

A Practical Guide for Enhancing Safety Culture Using the Nuclear Industry Safety Culture Inventory

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Executive Summary

This guide provides a practical framework for nuclear organisations to understand, assess, and enhance their safety culture. The Office for Nuclear Regulation (ONR) has structured this guide on its six-dimension safety culture model (ONR 2024), which forms the basis of the Nuclear Industry Safety Culture Inventory (NISCI) assessment tool (ONR, 2025a). The six dimensions are: Senior Leadership, Line Management, Immersion, Accountability, Challenge, and Reporting.

For each dimension, this guide introduces the core concept and its attributes as specified by ONR, links to legislation and legally binding licence conditions, alignment with international standards, and insights from academic research. It then translates this foundation into practical, actionable guidance that organisations can implement to foster a mature and resilient safety culture.

The guide also explains how organisations can use the NISCI software tool as part of a continuous improvement cycle (Measure, Analyse, Plan and Act, and Re-measure), consistent with ONR's latest guidance on safety culture assessment (ONR, 2025b). To enhance its practical utility, this guide also includes a detailed Practical Self-Assessment and Reflection Tool in Section 7 to facilitate structured, qualitative conversations about safety culture.

This evidence-based guide is ONR's roadmap to help nuclear organisations move beyond abstract ambition and take targeted, effective action to ensure safety remains the overriding priority in both word and deed.

Introduction: The Imperative of a Proactive Safety Culture

The Evolution of Safety Thinking

The modern understanding of safety in high-hazard industries represents a significant evolution from earlier, more limited perspectives. Historically, safety management was primarily concerned with technical integrity and procedural compliance. The change in thinking began in earnest following catastrophic events, most notably the 1986 Chernobyl disaster, which starkly demonstrated that technological and procedural safeguards alone are insufficient (IAEA, 1992; Reason, 1997). Investigations into this and other major incidents, such as Three Mile Island and Fukushima, revealed that the root causes were often deeply embedded in the organisation's values, beliefs, and behavioural norms (Kemeny, 1979; Kurokawa, 2013) – what we now understand as its safety culture (Clarke et al., 2023). This realisation, first formally articulated by the International Nuclear Safety Advisory Group (IAEA, 1991), has since become a central focus for regulators and operators across all major hazard sectors, including Great Britain's (GB) nuclear industry.

Defining Safety Culture for GB's Nuclear Industry

The Office for Nuclear Regulation (ONR) has established a clear and comprehensive definition of safety culture, which serves as the foundation for its regulatory approach. It defines safety culture as:

"The underlying assumptions, which underpin the value placed upon safety by every individual and group at every level of the organisation, which interacts with the organisation's structures and management systems, resulting in behavioural norms that consistently emphasise safety over competing goals." (ONR, 2024).

This definition is critical. It moves beyond focusing on characteristics and attitudes to also address the 'underlying assumptions' – the often unspoken, deeply held beliefs that dictate "the way we do things around here" (Schein, 1985). It highlights the interaction between people and systems and establishes the ultimate test of a strong safety culture: the consistent prioritisation of safety over competing pressures such as schedule, cost, or production targets. This definition both aligns and builds on the international consensus, particularly with the principles established by the International Atomic Energy Agency (IAEA), which has long recognised safety culture as a primary determinant of safety performance (IAEA, 2016; IAEA, 2020).

Introducing the ONR Model and the NISCI Tool

To translate this definition into a measurable and manageable framework, ONR commissioned the development of a state-of-the-art model and assessment tool specifically for GB's nuclear industry. The result is the Nuclear Industry Safety Culture

Inventory (NISCI), a psychometrically validated quantitative measure built upon a robust six-dimensional model of safety culture (Clarke et al., 2023). This model, developed by academics from Alliance Manchester Business School, provides a common language and a structured approach for organisations to assess their culture, benchmark performance, and identify areas for improvement.

The six dimensions of ONR's safety culture model are:

1. Senior Leadership
2. Line Management
3. Immersion
4. Accountability
5. Challenge
6. Reporting

Figure 1: ONR's Model of Safety Culture



Purpose and Guide Structure

The purpose of this guide is to provide nuclear organisations with a comprehensive, evidence-based, and practical roadmap for using the NISCI to understand and enhance their safety culture. The guide is structured around the six fundamental dimensions and provides practical tools for measurement and improvement.

- **Sections 1-3** provide a deep dive into the six dimensions, organised into three thematic parts. For each dimension, the guide defines the core concept, explains its links to legislation, aligns it with international standards, integrates academic insights, and provides practical guidance for organisations.
 - **Section 1: The Leadership Imperative**, covering Senior Leadership (setting the organisational compass) and Line Management (translating vision into daily reality).
 - **Section 2: The Human Experience**, focusing on Immersion (cultivating a valued and engaged workforce) and Accountability (engineering a fair and just culture).
 - **Section 3: The Proactive Stance**, detailing Challenge (fostering a questioning mindset) and Reporting (building confidence in organisational learning).
- **Section 4** provides guidance on applying the NISCI tool for continuous improvement through the measurement and improvement cycle.
- **Section 5** explains how to interpret NISCI results through benchmarking and prioritisation.
- **Section 6** looks beyond the numbers to explain the crucial role of qualitative data in understanding safety culture.
- **Section 7** offers a practical self-assessment and reflection tool based on the six-dimensional model.
- The **Conclusion** provides guidance on how to integrate the dimensions for sustained improvement.

By systematically addressing each dimension, organisations can move beyond abstract ambition and undertake targeted, effective interventions to ensure safety remains their overriding priority in both word and deed.

Section 1: The Leadership Imperative

Leadership is the primary driver of organisational culture. The actions, priorities, and communications of leaders send powerful signals throughout the organisation about what is truly valued. ONR's six-dimension safety culture model differentiates between the strategic influence of senior leadership and the direct, daily impact of line management, as the workforce perceives these two groups differently and they have distinct roles in shaping the safety culture (Clarke et al., 2023).

Senior Leadership – Setting the Organisational Compass

Introduction to the Dimension

Senior leaders are responsible for creating the overarching vision and framework for safety. Their role is not merely to approve policies but to both actively and visibly embody the organisation's commitment to safety, setting the standard for the entire workforce. ONR has previously identified that shortfalls in leadership are a key factor contributing to deficiencies in safety culture across the industry, making this a priority area for regulatory attention (ONR, 2021). In its six-dimension safety culture model, ONR has defined the Senior Leadership dimension by three critical attributes: Communication, Consistency, and Openness.

Links to Legislation and Licence Conditions

UK law firmly establishes the accountability of senior leaders through broad statutes and specific nuclear legally binding licence conditions. These broad legal duties translate into specific, enforceable requirements for GB's nuclear sites. Senior leaders are directly responsible for ensuring compliance with Licence Conditions that are fundamentally strategic in nature, such as LC 17 (Management Systems) and LC 36 (Organisational Capability).

