IAEA
International Atomic Energy Agency

Guidelines for Safety Culture Self-Assessment for the Regulatory Body

Vienna, September 2019

IAEA Services Series 40

IAEA SAFETY STANDARDS AND RELATED PUBLICATIONS

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GUIDELINES FOR SAFETY CULTURE SELF-ASSESSMENT FOR THE REGULATORY BODY

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GUIDELINES FOR SAFETY CULTURE SELF-ASSESSMENT FOR THE REGULATORY BODY

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For further information on this publication, please contact:

Regulatory Activities Section
International Atomic Energy Agency
Vienna International Centre
PO Box 100
1400 Vienna, Austria
Email: Official.Mail@iaea.org

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FOREWORD

The IAEA safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. These standards, in particular IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), Governmental, Legal and Regulatory Framework for Safety, provide key references for establishing, maintaining and continuously improving the national framework for safety. Other standards such as IAEA Safety Standards Series No. GSR Part 2, Leadership and Management for Safety, establish requirements for ensuring safety on the basis of the interrelated concepts of leadership for safety and management for safety.

Since the accident at the Fukushima Daiichi nuclear power plant, considerable attention has been focused on the causes and consequences of the accident and the need to assess the prevailing assumptions regarding safety in organizations associated with nuclear installations and other facilities and activities using ionizing radiation. In a number of IAEA technical meetings, conferences and international experts meetings, the importance of safety culture and self-assessment of safety culture has been emphasized by both licensees and regulatory bodies.

The IAEA has developed a methodology for safety culture self-assessment (SCSA) in regulatory bodies, to assist States in undertaking self-assessment of safety culture, in accordance with the requirements of GSR Part 2. Using this methodology, regulatory bodies are able to develop an action plan for improvement on the basis of SCSA. The SCSA methodology is fully compatible with the IAEA safety standards and provides an opportunity for States to assess the underlying potential weaknesses that are influenced by cultural values, and can be used by all regulatory bodies regulating the safety of nuclear installations and other radiation facilities and activities.

The IAEA Officer responsible for this publication was G. Soare of the Division of Nuclear Installation Safety.

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1. INTRODUCTION

1.1. BACKGROUND

An important lesson from the Fukushima Daiichi accident is the role of the regulatory body in ensuring the protection of people and the environment from harmful effects of ionizing radiation. At the IAEA International Experts' Meeting on Human and Organizational Factors in Nuclear Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant [1], regulatory bodies from Member States clearly recognized the importance of having a strong safety culture within the regulatory environment.

The concept of a strong safety culture is recognized as a vital issue which addresses the range of interactions of individuals with the technology and the supporting organization. This aims to minimize human and organizational failures, and to take advantage of human capabilities in recovering from failures and in dealing with degraded, non-familiar or unexpected situations. Many IAEA safety standards emphasize and require programmes that foster a sound and strong safety culture in organizations in the nuclear industry and organizations using ionizing radiation [2].

Safety culture issues can arise at all stages of an organization's life, including in organizations previously recognized for their safety performance. In the past, the majority of effort to improve safety culture was focused on licensees of nuclear power plants and associated facilities. This emphasis has now been broadened to include all organizations associated with national nuclear and radiation programmes, including regulatory bodies.

Several reasons justify the need for regulatory bodies to think about and foster their own safety culture. Regulatory bodies which start with this self-reflection process can act as a role model for licensees. Dealing with cultural issues promotes the understanding of cultural development which in turn supports regulatory activities by providing greater competence in raising safety culture related issues with licensees and their management. Internal positive effects may be an improved transparency within the organization and improvements in efficiency, performance and greater effectiveness of internal communication and collaboration.

Prior to the Fukushima Daiichi accident, not all regulatory bodies started questioning their understanding and behaviours and their regulatory strategies and the influence of these on the culture and behaviour of licensees. However, the accident has led to a greater focus on safety culture and that of regulators. As a result, several regulatory bodies have recently started to reflect on their own safety culture and performed safety culture self-assessments (SCSAs), either on their own initiative or using the guidance set out in Performing Safety Culture Self-Assessments, Safety Reports Series No. 83 [3].

