INSIGHT REPORT

INTEGRATING QUALITY AND SAFETY IN ORGANIZATIONAL CULTURE:

A CROSS INDUSTRY LOOK

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Integrating Quality and Safety in Organizational Culture: A Cross Industry Look

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In many industries, there is no clear boundary between safety and quality cultures. They share many common traits, including requirements for employee involvement, leadership commitment, and a strong mechanism to support organizational learning. Additionally, quality failures and nonconformances that require rework have been correlated with increased accidents and recordable injury rates in manufacturing organizations. (Love 2016) These injuries are frequently the result of fatigue, workplace pressure, and the pressure from extra work due to quality failures.

This Insight Report explores the integration of quality and safety cultures in different industries. These examples demonstrate the importance of balancing automated technology solutions with human behavior management in complex organizations.

HIGH-RELIABILITY ORGANIZATIONS

To observe the interconnectedness of safety and quality cultures, we can look to high-reliability organizations (HRO) such as the aviation industry, nuclear power plants, and oil rigs. HROs are complex environments where people and advanced technologies engage in precision work that can be disrupted at any moment by unforeseen events – but still, they must continue operating to high levels of performance. They are typically round-the-clock organizations with multiple redundancies and failsafe mechanisms to maintain vigilance against error. When an issue arises, HROs rigorously pursue root causes to prevent future failure. (Alavosius 2017)

When problems arise in HROs, they are usually the result of minor errors that are compounded as they propagate through dependent systems. Slight variations in human behavior, particularly when they arise due to deeply embedded cultural considerations, can cascade throughout the HRO to produce serious accidents that impact both quality and safety. The case studies that follow show how the dependency of these interlocked behaviors, combined with the complexity of data produced by automated systems, make humans the most vulnerable point of failure.

The aviation industry represents the best example of an HRO, in which automated systems including navigation, monitoring the systems on individual planes, and air traffic control are integrated with highly developed human competencies. As a result, the aviation industry sees an extremely small number of safety violations relative to the millions of hours of commercial aviation operation annually.

HRO cultures are built upon the same fundamental principles that support healthy quality and safety cultures. In everyday operations, HROs are sensitive to minor fluctuations and behavioral deviations so that they can detect and correct them before they cascade into major failures. They continuously refresh and update their knowledge of the system to anticipate and prevent future failures. In a crisis, HROs combine standard operating procedures (SOPs) and adaptive behavior with on-the-spot sensemaking and organizing. Workers are empowered to assess the situation while simultaneously acting to correct failures and protect the system.

HROs thus demonstrate “mindful organizing”. This concept (Weick 2015) operates on five fundamental principles:

1. Preoccupation with failure

- HROs pay more attention to process management and assessing the possibility of system failure than they do commercial and market profitability. They do this in three ways:
  i. They focus on detecting emerging signs of failure and use them to diagnose other dependent failures throughout the system.
  ii. They focus on anticipating potential errors before they occur.
  iii. They acknowledge that individual knowledge of a system, particularly in a crisis situation, is incomplete. They work to aggregate and validate knowledge from multiple sources over time.

2. Reluctance to simplify

- HROs do not fall victim to the lazy thinking that looks for simple solutions to complex situations. They recognize that humans have an innate bias to categorize and simplify information based on past experience, and that complex systems are likely to breed complex failures. In other words, HROs do not wield Occam’s Razor (the philosophy that the correct solution to a problem is the simplest one) carelessly.

3. Sensitivity to operations

- HROs recognize the interdependencies of a complex system and that problems can occur at any point in that system. In other words, an HRO has no front line that is prioritized over any other level of the system. In an HRO, the entire system is the front line.

4. Commitment to resilience

- HROs are not error-free, but they are designed so that they will not be crippled by failures. By identifying problems as they occur, preventing them from accumulating into failures, and learning from them to prevent future errors, they ensure that they can operate continuously.

5. Deference to expertise

- HROs organize around problem-solving, not the fixed hierarchy of the organization, to dictate how the organization responds to challenges. Each contributor seeks out appropriate expertise from within the organization to address issues and propose unanticipated solutions.

