Canada Energy Regulator | Régie de l'énergie du Canada

Safety Culture Assessment Guidance

Canada

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Orientation sur l'évaluation de la culture de sécurité

Ce rapport est publié séparément dans les deux langues officielles.
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1. Background

There is clear evidence from the analysis of global incidents that safety culture is a key factor in most high consequence accidents. This has highlighted the need for pipeline operating companies to develop a pervasive organizational culture in which safety is a core value and preeminent priority for all leaders and staff.

A comprehensive safety culture assessment is a valuable practice that provides an organization's leaders and employees with insights about potential cultural strengths and weaknesses. This serves to focus organizational efforts on the nurturing of existing strengths and mitigation of co-existing weaknesses. Best practices developed and validated by other high hazard industries, such as nuclear and aviation, should be employed to obtain robust and actionable results.

This document is intended to provide an introduction to some of these well-tested assessment practices and provides additional resources and tips for a company undertaking a safety culture assessment. It also introduces several concepts that may be of assistance for those who are responsible for planning and conducting such an assessment.

2. Safety culture frameworks and their use

Cultural frameworks serve to simplify and communicate a complex concept into distinct dimensions to support clarity and understanding. There are many safety culture frameworks available for consideration and use by organizations.

Some safety culture frameworks contain many dimensions while other models have fewer dimensions. This might suggest that one model is more comprehensive than another, but that is not necessarily the case. In general, the available frameworks are similar, even when the number of dimensions vary.

It is important to select the framework that works best for the context in which it is to be used. Models with fewer dimensions tend to be more generic and applicable to a wider range of situations and are preferable if the model will be applied to several types of organizations.

Companies should choose a framework that is best suited to their organizational needs. This may require some adaptation of an existing model or development of a unique framework for it to make sense and be more easily applied and understood throughout the organization.

The following safety culture framework dimensions are derived from the Canada Energy Regulator's Safety Culture Framework. For a more comprehensive review of each dimension including attributes and descriptors, please see: Advancing Safety in the Oil and Gas Industry: Statement on Safety Culture (2021). Available at: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/statement-safety-culture/index.html

> **For a more comprehensive review of each dimension including attributes and descriptors, please see: Advancing Safety in the Oil and Gas Industry: Statement on Safety Culture (2021). Available at: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/statement-safety-culture/index.html**

Sample safety culture framework dimensions
CER Safety Culture Framework

NEGATIVE DIMENSIONS (CULTURAL THREATS)	POSITIVE DIMENSIONS (CULTURAL DEFENCES)
Production Pressure	Committed Safety Leadership
Complacency	Vigilance
Normalization of Deviance	Empowerment and Accountability
Tolerance of Inadequate Systems and Resources	Resiliency

Safety culture threats

Production pressure

Production pressure occurs when there is an imbalance between production and the prevention of harm. This can occur when leadership overly values production, such that the emphasis is placed upon meeting the work demands, schedule or budget, rather than working safely. Organizational goals and performance measures are heavily weighted towards commercial and production outcomes over protection. Business strategy, plans, resourcing, and processes fail to adequately address safety considerations.

Complacency

Complacency occurs when there is a widely held belief that all possible hazards are controlled, and the organization has forgotten to be afraid resulting in reduced attention to risk. The organization views itself as being uniquely better (safer) than others and as a result, does not need to conform to industry standards or best practices. This can be the result of an over-reliance on limited data sets (e.g.: occupational injury rates) that leads to the erroneous belief that the organization is not at risk for a major accident. The absence of a (safety) failure over time results in a reduction of organizational vigilance.

Normalization of deviance

Normalization of deviance occurs when it becomes generally acceptable to deviate from safety systems, procedures, and processes. The organization fails to implement or consistently apply its management system across the operation (regional or functional disparities exist). Rules, procedures, and defenses are routinely circumvented to get the job done.

Tolerance of inadequate systems and resources

Tolerance of inadequate systems and resources occurs when it becomes acceptable to work with inadequate systems and resources, which often occurs when the organization tries to do too much with too little. No allowance is made in business and operational planning for unanticipated problems and changing conditions, which would include resource contingencies for completion of work. The organization is slow to react to changing conditions. Most attempts to make the operation safer through enhanced systems and resources happen following an incident or regulatory action.