The IAEA Report on Strengthening Nuclear Regulatory Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant [4] identifies the following lessons that are relevant to strengthening the effectiveness of national regulatory bodies:

- "Regulatory bodies should consider safety culture in their regulatory processes by developing a safety culture policy, and training senior management and staff in their respective roles and responsibilities in implementing it.
- Regulatory bodies should engage in ongoing dialogue with licensees to enhance the understanding of safety culture aspects and to seek licensees' commitment to perform self-assessments and independent peer assessments of safety culture on a regular basis" [4].

Regulatory bodies attending the International Experts' Meeting stressed the importance of taking steps to strengthen programmes and processes to continuously promote and improve their internal culture. This will ensure, for example, that accountabilities are clear and that all staff understand the importance of reporting concerns and that they are encouraged and supported to achieve this.

Realizing the importance of detecting signs of a weak safety culture, the SCSA methodology set out in Safety Reports Series No. 83 [3] has been applied and associated training material has been developed to support and strengthen national regulatory bodies in strengthening their safety culture. The training material is designed to encourage staff members to think more about human and organizational factors as drivers of nuclear and radiation safety, and to be able to recognize and influence more effectively cultural aspects in all relevant activities within the national nuclear programme

It is important to note that an SCSA is a significant undertaking. It needs resources, time and the engagement of management and staff. It is also important that an SCSA is not regarded as a 'one-off' activity without continuous follow-up. Rather, it is recommended that an SCSA be used as the starting point for a continuous safety culture improvement programme that is integrated in the regulatory body's management system so that it can be applied across all activities.

1.2. OBJECTIVE

The objective of this publication is to provide guidance for regulatory bodies on how to perform SCSAs. The information provided will be of practical value to regulatory bodies trying to improve their own safety culture and will enhance the effectiveness of their safety culture oversight efforts. The publication is based on Safety Reports Series No. 83 [3] and complements it for use by regulatory bodies. Safety Reports Series No. 83 [3] should be used in parallel with these guidelines for more details on procedures, the methodology and its application, as well as for background knowledge to obtain a deeper understanding of the subject.

It addresses the role to be played by senior managers, the team that prepares and executes an SCSA and the staff members who are interested or will be involved in the self-assessment process.

1.3. SCOPE

These guidelines are intended for use by regulatory bodies responsible for regulating the safety of nuclear installations, radiation facilities and related activities. More specifically, is to be used by:

- Senior management in sponsoring the conduct of an SCSA and the subsequent actions, and
- Regulatory staff involved in the self-assessment process, starting from planning the review, through to conducting, implementing, drawing and documenting the conclusions and developing the draft action plan for safety culture continuous improvement

1.4. STRUCTURE

A short overview of the concept of culture according to Schein's model is given in Section 2 in order to make the reader familiar with the subject of organizational and safety culture. An overview of the specific aspects of the safety culture of a regulatory body is also given.

Section 3 describes the self-assessment process for a regulatory body as set out in Safety Reports Series No. 83 [3]. It describes in more detail the definition of the scope and extent of an SCSA in regulatory bodies, the prerequisites, the data collection process, its analysis and the determination and communication of the results.

Finally, the appendices give greater detail to support parts of the main text of the publication. The roles and responsibilities of those likely to be involved are outlined in Appendix I.

2. CULTURE AND SAFETY CULTURE

2.1. BRIEF INTRODUCTION TO SCHEIN'S MODEL OF ORGANIZATIONAL CULTURE

Culture is a complex concept. However, it is very important in attempting to understand the attitudes and behaviours of groups of people, from nations to organizations of all sizes. Different authors have described culture with various models. One that is widely adopted in the nuclear industry is the model of Edgar Schein, an organizational psychologist [5]. Schein describes organizational culture as follows:
"The culture of a group can now be defined as a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems".

Schein describes the development of these basic assumptions, how they become taken for granted and eventually become part of the organizational culture.

If the experience of a behavioural pattern is positive for an individual member of the staff, an individual and his colleagues, or a group, for an organizational unit or even the whole organization, there is a good chance that the same patterns of behaviour will be used again. They become part of daily life, turn into 'traditions'. All group members accept this, and new members are taught to behave this way in this specific situation. Finally, this behaviour is taken for granted. Nobody needs to talk about it anymore. It becomes part of the culture of the group. If, finally, one asks one of the group members why he/she behaves like this, they may not even be able to answer the question. At this stage, they form the culture of the organization. They are 'the essence' of the culture.