Each of these principles helps to cultivate the attitudes and behaviors that support strong quality and safety cultures. In the examples that follow, we show how industries that integrate those principles in everyday operations as well as crisis situations can achieve levels of performance that are truly remarkable.

NUCLEAR ENERGY

At a nuclear power plant, unforeseen accidents can lead to incredibly complex and dangerous situations. While the number of serious nuclear accidents has been relatively small over the past few decades, the impact of their damage and cost can be extreme compared to how infrequently they occur. The most serious accidents, such as Fukushima Daiichi in 2011, Chernobyl in 1986, and Three Mile Island in 1979, resulted in billions of dollars in cleanup costs, incalculable environmental damage, and loss of life. In addition, increased levels of carcinogens were associated with long-term increases in cancer rates.

Despite the fact that the term "safety culture" was not common in the nuclear industry in 1979, the U.S. Nuclear Regulatory Commission had a tacit understanding of the role that culture played in the incident at Three Mile Island, in which a series of human and mechanical failures resulted in a loss of coolant in one of the facility's reactors, when it wrote: "The one theme that runs through the conclusions we have reached is that the principal deficiencies in commercial reactor safety today are not hardware problems, they are management problems." (Morrow 2014) The International Atomic Energy Agency (IAEA) subsequently introduced the term "safety culture" as part of its assessment of the shortcomings that led to the Chernobyl disaster, which was a catastrophic reactor failure resulting in 31 deaths and widespread contamination of an inhabited area.

The Fukushima Daiichi disaster in Japan, in which a large tidal wave flooded the Fukushima Daiichi nuclear power plant and resulted in a reactor meltdown, provided a critical test for the state of the quality and safety culture in the nuclear industry and has pointed the way towards necessary improvements. The National Academy of Sciences (NAS), in its study of the accident, stated that: "Personnel at the plant responded to the accident with courage and resilience; their actions likely reduced its severity and the magnitude of offsite radioactive material releases. However, several factors relating to the management, design, and operation of the plant prevented plant personnel from achieving greater success and contributed to the overall severity of the incident." (National Research Council 2014)

These factors included:

- The failure of the Tokyo Electric Power Company (TEPCO) and the Nuclear and Industrial Safety Agency to acknowledge evidence that the design of the plant was not adequate to prevent damage to critical safety equipment resulting from tsunamis.
- The loss of all power to the plant, coupled with the loss of real-time information for monitoring the incident, limited the options for appropriate response.
- Poor communication among response teams resulted in workers competing for attention and services in the onsite emergency response center.
- Emergency response center staff lacked adequate training and procedures for incidents involving a complete loss of power.
- Emergency response center staff, both onsite and at headquarters, lacked clarity in their roles and responsibilities.
- Staffing levels were inadequate for dealing with an incident of that magnitude.

In response to the incident, the NAS made a series of recommendations for the U.S. nuclear industry that heavily emphasized the importance of building a quality and safety culture. Their specific guidance included the following:

- Plant owners and regulators must continuously seek out new information about potential threats and revise existing frameworks to meet them.
- The industry must enhance its ability to assess the risks of incidents that exceed the limitations of the plant design that can lead to a loss of critical safety functions.
- The Nuclear Regulatory Commission (NRC) must incorporate modern risk assessment techniques into its regulations and capabilities.
- The NRC must increase its attention on building a strong culture of safety and ensure transparency and communication about ongoing safety-related activities.

Given the cataclysmic potential of nuclear incidents, the value of information derived from leading indicators can be high. Since disasters like Chernobyl and Fukushima are rare, the less significant events that occur more frequently are better indicators of cultural problems that can lead to failure. Post-accident analysis has demonstrated that the nuclear industry is particularly vulnerable to the negative impacts related to workers' attitudes toward (and beliefs about) safety. These are shaped by the organization's culture. If the culture does not value safety, there is a greater risk that workers will engage in unsafe behavior and potentially set the stage for a critical safety event. (Morrow 2014)

Operating a nuclear power plant is a complex undertaking. There are hundreds of systems, subsystems, and tools in place, and the environment is characterized by high hazards and potential risks. Employees require diverse competencies that include advanced understanding of technologies for data collection and interpretation, as well as practical trade skills. (Reiman 2005). These two complementary capabilities can sometimes be at odds with one another. Maintenance workers in this industry, who are highly skilled in the hands-on elements of their work, can feel threatened or alienated by the idea of their work being reduced to data points on control panels. (Reiman 2005)