International Alignment

This dimension aligns perfectly with international standards. The IAEA states that leaders at all levels must demonstrate leadership for safety, with senior management showing clear commitment (IAEA, 2016; IAEA, 2020). A fundamental characteristic of a strong culture is that safety is a clearly recognised value, which organisations demonstrate through documentation, communications, and, crucially, the decisions and behaviours of leaders (IAEA, 2006). The IAEA also stresses the importance of leaders fostering open communication and building relationships based on trust (IAEA, 2016).

Academic and Research Insights

Academic research distinguishes between different leadership approaches, providing a critical lens for understanding ONR's model. Research has shown that a transformational leadership style – which focuses on inspiring, motivating, and intellectually stimulating followers – has a significantly stronger positive impact on safety culture than a purely transactional style, which relies on contingent rewards and corrective actions (Clarke,

2013; Zhao et al., 2022). This suggests that a senior leader who can inspire a deep-seated belief in safety values will be more effective than one who simply communicates rules.

Practical Guidance for Organisations

- **Develop a structured senior leader communication plan:** This plan should schedule regular, themed safety communications from the executive team. It should define key messages, target audiences, and the most effective channels (e.g., all-hands meetings, site-wide briefs, video messages, internal publications).
- **Transform ‘safety walks’ into ‘safety dialogues’:** Senior leaders should structure site tours to be less about inspection and more about genuine conversation. Leaders should receive training to ask open-ended questions, listen actively to concerns from frontline staff, and avoid a defensive posture. The goal is to learn, not to audit.
- **Establish a formal policy for resolving goal conflicts:** Create and embed a clear, non-negotiable process for how the organisation will handle conflicts between safety and production goals. This policy should explicitly state that safety is an overriding priority and empower individuals at all levels to halt work when a safety concern exists.
- **Model fallibility and accountability:** Leaders should openly acknowledge and discuss their own mistakes and failures related to safety. This powerful act of humility demonstrates that no one is above scrutiny, normalises the discussion of errors, and encourages others to report their own mistakes without fear of blame.
- **Implement formal upward feedback channels:** Establish structured forums where frontline staff and their representatives can brief senior leaders directly on current safety challenges and concerns. This could include reverse-mentoring schemes or dedicated sessions with safety committees.
- **Create a transparent feedback loop:** Implement a system to track all safety suggestions submitted by the workforce. Every suggestion should receive a formal response, either detailing the actions that management will take or providing a clear, respectful rationale for why management has decided to take no action. This demonstrates that feedback is both heard and taken seriously.

Line Management – Translating Vision into Daily Reality

Introduction to the Dimension

While senior leaders set the strategic direction, line managers are the crucial link who translate that vision into the daily reality of the workforce. The Line Management dimension mirrors the same three critical attributes of Senior Leadership: Communication, Consistency, and Openness. However, these manifest in more direct, hands-on behaviours.

Links to Legislation and Licence Conditions

Line management behaviours are essential for meeting several key Licence Conditions. For LC 26 (Control and supervision of operations) and LC 12 (Duly authorised and other SQEPs), the act of ‘supervision’ is a behaviour. A line manager who cannot communicate clearly, uphold standards consistently, or remain open to feedback is not a competent supervisor. Line managers are also primary agents for ensuring compliance with LC 10 (Training) through coaching, mentoring and effective pre-job briefings. A line manager with

poor communication skills or a dismissive attitude towards procedures undermines the effectiveness of any formal training programme, thereby failing to meet the intent of LC 10.

International Alignment

IAEA standards on leadership and management for safety apply to all levels of management, not just the senior team (IAEA, 2016). Line managers are critical for integrating safety into all activities and ensuring that there is a high level of compliance with procedures at the operational level (IAEA, 2016). They are the primary implementers of the management system daily, making their commitment and actions vital for the system's effectiveness.

Academic and Research Insights

Analysis of the initial NISCI validation study indicates that Line Management is a relative strength in GB's nuclear industry and is significantly higher than that for senior leaders. However, the large gap between the perceived consistency of senior leaders and that of line managers suggests a cultural disconnect, where positive micro-cultures created by line managers are vulnerable to being undermined by senior leaders (Clarke et al., 2023).

Practical Guidance for Organisations

- **Invest in communication and coaching skills:** Provide line managers with dedicated training in coaching, active listening, and constructive feedback techniques. This equips them to handle difficult conversations about unsafe behaviour or procedural deviations in a way that is corrective but not punitive, thereby preserving trust.
- **Structure and empower pre-job briefings:** Hold daily pre-job safety briefings, structured to be interactive dialogues, not one-way lectures. Provide managers with tools and templates to facilitate discussions about risks, controls, and "what-if" scenarios, encouraging active participation from the entire team.
- **Align performance management with safety behaviours:** Integrate the safety leadership attributes from ONR's six-dimension safety culture model into the performance appraisal system for all line managers. Their performance should be evaluated not just on team productivity but also on their demonstrated commitment to safety communication, consistency, and openness.
- **Delegate authority for small-scale improvements:** Provide line managers with a small, dedicated budget and the authority to implement low-cost safety improvements suggested by their teams without needing to go through a lengthy central approval process. This accelerates improvement and demonstrates that worker feedback has an immediate impact.

Section 2: The Human Experience

Moving on from the actions of leadership, the next set of dimensions focuses on the experience of the individual employee within the safety culture. How people feel, how others treat them, and how the organisation responds to their actions are powerful drivers of their behaviour and their level of commitment to safety.

Immersion – Cultivating a Valued and Engaged Workforce

Introduction to the Dimension

The Immersion dimension addresses the emotional and psychological state of the workforce. It is concerned with the degree to which employees feel connected to the organisation's safety culture. A high degree of immersion signifies a workforce that moves beyond mere compliance towards genuine engagement. The two critical attributes are: Feeling Valued and Disengagement.

Links to Legislation and Licence Conditions

Immersion links to an employer's duty under the Health and Safety at Work etc. Act 1974 to ensure the health, safety and welfare of their employees, which is understood to include mental wellbeing. A culture where employees feel undervalued or disengaged can create a psychologically taxing environment, leading to harm through burnout, which represents a failure to protect employee welfare.

International Alignment

The IAEA's Harmonized Safety Culture Model explicitly includes 'employee engagement' as a key attribute of leader responsibility and highlights that a respectful work environment is a fundamental trait of a strong culture (IAEA, 2020).

Academic and Research Insights

The concept of 'feeling valued' is a practical manifestation of psychological safety – a shared belief that a team is safe for interpersonal risk-taking (Edmondson, 1999). Research also shows strong correlations between engagement and safety culture (Biddison et al., 2015).