It takes a long time for certain behavioural patterns or ways of thinking to be adopted, used and shared by the members of an organization. The way such patterns develop cannot be controlled. Success or failure of a pattern determines how it will be recognized by most of the staff.

However, success and failure may be influenced by external and internal circumstances. For instance, if the response of members at higher levels in the hierarchy to success or failure of such patterns is recognized by individuals, they will react accordingly in the future. Therefore, the role model presented by senior and middle managers is of the utmost importance. Their behaviours, their way of thinking, and their way of recognizing success and failures, will have a strong influence on the way in which behaviours are fostered or impeded. By these means, managers will be able to influence the development of the organizational culture.

These basic assumptions influence the way group members think and the way they act in the group. They determine what is important to the group and what is not. Thus, they also determine the style of collaboration and communication. They determine what people find acceptable or not acceptable; what is highly regarded and representative within the organization and what is not.

A wide range of observed features of the organization from company logos, mission statements and sometimes even the style of the building and the furniture are expressions of the organization's culture. Schein calls these visible parts of the culture 'artefacts', in contrast to the invisible tacit aspects of culture reflected in the basic assumptions. While it is understandable how a basic assumption influences or creates the artefacts, it is impossible to infer from these alone, the basic assumptions and onwards to the culture of an organization.

Very often an analogy is used to illustrate the contrast between the visible artefacts and the invisible basic assumptions. This is known as the iceberg model and it is shown in Fig. 1.

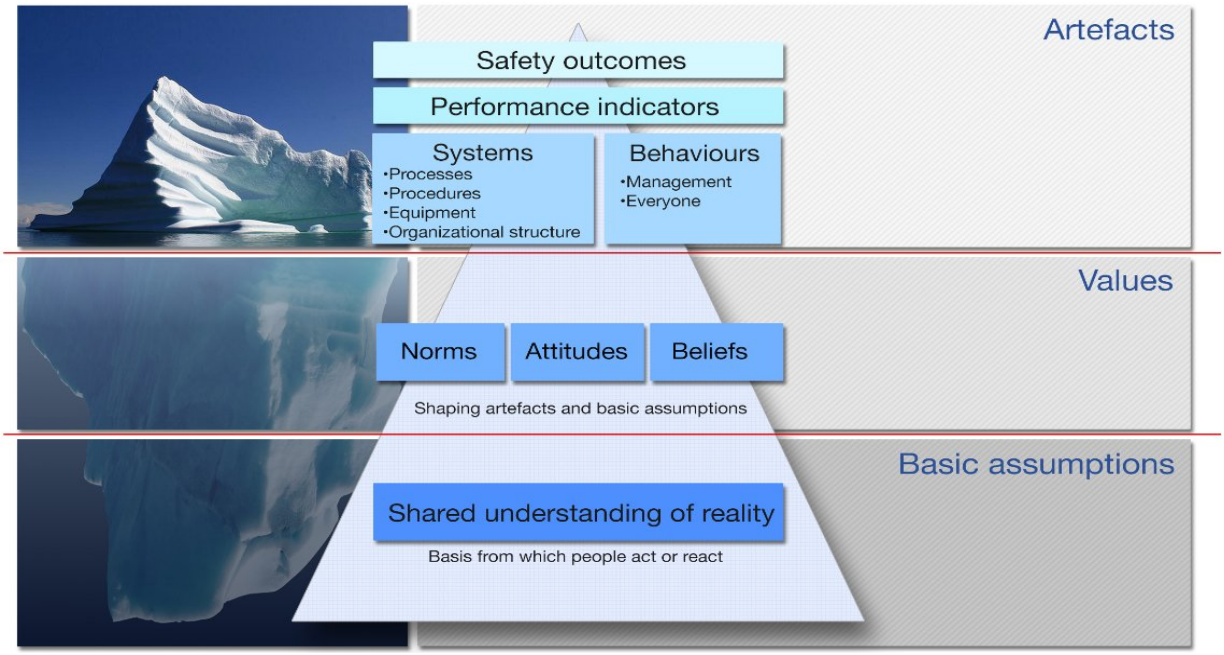

FIG. 1. The iceberg model of safety culture. [3]

While the artefacts of the culture are visible like the tip of an iceberg, the shared basic assumptions, which are taken for granted, are below the surface. However, they comprise the major part - the essence of the culture. A comprehensive understanding of a culture requires the knowledge of all three levels and their interactions. If we want to explore and to understand a culture, we need to dive down to the essence, i.e. the basic assumptions that are usually taken for granted. Simple observations are not sufficient. Section 3.3 of this publication sets out details of methods for collecting data.