Organizational learning is also difficult in the nuclear industry, since the distributed nature of the plant does not naturally lend itself to face-to-face communication and relationship building. New technology must therefore be implemented only after leadership has accounted for the impact it will have on the work of the maintenance staff. (Reiman 2005) Teaching and training practices must also account for the unique demands and communications practices, both formal and informal, of HROs in comparison to other types of organizations, such as technology or manufacturing. (Gotcheva 2016)

Nuclear power plants operate on a decades-long lifecycle that stretches from design, to construction, to power delivery, to decommissioning. Plant design faces unique difficulties, including the fact that many potential hazards cannot be anticipated or contextualized in advance, which can lead to dysfunctional design. Particularly in

complex, distributed organizations like this, organizational culture is rarely uniform and can be expressed differently across sites, departments, and geographies. This can lead to stark differences in the quality and safety cultures even within one organization. In addition, the complexity of the supply chain, incorporating partners with various degrees of dedication to safety principles, can also present considerable challenges. (Gotcheva 2016)

Designing a nuclear power plant therefore involves reconciling multiple, often conflicting, values. The pressure for innovation exists in conjunction with the need to support and develop the practical hands-on skills of the workers. To facilitate this, power plant design should incorporate defense-in-depth, which deploys equipment and procedures to "prevent the escalation of anticipated operational occurrences and to maintain the effectiveness of physical barriers placed between a radiation source or radioactive material and workers, members of the public or the environment, in operational states and, for some barriers, in accident situations." Defense-in-depth, applied to the nuclear industry, has five levels to identify and prevent cascading failures: (IAEA 2007)

- Level 1: Prevention of abnormal operations and failures.
- Level 2: Control of abnormal operation and detection of failures.
- Level 3: Control of accidents within the design basis.
- Level 4: Control of severe plant conditions, including prevention of accident progression and mitigation of the consequences of severe accidents.
- Level 5: Mitigation of radiological consequences of significant releases of radioactive material.

NSQ-100 Nuclear Safety and Quality Management System – Requirements from the Nuclear Quality Standard Association is based on the ISO 9000 series. (NSQA 2007) Its purpose, which considers the integrated nature of safety and quality, is to provide guidance to the nuclear energy industry so it can:

- develop an advanced level of nuclear safety and quality culture in all activities,
- ensure the appropriate level of quality to meet customer expectations in compliance with applicable regulations,
- contribute to the operational excellence by supporting continuous improvement initiatives, and
- standardize quality management system requirements to the greatest extent possible.

NSQ-100 defines safety culture as the "overall characteristics and attitudes in organizations and individuals which establish that, as an overriding priority, protection and nuclear safety issues receive the attention warranted by their significance." According to *NSQ-100*, organizations can promote safety and quality culture by:

- ensuring a common understanding of the key aspects of safety culture within the organization,
- providing the means by which individuals and teams are supported to carry out their tasks safely and successfully, taking into account the interaction between people, technology, and the organization,
- reinforcing a learning and questioning attitude at all levels of the organization, and
- providing ways to develop and improve safety culture.

The newest standard is *ISO 19443:2018 Quality management systems*, an application of ISO 9001:2015 to the requirements of the nuclear energy sector. It uses the high-level structure introduced in ISO 9001:2015 (Annex SL) and emphasizes how quality and safety culture aligns with local and international regulatory requirements, risk management, and improving overall performance.

CONSTRUCTION

Culture in the construction industry has some unique challenges. The project-based nature of the industry means that multiple teams with different specializations, such as architects, designers, engineers, and builders, all converge on a single project for a limited period of time. (Teräväinen 2018) Each of these teams can have diverse perspectives on safety and quality culture that can be difficult to integrate. Further, team composition often changes in the middle of a project, which means there is often a lack of incentive to invest in building a resilient organizational culture because everyone knows it can only last as long as the project does. (Zuo 2006) As a result, organizational learning, and the communication channels that support it, can be minimal in the construction industry. Further, the bid-based procurement model of construction projects can lead to adversarial relationships between organizations and teams, which creates a significant obstacle for cultural cohesion.