Safety culture defences

Committed safety leadership

Safety (i.e., prevention of harm to people and the environment) is an organizational value demonstrated by a genuine leadership commitment and expressed by providing adequate resources, systems, and rewards to serve this end. Senior leaders recognize that commercial goals and safety can come into conflict and take measures to identify and resolve such conflicts in a transparent and effective manner. The strategic

business importance of safety is reflected in the company's strategy, business plans and processes.

Vigilance

Vigilance refers to organizational preoccupation with failure and the willingness and ability to draw the right conclusions from all available information. The organization implements appropriate changes to address the lessons learned. It includes the continual collection and analysis of relevant data to identify hazards (human, technical, organizational and environmental factors) and manage related risk. The organization actively disseminates safety information in order to improve overall awareness and understanding of risks.

Empowerment and accountability

Management benefits from the expertise of front-line workers to achieve better solutions to meet safety challenges. Employees feel that they can stop any activity when they notice a potential hazard in order to mitigate, eliminate, or report it even when that may have an impact on production or costs. Accountabilities and responsibilities for safety are clearly established and documented at all levels of the organization. Ownership for safety outcomes is present at all levels and functional areas of the organization.

Resiliency

Resiliency is the capability to respond effectively to changing demands in order to manage potential or emerging risk. There are organizational mechanisms in place to manage complex activities, and to constantly meet the fluctuating demands of a high hazard industry. There is a reluctance to simplify problems and situations to arrive at a solution. The organization allows decisions to be made by front-line employees and allows authority to migrate to the employees with the most expertise, regardless of their level in the company. The organization is committed to developing capabilities to detect, contain, and rebound from errors that may occur.

3. Safety culture indicators, maturity models and their potential use during assessment

Safety culture indicators are part of a safety culture toolkit. While indicators do not measure safety culture directly, they are intended to point to signals of strength or weakness that may provide an indication of the relative health of an organization's culture.

Indicators can be used to shape and facilitate safety culture data collection and analysis. Themes and trends may be identified and understood using well-designed indicators.

> **For a sample set of safety culture indicators, please see the North American Regulators Working Group on Safety Culture. (2016). Safety Culture Indicators Research Project: A Regulatory Perspective: https://www.cer-rec.gc.ca/en/safety-environment/safetyculture/safety-culture-indicators-research-project-regulatory-perspective.html**

Safety culture maturity models have been developed to assist companies in sensing, plotting, and articulating the current state of their safety culture and path towards improvement. Maturity models do not measure safety culture, but they can provide a helpful framework for understanding organizational development and the fluidity of the culture journey (i.e., safety culture can both improve or degrade over time; there is no inevitable progression from weakness to strength).

Two of the most prevalent safety culture maturity models are Westrum's[1] three-tiered organizational culture typology (i.e., pathological, bureaucratic, and generative) developed in 1988 and subsequent adaptation by

1 Westrum, R. (1996). Human factors experts beginning to focus on organizational factors in safety. International Civil Aviation Organization Journal, 51, 6-27.

Hudson[2] (2007), which expanded the model to five levels (i.e., pathological, reactive, calculative, proactive, and generative). This latter model is now known as the Hudson safety culture maturity ladder; it has been widely used. (Please see the reference list at the end of this document for further information on this model.)

Maturity models can be particularly useful when communicating the results of comprehensive safety culture assessments, organizational aspirations, and proposed action plans to leaders/decision makers and employees.

4. Safety culture assessment methods: Data collection

In the past, many companies have relied on perception surveys to evaluate their safety culture. Researcher and practitioner learnings have demonstrated that questionnaires are not effective assessment instruments on their own. A multi-method approach should be used and a comprehensive cultural assessment should include document reviews, work observations, individual interviews, and focus groups. At a minimum, three specific methods should be used to collect data points. While each of the five methods has some limitations, the inclusion of and comparison of several methods provides richer data that may be more easily correlated, interpreted, and acted upon. Data collected using these methods should be triangulated to validate findings and subsequent focus areas.

Questionnaire/surveys

Questionnaires designed to collect perceptions about safety culture have been widely used across industry. Perception surveys offer an efficient method for quantitative data collection and provide ease for benchmarking across teams, regions, business units, and companies. They tend to be built using a Likert scale (i.e., a linear set of responses that increase or decrease in strength), but other measurements may be used. In some instances, free text fields may also be provided to allow participants to clarify or comment on their rating.

