

THE FUTURE OF SAFETY

REDESIGNING THE SAFETY, HEALTH & ENVIRONMENTAL FUNCTION FOR THE YEAR 2000

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Due to increasing pressure from government, consumers and community groups, the need to improve the effectiveness of the safety, health and environment (SH&E) function is emerging as a priority for managers. Downsizing, streamlining and trends toward employee empowerment have created the need for managers to redefine the way in which SH&E is performed and restructure it to meet the challenges of the year 2000—and beyond.

FORCES DRIVING THE NEED FOR CHANGE

In May 1993, the authors worked with 80 safety professionals to develop a comprehensive approach to managing an overwhelming

workload. Sixty-hour work weeks were common; as pressure to improve performance mounted, longer working hours were anticipated. All involved agreed that the way work was accomplished needed to change. The real challenge was determining how to effect this change and still meet corporate objectives.

To investigate the need to redesign the SH&E function, participants were asked to rank the demands for improved performance, listed here in order of importance:

1) Economics. Economic survival was considered the primary driver. The need to cut costs has caused managers to view accident reduction as an area for significant savings. At the same time, "cost-effectiveness" initiatives are reducing resources needed to implement SH&E programs, making it more difficult to meet objectives.

2) Competition. As more competi-

tors emerge, organizations must accomplish more with less. Accidents increase production costs and time, which companies cannot afford.

3) Community Activism. The "green" movement has great impact on managers who work in businesses that affect the environment or represent a physical threat to the community. (Many participants forecast that this demand will become the key driving force for change by the year 2000.)

4) Government Participation. Government, in response to constituencies, is demanding safer workplaces and a cleaner environment.

5) Workplace Dynamics. Changes in workforce composition, including gender, race, education level and age distribution, have created new demands for greater autonomy and safety.

6) Customer Expectations. Given more choices, customers expect safer, cleaner, healthier products.

7) Technology. The rate of technological change has increased the demand for new procedures, policies and training. In addition, information technology has threatened to eliminate SH&E staff functions.

8) Globalism. Global competition increases financial pressures on domestic facilities. In addition, international cultures may not respond to the "way we've always done it."

TIME FOR CHANGE IS NOW

This list dramatically illustrates why the present mode of operation is no longer effective, and why the SH&E function should be redesigned. New challenges require new thinking, especially when current methods maintain the status quo or produce higher incident rates. The innovative approach presented here is based on a combination of "strategic" and "systems" thinking. It may face strong resistance from the traditional safety cul-

ture, which believes that engineering initiatives are the answer to accident prevention in industry.

Although the traditionalist might claim, "I do systems planning," s/he is referring only to hazard control, analysis to anticipate hazards and engineering to prevent accidents (Simon). This thinking ignores organizational, behavioral and cultural systems. Consider this example from the 1991 edition of National Safety Council's Accident Prevention Manual for Business and Industry. In its chapter on "Emerging Trends in Safety and Health," the book states:

"Management needs to place greater emphasis on use of engineering techniques in accident prevention Instead of focusing primarily on correcting workers' unsafe practices, management should examine and assess the total human-machine environment system to appraise loss potential. They can then apply the principles of engineering science to minimize future accidents and subsequent losses" (Tarrants).

According to social systems expert Charles Perrow, who analyzed catastrophes at Three Mile Island and Bhopal, India, technological solutions are not the answer to system failures. In *Normal Accidents: Living with High-risk Technologies*, he warned that technology can, in fact, exacerbate the situation by lulling people into a false sense of security and control, thus causing them to ignore or misinterpret warning signs. Studies of large systems failures suggest that the entire organizational system, including internal and external stakeholders, ultimately influences circumstances surrounding such disasters.

Perrow expanded on additional problems that dangerous, complex technologies face. He postulated that the properties of systems themselves, rather than owner, designer or operator error, can result in catastrophic accidents:

"When serious accidents (such as Union Carbide's in Bhopal, India) occur, investigations blame operator error. That is why most safety programs focus on employee qualifications and better operator training. Where complexity is designed into the production process, the ability to anticipate unlikely combinations of small errors is limited, although such combinations are ultimately responsible for major errors. Whether officially 'caused' by operators, these errors are invited by complex technology; no amount of training or regulation can prevent them all" (Perrow 63).