The research conducted to develop the NISCI found that disengagement negatively affects the safety culture (Clarke et al., 2023); it did not find that increasing the engagement of already engaged employees improves the safety culture. This explains why the attribute is negatively phrased, focusing upon measuring disengagement rather than engagement.

Practical Guidance for Organisations

- **Implement fair and meaningful recognition programs:** Develop recognition systems that are transparent, fair, and specifically acknowledge proactive safety behaviours, not just the absence of incidents.

- **Invest in the work environment:** The message that employees are valued is undermined by poor facilities, inadequate tools, or a psychologically taxing environment. Addressing issues like excessive workload and burnout is a tangible way of showing the organisation values its people.
- **Promote respectful communication:** Implement and enforce a code of conduct that mandates respectful interaction at all levels. Leaders must model this behaviour and address incivility swiftly, as such actions are toxic to psychological safety.
- **Empower employees through participation:** Involve employees directly in the creation and improvement of the safety procedures that govern their own work. This fosters a sense of ownership and ensures procedures are practical.
- **Adopt a "Safety-II" mindset:** Shift the organisational perspective from seeing humans as a source of error (Safety-I) to viewing them as a source of resilience and safety (Safety-II), seeking to understand how things go right (Hollnagel et al., 2015).

Accountability – Engineering a Fair and Just Culture

Introduction to the Dimension

The Accountability dimension addresses how an organisation responds to success, failure, and human behaviour. A positive culture applies accountability in a manner that is fair, consistent, and focused on learning rather than blame. Its critical attributes are: Presence of Accountability and Just Culture.

Links to Legislation and Licence Conditions

LC 7 (Incidents on the site) mandates a formal process to investigate incidents – an essential first step in any fair accountability system. The Health and Safety at Work etc. Act 1974 (HASAWA) also establishes dual responsibility for employers and employees. Together LC 7 and HASAWA provide the legal foundation for a Just Culture: a system where everyone is held accountable within a process designed for learning and improvement.

International Alignment

The IAEA's standards strongly support the principles of a Just Culture, linking it directly to the willingness of the workforce to participate in safety reporting and learning systems (IAEA, 2020). The concept of clear accountability for safety is a fundamental characteristic of a strong culture, where roles and responsibilities are clearly defined and understood at all levels (IAEA, 2016).

Academic and Research Insights

The concept of a Just Culture moves away from a counterproductive "blame culture" without becoming a "blame-free" culture (Reason, 1997). The key is differentiating between human error, at-risk behaviour, and reckless behaviour, and responding appropriately to each (Dekker, 2012). Analysis of the initial NISCI validation study reveals that Accountability was the weakest dimension among the respondents (Clarke et al., 2023).

Practical Guidance for Organisations

- **Train leaders in Just Culture principles:** Provide in-depth training for all leaders and managers on Just Culture principles, human error management, and non-punitive coaching techniques.
- **Apply accountability system-wide:** Accountability should be present at all levels. If a frontline error is traced to flawed procedures or unrealistic targets, a Just Culture holds the leaders who designed those systems accountable for their decisions.
- **Utilise a decision framework:** To aid managers in applying these principles consistently, use a decision framework to move the response to an event from an immediate reaction to a structured, fair, and defensible analysis.

Table 1: A Just Culture Decision Framework

Behaviour Type	Definition	Guiding Questions (for the manager)	Managerial Action
Human Error	Unintentional action; a slip, lapse, or mistake.	Did the individual intend for this to happen? Was this an honest mistake that anyone could have made?	Console & learn: Console and support the individual involved. Lead an investigation into the systemic factors and focus on improving system defences.
At-Risk Behaviour	A choice where risk is not recognised or is mistakenly believed to be justified.	Why did this choice make sense to the individual at the time? What systemic pressures influenced this behaviour?	Coach & strengthen: Engage in a coaching conversation to enhance risk awareness. Investigate and remove systemic incentives for the at-risk behaviour.
Reckless Behaviour	A conscious disregard of a substantial and unjustifiable risk.	Did the individual knowingly violate a critical safety rule while understanding the potential for harm? Was this a choice no other reasonable professional would have made?	Remediate & discipline: Apply the formal disciplinary procedure fairly. Re-evaluate the individual's fitness for duty and consider remedial training or reassignment.

Note: This framework synthesises principles from Just Culture literature, e.g., Reason, 1997; Dekker, 2012; Boysen, 2013.

Section 3: The Proactive Stance

The final dimensions of ONR's six-dimension safety culture model encapsulate the dynamic, forward-looking elements of a mature safety culture. They move beyond static states and processes to describe a culture that is actively vigilant, constantly questioning, and structured to learn and adapt. This proactive stance is what separates organisations that simply manage safety from those that are truly resilient.

Challenge – Fostering a Questioning and Vigilant Mindset

Introduction to the Dimension

A strong safety culture is characterised by a state of chronic unease, where existing conditions and assumptions are constantly and respectfully challenged in the pursuit of identifying hidden risks. The two critical attributes are: Questioning Attitude and Sensitivity to Weak Signals.

Links to Legislation and Licence Conditions

A robust challenge culture is essential for complying with UK health and safety law. The Health and Safety at Work etc. Act 1974 (Section 7) requires employees to take reasonable care, which requires a questioning attitude to identify and challenge risks.

This professional vigilance is a core component of several Licence Conditions. For instance, the competence requirements of LC 12 (Duly authorised and other SQEPs) are not met if staff feel unable to challenge unsafe procedures or decisions. Similarly, the effectiveness of safety processes like LC 15 (Periodic review) depends entirely on a culture where existing assumptions can be openly questioned. A strong challenge culture is therefore a key enabler for proactive safety management and demonstrating compliance.

International Alignment

A questioning attitude is a cornerstone of international nuclear safety standards, identified as essential by the IAEA, USNRC, and WANO to discourage complacency and ensure vigilance (IAEA, 2020; USNRC, 2014; WANO, 2013).

Academic and Research Insights

This concept is central to the theory of High Reliability Organisations (HROs), which are distinguished by their preoccupation with failure (Weick and Sutcliffe, 2007). It is also impossible to separate Challenge from psychological safety; an individual will only challenge a decision if they feel psychologically safe to do so (Edmondson, 1999).

Analysis of the initial NISCI validation study reveals that Challenge was the highest-scoring dimension, suggesting this is a cultural strength in the industry, but one that requires constant reinforcement (Clarke et al., 2023).