Perception surveys are limited in their value as they can:

- be subject to significant bias in their design (e.g., questions may be leading and tend to be framed in the positive);
- result in questions and terminology being misunderstood and inconsistently interpreted by participants;
- lead to results that are difficult to both interpret and validate, which often results in overgeneralizations that make it challenging to pinpoint areas that require redress.

Pairing a well-designed perception survey with other assessment methods provides value to an organization; the survey itself may be used as a preliminary step in identifying potential topics for deeper exploration. A perception survey can also help to illuminate disconnects and disparities between hierarchical levels in the organizations and/or other distinct groups, such as functional teams and business units.

> **For practical tips on developing a perception survey, please see American Association for Public Opinion Research. (n.d.). Best practices for survey research. Retrieved from: https://www.aapor.org/Standards-Ethics/Best-Practices.aspx**

2 Hudson, P. (2007). Implementing a Safety Culture in a Major Multi-national. Safety Science, 45, 697-722.

Document reviews

Document reviews focus on the analysis of existing company policies, processes, procedures, and written commitments. Management system related documentation articulates the espoused values of the organization so it can provide valuable information about what has been deemed important by leaders. Historical company performance data (i.e., incident investigation reports, internal monitoring, and audit results, etc.) may also provide insights into how these policies and commitments are lived within the company by staff and leadership.

Document reviews have limitations and challenges. For example, document reviews are labour intensive. Additionally, sometimes what is expressed in documentation may not accurately reflect how the organization functions. Notably, a disconnect between stated intent and actual behaviour within an organization is a cultural signal.

Work observations

Work observations provide an opportunity to identify differences in expected versus actual performance in real time. Observations can help assessors understand how espoused company values are translated into real world practices, norms, and decision-making.

Assigned observers must be trained and experienced to effectively capture and interpret what is being observed with related cultural implications. Observational data are prone to distortion as people often behave differently when observed so this must be considered when interpretation occurs.

Interviews

One-on-one interviews provide an opportunity to explore cultural issues and emerging themes in-depth. The use of semi-structured (i.e., thematic areas explored via specific questions) or unstructured (i.e., open-ended questions in which themes naturally emerge based on interviewee comments) interviews may be employed to collect meaningful cultural signals and/or to assist with interpreting other data points.

This data collection method requires interviewer skill and a sensitivity to personal biases, which might influence interviewees in a particular direction. Interviews can provide very good quality data and tend to be quite valuable during assessments. One drawback of this methods is how time consuming it may be as the analysis of interview notes and transcripts is labour intensive.

> **For practical tips for conducting safety culture assessment interviews, please see US Nuclear Regulatory Commission. (n.d.). Interview techniques for assessing safety culture. Retrieved from: https://www.nrc.gov/docs/ML0718/ML071830168.pdf**

Focus groups

Focus groups bring small groups together to discuss and build upon previously identified and emergent cultural themes. These inclusive and interactive sessions provide considerable flexibility in the way that perspectives and information are collected. Focus groups are highly effective as they often reveal issues and responses that are not easily accessible through other methods.

As with the other data collection methods, focus groups have some limitations that need to be managed. Specifically, they require skilled facilitators with a sensitivity to their own biases that may affect the probing questions asked and the resultant discussion. Power dynamics, peer pressure and the potential for group think to develop must also be considered when planning and/or managing focus group strategies and implementation.

> **For practical tips associated with conducting a focus group, please see Interaction Design Foundation. (2021). How to conduct a focus group. Retrieved from: https://www.interactiondesign.org/literature/article/how-to-conduct-focus-groups**

5. Safety culture assessment methods: Data analysis

Once data has been collected via a multi-method approach, it must be analyzed and interpreted by the assessment team. In general, this process requires the extraction of cultural themes and triangulation of related signals across the multiple data collection sources. There are many lenses that should be applied to this analysis, including but not limited to:

a. identification of common themes across data collection methods;
b. identification of thematic differences across data collection methods;
c. identification of data that serve to illustrate the noted cultural themes (e.g., participant quotations, stories or observations);
d. disparities between what is said and/or written (i.e., espoused values by leaders and those found in documentation) and what is actually done in practice;
e. differences and similarities between sub-groups (e.g., teams, business units, regional offices) and hierarchical levels; and
f. identification of any significant observations of patterns of behaviour related to safety commitment and tolerance of risk.