Clearly, a new, more effective approach to accident prevention is needed. Engineering, regulation and/or training cannot achieve these goals alone. This article presents a framework that systematically considers the multiple influences that produce a given organizational result. In surpassing root cause

analysis, it presents an open systems model for redesigning the SH&E function, one which addresses current demands and will result in company-specific solutions. Five topics are discussed here:

- 1) Explanation of Simon Open System model for organization design.
- 2) Four-step change process.
- 3) Role of organizational culture in the change process.
- 4) Case study using the models in real-time.
- 5) Implications of systems thinking for redesigning the SH&E function.

THE SIMON OPEN SYSTEM MODEL

The Simon Open System (S.O.S.) model is an exemplar for fundamental organization redesign (Figure 1). It is a tool for conducting organizational diagnosis and planning large-scale improvements. Here, it is adapted to redesign the SH&E function. This approach involves cultural change as well as organizational restructuring needed to support the new culture. Adapted from the work of Nadler and Tushman, two leaders in organization design, S.O.S. is based on a view of organizations as open systems. Nadler and Tushman defined an open system as:

"A set of interrelated elements; a change in one element affects other elements. An open system interacts with its environment. It is more than a set of interrelated elements; rather, the elements constitute a mechanism that takes input from the environment, transforms it and produces output. At the most general level, it should be easy to visualize organizations as systems. For example, a manufacturing plant is [comprised] of different, but related, components (departments, jobs, technologies). The plant receives input from the environment—labor, raw materials, production orders—and transforms it into products" (Nadler, et al 42).

This view of organizations leads to "open systems planning," a technique that examines and changes the entire system in order to improve organizational effectiveness. Beckhard and Harris pointed out that an organization, in order to remain in balance with its environment, faces constant pressure to change; these changes often result in internal instability. The manager's dilemma is to respond to external demands while maintaining the productivity of the organization (Beckhard and Harris). Similarly, changing the SH&E function to meet the challenges of the year 2000 requires that organizational balance be maintained while new demands are being met.

EXPLANATION OF THE S.O.S. MODEL

The S.O.S. model is designed to help managers achieve this task. It has six components: 1) environ-



mental demands; 2) input; 3) transformational process; 4) output; 5) feedback loop; and 6) culture. The arrows in Figure 1 show that an organization is never static and that relationships exist between each part of the whole. Therefore, each proposed change must be evaluated in terms of the whole system.

Environmental Demands

The SH&E manager must answer both internal and external demands. The external environment includes institutions, groups, individuals and events outside the organization, which impact company-wide initiatives, strategies or objectives. Internal demands include supervisors, unions or workplace expectations. Both types of demands must be identified and ranked in order to begin redesigning the function.

Input

Input includes resources (people, information, energy, materials) and strategic objectives that fuel an organization's ability to

produce its product or "output." New initiatives require extensive resources. Analysis must ask: "Are sufficient resources available to support the redesign?" "Are objectives clear and based on environmental demands?"

Transformational Process

The transformational process is the organization itself. It is the organization's work that transforms input and output. The process is comprised of closely connected systems, which are only effective if their parts work well together.

A good analogy is a motorcycle. Having the best engine, transmission, wheels, etc., is not enough. These components must fit together and complement each other. Likewise, the various parts and design elements of organizations must fit together.

The two major components in the transformational process are culture and organizational influences. The culture, shown at the center of Figure 1, is the engine. Organizational influences surrounding the culture—structure, technol-

ogy, rewards, measurement systems and social processes—are the supporting components. Table 2 describes the organizational components and provides a list of questions to help an organization determine whether its systems are working together to produce excellent overall safety performance.

Output

An organization's output is its results. Output should be identified and measured at the individual, group and organizational level. Table 1 shows sample SH&E output (which is not limited to incident rates).

Feedback Loop

Feedback is information regarding an organization's actual performance or results; it is used to control the future functioning of the system. Since an organization depends on the environment not only for its input, but also for acceptance of output, the feedback loop provides information that allows an organization to adjust to environmental changes. For

example, higher workers' compensation costs are negative feedback, indicating need for change. Conversely, high employee morale and fewer accidents are positive indications that programs are working. Without feedback, a company cannot know when and how to change.

