

The Safety Culture of the Regulator

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Safety culture was, for many years, understood as an issue primarily of concern to operating organisations. The role of the regulator with respect to safety culture was regarded as one of developing and applying methods for oversight of safety culture in duty-holders. After the accident at the Fukushima Daiichi nuclear power plant, however, awareness has increased of the importance of safety culture within regulatory bodies. The recent accidents involving the Boeing 737 MAX aircraft have also highlighted the crucial role of culture as a component of effective regulatory oversight.

Through its regulatory strategy, the way it carries out its daily oversight work, the type of relationship it cultivates with duty-holders, the values it conveys and the importance it attaches to safety, the regulator profoundly impacts the safety culture of duty-holders. Regulators therefore need to be conscious of this impact in order to promote and sustain the willingness and efforts of operating organisations to discharge their primary responsibility for safety.

This paper sets out work recently completed by the Nuclear Energy Agency’s Working Group on Safety Culture, an international group of nuclear regulators, to develop guidance on how regulators can assess and strengthen their safety culture. It focuses on methods to develop and maintain the competence of regulatory staff in the area of safety culture, as well as methods regulators can use to assess and reflect on their culture, using quantitative and/or qualitative techniques. The guidance was derived from a survey and analysis of methods developed by nuclear regulators worldwide and lessons learned in their application.

The academic literature is sparse on the topic of the safety culture of the regulator and this work builds on guidance published by the Nuclear Energy Agency, comprising principles and traits for the safety culture of an effective nuclear regulator. The paper refers to other work in this area and ongoing research needs. Seventeen countries contributed to this work including the United Kingdom, through the Office for Nuclear Regulation.

Introduction

Background

It is essential that organisations in the nuclear community maintain a healthy safety culture in order to achieve the common goals of safe operation of nuclear facilities and safe use of nuclear material. Regulatory bodies are no exception to this, as they are a key element of an interconnected system that also includes nuclear site licensees, research institutions, technical support organisations, as well as governmental organisations and other stakeholders. By directly and indirectly interacting with each other, all organisations within this interconnected system have an impact on nuclear safety and mutually influence their respective safety cultures.

Regulatory bodies, by their nature, deeply influence the safety culture and the safety of the organisations they oversee. Based on their regulatory strategy, the way they carry out their daily oversight work, the type of relationship they cultivate with duty-holders, the values they convey and the importance they give to safety, regulatory bodies profoundly impact duty-holders’ safety culture, their sense of responsibility for safety and, by extension, the safety of their facilities. Regulatory bodies need to be conscious of this impact in order to promote the willingness and efforts of operating organisations to discharge their primary responsibility for safety.

The Nuclear Energy Agency (NEA) guidance document ‘The Safety Culture of an Effective Nuclear Regulatory Body’ (NEA, 2016) identifies and describes five principles and their associated attributes for a healthy safety culture within the nuclear regulatory body (Table 1).

Table 1 - Principles and attributes of a healthy safety culture in regulatory bodies (NEA, 2016)

Principles	Attributes
<p>Principle 1: Leadership for safety is to be demonstrated at all levels in the regulatory body.</p>	<ul style="list-style-type: none"> • “Safety first” is a guiding principle in the regulatory body. • All leaders throughout the regulatory body demonstrate a commitment to safety in their decisions and behaviours. • Leaders create an environment for positive development of the safety culture. • Leaders clearly define individual roles, responsibilities and authority. • Leaders ensure that the necessary resources are available to meet the safety mission.