Practical Guidance for Organisations

- **Explicitly grant and reinforce "Stop-Work Authority":** Grant every individual the authority and responsibility to stop any job they believe to be unsafe. Leaders should publicly celebrate acts of stopping unsafe work..
- **Train for assertiveness and "Safety Voice":** Provide training on communication techniques that enable staff to voice safety concerns in a manner that is assertive yet respectful.
- **Leaders should give recognition to those who pose questions:** Leaders at all levels should consistently and visibly provide recognition to, and in exceptional cases reward, employees for asking questions and challenging assumptions. A leader who reacts defensively can silence a whole team.
- **Emphasise near-miss and unsafe condition reporting:** Train the workforce so that they understand that reporting near-misses and hazardous conditions are free lessons that allow the organisation to learn before harm occurs.

Reporting – Building Confidence in Organisational Learning

Introduction to the Dimension

An effective reporting culture is the central nervous system of a learning organisation, allowing it to become aware of its vulnerabilities. The three critical attributes are: Feeling Safe, Confidence, and Informed Compliance. People must feel safe to report, have confidence the report will be acted upon, and be knowledgeable about the rules that reporting helps to improve.

Links to Legislation and Licence Conditions

An organisation cannot demonstrate effective arrangements for LC 7 (Incidents on the site) if its workforce does not feel psychologically safe to raise concerns without fear of reprisal. A culture of fear or futility fundamentally undermines the intent of LC 7.

For compliance to be 'informed', personnel must first be adequately trained on the rules (LC 10) and be suitably qualified and experienced to follow them correctly (LC 12).

International Alignment

International standards emphasise that effective reporting systems must include robust processes for investigation, corrective action, and feedback to the original reporter (IAEA, 2012). The IAEA's Harmonized Safety Culture Model includes the trait "Raising Concerns," which specifies that organisations must have supportive policies and confidential channels for reporting (IAEA, 2020).

Academic and Research Insights

A strong reporting culture is the ultimate outcome of a psychologically safe environment (Edmondson, 1999). Individuals will only report openly if they are confident that they will not be blamed or suffer retaliation (Reason, 1997).

Analysis of the initial NISCI validation study identified a confidence gap: while employees felt relatively safe to report, their confidence that reports would be acted upon was significantly lower, suggesting a sense of futility may be the primary barrier to reporting (Clarke et al., 2023).

Practical Guidance for Organisations

- **Implement and vigorously enforce a non-retaliation policy:** The organisation should have a formal, well-publicised policy that guarantees protection for those who report safety concerns in good faith – these protections can be embedded within health and safety policies, whistleblowing policies, dignity at work policies, anti-bullying/harassment policies, and grievance procedures. Any instance of alleged retaliation for reporting a safety concern must be investigated swiftly and transparently.
- **Provide multiple and confidential reporting channels:** While direct reporting is often preferred, organisations should provide alternative, confidential, or anonymous channels, such as an employee concerns program or a dedicated hotline.
- **Implement a "Closed-Loop" feedback system:** Implement a system where every individual who submits a safety report receives timely feedback, acknowledging receipt, providing updates, and communicating the final outcome.
- **Involve end-users in procedure development:** The people who perform the work are the experts. Involving them directly in the development and review of their own procedures ensures the documents are accurate, usable, and understood, which is a powerful driver of informed compliance.

Section 4: Applying the NISCI Tool for Continuous Improvement

The development of ONR's six-dimension safety culture model was not merely a theoretical exercise; it was created to be a practical, applied tool for GB-based nuclear organisations. ONR has operationalised its safety culture model by launching the NISCI – a software-based survey tool, enabling organisations to move from abstract cultural goals to a data-driven cycle of measurement, analysis, and targeted improvement. Using this tool effectively is key to unlocking its potential to genuinely enhance safety performance.

The Measurement and Improvement Cycle

The NISCI tool is designed to be the engine of a continuous improvement cycle, a process that should be integrated into an organisation's Safety Management System. This cycle consists of several distinct but interconnected stages:

Stage 1: Measure – Getting the Organisational Baseline

The first step is to gather robust data on the current state of the safety culture. The NISCI software facilitates this through a structured process:

- **Setup:** An organisation registers to use the tool and, using a setup wizard, creates a survey tailored to its needs. This includes defining the survey's title and accepting terms and conditions.
- **Configuration:** The organisation can choose the survey's length. Three versions are available: a full 60-item survey (taking around 20 minutes), a 30-item version "short-form", and a 15-item "super-short" form. For the initial assessment, the 60-item version is required to establish a comprehensive baseline for benchmarking purposes. Organisations can also add up to five custom Likert-scale questions and five open-ended text questions to explore specific local issues.
- **Deployment:** The survey is hosted online and deployed to employees and contractors via a dedicated URL or QR code. It is optimised for completion on PCs, tablets, and smartphones.

Stage 2: Analyse – Identifying Strengths and Weaknesses

Once a sufficient number of responses are collected (a minimum of 10 is required), the tool's analytical power can be leveraged:

- **Automated reporting:** The software automatically generates a detailed NISCI report, providing scores for each of the six core dimensions and their 15 sub-dimensions. If open-ended questions were included, a separate comments report is also generated.
- **Benchmarking:** A key benefit of the NISCI is its ability to benchmark results, allowing an organisation to see how its culture compares to industry averages. This helps to contextualise performance and identify areas of common strength or weakness across the sector.
- **Quartile ranking:** The NISCI report also provides a quartile rank for each dimension and sub-dimension, showing where an organisation's score falls relative

to the other nuclear organisations (Top 25%, Middle 50%, or Bottom 25%). This provides valuable comparative context. However, it is important to interpret this ranking carefully – the nuclear industry generally has high levels of safety, so a score in a lower quartile does not necessarily indicate poor performance in absolute terms, but rather an area where performance is lower relative to peers and may warrant further investigation.

- **Filtering and deep diving:** The reports can be filtered to analyse results from specific parts of the organisation, such as a particular site, department, or work area. This granular analysis is crucial for moving beyond a single, monolithic view of the culture and identifying specific "hot spots" or pockets of excellence. These filtered results for specific sub-groups can also be compared against the overall industry benchmarks to understand if and why certain parts of the organisation perceive the culture differently. For example, an organisation might find that while its overall score for "Line Management" is high, a specific division scores poorly on "Line Manager Openness." This allows for highly targeted interventions.

It is important to note that the data, as presented in the NISCI's automated reports provides organisations with valuable insights into safety culture, but keep in mind:

- Consider scores in the context of other useful data sources, such as safety culture focus groups, input from safety reps etc. Such discussions will help add context and support optioneering for improvement actions.
- Organisations and their subdivisions, sites or facilities, will have different risk profiles. Management should consider their organisation's NISCI data in the context of their organisation's risk profile(s).
- The mean scores provided in an organisation's NISCI reports need interpretation. Just because one-dimension scores slightly lower than another dimension, it does not necessarily mean the lower scoring dimension is a priority. Management will need to determine priorities based on a range of other information, including the organisation's risk profile.
- The automated report will present the organisation's scores as means (averages), which can sometimes mask areas that may need improvement.
- An organisation's NISCI report provides other critical data for management to consider, for example, viewing the NISCI report charts which illustrate responses as negative, neutral, and positive can provide further insights on areas of stronger and poorer performance.