6. Safety culture assessment cycle

In order to understand and improve its existing safety culture, a company should evaluate their safety culture on a three to five year cycle. This cycle provides adequate time for resultant actions (from the prior assessment) to be identified, developed, implemented, and embedded within the organization's processes, practices, and norms.

7. Who should conduct the assessment?

A safety culture assessment is a unique form of organizational evaluation; it differs from traditional system audits and reviews. A company that is considering conducting its first self-assessment should seek support from a qualified safety culture expert until such time as internal competency has been established.

Safety culture assessment teams benefit from having members with varied backgrounds, perspectives, and skills. In some instances, companies may consider having the team comprised of external parties only while others may choose to create a team made up of internal staff and management. There are benefits and drawbacks associated with each approach as described below.

External Assessment Team Advantages and Disadvantages

Advantages	Disadvantages
In low-trust organizations, an external party may be better able to facilitate increased participation and sharing of honest feedback.	In tight-knit organizations, staff may not want to share openly with "an outsider".
Provides a neutral view of the organization that is not biased positively or negatively.	May have difficulty interpreting all data without more in-depth knowledge of the organization's history, make up and character.
More likely to find expertise related to safety culture and other important social sciences.	Unlikely to have operational experience and expertise associated with the organization's activities, hazards, and risks.

Internal Assessment Team Advantages and Disadvantages

Advantages	Disadvantages
Where trust exists within the organization, it can be leveraged to improve participation and honest contributions.	Where trust is not strong, relying on current staff and management can prevent honest engagement by participants.
Technical expertise associated with the organization's activities, hazards, and risks can be utilized to aid in data collection and interpretation.	Required competencies may not be readily available in house.
Those currently embedded in the existing culture may be able to contextualize the results and aid in interpretation.	Potential for group-think to exist or develop resulting in poor or invalid interpretation of results.
Knowledge of the existing management system and documentation can improve efficiency of certain tasks.	

Companies may benefit most from employing a hybrid approach that includes staff from various hierarchical levels and functional departments supplemented with an external resource who is not embedded in the existing culture. Such a team allows for the leveraging of internal knowledge of existing values and norms, relationships across the organization and technical expertise associated with the work being performed. The external party offers a neutral perspective that can challenge potential cultural blind spots that develop over time as member of the community.

Assessment team competencies

Specific competencies that should be included within the assessment team membership include:

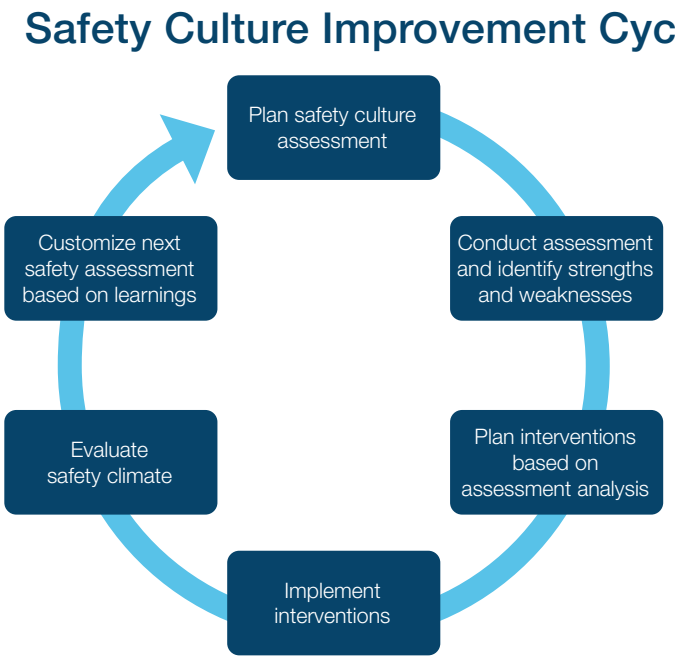
a. Knowledge of various safety culture framework(s) and tools;
b. Understanding of social and organizational psychology;
c. Systems thinking including expertise in the design, development and implementation of management systems;
d. Operational knowledge of the company's activities and related hazards and risks;
e. Group facilitation skills; and
f. Critical thinking, data analysis ,and interpretation skills (of qualitative data in particular).