2.2. WHAT IS SAFETY CULTURE?

The term 'safety culture' has a long history within the nuclear area, used the first time in INSAG-1 [6] after the Chernobyl accident. Subsequently, many definitions of safety culture were formulated, starting with the definition given in INSAG-4 [7]: "Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." All definitions of safety culture essentially highlight the importance of safety and safe behaviour.

Safety culture is part of organizational culture. It can be described by those characteristics that determine how safety is considered in the organization, i.e. the basic assumptions concerning safety.

Like an organizational culture, safety culture is not good or bad per se. There may be basic assumptions that foster safe behaviour, whilst there may be others that lead to unsafe behaviour. An assessment of a safety culture may result in a description of these basic assumptions (descriptive analysis of safety culture).

If an organization has a good safety culture, a basic assumption is that safety has the highest priority and that the members of the organization will act and behave in a safe manner. In this sense, a good

safety culture exhibits certain characteristics that we expect to be present. Such a set of characteristics defines a 'norm' for a good safety culture. Comparing the characteristics found in the descriptive analysis against these 'required' characteristics (normative analysis of safety culture) results in a set of strengths and weaknesses which in turn are the basis for an improvement programme. IAEA Safety Standards Series No. GS-G-3.5, The Management System for Nuclear Installations [8] sets out five characteristics of a good safety culture:

- Safety is a clearly recognized value;
- Leadership for safety is clear;
- Accountability for safety is clear;
- Safety is integrated into all activities;
- Safety is learning driven.

These characteristics are used in Safety Reports Series No. 83 [3] for the normative analysis of safety culture during the self-assessment process (see Section 3.4.2).

2.3. SAFETY CULTURE OF A REGULATORY BODY – IMPORTANCE AND BENEFITS

The safety culture of a regulatory body is that part of the organizational culture that influences the behaviour of individuals (staff and management), organizational units and the organization in dealing with safety. It will include the attitudes and behaviours of the management, for example in promoting a questioning attitude, commitment and motivation at all organizational levels. This is very important in improving the regulatory body's internal performance but, vitally, will also influence how it performs oversight on licensees and how it is perceived by key stakeholders such as government and the public.

A regulatory body that engages in a safety culture improvement programme need to be aware of the concepts important to safety culture, the process of cultural change and the factors which can influence culture. This will help the regulatory body to establish an effective programme for oversight of the safety culture of licensees and thus have a positive impact on it. When staff have a poor understanding of safety culture and have not been involved themselves in improvement activities, this can inhibit them from questioning licensee progress and performance in this important area. Being involved and obtaining a deeper understanding can improve both capability and confidence in addressing the issues with licensees. Interest can be generated by education, training, workshops and discussions, particularly where this is made relevant to those involved. Experience also shows that many senior managers of regulatory bodies understand, in general, the importance of safety culture. However, because of a lack of in depth understanding of the concept of culture and cultural development, they feel uncomfortable and go back to technical matters with which they are more familiar and comfortable.

While licensees have to foster a culture that promotes safe behaviour in their daily nuclear activities in working with radiation, regulatory bodies have to develop a culture that establishes and maintains a regulatory framework that:

- Provides further assurance that the safety of people and the environment is maintained;
- Ensures that facilities and activities are in compliance with the legal and regulatory requirements;
- Influences positively the safety culture of the licensees;
- Fosters transparency in nuclear matters;
- Enhances the credibility of the regulatory body.

The benefits to the internal capability of the regulatory body may include:

- An enhanced focus on safety in the context of daily work;
- The development of a more systemic view of nuclear safety;
- Improved communication between leaders and staff and among staff thus leading to improved internal collaboration;
- Achievement of greater transparency, trust and confidence, leading to a more positive working environment;

- Improved effectiveness and efficiency of the regulatory functions resulting in more timely and cost-effective operations (thus building confidence in the regulatory process amongst licensees, the general public and government);
- A shift from reactive to more proactive management of safety;
- Increased vigilance in responding to weak signals and in establishing an enhanced reporting culture.