Principles	Attributes
Principle 2: All staff of the regulatory body have individual responsibility and accountability for exhibiting behaviours that set the standard for safety.	<ul style="list-style-type: none"> • Personal commitment to and accountability for safety from every staff member, at all levels of the organisation. • A strong sense of collaboration and co-ordination of activities across the organisation. • The need for moral courage and agility in doing the right thing.
Principle 3: The culture of the regulatory body promotes safety and facilitates co-operation and open communication.	<ul style="list-style-type: none"> • Openness and transparency. • Clear organisational commitment to co-operation. • A questioning attitude, and mechanisms to raise differing opinions on regulatory decisions. • Promotion of safety and associated knowledge.
Principle 4: Implementing a holistic approach to safety is ensured by working in a systematic manner.	<ul style="list-style-type: none"> • A healthy respect for the consequences of all actions and decisions taken by the regulatory body. • Clear awareness of roles and responsibilities in relation to licensees. • A clear regulatory framework. • Proactivity, adaptability and a holistic approach. • Recognition of the complexity of safety issues.
Principle 5: Continuous improvement, learning and self-assessment are encouraged at all levels in the organisation.	<ul style="list-style-type: none"> • Safety culture self-assessment and peer reviews. • Learning from experience, fostering exchanges and increasing knowledge. • Knowledge management to build a healthy safety culture. • Continuous improvement as a clear value of the regulatory body.

The work described in this paper addresses two challenges identified in the NEA Green Booklet:

1. How regulators can develop and maintain adequate staff competence in safety culture; and
2. How regulators can assess and reflect on their safety culture, as a route to learning and continuous improvement.

Lessons from past failure

Safety culture was, for many years, understood and treated as an issue primarily for nuclear operating organisations. The role of the regulatory body with respect to safety culture was regarded as one of developing and applying methods for oversight of safety culture in the regulated entities. After the accident at the Fukushima Daiichi nuclear power plant in 2011, however, awareness has increased regarding the importance of safety culture within regulatory bodies.

The report by International Atomic Energy Agency (IAEA) into the Fukushima Daiichi accident (IAEA, 2015) found that:

- The regulation of nuclear safety in Japan at the time of the accident was performed by a number of organisations with different roles and responsibilities and complex inter-relationships. It was not fully clear which organisations had the responsibility and authority to issue binding instructions on how to respond to safety issues without delay.
- The regulatory inspection programme was rigidly structured, which reduced the regulatory body’s ability to verify safety at the proper times and to identify potential new safety issues.
- The regulations, guidelines and procedures in place at the time of the accident were not fully in line with international practice in some key areas, most notably in relation to periodic safety reviews, re-evaluation of hazards, severe accident management and safety culture.

The IAEA noted that ‘*The regulatory body needs to acknowledge its role within the national nuclear system and the potential for its impact on the nuclear industry’s safety culture. The regulatory body has the challenging role of questioning the nuclear industry’s approach to safety. Therefore, the regulatory body needs a critical, profound, self-reflecting and questioning ability. This may include institutionalizing an ongoing dialogue within the organization and with other stakeholders on the regulatory body’s safety culture and its impact on nuclear safety.*’

Further evidence of the importance of culture in effective regulatory oversight is provided by the accidents involving the Boeing 737 MAX aircraft in 2018 and 2019. An investigation into these accidents (House Committee on Transportation and Infrastructure, 2020) found that:

- Excessive delegation by the Federal Aviation Authority (FAA) of certification functions to Boeing on the 737 MAX eroded FAA’s oversight effectiveness and the safety of the public.
- Boeing employees acting as representatives of the FAA, or performing certification functions on behalf of the FAA, were impaired from acting independently of the company in regard to the certification of the 737 MAX. Crucially, they did not relay important safety-related information to the FAA because there was no requirement to do so.
- FAA senior managers acted against the safety recommendations of FAA’s own technical experts to support Boeing’s business interests.
- The key takeaway from an FAA safety culture survey conducted in 2016 was that “*FAA Aviation Safety senior leadership’s response to and management of industry pressure is at the heart of the organization’s core safety culture challenges: lack of trust, inconsistent accountability, FAA role confusion, and the perception that Aviation Safety is moving further away from its safety mission.*”

The work of the NEA Working Group on Safety Culture

The NEA’s Working Group on Safety Culture (WGSC) was formed in 2017 with the aim of providing a senior-level regulatory forum for fostering discussion and exchange of information and experience on diverse, practical approaches to developing and sustaining a healthy safety culture within the regulatory body and across the wider, interconnected system of stakeholders.

