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The Five Disciplines That Create High Reliability in an Organization

Measuring and managing the five critical disciplines that produce consistent safety outcomes

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Four years before BP's Deepwater Horizon became global news, ExxonMobil walked away from a $187 million investment in a similarly deep sea well. The well had yet to produce a single drop of oil when engineers detected geologic instability in the seabed. After consulting with geologists and drillers on the project, leaders decided that the best course of action was to cap the well and move on. Industry analysts at the time accused the organization of being too risk averse. After all, no incident had actually occurred.

That narrative changed in 2010 when operators of the Deepwater Horizon lost control of a wellhead that had experienced similar disturbances. This time, there was no speculation of whether the risk was "real" or not. The explosion and fire killed 11 workers. It also created an environmental and public relations nightmare for BP. For leaders across the industry, the tragedy of the Deepwater Horizon was compounded by the fact that many of the lessons it had to offer had already been "learned" before.

So why did only one organization seem to heed them?

The Emergence of the High Reliability Organization (HRO)

Since the 1980s, effort has been made in the safety community to define a High Reliability Organization (HRO). Ultimately, the HRO functions to understand why early warning signals are overlooked, and what can be done to improve identifying and responding to these signals.

The HRO paradigm seeks to characterize organizations that stay safe despite operating in high-risk conditions (Figure 1). Good examples are submarine groups, wildfire incident management teams, and nuclear plant operations. In theory, a HRO would routinely make the same kinds of decisions that ExxonMobil did back in 2006 — and simultaneously avoid the mistakes made by operators of the Deepwater Horizon in 2010.

The challenge for leaders is that defining HRO performance has largely been an academic exercise rather than a practical one. Leaders struggle to translate anecdotal examples of feel-good "habits" into actionable and, more importantly, measurable practices.

DEKRA's approach is different. Rather than focus on individual behaviors found in HROs, which are helpful but hard to operationalize, we identify organizational practices that systemically mitigate risk. We have defined five measurable disciplines that together support the technical and operational aspects of catastrophic incident prevention.
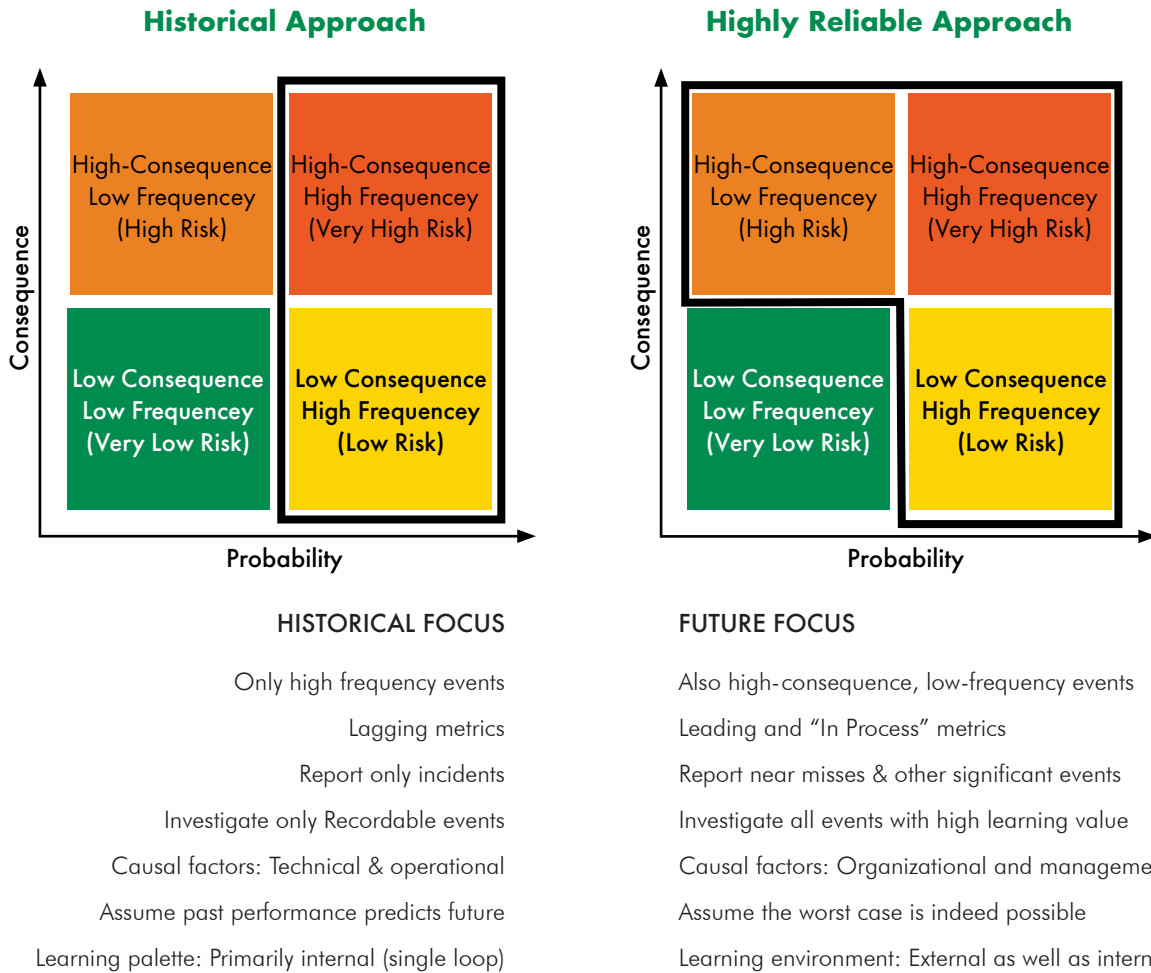