Safety and quality culture are closely integrated in construction projects, since the amount of rework due to poor quality increases with the number of safety incidents. An organizational culture that does not prioritize quality is associated with habits and beliefs that can lead to unsafe behavior and accidents, even when workers are unaware of how their perspectives have been shaped. (Love 2016)

There is, however, resistance to some of the elements of quality culture. Research has found that introducing quality tools can have a negative effect on the organizational culture in construction. Workers resent the possibility that a quality checklist might replace their expert knowledge, even though this perception is usually not grounded in reality. Reducing pride of work while increasing the fear that quality initiatives will be used to single workers out for punishment will not advance a quality culture. (Saha 2005)

While there is a strong appetite among some construction professionals to strengthen quality assurance requirements within the industry, there is little agreement about how to do this because many organizations operate with a mix of clan and hierarchical cultures. While workers tend to support the introduction of additional cultural elements that emphasize flexibility and a more human-centered culture, executives tend to favor market and hierarchical cultures that prioritize roles and tasks ahead of individuals and personal development. Research suggests that continuing to neglect the human-centered elements of culture will have a significant impact on the ability of the construction industry to provide long-term value at the required levels of efficiency. (Teräväinen 2018)

Advocates for stronger organizational cultures of safety and quality in construction must therefore acknowledge the potential for misalignment between lean principles, current industry practices, and individual worker perspectives. One proposed remedy is a greater emphasis on building long-term relationships between teams and subcontractors to inspire cohesion and loyalty at all organizational levels. (Saha 2005) Further, executives should recognize the importance of communication and information management on construction projects by implementing the ISO standards from ISO/TC 59/SC 13 – *Organization of information about construction works*, which develops standards that define controlled vocabularies and requirements for digital exchange of documentation and data.

Some governments have implemented requirements for quality assurance in the construction industry, despite the evidence that quality tools and standards will not provide benefits beyond inspiring consumer confidence if organizational culture is ignored. (Saha 2005). Current research suggests that the construction industry needs to pay much closer attention to empowering its workforce and creating a culture of quality within project teams. (Saha 2005) This is particularly important because high-profile quality failures in the construction industry can have significant impact on consumer confidence in an organization's brand, of which the problems with the Opal Tower in Sydney, Australia are a recent example.

PETROLEUM

The Deepwater Horizon disaster in the Gulf of Mexico in 2010 catalyzed the study of safety and quality culture in the petroleum industry. In 2011, the Deepwater Horizon Study Group from the Center for Catastrophic Risk Management reported that the organizational culture of both BP and the Deepwater Horizon offshore drilling rig had been a contributing factor to the disaster, which added considerable urgency to understanding how and why this was the case. The remainder of this section draws heavily from work by Alavosius (2017), who examined the development of skills and behaviors in HROs with a focus on oil rigs.

HROs like oil rigs face the challenge of trying to integrate increasingly autonomous technology with human workers that remain prone to fatigue, sub-optimal behavior, and other factors that can lead to poor decision-making and compromised safety. Crew Resource Management (CRM) has emerged as a method for creating a work environment for HROs where there are rigid and standardized roles. This enables workers to operate with a high degree of precision, while remaining flexible and dynamic enough to adapt quickly to rapidly changing situations, particularly in a crisis. In the oil and gas industry, CRM incorporates nontechnical skills to integrate the different vantage points of crew members as they adapt to emerging situations. The typical CRM workflow is based on the following chain of activities:

1. Plan a work process
2. Brief everyone on roles/functions
3. Monitor the process as it occurs
4. Detect and report deviations from the plan
5. Communicate corrections from the top down
6. Adjust actions as needed
7. Debrief at important moments (e.g. significant changes or conclusion of work), and
8. Learn to refine the human-machine interface.

Since humans are often potential points of failure in increasingly automated complex systems, CRM aims to reduce human error by focusing on training and human behavior. The method focuses on six core skill sets:

1. Communication

Effective team communication, especially verbal communication, can be badly impeded by noise and dispersed locations on an oil rig. In addition, adherence to rigid management hierarchies can discourage open communication. CRM aims to facilitate communication horizontally among crew members and vertically between workers and management to create an effective interlocking of behavior. It acknowledges and uses the informal communication networks that characterize self-organizing social systems.