8. Safety culture advancement (following assessment)

Safety Culture advancement may be viewed through a continual improvement cycle. See figure below. An initial safety culture assessment is typically conducted to illuminate potential blind spots and areas of cultural strength and weakness. The central steps in this cycle are as follows:

a. plan safety culture assessment scope, tools, team, and analysis process;
b. assess and identify areas of weakness and strength;
c. plan interventions (at multiple levels of organization – board, executive, management, worker) to mitigate weaknesses and further support strengths;
d. implement interventions and provide time for adoption and embedding;
e. evaluate to determine if interventions are effective;

f. update and plan next comprehensive safety culture assessment; and
g. complete next comprehensive safety culture assessment.



Though less common, a company may introduce safety culture improvement strategies (i.e., interventions) and then schedule their initial assessment to evaluate their impact and to establish a benchmark for future assessments.

9. Additional references

For more detailed information and guidance on conducting a safety culture self- assessment, please see:

1. Energy Facilities Contractors Group (EFCOG). A guide to safety culture evaluation. Retrieved from: https://efcog.org/wp-content/uploads/Wgs/Safety%20Working%20Group/_Integrated%20Safety%20Management%20Subgroup/_Safety%20Culture%20HRO/EFCOG%20Safety%20Culture%20Guides/Guide%20to%20Safety%20Culture%20Evaluation_Rev%200_Sept_2015.pdf
2. International Atomic Energy Agency (IAEA). (2016). Safety Reports Series No. 83: Performing Safety Culture Self-assessments. Retrieved from: https://www.iaea.org/publications/10742/performing-safety-culture-selfassessments.
3. International Association of Oil and Gas Producers (IOGP). (2010). A guide to selecting appropriate tools to improve safety culture. Report No. 435. Available at: A guide to selecting appropriate tools to improve safety culture,.
4. IOGP. (2013). Shaping safety culture through safety leadership. Report No. 452. Available at: Shaping safety culture through safety leadership.

Appendix A: Comparison of Safety Culture Frameworks

	Source of Framework					
	Canada Energy Regulator (CER)	**James Reason**	**High Reliability Organizations (Weick and Sutcliffe Model)**	**US Bureau of Safety and Environmental Enforcement (BSEE)**	**US Pipeline and Hazardous Materials Safety Administration (PHMSA)**	**International Atomic Energy Agency (IAEA)**
Safety Culture Dimensions	Committed Safety Leadership Production Pressure			Leadership Safety Values and Actions	Leadership is clearly committed to safety	Leadership for safety is clear
	Vigilance	Learning	Preoccupation with failure	Continuous Learning	Organization practices continuous learning	Safety is learning driven
	Committed Safety Leadership Production Pressure		Preoccupation with failure	Leadership Safety Values and Actions	Decisions demonstrate safety is prioritized over competing demands	Safety is a clearly recognized value
	Vigilance Complacency Normalization of deviance	Informed Reporting Complacency Normalization of deviance	Reluctance to simplify interpretations Sensitivity to operations	Problem Identification and Resolution	Reporting systems and accountability are clearly defined	
	Vigilance Complacency Normalization of deviance	Informed Just Complacency Normalization of deviance	Preoccupation with failure	Environment for Raising Concerns Inquiring Attitude	There is a safety conscious work environment	
	Empowerment and Accountability Vigilance	Just	Deference to expertise	Personal Accountability	Employees feel personally responsible for safety	Accountability for safety is clear
	Vigilance	Informed	Deference to expertise	Effective Safety Communication	Open and effective communication across the organization	

Source of Framework (cont.)						
	CER	**James Reason**	**High Reliability Organizations**	**BSEE**	**PHMSA**	**IAEA**
Safety Culture Dimensions	Vigilance	Just	Deference to expertise	Respectful Work Environment	Mutual trust is fostered between employees and the organization	
	Vigilance	Just	Preoccupation with failure	Environment for raising concerns without fear of retaliation, intimidation, harassment, or discrimination	Organization is fair and consistent in responding to safety concerns	
	Vigilance Resiliency Tolerance of Inadequate Systems and Resources Production Pressure	Informed Flexible Tolerance of Inadequate Systems and Resources	Commitment to resilience	Work Processes	Training and resources are available to support safety	Safety is integrated into all activities