In 2020 the WGSC completed a significant project to identify and analyse methods for assessing and strengthening the safety culture of the regulatory body. The resulting report (NEA, 2020) provides an overview and practical examples of how regulators can develop and maintain their competence in the area of safety culture and carry out self-reflection and self-assessment activities in order to understand their safety culture and its impact on the organisations they oversee. The report reflects the experience of seventeen participating countries, including the United Kingdom, and draws out best practices and lesson learned in applying these methods.

In collating the experience of nuclear regulators worldwide, the report seeks to counteract any sense of complacency or infallibility which may arise from organisations in the nuclear community working in isolation from one another. Furthermore it promotes the efforts of nuclear regulators to develop staff who understand and can apply the theoretical foundations of safety culture both as an internal and external-facing capability.

Methods regulators can use to build competence in safety culture

Context

Competence in safety culture is a key characteristic of an effective regulator. Safety culture competence supports a holistic approach to regulatory oversight of duty-holders, considering human, technological and organisational aspects (IAEA, 2016a) in an integrated way. It also supports self-awareness of the safety culture of the regulatory body and how it impacts, and is impacted by, duty-holders.

The study carried out by the NEA WGSC found that regulatory bodies use a wide variety of methods to build safety culture competence and awareness within their organisations. These include training in a variety of forms (classroom training and e-learning), workshops, seminars, internships and tutorship programmes, targeted at both regulatory and non-regulatory staff.

While some methods have a clear “external” focus, e.g. building the competence of inspectors to undertake regulatory oversight of safety culture in duty-holders, others have an “internal” focus, e.g. raising awareness of all staff in the regulatory body on safety culture and fostering good leadership behaviours. Some methods combine both aspects.

Examples

The NEA report classifies the methods used by regulators to build competence in safety culture according to their overall aim and target audience. Table 2 below provides examples of methods successfully deployed by regulators, their objectives, format, and pros and cons.

Table 2 – Examples of methods used by regulators to build safety culture competence and awareness

Example 1:	Workshop on the regulatory approach to safety culture
Target audience:	Experts in human and organisational factors (regulator, technical support organisations and academia)
Objectives:	<ul style="list-style-type: none"> • Exchange experience; • Share information on new developments; and • Discuss questions, methods and regulatory approaches.

Example 1:	Workshop on the regulatory approach to safety culture
Format:	<p>Two-day workshop addressing four topics:</p> <ul style="list-style-type: none"> • Concepts of safety culture – what is our understanding of safety culture? • Methods for the assessment of safety culture – how can we assess safety culture? • Regulatory oversight of safety culture – how do we regulate safety culture? • Possibilities for influencing and improving safety culture – how can safety culture be improved? <p>Each topic starts with an introductory presentation, followed by discussion in small groups. The groups exchange views and discuss approaches and methods, while answering lead-in questions. The discussions are moderated, and the moderator presents the results afterwards in plenary. The composition of the groups changes with each topic.</p>
Pros and cons:	<p>The format of dynamic, small groups fosters intense exchange of knowledge and the possibility of asking open questions. The exchange between experts across different organisations promotes thinking outside the box, mutual support and new insights. A challenge is to ensure representation from a range of relevant stakeholder organisations.</p>

Example 2:	Internship of new inspectors in a nuclear operating organisation
Target audience:	New inspectors
Objectives:	<ul style="list-style-type: none"> • Create an immersive experience in the regulated activity for new inspectors; • Understand the workplace culture, environment and constraints; • Explore related communications; and • Increase technical knowledge.
Format:	<p>One- or two-week internship of new inspectors in a nuclear site licensee as part of core regulatory training. The internship is planned after completion of the inspector’s initial training programme and following completion of a few months of professional experience, in to order to maximise the benefit of the internship. A site is chosen outside the inspector’s territory and must offer activities relevant to the intern’s portfolio. Sites facing difficulties with safety or radiological protection, or lacking resources, are avoided. It is made clear that the internship will not be used for licensee control or oversight purposes. A programme is established with the licensee to give the intern a broad overview of relevant activities, including participation in operational tasks such as spending a night shift in the control room of a nuclear power plant.</p>
Pros and cons:	<p>The internship helps in understanding the licensee organisation’s culture, constraints and environment, thus informing a more practical and graded approach to regulatory oversight. It improves the inspector’s technical knowledge and self-confidence. There is a positive perception by both interns and licensees of the programme and it also aids in assimilating the regulator’s culture among interns. A challenge is that the internships are resource consuming.</p>