2. Situational awareness

Situational awareness (SA) is the ability to monitor elements in the environment, comprehend their meanings, and project their significance into the future. Shared SA among crew members relies upon effective communication among team members, both formal and informal, and can include closed-loop communications (in which the receiver of a message repeats it to the sender for confirmation to avoid misunderstanding) and overheard conversations.

3. Decision Making

Decision making relies on the technical and interpersonal competencies of the leader. Leaders are frequently confronted with several possible options in any situation, and they must have the experience and flexibility to adapt to the information as they receive it and act on it in a way that acknowledges the complexity of the situation while appropriately addressing risk. On an oil rig, the well-site leader (WSL) needs to understand the technical and engineering aspects of the rig and the well, but also needs strong knowledge of the crew and its capabilities. In addition, he or she must have the capacity to absorb and interpret information from the experts engaged in the situation and make effective decisions under rapidly changing conditions.

4. Teamwork

Effective teamwork relies on breaking down communication barriers to facilitate coordination. Sometimes, these are the result of management hierarchies; sometimes, they result from trust issues. Interlocking behavioral contingencies (IBCs) occur when the behavior of one individual in a group becomes connect-

ed to and dependent on that of another, which then produces a group pattern of behavior that has a powerful impact on the outcome of any given situation. These *metacontingencies* represent the coordinated behavioral system of the group, which is the foundation of effective teamwork. As with all HROs, this coordinated behavior needs to be flexible and adaptive at both the individual and group level to respond to rapidly changing conditions.

5. **Management of limits of crew members' capacities**

   Increasing automation can reduce human workloads in some areas. However, leadership must be sensitive to the possibility that automation will increase demands on humans in other areas. Sensors can collect vast amounts of data that can be overwhelming for people who need to make quick decisions based on that information, while automated workflows can impose unreasonable demands on human workers that remain prone to fatigue and stress. (Alavosius 2016) Workers are also prone to habitual behavior that accepts high levels of risk because they have been able to operate under those conditions for extended periods of time without consequence, a phenomenon known as *normalization of deviance*. CRM ensures that a person's ability to maintain vigilance for extended periods of time is relieved, not exacerbated, by automation — and therefore does not become a problem that affects group behavior.

6. **Leadership**

   Leadership, at the organizational and team levels, sets the tone for organizational culture. When leadership values safety and culture, the entire organization will follow. By establishing clear goals and communicating them to the organization, leadership can promote alignment. Leadership maintains awareness of the competencies of the group and demonstrates SA by responding to changes in the group situation and ensuring continued cohesion and direction.

CRM is therefore an approach to orchestrating group behavior in HROs through a combination of standard operating procedures (SOP) and an awareness of human behavior. According to the Industry of Oil and Gas Producers (IOGP), CRM is an effective development and application of nontechnical (i.e. soft cultural) skills that improve the safety and efficiency of well operation teams. (IOGP 2014) IOGP has developed a proposed CRM curriculum for well operations teams to guide the industry in implementing this method.

Norway has set itself the ambitious goal of making its petroleum industry a world leader in health, safety, and environment (HSE) and has created regulations to help it get there. Part of the regulation includes the requirement to foster a sound HSE culture throughout the industry, with the specific applications of the requirements left to the discretion of individual organizations.

In 2014, the Petroleum Safety Authority (PSA) issued guidance on the 2011 revision of the framework regulations with the following interpretation of HSE culture: (Bye 2016)

A sound health, safety and environment culture can be observed in enterprises that organize continuous, critical and thorough work in order to reduce risk and improve health, safety and the environment. Elements of a sound health, safety and environment culture could thus be:

- ***a.*** *That systematic, continuous and broad-spectrum monitoring and mapping methods are used as a basis for determined and managed prioritization of efforts in the health, safety and environment work – based on the regulations' principles of risk reduction and management,*
- ***b.*** *That the effort and means in the health, safety and environment work are continuously subject to a critical assessment as regards potential goal conflicts and efficiency,*
- ***c.*** *That there is a clear understanding in the organization that culture is not an individual quality, but something that is developed in the interaction between people and given framework conditions. Therefore, management responsibilities and behavior will be key elements at all levels of the business,*
- ***d.*** *That development and collective learning is facilitated through competence enhancement, participation and a systematic and critical reflection at all levels, and*
- ***e.*** *That health, safety and environment work cannot be viewed independently from each other or from other value-creating processes in the enterprise."*

The PSA guidance on the interpretation of HSE culture shows a clear line of influence from elements of quality and CRM. In particular, Item C clearly defines not only what culture is but also what it is not, specifically that it is not "an individual quality, but something that is developed in the interaction between people and given framework conditions." (Bye 2016) This was perhaps a response to feedback from crew workers that management had initially interpreted these guidelines as focused on individual responsibility and behavior, not on the IBCs the literature on CRM had already identified as a crucial foundation of HSE culture in the petroleum industry.

Despite the accusation that the regulation was little more than political rhetoric, Kongsvik (2016) suggests that organizations that systematically implemented an HSE culture with strong leadership support saw significant positive results. HSE language eventually became the vocabulary for team members to frame and express even those situations that were not directly related to HSE issues.

HEALTHCARE

Healthcare is another industry where safety and quality of patient care are intricately interconnected. The U.S. Center for Disease Control (CDC) identifies 10 fundamental activities that all community-based health care providers should undertake to prioritize both requirements. These principles resonate with the descriptions of quality and safety culture from other industries: (CDC Public Health Services)

1. Monitor health status to identify and solve community health problems.
2. Diagnose and investigate health problems and health hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships and action to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. Assure competent public and personal health care workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Research for new insights and innovative solutions to health problems.

Although the foundations are similar, healthcare has its own unique set of challenges. An increased focus on quality and safety will require residency programs in hospitals to reassess the ways in which they train physicians to practice. (Morrison 2018) Hospitals frequently impose rigid hierarchies in which senior physicians can disregard the observations of junior physicians and nurses who are often more intimately familiar with the patient or medical challenge. This is often coupled with poor team communication, procedural workarounds that foster unsafe behavior, intimidating behavior, and a tolerance for mechanical system failure in medical devices like alarms. (Chassin 2013).

As a result, crucial patient information can be inadvertently lost or misinterpreted, which leads to higher rates of infection, incorrect procedures, and fatalities. While it seems to be a perfect candidate for the application of HRO principles for improvement, healthcare is, in reality, a poor fit for the HRO framework. HROs do not tolerate the rate of error, lack of resilience, and rigid hierarchical conflicts that suppress error reporting and multi-perspective problem solving that are so prevalent in healthcare. (Chassin 2013)

There have been a number of successful attempts to implement elements of safety and quality culture, as well as select CRM principles, in the healthcare system. The Patient-Centered Medical Home (PCMH) program in the Montiefiore Medical Group in New York seeks to transform the training of resident physicians according to the following principles: (Morrison 2017)

- Whole-person orientation
- A personal clinician to provide continuous, comprehensive care
- A physician-directed practice of team-based care
- Care that is coordinated across the health care system

- Quality and safety
- Enhanced access, and
- Payment linked to outcomes.

PCMH has successfully helped to transform the quality culture among residents during its preliminary implementation by bridging the gap between residency training and clinical practice. (Morrison 2018)

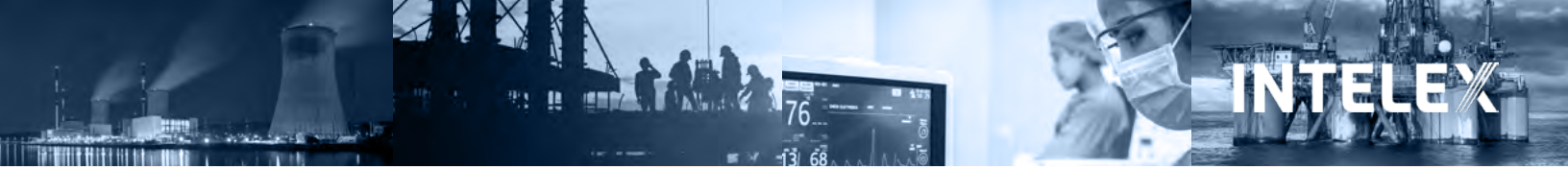
While healthcare agencies do not necessarily benefit from the application of the principles of HROs, select elements of CRM have proven to be very effective. TeamSTEPPS is a program built on the principles of CRM and developed by the United States Department of Defense in conjunction with the Agency for Healthcare Research and Quality. It is a detailed curriculum and framework for training medical teams to become highly effective at optimizing information and human resources to improve patient outcome. (AHRQ) Implementing TeamSTEPPS is a three-stage process consisting of a pretraining assessment, onsite training for all healthcare staff, and implementation and sustainment. TeamSTEPPS is built on four fundamental skill sets that reflect the influence of CRM:

1. Leadership
2. Situation monitoring or situational awareness (SA)
3. Mutual support, and
4. Communication.

Like CRM, TeamSTEPPS emphasizes communication among team members as a pivotal principle. This includes verbal call-outs of patient vital signs to ensure that all team members hear the information at the same time, closed-loop communication to prevent misinterpretation of call-outs, "CUS" words (derived from the acronym "I'm Concerned;" "I'm Uncomfortable," and; "I don't feel this is Safe") to communicate concern using a controlled vocabulary, and a two-challenge rule that gives any team member that has voiced a concern twice and been ignored the opportunity to move that concern up the chain-of-command, thereby providing a mechanism to break down hierarchical barriers to communication. (Alavosius 2017)

Some healthcare organizations have had considerable success implementing other existing frameworks like Six Sigma and the EFQM Excellence Model to promote quality and safety culture. New York Presbyterian Hospital, for example, applied Six Sigma principles to select projects including isolation management for patients, inventory management for medication and supplies, and room assignments. They built an effective team of problem solvers across multiple departments, which has resulted in reduced operating expenses, reduced length of stays for patients, and improved patient flow. (Craven 2006)

The UK EHS has implemented EFQM to provide performance indicators to enhance performance and create a long-term culture of excellence. Since EFQM does not prescribe a specific implementation, healthcare units can adapt the framework to suit



their own requirements. Initial research suggests that a particularly important part of EFQM is prohibiting assignment of blame to individuals, proposing instead that all errors are seen as opportunities for improvement at the system level. (Stahr 2001)

The High-Reliability Health Care Maturity Model is an adaptation of the "reluctance to simplify" principle of HROs. It combines elements of lean production, Six Sigma, and change management to create a framework for isolating root causes and preventing their reoccurrence in the uniquely complex health care environment. It focuses on the three fundamental principles of leadership, safety culture, and performance improvement as summarized in **Table 1 on page 14**. (Chassin 2013)

In the United States, the Public Health Accreditation Board (PHAB) has created a national accreditation program to increase the efficiency of public health departments across the country. It includes a set of standards that allow organizations to self-assess their quality improvement (QI) programs and integrate them into the organizational culture. Research suggests that the initial implementation has been successful at developing workforce capacity, reducing costs, increasing patient satisfaction, and an overall improvement of public health programs and services. (Siegfried 2018).

Developing nations, particularly those in Africa, face their own unique healthcare challenges. The Tanzanian healthcare system, which has implemented the Tanzania Quality Improvement Framework to increase its efficiency and manage its continuing HIV epidemic, does not receive sufficient government funding to meet its goals. It consequently relies on foreign donors to support programs such as maternal and child healthcare, HIV management, and community care. These donations frequently come with their own requirements for the implementation of diverse quality programs for each field of practice. While there are many elements from these standards that complement one another, there are many others that have their own vocabularies, training packages, and processes. These conflicts can create inefficiencies and confusion during implementation that the health care teams do not have the resources to meet. (Mwidunda 2015) Despite these challenges, Tanzania has successfully mandated QI programs in HIV clinics and dispensaries across the country by investing in regional health plans and promoting sustainable quality improvement programs. As a result, all health facilities must now have a Facility Quality Improvement Team dedicated to HIV and complete a plan/do/study/act (PDSA) cycle each quarter. (Mwidunda 2015)

Each successful implementation of a successful health care framework demonstrates the importance of maintaining a focus on organizational culture to complement technology solutions for collecting and measuring data. In particular, leadership, worker participation, technology competency, investment, and structural flexibility continue to be the key elements of a successful quality and safety culture in health care organizations.