In summary, a good safety culture in the regulatory body improves its own performance and its effectiveness in all oversight areas. Furthermore, it fosters an open and frank relationship with the licensees and helps licensees to recognize the importance of a strong safety culture and to make improvements where necessary. It also promotes greater confidence and trust from government, licensees and interested parties such as the public.

3. SELF-ASSESSMENT OF THE REGULATORY BODY'S SAFETY CULTURE

Self-assessment of safety culture provides an opportunity for the regulatory body's management to identify strengths and performance deficiencies and to initiate well thought through improvements that are understood and 'owned' by staff at all levels. An SCSA aims to identify behaviours, attitudes, underlying beliefs and basic assumptions in relation to safety culture and its influence on regulatory decision-making processes.

The first prerequisite when an organization wishes to improve safety culture is to develop knowledge and understanding of the concept of culture among senior managers. If necessary, familiarization with the concept should be made possible by providing material for self-study, by attending lectures and deepening the acquired knowledge in discussions and workshops. Sufficient time should be provided for this familiarization since it may be a demanding process for technically oriented people who will need to familiarize themselves with ideas, concepts and the 'language' of behavioural science. Making the learning material relevant to the issues facing the manager is very important. For instance, drawing out the organizational and cultural precursors to events that have occurred in (and beyond) the nuclear industry has been found to be a way of developing interest and understanding the relevance of the subject.

The second, and extremely important, prerequisite, is the strong commitment of senior management to enter into safety culture activities. Managers have to be credible and authentic and the commitment must be clear to staff through senior management actions. Otherwise any subsequent efforts can lead to loss of time, human resources, money, and loss of credibility. Furthermore, it may lead to frustration and cynicism among the staff that engage in a programme and then see it lead to nowhere.

The third prerequisite is a committed SCSA team, preferably composed of members from different departments and different hierarchical levels. Team members should be able and ready to take on these specially assigned duties over a significant period. Sufficient time should be allocated for each team member to enable them to participate fully and should have access to experience in the area of human and organizational factors in order to provide support if questions within the team arise. Ideally, team members will receive special training in order to provide them with the necessary competences to work in this area.

The fourth prerequisite is a sponsor. The person should be a member of senior management who is convinced about the value of a good safety culture and is ready to spend a significant amount of time engaging in safety culture improvement. This sponsor should act as a bridge between the safety culture team and senior management, and as a member of senior management, he/she should keep both senior management and all staff regularly informed about the process and milestones achieved.

The fifth prerequisite is a prepared organization. Staff should be well informed about the planned activities, be given the opportunity to be involved and listened to and, in particular, they must be convinced of the continued commitment and support of senior management in establishing such a programme.

3.1. OVERVIEW OF THE IAEA METHODOLOGY

The IAEA SCSA methodology for regulatory bodies is summarized in Table 1.

TABLE 1. IAEA SCSA METHODOLOGY STEPS

First time application	1.Senior management workshop
First time application	2.Team training Module 1 & 2
Phase 1	1.Prepare the organization; 2.Prepare the team; 3.Prepare the self-assessment plan; 4.Conduct the pre-launch.
Phase 2	Data collection
Phase 3	5.Analyse the results; 6.Prepare report; 7.Communicate findings.
Phase 4	Develop actions
Phase 5	Implement actions & follow-up

For a first-time application of an SCSA, the IAEA recommends that a workshop be held for the regulatory body's management to provide familiarization with the concept of safety culture and the self-assessment process. The aim is to convince the management of the value and the benefits of an SCSA and the importance of implementing an improvement programme based on the results.

Once management has decided to perform an SCSA, the IAEA can provide training for the regulatory body's SCSA team to make the team members familiar with the concepts underpinning safety culture, the self-assessment process, the data collection methods and the analysis. The team then will be in a position to launch the assessment process. This involves the assessment of all of the three layers of safety culture mentioned in the iceberg model.