Example 3:	Behaviour and communications training course
Target audience:	Inspectors
Objectives:	<p>Improve awareness of how the behaviour and communication of individuals influences their learning abilities and the safety culture of regulated organisations</p>
Format:	<p>A practical, 42-hour training programme for inspectors on:</p> <ul style="list-style-type: none"> • ‘Non-violent’ communication (also called compassionate or collaborative communication) – to support personal development, relationships and social change (Rosenberg, 2015);

Example 3:	Behaviour and communications training course
Pros and cons:	<ul style="list-style-type: none"> • Appreciative inquiry - a strengths-based, positive approach to leadership development, behaviour and organisational change (Fitzgerald et al, 2003); and • Reflecting in action – to support ‘double loop’ learning, i.e. learning through challenging and correcting an organisation’s underlying norms, policies and objectives rather than being constrained by existing strategy (Argyris, 1977). <p>These methods support inspectors in becoming more aware of the ways in which their behaviour and communication (interaction with others) influences their own learning abilities as well as those of the regulated organisation and its safety culture.</p>

Example 4:	Site visit and workshop on safety
Target audience:	All staff
Objectives:	<ul style="list-style-type: none"> • Enhance the awareness of all staff on safety; and • Understand safety culture and how to apply it in daily activities.
Format:	<p>This training course aims to enhance awareness of safety among all members of staff of the regulatory body. Through deep discussion, it provides staff with an opportunity to understand safety culture in ways that will help in daily activities.</p> <p>The training comprises:</p> <ul style="list-style-type: none"> • A site visit to the Fukushima Daiichi nuclear power station and the former off-site emergency response centre; and • A workshop on safety, including exchange of opinion between staff of the regulator’s regional office and licensee.
Pros and cons:	The visit to the Fukushima Daiichi nuclear power station site has a positive impact on staff and is a cornerstone for them to understand the identity of the regulator. It also helps maintain the currency of the lessons learned from the accident. A challenge is the capacity limitation of events of this nature.

Commentary

Understanding and inculcating safety culture into an organisation requires regular training, ongoing discussion of the importance of culture, and revisiting key concepts from time to time. It is beneficial to both repeat the basics of safety culture and enhance awareness through examples with new inputs and situations. A level of training in safety culture should be provided to all staff of the regulatory body, not just inspectors. The examples in Table 2 indicate the breadth of methods successfully employed by nuclear regulators worldwide.

As part of its approach, the regulatory body should consider offering a formal qualification programme to train inspectors and other experienced staff to become safety culture assessors. Such a qualification programme should require a firm understanding of both safety culture and inspection skills and should form the basis for oversight of safety culture. To that end, it should include a variety of activities, each designed to help acquire information or practise a skill that may be important during formal safety culture assessments. These activities differ from the observations of an inspector during routine inspections, during which safety culture issues may arise and are noted.

Sharing examples of good safety culture training models, especially if they have already been implemented with success in other regulatory bodies, is advisable. Benchmarking or discussion with other regulatory bodies may reveal similar challenges and problems, and methods by which they have been overcome. Some best practices considered to be effective by practitioners in this field, drawing on their experience, are outlined below.

- Senior management commitment to, and active participation in, safety culture training.
- Use of simulations or role play to enliven behavioural training of inspectors, with feedback in both training and work situations.
- Use of a variety of complementary learning formats, e.g. e-learning, classroom training, workshops and coaching in the field.
- Application of a systematic approach to training (IAEA, 2002), comprising:

- Analysis of training needs;
- Design, development and implementation of training in accordance with those needs; and
- Evaluation of training effectiveness.
- Use of senior inspectors with deep experiential and organisational knowledge to support training of new inspectors.
- Use of senior representatives of licensee organisations to support training of new inspectors, to offer an alternative perspective.
- Benchmarking approaches to regulatory oversight of safety culture with regulators in other industry sectors, e.g. aviation, rail and healthcare, and with academia.