Historical Approach

HISTORICAL FOCUS

Only high frequency events

Lagging metrics

Report only incidents

Investigate only Recordable events

Causal factors: Technical & operational

Assume past performance predicts future

Learning palette: Primarily internal (single loop)

Highly Reliable Approach

FUTURE FOCUS

Also high-consequence, low-frequency events

Leading and "In Process" metrics

Report near misses & other significant events

Investigate all events with high learning value

Causal factors: Organizational and management system

Assume the worst case is indeed possible

Learning environment: External as well as internal

Figure 1. Framework for a High-Reliability Organization (HRO) adapted from Managing the Unexpected by Sutcliffe & K. Weick.

The Five Disciplines of High Reliability Organizations

When thoroughly investigated, catastrophic incidents are generally found to have happened after early-warning vulnerabilities were not recognized or recognized but not acted upon. These vulnerabilities represented catastrophic exposures. (Figure 2).

If an organization is serious about reducing the potential for a catastrophic incident, they must embrace the following five disciplines:

Anticipation

Fostering systems and behaviors that are sensitive to "weak signals" that may be indicative of an increased risk of catastrophic events.

Anticipation is about recognizing the early warning signs that help you prevent incidents. An organization strong in Anticipation will have mechanisms to capture information from a variety of sources that may be meaningful early indicators of change to exposure. Examples may include process deviations, unusual maintenance requests, and even frontline workers detecting differences in sounds.

DEKRA recently worked with a company that had defined the normal operating range of key process parameters, as well as a broader range for these parameters identified as "safe operating limits," where the operators could control the process. Excursions outside of the safe operating limits were reported and studied, but excursions outside the normal operating range limits were not.

This is an example of weak Anticipation. If the process is outside normal operating range, that is an early indication that it did not function as designed. If the organization asks why, they are likely to discover ways to reduce risk.

To have strong Anticipation, you need a culture that supports it. This means:

- People are encouraged to report, and the value of reporting is reinforced.

- Data is acted on.

- Leaders understand and accept that there will be a lot of information that may not be essential, but it is worth sorting through to be sure they do not miss the critical information.

- There are key leadership behaviors that help create this culture. When those behaviors are practiced, an organization is built with strong Anticipation.