Stage 3: Plan and Act – Developing Targeted Interventions

The analysis provides the "what" – the areas of weakness; the next step is to plan the "how." The data from the NISCI report should be used to develop a tailored improvement plan:

- **Prioritise:** Organisations often start by focusing their efforts on the dimensions or sub-dimensions with the lowest scores or the biggest negative deviation from the benchmark. They should, however, determine priorities based on the NISCI results alongside a range of other information, including the organisation's risk profile. Analysis of the data from the initial NISCI validation study, which surveyed 3,480 workers, identified weaknesses in "Senior Leader Consistency" and "Accountability," which suggests these may be critical areas for many organisations to address.

- **Develop interventions:** Using the analysis, the organisation can implement the practical strategies outlined in this guide. For instance, a low score on "Confidence" in the Reporting dimension points to a need to strengthen the corrective action program and improve the feedback loop to reporters.
- **Engage the workforce:** Improvement plans should be developed with input from the workforce. Sharing the anonymised results with teams and holding workshops to discuss the findings and co-create solutions can foster engagement and ownership of the improvement process.

Stage 4: Re-measure – Closing the Loop

Safety culture enhancement is a continuous journey, not a one-off project. After a suitable period of implementing the improvement plan, the organisation should re-assess its culture to gauge progress.

- **Targeted measurement:** It may not be necessary to deploy the full 60-item survey each time. If interventions were focused on a specific area, such as Reporting, the organisation can opt to measure just that single dimension to see if the targeted actions have had a measurable impact.
- **Track trends:** Over time, this cyclical process allows the organisation to track cultural trends, celebrate successes, and adapt its strategy as new challenges emerge. This longitudinal data is far more powerful than a single snapshot.

Section 5: Interpreting NISCI Results: Benchmarking and Prioritisation

Once an organisation has used the NISCI tool to measure its safety culture, the resulting scores provide a powerful dataset. However, a score has limited meaning when viewed in isolation. Its true value is revealed through comparison and context. The research that underpins the NISCI tool provides benchmark data from an initial validation study of 3,480 workers across 15 different GB-based nuclear organisations. This data serves as a useful reference point for an organisation to interpret its own results and prioritise areas for improvement. In time, as more data is collected, this benchmark will be updated.

A practical way to use this dataset is to identify areas where an organisation's score is significantly lower than the industry benchmark. There are two primary methods for doing this:

1. **Quartiles.** The simplest method is to use the quartile rankings which the report provides. Here, the organisation can subject any results which fall in the bottom quartile (bottom 25%) to further investigation.
2. **Means.** Another method is to investigate any results that fall one standard deviation or more below the industry mean. Such a score would place an organisation in the bottom 15% of the validation sample for that specific attribute, signalling an area that warrants further investigation.

Table 2 provides data necessary for this second method. For each sub-dimension, it shows the industry mean score and the calculated "Score to Investigate" (which is the mean minus one standard deviation). This is based on unweighted means, calculated from the overall results of each of the 15 organisations that participated in the validation study, rather than the overall number of participants. Using unweighted means ensures that the results of a large organisation does not dominate the data, making the benchmark more appropriate for learning between organisations.

To use this table, an organisation can:

1. Compare its mean score for each sub-dimension against the "Industry Mean (M)" column to get a general sense of its performance.
2. If the organisation's score for a particular sub-dimension is at or below the corresponding value in the "Score to Investigate" column, this should be considered a high-priority area for developing improvement actions.
3. Use these priority areas to guide the qualitative investigations described in Section 6 using the tool outlined in Section 7. For example, a low score in "Confidence" should prompt focus groups and interviews that explore why employees feel their reports may not be acted upon.

Important: The benchmarks in Table 2 reflect the average performance of entire organisations and should not be used to assess individual teams. Due to greater variability in small groups, a single dissatisfied employee can significantly affect a team's average, whereas larger organisations balance out individual differences. Consequently, scores that appear low for a small team may still fall within the normal range for such groups.

Table 2: NISCI Sub-Dimension Benchmarks for Prioritisation

Dimension	Sub-Dimension	Industry Mean (M)	Standard Deviation (SD)	Score to Investigate (M - SD)
Senior Leadership	Communication	3.99	0.25	3.74
	Consistency	3.79	0.29	3.50
	Openness	4.09	0.21	3.88
Line Management	Communication	4.16	0.20	3.96
	Consistency	4.42	0.16	4.26
	Openness	4.21	0.17	4.04
Immersion	Feeling Valued	3.75	0.31	3.44
	Disengaged*	1.86	0.20	(See note)
Accountability	Presence of Accountability	3.65	0.33	3.32
	Just Culture	3.64	0.25	3.39
Challenge	Questioning Attitude	4.41	0.14	4.27
	Sensitivity to Weak Signals	4.53	0.10	4.43
Reporting	Feeling Safe	4.00	0.23	3.77
	Confidence	3.64	0.32	3.32
	Informed Compliance	4.26	0.15	4.11

Note: The 'Disengaged' sub-dimension is reverse scored, so higher mean values indicate concern. For this sub-dimension, the threshold for investigation is calculated as the mean plus one standard deviation (M + SD). Here, scores of 1.99 or above should be investigated.

Section 6: Beyond the Numbers – The Crucial Role of Qualitative Data

While the NISCI tool provides invaluable quantitative data – the "what" of safety culture – a truly deep understanding requires exploring the "why." This is where qualitative methods become essential. A mixed-methods approach, combining the breadth of a survey with the depth of qualitative inquiry, provides the most robust and actionable insights into an organisation's culture. This approach reflects regulatory expectations (ONR, 2025b), and the use of qualitative methods is consistent with national and international best practice; indeed, ONR, the United States Nuclear Regulatory Commission, and the IAEA use a combination of document reviews, interviews, focus groups, and observations to conduct their own comprehensive safety culture assessments (IAEA, no date; USNRC, 2009; ONR, 2025c).