After the preparation phase the SCSA team collects information (data) on the safety culture of the organization. Usually the data collection starts with a survey (questionnaire) to explore perceptions of the visible artefacts/manifestations of the organization's culture.

The analysis phase is expected to identify the strengths and weaknesses of the regulatory body safety culture, together with opportunities for improvement and the risks if action is not taken. It provides the basis for a formal assessment report and an action plan for improvement.

The analysis is composed of two distinct modes (see Fig. 2):

- Descriptive analysis (based on data and theory of culture): the collected data are grouped and aggregated into 'themes' describing the specifics of the culture, in the attempt to identify the essentials of the culture - i.e. the basic assumptions
- Normative analysis (based on data, a theory of culture, and a normative framework): the descriptive 'images' of culture (the identified basic assumptions) is compared with the normative framework of the IAEA, i.e. the five characteristics of good safety culture and their attributes. The comparison may reveal strengths and weaknesses. Strengths are characteristics to be preserved and fostered in the future. For weaknesses, ways must be identified to influence the corresponding characteristics in a positive direction. Both are part of the basis for an action plan

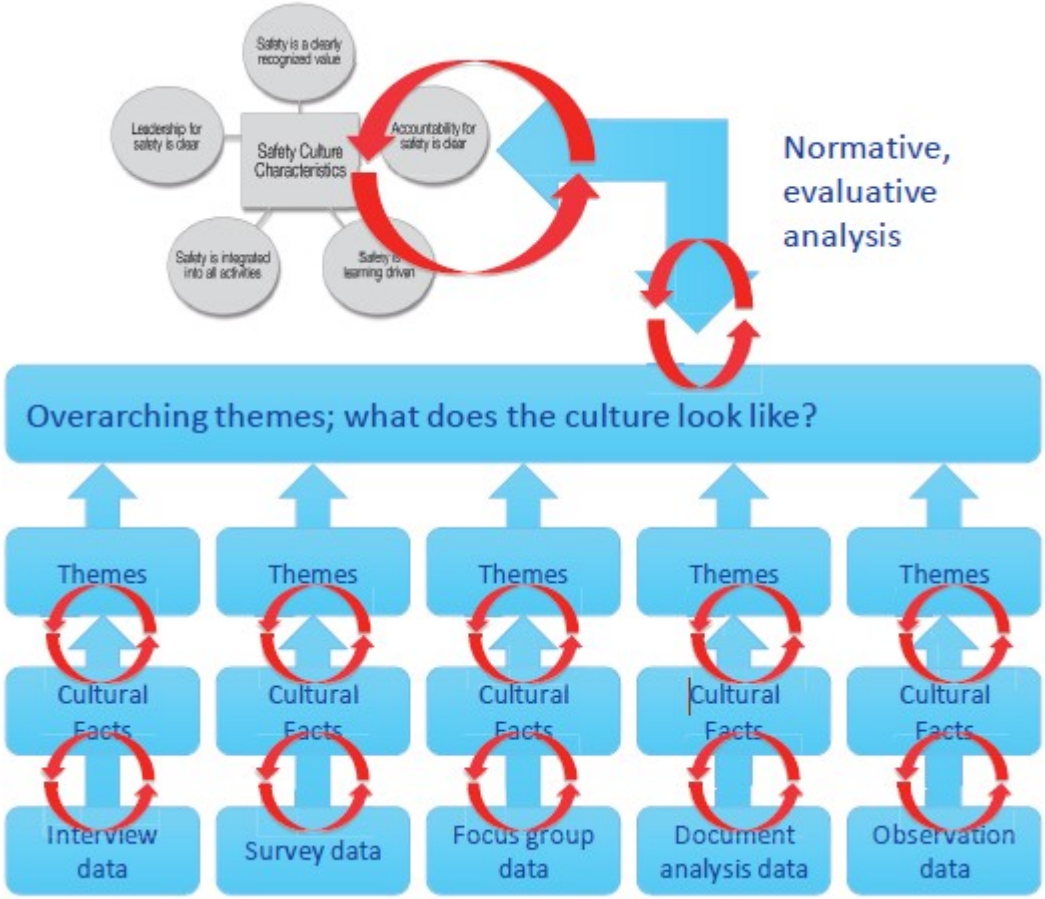

FIG. 2. Overview of descriptive and normative analysis [3]

Regulatory bodies with limited resources, for example those which are small in size and scope of operations with few licensees, may feel it appropriate to reduce the scope of the self-assessment by using only a part of the data collecting methods. There are dangers, however, that this may lead to a limited description of the safety culture which in turn bears the danger of wrong conclusions and should thus be the subject of very careful consideration. A discussion about the scope of the self-assessment is presented in Section 3.2.2.1.