In summary, open systems theory stresses two factors for understanding organizational success: 1) Ultimately, an organization's survival depends on its ability to adapt to demands of its environment. 2) In meeting these demands, managers must be concerned with a total cycle of input-process-output, not merely end results. The S.O.S. model provides a "whole systems" framework for redesigning the SH&E function so it responds to company-specific environmental demands.

FOUR-STEP CHANGE PROCESS

In applying the model, a four-step process can be used to analyze an SH&E organization and plan for function redesign. Involving members from all organizational levels in this process ensures that the information obtained is more accurate and strengthens support needed to implement change.

Step 1. Where is the organization now? Answer Table 2's "Questions re. Present" in order to evaluate the organization's current status.

Step 2. Where does the organization want to be? Answer "Outputs" questions in order to identify desired results in terms of individual, group and organizational performance.

Step 3. What must change in order to achieve those results? Answer "Questions re. Future" for each component.

Step 4. Note the differences between where the organization is and where it wants to be. Based on results, develop a plan to implement change.

CULTURE'S ROLE IN ORGANIZATIONAL CHANGE

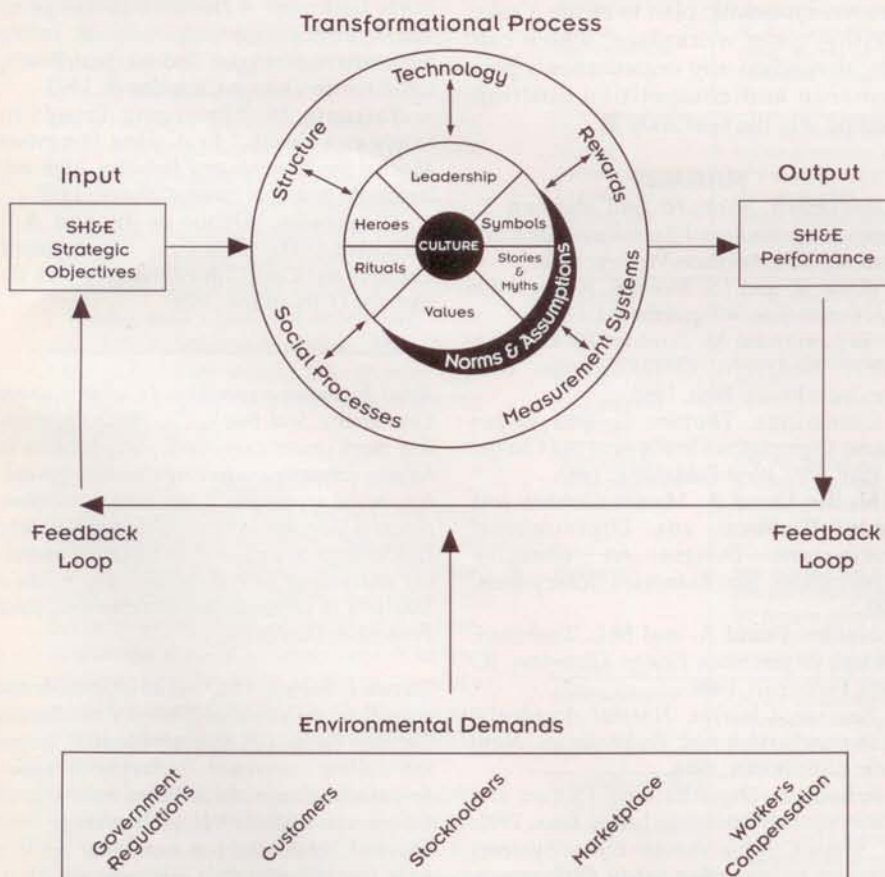
Structural change requires cultural change as well. The S.O.S. model places culture at the heart of an organization, which reflects its central role in the workings of organizational life. Cultural change, however, is complex (and full discussion exceeds this article's scope). Principally, it entails gaining leadership commitment to model, reward and support new programs and systems. It also involves all members of the organization, who are enlisted to identify norms and assumptions that must change.

What Is Culture? How Is It Formed?