Methods regulators can use to assess and reflect on their safety culture

Context

The main motivation for regulators to undertake self-reflection and self-assessment activities is to determine how effectively they discharge their regulatory responsibilities, as well as understanding and improving their own culture and that of the organisations they oversee. Performing regular self-reflections, self-assessments and external reviews – combined with healthy a learning attitude – are critical to identifying areas of improvement in all regulatory activities and supporting continuous improvement.

Methods used by regulatory bodies often focus primarily on one of the following purposes, although the allocation is not always clear-cut:

- **Self-reflection.** This refers to descriptive, introspective activities within the regulatory body (groups, organisational units or the entire organisation) aimed at understanding its functioning and impact on safety, and the safety culture of licensees, thus contributing to an environment of continuous learning. The techniques in this category are varied in nature and tend to be simpler and less formal.
- **Self-assessment.** This refers to normative assessment activities within the regulatory body against a set of pre-defined criteria by means of a systematic and structured process. Such assessments aim to evaluate the current situation and opportunities for continuous improvement towards the fulfilment of specific norms or requirements. The techniques in this category are more uniform, structured and rigorous in nature.

Examples

Table 3 below provides examples of the variety of methods used by regulators for safety culture self-reflection and self-assessment.

Table 3 – Examples of methods used by regulators for safety culture self-reflection and self-assessment

(a) Self-reflection methods

Example 5:	Regulatory nuclear interface protocol
Objective:	To improve the efficiency and effectiveness of working relationships between the regulator, duty-holders and other stakeholders
Participants:	Staff of the regulatory body, duty-holders and other stakeholders
Format:	<p>The method involves:</p> <ul style="list-style-type: none"> ● Development of a mutual framework for more effective ways of working between the concerned parties, i.e. a shared set of values and behaviours such as: <ul style="list-style-type: none"> ○ Responsive, well-informed and innovative, e.g.: <ul style="list-style-type: none"> ▪ Listen first, be constructive and flexible ▪ Operate such that there are ‘no surprises’ for regulated and regulator ○ Balanced and proportionate, e.g.: <ul style="list-style-type: none"> ▪ All parties will act professionally, recognising the other parties’ perspectives and responsibilities ▪ Make judgements and take action in a manner which is judged proportionate ○ Consistent and transparent, e.g.:

Example 5:	<p>Regulatory nuclear interface protocol</p> <ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Be consistent in the advice tendered, judgements and decisions made, where the situations are comparable ▪ Share with the other party the rationale for decisions and advice ○ Timely, e.g.: <ul style="list-style-type: none"> ▪ Engage early to discuss the issues, requirements and significant assumptions ▪ Where changes to plans are necessary, alert all parties and share context promptly • Each party then gathers feedback on its own and the other’s compliance with the desired ways of working. This is done by spending a few minutes at the end of each interaction (e.g. a meeting or inspection) to reflect on the observed behaviours, using the following prompts: <ul style="list-style-type: none"> ○ Were the objectives agreed before the interaction? ○ Were the objectives met by the interaction? ○ Were there areas of good practice? ○ Were there areas for improvement? • Feedback is acted on at the time and periodic overview reports are prepared in order to ensure lessons are being learnt and wider opportunities for continuous improvement are taken. Meetings are held to allow for strategic dialogue on key issues across the sector.
Pros and cons:	<p>This is a simple system of reflecting on the health of interactions between the regulator, duty-holders and other stakeholders, capturing both good practices and areas for improvement. There may be a tendency to discontinue use of the method if interactions appear to be healthy, thereby potentially losing the opportunity to pick up early signs of deterioration.</p>