- Organizations with strong cultures have leaders who visibly value the search for early warnings and reinforce the analysis of these indicators, even when this does not result in identification of serious risk. These

leaders understand that supporting the detection and investigation of many false positives is worth it if it results in avoiding just one catastrophic event.

Questioning

Making effective use of information to analyze, understand, and plan mitigation of risks, while making a conscious effort to overcome bias.

The questioning discipline is about preserving the integrity of decision-making and action, specifically by protecting teams from the natural biases innate in all humans and groups. Traditional process safety management includes a number of elements (such as process hazard analysis, pre-startup safety review, and management of change) designed to evaluate and plan for the control of hazards and risks. However, there are common, but often undetected, cultural characteristics such as cognitive bias that can undermine the effectiveness of these efforts and leave the organization vulnerable.

Cognitive bias refers to the tendency we all have to rely on intuitive, rather than analytical thinking in order to process information efficiently. Our knowledge and experience allows us to reach conclusions and make decisions quickly and efficiently.

However, this can also trap us in poor decision-making. We witnessed the impact of cognitive bias in one incident where a crew of maintenance workers responded to the sound of leaking gas from pipelines in a trench. Everyone on the crew assumed the gas was nitrogen because of a previous nitrogen leak. But this time, the leak was hydrogen. When the trench cover was lifted, a spark ignited the hydrogen and killed several people.
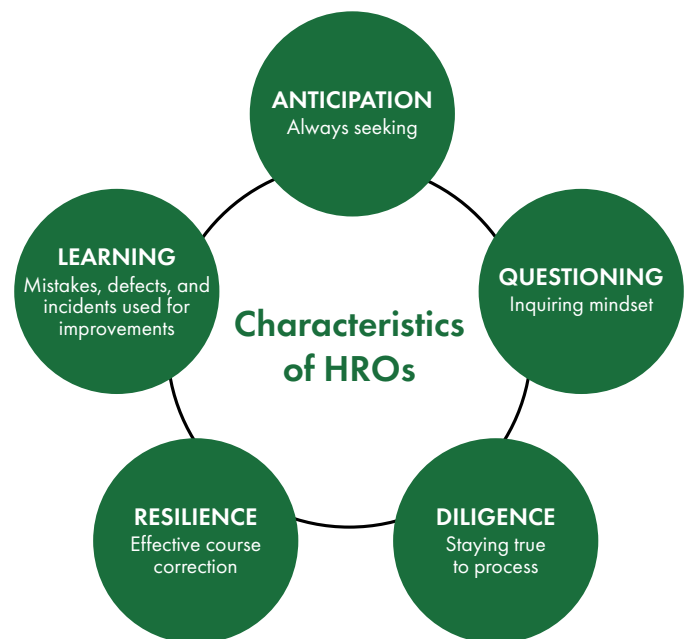

Figure 2. The DEKRA HRO Assessment Model

Had the work crew applied appropriate Questioning, it is likely that they would have overcome the bias that drove them to assume it was a nitrogen leak. Even if the leak was nitrogen, using the gas detector for Questioning would have identified if an oxygen deficient environment was present.

Cognitive bias can also get us in trouble in formal hazard analysis. We too often readily accept what we think we know about a particular condition, situation, or deviation. A tendency to go along with a group's dominant opinion makes this worse.

Biases can include:

- **Confirmation bias.** The tendency to search for or interpret information in a way that confirms one's preconceptions.

- **Normalcy bias.** The refusal to plan for, or react to, a disaster which has never happened before.

- **Availability bias.** The tendency to predict based on how easily an example can be brought to mind.

- **Status quo bias.** The tendency for people to want things to stay relatively the same.

- **Groupthink.** The tendency to do (or believe) things because many other people do (or believe) the same.

- **Risk seeking/risk aversion.** The tendency to make risk-averse choices if the expected outcome is positive, but make risk-seeking choices to avoid negative outcome.