TABLE 1

DOMAIN	COMPONENT	MATURING STAGE			
		Beginning	**Developing**	**Advancing**	**Approaching**
Leadership	Board	Focus only on regulatory compliance.	Focus limited to hearing reports from quality committee.	Engaged with development of quality goals and regularly reviews events.	Committed to goal of zero patient harm for all clinical services.
	CEO/ Management	Focus only on regulatory compliance.	Acknowledges need to improve quality and delegates development.	CEO leads development of quality agenda.	Management aims for zero patient harm.
	Physicians	Low participation in quality improvement activities.	Some participation in quality improvement activities.	Lead quality improvement activities, but with some gaps.	Lead quality improvement activities through the organization.
	Quality strategy	Quality is not identified as strategic imperative.	Quality is one of many competing priorities.	Quality is one of top 3-4 strategic priorities.	Quality is highest strategic priority.
	Quality measures	Quality measures not prominently displayed.	Few quality measures reported internally.	First internal reporting of measures begins.	Quality measures routinely displayed and reported.
	Information technology	No IT support for quality improvement.	Some IT support for quality improvement.	General IT support for quality improvement.	Sustained IT support for quality improvement.
Safety Culture	Trust	Behavior is not assessed.	Codes of behavior are adopted.	Trusting environment for all staff.	High measures of trust in all areas.
	Accountability	Emphasis on blame.	Importance of disciplinary procedures recognized.	Adoption of disciplinary procedures and safety culture.	Disciplinary procedures adopted across organization.
	Identifying unsafe conditions	Root cause (RCA) analysis limited.	Pilot programs initiated.	Unsafe conditions and accidents reported.	Close calls, accidents, and unsafe conditions routinely recorded.
	Strengthening systems	No efforts to strengthen systems.	RCAs begin to identify weaknesses.	System weaknesses catalogued and prioritized.	Proactive approach to system weakness.
	Assessment	No measure of safety culture.	Some measure of safety culture.	Safety measures adopted and deployed.	Safety culture systematically measured and reported.
Performance improvement	Methods	No formal approach to quality management.	Exploration of process improvement tools.	Committing to adopt RPI.	Acceptance and adoption of RPI tools.
	Training	Training limited to compliance personnel.	Training outside quality department recognized as key to success.	Training of select staff in RPI.	All staff trained in RPI.
	Spread	No commitment to adoption of improvement methods.	Pilot projects with new tools conducted.	RPI used in some areas.	RPI tools used throughout the organization.

CONCLUSION: TAKE ACTION

All organizations can learn best practices for improving and integrating safety and quality cultures. HROs and other complex organizations provide examples of many best practices, but an organization does not have to be an HRO or a complex system to get the best out of its organizational culture. Here are a few fundamental principles about safety and quality culture that we can take as best practices from this cross-industry review:

- A strong organizational culture consists of people, tools, and processes. Automation and software are a pivotal element of that formula, but they cannot solve everything. Organizations must remember that people, and the culture of which they are a part, will always be an important component of an organization's systems.
- Humans are the most common point of failure in a complex system, but an organization with a strong culture must know how to encourage and promote human behavior that focuses on the principles of safety and quality and works to avoid errors and failure.
- HROs know that failures are the culmination of errors that accumulate in places where we least expect them and give off warning signals over time. A strong organizational culture of quality and safety must be attuned to those signals and know how to act on them before they grow into failures.
- Standards such as ISO 9001:2015 and frameworks like CRM are authoritative sources that can guide organizations in their goal of establishing strong quality and safety cultures.
- Communication, leadership engagement, and situational awareness are fundamentally important principles in any organization, and workers at every level must understand and embody those principles.

A strong culture to support both quality and safety is vital for ensuring that an organization will thrive as it meets its day-to-day responsibilities, and not only survives but grows in response to unforeseen circumstances and crises. In this Insight Report, we've looked at the principles of quality and safety in different organizations to see how they adapt and manage them to meet their own requirements.

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