Example 6:	<p>The “serious game”</p>
Objective:	<p>To start and maintain a dialogue on safety culture and collect ideas from employees about what is necessary to improve it</p>
Participants:	<p>All staff</p>
Format:	<p>In the “serious game”, a small group of employees is asked to pick from an array of toys and random objects that are placed on a table. Employees are then asked to freely associate the object with an aspect of the organisation’s safety culture. The objects are not intended to have a particular meaning, but rather serve as a means of psychological evaluation. The exercise is meant to be fun, like a game, but with a serious intent, namely, to generate reflections and insight on the organisation’s safety culture.</p>
Pros and cons:	<p>The game generates increased awareness and a more common understanding of safety culture through an activity that is highly entertaining. It also provides ideas for improving safety culture to take forward as practical measures. It takes time to organise and play the game (half a day) and is not something that can be repeated often with the same group of people.</p>

(b) Self-assessment methods

Example 7:	<p>Stakeholder survey</p>
Objective:	<p>To better understand how the regulator is regarded by those it works with, enabling it to learn and improve, as well as adapt to evolving stakeholder needs</p>

Example 7:	Stakeholder survey
Participants:	Licenseses, duty holders, government, academics, international regulators and other interested parties
Format:	<p>This method comprises an annual survey of external stakeholders, including in-depth interviews with a sample of respondents, analysis of the results and development of conclusions. The survey is administered and supported by a third-party organisation competent in this field.</p> <p>Examples of the topics covered by the survey are as follows:</p> <ul style="list-style-type: none"> • Stakeholder understanding of the regulatory purpose and effectiveness of relationships with the regulator; • Attributes of an effective regulator, e.g. professionalism, independence and consistency; • Regulator influence on improvements in nuclear safety and security culture; and • Regulator enablement of innovation in the industry.
Pros and cons:	The survey provides the regulator with a direct view from stakeholders of its performance and effectiveness in regulating the industry, including culture aspects. The use of a survey enables comparison of results from one year to the next (although with limitations relating to sample size) and benchmarking with other regulators and public bodies. The in-depth interviews with a sample of stakeholders help explore the factors underlying the headline survey responses.

Example 8:	Self-assessment of regulatory oversight culture
Objective:	To improve the regulatory body’s awareness and understanding of safety culture and associated expectations.
Participants:	A sample (ca 14%) of staff in the regulatory body
Format:	<p>This approach comprises a rigorous, multi-method, self-assessment of the regulator’s safety oversight culture, conducted typically every 3-5 years. The methods used include a staff questionnaire, focus groups and analysis of supporting documentation.</p> <p>The main steps in carrying out the self-assessment are as follows:</p> <ul style="list-style-type: none"> • Pre-planning, followed by information gathering and discussions on the normative framework to be used for the assessment via a working group. The normative framework used in this case was the NEA green booklet (NEA, 2016). Areas of focus for the assessment included: psychological safety, collaboration and communication, and decision making • A descriptive then normative analysis of relevant documentation (e.g. town hall meeting reports), administering of a survey among staff of the regulatory body, and conduct of focus groups. This produces a large volume of data which is then analysed in a collaborative and iterative way to give rich insight into the culture of the organisation. This approach aligns with IAEA guidance, i.e. IAEA (2016b) and IAEA (2019). • Drafting of an assessment report by the project team in consultation with independent experts. • Collaborative development of a management action plan responding to the recommendations in the assessment report. • Presentation to senior leadership to obtain approval and buy-in for the methods, approach and improvement measures. <p>An external safety culture expert and an organisational development consultant were contracted to provide feedback and an independent perspective on the assessment, to prepare the final report and actions, and to present to senior leadership.</p>
Pros and cons:	Strengths in this approach include the integration of relevant existing data (e.g. surveys), third-party expert oversight to provide additional robustness in the assessment, and openness and

Example 8:	<p>Self-assessment of regulatory oversight culture</p> <p>rigour in how the findings, conclusions and recommendations of the assessment are shared and addressed. Potential areas of improvement include use of a wider range of data-gathering techniques (e.g. interviews), ensuring currency of information in the data sample and supporting openness in focus group discussions. The use of a multi-method approach (focus groups and document analysis, as well as survey) allows the deeper levels of culture to be explored, i.e. the unconscious, taken-for-granted beliefs and values of the organisation.</p>
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Commentary

As can be seen from Table 3, nuclear regulators use a variety of means to assess and reflect on their safety culture. These range from simple structured feedback as part of routine internal or external meetings, through group work using metaphors to explore the culture of the regulator, to use of more rigorous surveys and/or qualitative research techniques, possibly involving external experts and participants.