The only way to guard against the insidious effects of cognitive bias is through culture and leadership. There are specific leadership behaviors, such as encouraging the voicing of dissenting opinions, that promote a culture that produces more accurate decisions. There are also specific skills involved in asking the right question in the right way to get the right data.

Leaders must promote and measure the use of these leadership behaviors and skills.

Diligence

Monitoring, reinforcing, and verifying program execution with a focus on "right time first."

The diligence discipline is about assuring consistent and reliable use of safety programs and processes. Even the most excellent hazard identification and control efforts are subject to failure or underperformance if the programs and practices are not followed.

While many organizations use periodic audits to provide a check on implementation, the key to assuring consistent and ongoing activity is developing leaders who monitor, reinforce, and verify effective program execution.

Monitoring involves regularly acquiring information on what subordinates do, how they progress toward goals, and what

issues or problems they encounter. This is not micromanaging. Rather, it is assuring that the leader has sufficient information to meaningfully recognize good performance, provide support when needed, and provide corrective feedback on those occasions when subordinates fail to fulfill their responsibilities.

A leader's monitoring behavior may take many forms. Depending on the situation and the leader, these may include walking around and observing, informal conversations at the front line, periodic meetings to review progress, use of written progress reports, and review of appropriate metrics.

Reinforcement involves providing feedback that recognizes good performance. This communicates the importance and priority of the catastrophic event prevention activities and maintains focus on consistent execution. Effective reinforcement is based on effective monitoring, which provides the leader with specific data to inform reinforcement, avoiding the vague and ineffective "good job" feedback to subordinates.

Verification is similar to monitoring, but where monitoring is focused on the performance of subordinates, verification is focused on activities and programs. Assuring that audit findings are resolved in a timely manner is an example of verification, and leaders who do this effectively are more likely to have organizations where consistent execution is valued as part of the culture.

Resilience

Developing and exercising the ability to react in ways that prevent upset conditions from becoming catastrophic events.

The Resilience discipline is about developing the agility to recognize and quickly respond to exposures in real time. Upset conditions occur from time to time in any system. A resilient organization is able to react in ways that prevent upset conditions from becoming catastrophic events and learn from that experience.

This has a major influence on results. Even where automated control systems are designed to handle upset conditions, it is important that workers understand when and how to intervene. They must also be not only able but willing to make appropriate interventions early. An organization that is strong in Resilience is more likely to prevent a small process disruption from becoming a major incident.

There are two main requirements for Resilience:

Knowledge. Do people at various levels have a broad enough understanding of the operation to make good judgments in case of emergency? Some organizations approach this through use of extensive sets of rules and procedures. That approach is intended to assure consistency and avoid having to rely on technical knowledge at the operating level.

However, two problems arise with that approach.

First, the range of possibilities that require planning can result in a proliferation of procedures and rules that may become impractical.

Second, this approach assumes that all possibilities can be identified in advance, something that is unlikely to be true. The alternative is to develop an organization where people are knowledgeable and taught to make good judgments based on their knowledge and the information at hand.

Willingness. Are people more or less likely to take action on their own initiative? The answer is directly related to culture. People are less likely if they are not confident that the organization will support them. Perceptions of the culture's support for resilience are formed over a long period and are based on many small actions. An organization seeking strong catastrophic event prevention will be sensitive to this and intentionally create the culture that supports Resilience.

Learning

Mistakes, upset conditions, and incidents are used as improvement opportunities.

Do leaders establish both the expectation that learning is an ongoing process that never stops, as well as the systems and processes to support continuous learning?

Resilient organizations make learning routine rather than waiting for an incident to trigger learning activities. They create formal mechanisms, such as cross-functional teams and advanced training in incident investigation, to continually capture and respond to risk data. They also focus on generating new knowledge, not finding fault with workers.

Great learning organizations are also characteristically self-aware. They make sure that even the newest employee knows the story of where they came from and where they are going.

Continually learning organizations are vigilant about preserving organizational memory and ensuring that hard lessons are never forgotten or repeated.

