance (or range) for record-

able injuries had been reduced from 0 to 8, to 0 to 3. At the end of the first year, that variance was 0 to 1. The survey used to sample workplace safety culture was conducted again at the one-year anniversary of the change process; it continued to show that employees were more widely believing that the company was healthy and moving under competent leadership in the right direction. It also showed that employees believed they were valued and that their participation played a significant role in company success (McGrath, et al).

The company, which had experienced 10 lost-time injuries and 1,000 lost workdays the year before the change effort, recently surpassed one million workhours without a lost-time injury. Even better, the measured severity of injuries during this period has been below the level that would threaten lost workdays. Of particular importance to upper management, the gross profit margin rose from 16 percent to 31 percent (Pfeffer).

Every three months, the leadership team gathers offsite to revisit lessons learned, share new experiences, recement a common mission and vision for success, and celebrate the road taken. After all, their effort was a pioneering accomplishment (Barker). When the group decided to make this change, no data were available to tell upper management that the direction was correct. Absent of data, they had the intuition that the chosen direction was correct—and the guts to see the journey through. ■

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