Safety culture self-reflection activities are generally simpler in nature, less formal and have an element of fun built in. They are broadly aimed at: (i) fostering self-reflection of groups, organisational units or the entire organisation, and (ii) increasing overall awareness and understanding of safety culture within the organisation. Self-reflection methods vary in their objectives, scope and outputs and generally are more suited to addressing the tangible elements of culture, i.e. the observable behaviours, structures and processes, rather than the intangible elements, i.e. the deeply-held, shared assumptions which drive behaviour. Important factors in the successful application of self-reflection activities include senior management openness and involvement, motivation and engagement of staff, and a focus on the process not just the output.

Safety culture self-assessment activities are generally more rigorous in nature, follow published methodologies (e.g. IAEA, 2019) and lead to a formal output. They are aimed at understanding and evaluating elements of safety culture, through a structured and systematic process consisting of a descriptive analysis, followed by a normative assessment and the development of an action plan. Self-assessments address not only symptoms, but also the deeper causes of a weakness, gathering and analysing specific information for the purpose of improvement. These methods may use one or more quantitative and qualitative research techniques such as surveys, interviews, focus groups, observations and document reviews. Important factors in the successful application of self-assessment techniques include the competence of the assessment team, commitment of top management, transparency and trust among staff, use of complementary data-gathering methods, external independent input, and follow-up on the assessment findings to support continuous improvement.

Conclusions

It is essential that organisations in the nuclear community maintain a healthy safety culture in order to ensure the safe use of nuclear energy. Regulators are no exception to this, as participants in an interconnected system of duty-holders and other stakeholders, in which each organisation influences the safety culture of others. It is therefore necessary for all organisations, including regulators, to strive to foster and sustain a healthy safety culture through continuous review, learning and improvement. This will be achieved by taking a systemic approach to safety in which individuals, technology and organisations are considered as a complex and dynamic system of interacting parts.

This paper summarises work undertaken by the NEA’s Working Group on Safety Culture to identify and evaluate methods which regulators can use to: (a) build competence and awareness in safety culture; and (b) assess and reflect on their safety culture as a route to learning and continuous improvement.

The applying these methods, NEA offers the following conclusions for regulators:

1. Understand the significance of the safety culture of the regulatory body – regulators are part of an interconnected system in which organisations mutually influence their respective safety cultures, positively or negatively.
2. Foster management commitment and involvement – the example set by management plays an important role in the success of safety culture improvement activities.
3. Actively involve staff – use methods which are enjoyable, provide a safe environment for people to raise concerns, and focus on the process not just the results. Openly communicate the findings and actions.
4. Learn from the experience of others – identify and adapt the ideas, inspiration and advice of other organisations to your own context.
5. Get started – worry less about the choice of method and start with activities that create a positive atmosphere and open the door for continuing efforts.
6. Create early successes – start with straightforward approaches that will deliver early successes, thereby creating a positive feedback loop towards more open communication and increasingly elaborate approaches.
7. Apply the right expertise – use practitioners in human and organisational factors, combined with the right method for the context, applied in a collective and interdisciplinary way.
8. Combine methods, tools and approaches to support continuous improvement, tailored to the needs of the organisation and the available resources.

9. Plan, monitor and evaluate safety culture activities as an integral part of the organisation's management system.
10. Ensure continuous improvement through follow-up or repeat activities, evaluation of the effectiveness of improvement actions and by maintaining an openness to learning.

The NEA report identifies further research needs in the area of the safety culture of the regulatory body, and the Working Group on Safety Culture is currently engaged in two tasks: (i) to understand that impact regulatory bodies have on the safety culture of the organisations they oversee, and vice versa, and (ii) to explore the role of leadership in the regulatory body. The two tasks will gather data and analyse best practices and lessons learned from the stakeholders in the nuclear community worldwide.

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Disclaimer

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