Building a HRO

How can leaders develop a High Reliability Organization? Fundamentally, high reliability is a blended cultural and technical process driven by leaders. Leaders must establish the expectation that attention to exposure is an ongoing learning process that never stops.

At the same time, they must also assure that organizational and technical systems, as well as enabling systems, support continuous learning. The practices that can help your organization move toward high reliability are:

Cultural assessment. The first step is identifying how your organization is performing today, rather than looking at incident rates, which are poor indicators of actual exposure. The Reliability scales in Table 1 are readily measured alongside culture indicators shown to predict general safety outcomes. (Visit our website for more details.)

Technical assessment Cultural assessments can be immensely powerful and have been demonstrated to predict safety outcomes. To get a more holistic picture of organizational reliability, it is advisable to also conduct a technical assessment that evaluates the effectiveness of process safety systems, including the identification of risk, robustness of protective barriers, and capability of personnel responsible for system operations.

Develop a catastrophic incident prevention improvement roadmap. Based on the findings from the cultural and technical assessments, an organization's capability can be assessed against one of several internationally

ANTICIPATION	QUESTIONING	DILIGENCE	RESILIENCE	LEARNING
Always Seeking	Inquiring Mindset	Focus on "Right first time"	Effective course correction	Mistakes, defects, & incidents used for improvement
Priority is given to leading measures and weak signals Data and hunches are valued Systems and culture support problem-seeking Input from the frontline is given high value High Sensitivity to Change Reinforcement of reporting	Rigorous analysis systems are in place and used constantly The organization actively works to overcome bias The risk acceptance process is clearly defined and followed Recommendations are applied widely	Leaders set clear expectations Roles and responsibilities are well defined and understood Routine monitoring/ checking Follow-up ensures findings are addressed in a timely manner	Teams have rehearsed responding to a variety of upset conditions Leadership supports and reinforces employee intervention to minimize impact Communication, roles, and decision making authority is clear	Post upset activity focuses on learning and putting lessons into action widely Investigation root causes point to system and culture issues Organizational learning messages are broadly communicated and well understood Learning is a "Process" that leads to corrective and preventive actions that are sustained.

Table 1. HRO Scales

recognized catastrophic incident prevention models. Improvement plans can be developed and placed to meet organizational risk resolution timelines and resource capacity.

Adopt a learning orientation. High reliability organizations are characteristically self-aware. They make sure that even the newest employee knows the story of where they come from and where they're going. They're also vigilant about preserving organizational memory, looking outside their organization for learning opportunities, and assuring that hard lessons are never forgotten or repeated.

Moving Toward HRO Performance

The promise of HROs is that they define a path to consistent safe performance, even at the frontiers of industry and technology. As with all innovation, the key to adoption is enabling your Culture and Organizational Systems to support High Reliability principles reliably and predictably. The practical and measurable nature of DEKRA's Reliability scales opens a new way for leaders wishing to create High Reliability organizations.

DEKRA's Organizational Process Safety Consulting Services enable leadership to understand and address the underlying factors that contribute to catastrophic safety risk, uncover organizational blind spots, and identify cultural and leadership factors that contribute to ineffective exposure control.

As a starting point, DEKRA assesses the critical factors that influence the level of organizational risk, effectiveness of risk mitigation, and sustainability of exposure control. The assessment results allow leadership to identify targeted solutions that address the most impactful issues facing their organization.

DEKRA's approach combines our world-renowned technical expertise in Process Safety with our industry-leading scientific perspectives on Organizational Safety and Reliability. DEKRA provides a comprehensive solution set and organizational change model, with a focus on culture change, governance, leadership development, employee participation, and risk control systems. We work with your team to understand why early warning signals are overlooked and what can be done to improve the identification of and response to these signals.

We also work with you to build a Learning Organization where risks are systematically identified, controls sustainably implemented, and performance is monitored – developing the attributes of a HRO that reduces the potential for catastrophic incidents.

Interested in moving towards becoming a High Reliability Organization?

Connect with us!

Connect with us: Interested in moving towards becoming a High Reliability Organization?

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