Why Qualitative Data is Essential

Quantitative survey data can identify problem areas, but it cannot explain the context, stories, and shared beliefs that drive the numbers. Qualitative data is essential because it:

- **Explains the "Why":** A low score in "Accountability" is a number; a focus group can reveal stories of perceived unfairness, inconsistent discipline, or a lack of feedback that explain that number. It uncovers the local rationality – why certain behaviours, even unsafe ones, make sense to people in their specific context.
- **Adds richness and context:** It captures the nuances of language, emotion, and group dynamics that surveys cannot. It helps to identify specific sub-cultures within different departments or on different shifts that might be masked by an organisation-wide average score.
- **Fosters engagement and trust:** The act of asking employees for their stories and opinions, and listening actively, is a powerful way to demonstrate that they are valued. This process can help to build the psychological safety and trust that are foundational to a strong safety culture.

Key Qualitative Methods

To supplement NISCI data, organisations should consider a range of qualitative methods, as outlined in ONR's guidance (ONR, 2025b; ONR, 2025c):

- **Focus Groups:** These are facilitated discussions with small groups of employees (typically 6-12) to explore specific topics in depth. They are particularly effective for understanding shared norms, beliefs, and perceptions within a team or department. For example, if NISCI results show low scores for "Line Manager Openness," a focus group could explore the team's experiences with raising concerns and providing feedback to their manager.
- **Interviews:** One-on-one interviews provide a confidential setting to explore sensitive topics and gain detailed individual perspectives. They allow the interviewer to probe deeper into specific issues raised by an individual's survey responses or to

understand the experiences of key personnel. Asking open-ended questions and requesting specific examples are key techniques for effective interviews.

- **Behavioural Observations:** Observing work as it is performed provides invaluable insight into the gap between "work-as-imagined" (what procedures say) and "work-as-done" (what actually happens). This method allows assessors to see the culture in action, observing how teams conduct pre-job briefings, handle unexpected events, and communicate with each other under real-world pressures.
- **Document Analysis:** This is a systematic method for reviewing documents to gain insights into hierarchy, power, authority, the degree to which safety controls are formalised, and how people value and prioritise safety. This can include reviewing safety policies, committee meeting minutes, and incident investigation reports.

Integrating Quantitative and Qualitative Data for Action

The true power of a mixed-methods approach lies in the synergy between the two types of data. The process should be iterative and is often most effective when using a technique known as sequential explanatory analysis (ONR, 2025b):

1. **Use NISCI to guide inquiry:** Use the quantitative results from the NISCI tool to identify the key areas for deeper exploration. A low score on a particular dimension becomes the starting point for designing targeted questions for focus groups and interviews.
2. **Use qualitative data to explain the numbers:** Triangulate the findings. Do the stories from the focus groups align with the low score on "Confidence" in reporting? Do observations of leadership meetings support the high score for "Senior Leader Communication"?
3. **Develop richer, more targeted interventions:** The specific examples and stories gathered through qualitative methods will provide a much clearer picture of what needs to be fixed. Instead of a vague goal to "improve accountability," the organisation can address the specific types of events where accountability was perceived to be unfair or inconsistent.
4. **Communicate for impact:** When presenting findings and action plans to leadership and the workforce, supplement charts and graphs with powerful, anonymised quotes and stories. Narratives are often more memorable and persuasive than statistics alone and can create a more compelling case for change.

By embracing this integrated approach, organisations can move beyond simply measuring their safety culture to truly understanding and improving it.

Section 7: A Practical Self Assessment and Reflection Tool

To make this guide more impactful, this section provides a single, integrated qualitative tool to help organisations conduct a self-assessment and spark internal conversations about their safety culture. For each of the six dimensions, it provides a high-level practical checklist with some deeper reflection prompts.

Dimension 1: Senior Leadership

This checklist is designed for senior leadership teams to evaluate the effectiveness of their safety leadership. The goal is to move beyond simple "yes/no" answers to a deeper reflection on the *quality* and *impact* of leadership actions.

Communication & Visibility: Is our commitment to safety clearly and consistently communicated?

- **Strategic Communication:** Do we have a formal, structured plan for communicating our safety vision and priorities, or is it ad-hoc?
- **Active Visibility:** Are senior leaders regularly and visibly present in operational areas?
 - *Reflection:* Are these "safety walks" genuine dialogues focused on listening and understanding, or do they feel more like inspections?
- **Clarity of Standards:** How effectively do we communicate clear, unambiguous safety standards to all levels of the organisation?
- **Feedback Loops:** Do we ensure that what we learn during site visits is formally captured and acted upon, with the outcomes communicated back to the workforce?

Prioritisation & Consistency: Do we 'walk the talk' on safety?

- **Decision-Making:** Do we have a clear, consistently applied process for resolving conflicts between safety and operational goals, ensuring safety is the overriding priority?
 - *Reflection:* Can we recall specific instances where we chose safety over production or schedule, and was this decision visible to the workforce?
- **Perception vs. Reality:** Is there a gap between what we say about safety and what employees *perceive* in our daily decisions, resource allocation, and priorities?
- **Upholding Standards:** Do we consistently uphold all safety rules and standards, even when it's difficult or inconvenient? Do we avoid any perception of "turning a blind eye"?

Accountability & Openness: Do we model a culture of learning and trust?

- **Modelling Accountability:** Do we openly discuss our own mistakes and the lessons learned from them, or do we project an image of infallibility?
- **Receiving Feedback:** How open are we to being challenged on safety matters? Do we actively encourage new ideas and critical feedback from all levels?

- **Psychological Safety:** Have we created formal, effective channels for frontline staff to provide safety feedback directly to us without fear of reprisal?
- **Responsiveness:** Does every safety suggestion from the workforce receive a timely, transparent, and respectful response, explaining what action will (or will not) be taken and why?

Dimension 2: Line Management

This checklist is for line managers to assess how effectively they translate the organisation's safety vision into daily reality for their teams. It encourages reflection on communication, consistency, and empowerment.

Communication & Engagement: Are we fostering an environment of proactive safety dialogue?

- **Pre-Job Briefings:** Are our pre-job briefings consistently held as interactive dialogues that encourage questions and team participation, or are they a one-way "tick-box" exercise?
- **Difficult Conversations:** Are we equipped with the coaching and communication skills to handle difficult safety conversations effectively and constructively?
 - *Reflection:* Do we proactively address unsafe behaviours and attitudes, or do we sometimes let things slide to avoid conflict?
- **Active Listening:** Do we actively ask for safety suggestions and concerns from our teams, take them seriously, and show a genuine willingness to change our own approach based on their feedback?

Consistency & Upholding Standards: Do our actions align with our words?

- **Modelling Behaviour:** Do we consistently uphold all the organisation's safety standards in our daily actions and instructions?
 - *Reflection:* Is there any perception that we "say one thing but do another," or do we reliably prioritise safety in the same way we expect our teams to?
- **Performance Management:** Is safety leadership a formal, meaningful, and regularly discussed component of how we appraise team and individual performance?
- **Fairness:** Are standards applied consistently across the team, or are there exceptions made for certain individuals or situations?