Although people feel their attitudes about safety originate from within, substantial research shows that people's beliefs about how things work arise from the norms or expectations of groups to

FIGURE 1 SIMON OPEN SYSTEM FRAMEWORK

A Diagnostic and Action Planning Framework to Improve SH&E Performance



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which they belong. This research has deep implications for understanding how safety attitudes develop and what must be done to change them. Individuals can be trained in new behaviors or offered individual rewards for changing; if group norms remain unchanged, however, the individual will likely revert to old behaviors. Thus, to change organizational behavior, group norms, not individual attitudes, should be addressed.

Can Culture Be Changed?

Changing assumptions is difficult because they are so deeply rooted—people feel they are surrendering freedom or a part of their “inner selves.” The following example illustrates how this dynamic applies to safety.

For years, printers worked with inks and solvents thought to be safe. However, retired printers began to report respiratory illnesses, which were traced back to these chemicals. As a result, respirators became required equipment. Years later, printers at a major newspaper refused to wear the respirators, claiming they were cumbersome. When pressed about long-term effects, one printer said, “I know how to take care of myself. I’ve been doing this for 30 years. Nothing has happened.”

Work groups form assumptions about safety based on their experience. These “discoveries” are passed on to new members as the correct way. Once such assumptions become part of the culture, they merge into the unconscious. Unfortunately, the assumptions may be based on faulty experience.

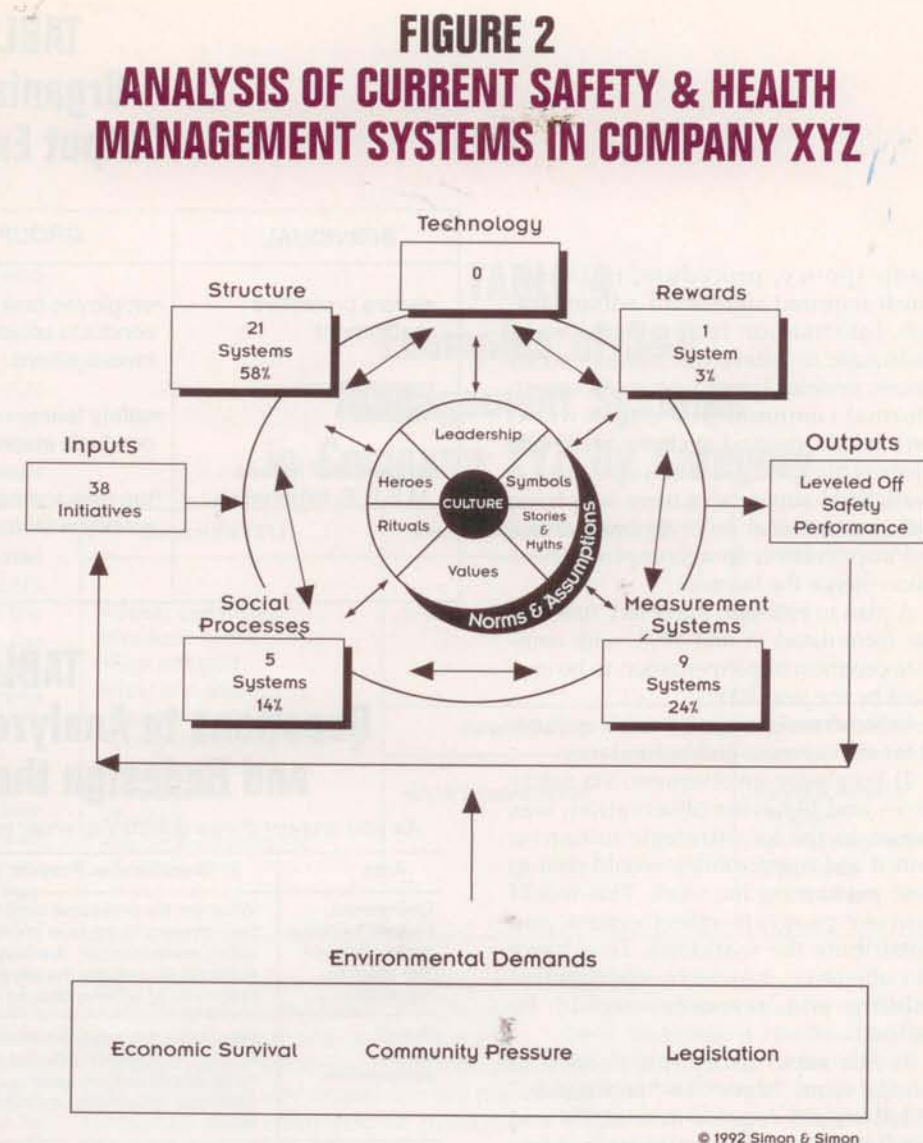
For culture to change, an urgent need must emerge and be communicated. Typically, organizational leaders detect this need and communicate it throughout the organization. Although the safety manager can be a catalyst for culture change, as a collaborator, advisor and facilitator, s/he cannot effect change alone. Authority and resources for such change are in management’s hands. As one safety director said, “If our CEO put safety performance on the list of corporate-wide objectives, our requests for resources would sail through!” This is a testament to the power of leadership in changing culture.