Empowerment & Responsiveness: Are we enabling our teams to be safety leaders?

- **'Stop Work' Authority:** Do our team members feel genuinely empowered and supported by us to stop any job they deem unsafe, without any fear of reprisal?
- **Delegated Authority:** Do we have the necessary authority and resources (e.g., budget, time) to implement practical, small-scale safety improvements suggested by our teams in a timely manner?
- **Closing the Loop:** When a team member raises a safety issue or suggestion, do we ensure they receive a clear and timely response, even if the change cannot be implemented immediately?

Dimension 3: Immersion

This checklist is for leaders and managers to assess the psychological and emotional connection of the workforce to the organisation's safety culture. The goal is to determine if employees feel genuinely valued and engaged, moving beyond mere compliance towards a state of active commitment.

Recognition & Value: Do our people feel genuinely valued, respected, and trusted?

- **Meaningful Recognition:** Do our recognition programs specifically and fairly reward proactive safety behaviours, not just the absence of incidents?
 - *Reflection:* How can we ensure our recognition systems are perceived as fair and meaningful, rather than tokenistic? Do they effectively acknowledge the efforts people make?
- **Respectful Environment:** Do our day-to-day interactions, policies, and working conditions consistently demonstrate that we respect and trust our people?
- **Wellbeing:** Are we actively addressing workplace stressors like excessive workload and burnout as a tangible way of showing we value our people's wellbeing?

Engagement & Ownership: Are our people actively engaged in safety, or is there a risk of disengagement?

- **Active Participation:** Are employees directly and meaningfully involved in creating and reviewing the safety procedures that govern their own work, fostering a sense of ownership?
- **Learning from Success:** Does our organisation actively seek to learn from everyday successes (a "Safety-II" approach), not just from failures? This reinforces the value of positive contributions and helps prevent disengagement.
- **Risk of Disengagement:** Is there a risk that safety has become a "tick-box exercise" for some of our people?
 - *Reflection:* Do we see signs of people "switching off" during safety discussions? Do our employees believe that their individual safety actions make a real and valued difference to the organisation?

Dimension 4: Accountability

This checklist helps organisations evaluate how they respond to successes, failures, and human behaviour. The goal is to assess whether accountability is applied in a manner that is fair, consistent, and focused on learning rather than blame, which are the core principles of a Just Culture.

A Fair & Just Culture: Do we foster a culture focused on learning, not blame?

- **Incident Response:** When things go wrong, is the immediate reaction to find someone to blame?

- *Reflection*: Do we have a fair process that investigates incidents with an "innocent until proven guilty" mindset and treats honest mistakes with support and a focus on learning?
- **Managerial Training**: Are all managers and supervisors trained in the principles of a Just Culture, including how to differentiate between human error, at-risk behaviour, and reckless behaviour?
- **Consistent Framework**: Do we use a consistent and fair framework (such as the Just Culture Decision Framework) to guide our response to incidents and errors? This helps ensure a structured analysis rather than an immediate emotional reaction.

System-Wide Accountability: Is accountability applied consistently and fairly at all levels?

- **Presence of Accountability**: Is there a perception that people can "get away with" poor safety behaviour? Are people at all levels held to account for safety, and do managers take clear and consistent action when rules are broken?
- **Systemic Investigation**: When an incident occurs, do our investigations rigorously examine systemic factors (e.g., flawed procedures, resource issues, production pressures) as potential root causes?
- **Leadership Accountability**: Are senior leaders held accountable for the systems they design and the production targets they set, especially when these are found to contribute to an incident?
 - *Reflection*: If a frontline error is traced back to a flawed procedure, does our Just Culture hold the leaders who designed that system accountable for their decisions?

Dimension 5: Challenge

This checklist helps organisations assess whether they foster a questioning and vigilant mindset. A mature safety culture is characterised by a state of chronic unease, where existing conditions and assumptions are constantly and respectfully challenged to identify hidden risks.

A Questioning Attitude: Do our people feel empowered and psychologically safe to challenge the status quo?

- **Stop-Work Authority**: Has every individual, including contractors, been explicitly granted the authority and responsibility to stop any job they believe to be unsafe?
 - *Reflection*: Do we publicly celebrate acts of stopping unsafe work to reinforce that this is a valued and expected behaviour?
- **Challenging Upwards**: Do our people feel comfortable challenging procedures or the actions of others (including leaders) if they seem unsafe?
- **Leader Response**: Do leaders at all levels consistently and visibly provide recognition to employees for asking questions and challenging assumptions? A leader who reacts defensively can silence a whole team.
- **Assertiveness Training**: Do we provide training on communication techniques that enable staff to voice safety concerns in a manner that is assertive yet respectful?

Organisational Vigilance: *Are we collectively attuned to identifying and addressing potential problems before they escalate?*

- **Sensitivity to Weak Signals:** Are we good at paying attention to the small issues that could be warning signs of bigger problems?
- **Proactive Mindset:** Are people encouraged to look for potential threats and seek advice when they notice something unusual?
- **Valuing Near-Misses:** Do we train the workforce to understand that reporting near-misses and hazardous conditions are "free lessons" that allow the organisation to learn before harm occurs?
 - *Reflection:* Is there a genuine culture of stopping to question things when faced with uncertainty, or is there pressure to push on regardless?

Dimension 6: Reporting

This checklist is designed to evaluate the effectiveness of an organisation's reporting culture. This culture is the primary mechanism through which the organisation becomes aware of its vulnerabilities and opportunities for improvement.

Psychological Safety: *Do our people feel safe to report concerns without fear?*

- **Perception of Reporting:** Is reporting a safety issue seen as a positive contribution, or are people who speak up viewed as "troublemakers"?
- **Non-Retaliation Policy:** Do we have a robust, well-publicised, and rigorously enforced non-retaliation policy for safety reporting?
 - *Reflection:* Do our people feel genuinely safe to report concerns without fear of negative consequences?
- **Reporting Channels:** Does our organisation provide multiple reporting channels, including confidential or anonymous options, to ensure there is always a safe path for concerns to be raised?

Confidence in the System: *Does our workforce have confidence that their reports will lead to meaningful action?*

- **Timeliness and Action:** When a concern is raised, is it acted upon quickly and effectively?
- **Feedback Loop:** Does every person who submits a safety report receive timely feedback acknowledging their report and explaining the outcome of the investigation?
- **Publicising Outcomes:** Do we widely publicise the positive safety improvements that result from employee reporting to build confidence in the system?
 - *Reflection:* Is there a perception that using the formal reporting system is a "waste of time," or are people confident their concerns will be investigated, even if they challenge productivity?

Informed Compliance: Do our people understand and respect the safety rules they are asked to follow?

- **Understanding the "Why":** Do our people understand the "why" behind the safety rules they are asked to follow?
- **Risk Awareness:** Do they feel fully informed about the risks of their job?
 - *Reflection:* Is there a high level of compliance because the rules are understood and respected, not just followed blindly?

Conclusion: Integrating the Dimensions for Sustained Improvement

ONR's six-dimension safety culture model provides a sophisticated and validated framework for understanding the complex, multifaceted nature of safety culture. However, its true power lies in recognising that these dimensions do not operate in isolation. They form a deeply interconnected and mutually reinforcing system – a web of culture where the strength or weakness of one dimension directly impacts all others:

- A failure in **Senior Leadership Consistency** will inevitably cascade downwards, eroding the **Immersion** of the workforce as they perceive a disconnect between words and actions.
- A weak **Accountability** system that defaults to blame will poison the psychological safety required for **Immersion**, which in turn will cripple the **Challenge** and **Reporting** cultures as people become afraid to speak up.
- Conversely, a strong **Challenge** culture, where issues are proactively identified, feeds valuable information into the **Reporting** system, which, when acted upon with confidence, strengthens the organisation's capacity for learning and improvement and reinforces the workforce's sense of being valued (**Immersion**).

A successful safety culture is therefore a balanced system. The journey towards cultural maturity requires a holistic approach that addresses all six dimensions concurrently. ONR's NISCI assessment tool provides the essential diagnostic – the "what" – by identifying an organisation's specific cultural strengths and vulnerabilities. This guide, by synthesising regulatory expectations, international standards, and academic research, provides the "how" – a practical, evidence-based roadmap for targeted action.

Ultimately, enhancing safety culture is not a project with a defined end date; it is a continuous journey of assessment, learning, and refinement. The principles and practices outlined in this guide must be woven into the very fabric of the organisation's integrated management system. By doing so, organisations can ensure that a strong, proactive, and resilient safety culture becomes more than just a regulatory aspiration – it becomes and remains simply 'the way we do things around here'.

References

Biddison, E.L.D., Paine, L., Murakami, P., Herzke, C. and Weaver, S.J., (2015). Associations between safety culture and employee engagement over time: a retrospective analysis.

Boysen, P. G. (2013). 'Just culture: a foundation for balanced accountability and patient safety', *Current Opinion in Anesthesiology*, 26(6), pp. 699-705.

Clarke, S. (2013). 'Safety leadership: A meta-analytic review of transformational and transactional leadership styles as antecedents of safety behaviours', *Journal of Occupational and Organizational Psychology*, 86(1), pp. 22-49.

Clarke, S., Holman, D., Hughes, D. and Siegl, L. (2023). *Development of a model and measure of safety culture for Great Britain's nuclear industry*. Office for Nuclear Regulation. [Online]. Available at: <https://www.onr.org.uk/media/kajllz4y/ambs-onr-nisci-report.pdf> (Accessed: 17 June 2025).

Dekker, S. (2012). *Just Culture: Balancing Safety and Accountability*. 2nd ed. Farnham: Ashgate Publishing, Ltd.

Edmondson, A.C. (1999). 'Psychological Safety and Learning Behavior in Work Teams', *Administrative Science Quarterly*, 44(2), pp. 350-383.

Hollnagel, E., Wears, R.L. and Braithwaite, J. (2015). *From Safety-I to Safety-II: A White Paper*. The Resilient Health Care Net. [Online]. Available at: <https://www.england.nhs.uk/sign-up-to-safety/wp-content/uploads/sites/16/2015/10/safety-1-safety-2-w-paper.pdf> (Accessed: 17 June 2025).

International Atomic Energy Agency (IAEA). (1991). *Safety Culture*. Safety Series No. 75-INSAG-4. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (1992). *The Chernobyl Accident: Updating of INSAG-1*. INSAG-7. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (2006). *Application of the Management System for Facilities and Activities*. IAEA Safety Standards Series No. GS-G-3.1. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (2012). *Low Level Event and Near Miss Process for Nuclear Power Plants: Best Practices*. IAEA Safety Reports Series No. 73. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (2016). *Leadership and Management for Safety*. IAEA Safety Standards Series No. GSR Part 2. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (2020). *A Harmonized Safety Culture Model*. Vienna: IAEA.

International Atomic Energy Agency (IAEA). (No date). *Independent Safety Culture Assessment (ICSA)*. [Online]. Available at: <https://www.iaea.org/services/review-missions/independent-safety-culture-assessment-isca>. (Accessed 19 June 2025).

Kemeny, J.G. (1979). *Report of the President's Commission on the Accident at Three Mile Island*. Washington, D.C.: U.S. Government Printing Office.

Kurokawa, K. (2013). *The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission*. National Diet of Japan.

Office for Nuclear Regulation (ONR). (2021). *Chief Nuclear Inspector's annual report on Great Britain's nuclear industry*. Bootle: ONR.

Office for Nuclear Regulation (ONR). (2024). *Safety Culture: Definition and Model*. Bootle: ONR

Office for Nuclear Regulation. (2025a). *Nuclear Industry Safety Culture Inventory (NISCI)*. [Online] ONR. Available at: <https://onr.org.uk/our-expertise/nuclear-industry-safety-culture-inventory-nisci/> (Accessed: 19 June 2025).

Office for Nuclear Regulation (ONR). (2025b). *NS-TAST-GD-117: Safety culture assessment and improvement*. Bootle: ONR.

Office for Nuclear Regulation (ONR). (2025c). *TD-HOC-GD-001: Methods for assessing culture and diagnosing organisational problems*. Bootle: ONR.

Reason, J. (1997). *Managing the Risks of Organisational Accidents*. Aldershot: Ashgate.

Schein, E.H. (1985). *Organizational Culture and Leadership*. 1st ed. San Francisco: Jossey-Bass.

U.S. Nuclear Regulatory Commission (NRC). (2009). *Nuclear Safety Culture Assessment Process Manual*. [Online]. Available at: <https://www.nrc.gov/docs/ml0918/ml091810809.pdf> (Accessed: 17 June 2025).

U.S. Nuclear Regulatory Commission (USNRC). (2014). *Safety Culture Trait Talk: Questioning Attitude*. Washington, D.C.: NRC.

Weick, K.E. and Sutcliffe, K.M. (2007). *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. 2nd ed. San Francisco: Jossey-Bass.

World Association of Nuclear Operators (WANO). (2013). *Traits of a Healthy Nuclear Safety Culture*. PL 2013-1. London: WANO.

Zhao, L., Yang, D., Liu, S., and Nkrumah, E.N.K., (2022). The effect of safety leadership on safety participation of employee: a meta-analysis. *Frontiers in psychology*, 13, p.827694.