CASE STUDY: USING THE S.O.S. FRAMEWORK

The following case study demonstrates how a corporate staff used the S.O.S. framework to draft a strategic plan to redesign the SH&E function.

Background and Need

XYZ’s management conducted a survey in an effort to optimize safety management. The goal: Determine why safety performance had leveled off. Feedback from safety and health (S&H)



field supervisors indicated that administrative workloads were overwhelming, and new programs were not improving results.

The division safety director met with an organization development consultant and 25 S&H supervisors. Based on analysis of data, they developed an action plan to improve the safety management organization.

Diagnosis

A copy of the S.O.S. model was displayed on a wall and explained. Supervisors were divided into teams of eight; each team member received a pad of sticky-notes.

The first task was to identify and categorize demands to improve SH&E performance. The top three categories were: 1) cost cutting, 2) community pressure to protect the environment and 3) stricter legislation. These were placed on the model.

Next, teams listed strategic initiatives launched by management in response to

these forces; these initiatives were entered in the “Input” box. The supervisors listed 38 initiatives; Table 3 lists several examples. The large number of initiatives cited suggests that crises or regulations were responded to individually, without a strategic framework.

Teams listed desired outcomes of these initiatives in the “Output” box. They then categorized safety and health management systems under their charge. Next, they positioned (via sticky notes) these 36 systems according to where they fit on the transformational process. (See Table 4.) Finally, teams evaluated the balance of the system and how likely it was to achieve the desired results (outputs).

Findings

The results dramatically illustrated why the participants suffered from burnout. The transformational process was out of balance (Figure 2). Some 21 (58 percent) of the 36 S&H management systems consisted of “structural” pro-

TABLE 1
Organization
Output Examples

INDIVIDUAL	GROUP	ORGANIZATIONAL
<ul style="list-style-type: none"> •wears protective equipment •reports near-misses •knows and follows M.S.D.S. information 	<ul style="list-style-type: none"> •employee task force conducts accident investigations •safety team conducts inspection •top management conducts weekly walk-thru 	<ul style="list-style-type: none"> •lower workers' compensation costs •lower recordable rates •increased employee participation in safety programs

grams (policy, procedure, training), which required significant administration. Information technologies were inadequate to relieve this burden; social process systems (employee involvement, informal communication, teamwork) were weak; reward systems were not reinforcing desired behaviors. As a result, S&H supervisors were supplying intensive personal involvement, control and supervision to accomplish these tasks—hence the burnout.

A plan to redesign the SH&E function was formulated in mid-1993, with complete program implementation to be executed by the year 2000.

1) Structural programs were evaluated for effectiveness and redundancy.

2) Employee involvement, via safety teams and behavior observation, was chosen as the key strategic initiative; control and responsibility would shift to those performing the work. This would improve program effectiveness and redistribute the workload. To achieve this objective, however, appropriate training and resources would be required.

3) The supervisory role needed to change from "doer" to "facilitator," which would require new skills and knowledge in facilitation, team building and communication. A list of requisite knowledge, skills and attitudes was created, and a training proposal submitted.

4) An intensive search for cost-effective technology was initiated. Video manuals, individual computer-based training and video conferencing were among the options available. Moving to new technology would also require that employees and supervisors become computer literate.

SUMMARY

The organizational framework presented here leads to several implications for redesigning SH&E organizations. First, it challenges SH&E managers to become agents of behavioral and cultural change, thus redefining the job to recognize that, in order to achieve safety excellence, competence in managing social forces is as important as technical expertise.

Second, this is a contingency view. That is, the right design for one company, division or plant may not work for another. The redesign chosen depends

TABLE 2
Questions to Analyze Your Organization
and Redesign the SH&E Function

As you answer these questions, enter your answers on the S.O.S. Framework

Area	Questions re. Present	Questions re. Future
Environment Outside business/ social pressures that affect the organization	What are the pressures outside the company to improve present safety performance? Are they sufficient to motivate the allocation of resources to achieve desired results?	What new demands do you see between now and the year 2000?
Output Safety performance	What does the safety performance of your organization look like now? What results are you getting at the individual, group and organizational level?	What is our vision of the desired performance? What would success look like at the individual, group and organizational level?
Culture Norms Assumptions Leadership Values, etc.	How does the culture (the informal policies and procedures of the organization) affect safety performance? What are the safety norms and assumptions that support safety? Hinder safety?	What are the assumptions, beliefs and norms that will be needed in the future?
Structure Lines of authority Formal communication Policy Procedures Training	Is the structure of the SH&E department and its policies, procedures & training set up to support desired behaviors and results?	What services should be centralized? Decentralized? How can you foster responsibility at all levels of the organization? Which safety functions are best placed in line or employee hands? What new programs are needed?
Technology Tools to get the work done	Are you taking advantage of computer & video to get the work done? Is the work environment and work flow designed for safety?	What technological changes do you see coming? How will they affect the safety effort? What technology will be available for training, communication?
Rewards	Are desired behaviors rewarded? Are we rewarding what we inspect? Do people want the rewards we're offering? Do people understand how to earn the rewards?	What types of rewards are becoming more important to the workforce? What new behaviors will have to be rewarded?
Measurements	Do our inspections measure our objectives? Are we measuring the factors that contribute to accident prevention?	What can we measure to help us control our safety performance? How can we tie our rewards to measurement?
Social Processes Informal communication Working relation- ships	Do employees perceive that their ideas are solicited and used? Is there open communication about safety issues & concerns?	How do we increase employee involvement, trust and open communication?

on technology, people, environment and organizational culture.

Third, the open systems approach reveals that resources for safety are driven by strategy and environment, not simply the desire to improve. It recognizes that, ultimately, corporations exist to make profit, and that safety resources are allocated in proportion to demands of the environment and strategic business concerns. If customers demand safer products, or if stockholders demand better safety performance, the organization will respond. Although the workforce can exert pressure for a safer workplace, only with support of society and the internal business community can they succeed.

Finally, SH&E managers must utilize a comprehensive framework to analyze the systems, culture and structures that affect performance. They cannot rely on single-factor methods or theories. Only from a comprehensive systems perspective can these managers realize why single solutions (i.e., changing a job description or policy) are ineffective when not accompanied by supporting changes in the reward system, culture, etc. Using the approach described will produce a comprehensive, systematic plan to redesign the SH&E function. Like all plans, its successful execution depends on continued focus, support and resources.

The current economic environment will likely result in substantial reorganization and reduction in SH&E staffs. It is early enough in that shift to reexamine assumptions about the SH&E function and redefine the perception of it from

TABLE 3
Examples of Strategic Initiatives

- Responsible Care
- Beyond compliance
- Employee empowerment
- Behavioral Accident Prevention
- Ergonomics
- Partnerships with government, labor and management
- ISO 9000

TABLE 4
Examples of S&H Management Systems in Company XYZ by Category

Structure (21)	Measurement Systems (9)	Technology (0)
<ul style="list-style-type: none"> •Safety committee •Workers' comp •Risk analysis •New and altered equipment review •Compliance programs •Accident/incident investigation •Training •Medical surveillance •Back-to-work 	•Accident reporting	•None
	Rewards (1)	Social Processes (5)
	•Incentives/awards	<ul style="list-style-type: none"> •Drug & Alcohol program •Disciplinary action •Employee involvement

cost center to value-added. Using the S.O.S. framework can produce a comprehensive, systematic plan to create a safe, healthy, clean workplace, which can only strengthen any organization's performance and competitive position heading into the year 2000. ■

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