3.2. PREPARATION

To prepare the self-assessment, regulatory bodies can access training on the IAEA SCSA methodology for regulatory bodies. The training provided by the IAEA comprises the following modules:

1. Senior Management Workshop: a three-day workshop on safety culture for senior managers that provides an understanding of an SCSA, enhanced safety oversight through improved safety culture, and the roles and responsibilities required for a successful cultural improvement programme.
2. Module-1 SCSA Training Course: a five-day training workshop on safety culture and the data gathering methods used in the SCSA methodology. The training provides knowledge and practical skills based on current international research and practices. The training includes a realistic case study to support learning by doing.

3. Seminar for Senior Management with the SCSA Team: a two-hour dialogue to develop the interface between the SCSA team and senior management in order to align expectations of the process and clarify roles and responsibilities. This dialogue aims to build senior management confidence in the team and vice versa.
4. Module-2 SCSA Training for the SCSA Team: a five-day workshop consisting of three days training on descriptive and normative analysis and a two-day train-the-trainer module for inspectors on safety culture oversight of licensees. The training provides further enhancement of team skills and enhances inspector understanding of safety culture.

Training can be requested via the IAEA website. To ensure a successful outcome, refresher training is recommended in advance of every self-assessment cycle to ensure that all members of the SCSA team are proficient at performing the various activities.

3.2.1. Preparing the organization

Involvement of all staff members, to the extent possible, is a condition for conduct of an effective SCSA. The staff should be aware that the SCSA is an opportunity to develop 'ownership', new skills and influence development, and reinforce continuous improvement across all levels of the organization.

Senior managers should facilitate this through their active endorsement and visible commitment.

The purpose of this preparation is to develop understanding of:
- Culture concepts such as basic assumptions, espoused values and norms;
- How identification of cultural strengths and weaknesses within the regulatory body can be used to enhance regulatory effectiveness and decision-making;
- How cultural awareness will enhance the regulatory body's capacity to conduct more effective safety culture oversight of licensees and to positively influence their efforts to promote safety.

The campaign should clarify that the purpose of self-assessment is not to:
- Audit the organization;
- Assess the performance of employees;
- Identify or target those who may not be satisfied with existing practices (although their views should be encouraged and welcomed).

Sufficient time for discussions and resources should be allocated so that staff are encouraged and enabled to be involved in the self-assessment process and to allow them to become familiar with the SCSA plan, including the involvement required and the timescales involved.

3.2.1.1. Preparing the management

A strong commitment of the senior management of the organization is essential and without this it will almost certainly fail to deliver the anticipated benefits. Furthermore, a perceived lack of commitment could lead to a weakening of the existing safety culture if staff feels that it is a 'paper exercise' without a positive outcome.

Senior management needs a good understanding of the concept and the development of culture, including possible influences. This understanding may be fostered in workshops. As discussed above, senior management must be convinced that an SCSA and its follow-up brings added value to the organization. Knowing about these benefits, management should show a strong and visible commitment by investing time in planning, allocating the necessary resources and by setting a good example in participating actively in all related events during the preparation and execution of the self-assessment.

Management should be committed to reinforce learning and a questioning attitude at all levels of the organization.

Staff should be encouraged to participate in the self-assessment in a frank and honest manner in a supportive environment. It is also of critical importance for the senior management team to commit to the dissemination of the findings to all staff and implementation of the associated improvement action plan in a timely and open manner and to be open to constructive criticism and feedback.

The senior management sponsor should be deeply interested in the subject and should be provided with the necessary resources to spend a considerable amount of time for supporting the project. As noted above, the sponsor will act as a 'driver' of the project and act as a bridge between the SCSA team and senior management.

3.2.1.2. Preparing the SCSA team

The SCSA team prepares, organizes and executes the self-assessment. Team members should be selected from across all the functional and hierarchical groups in the organization to the extent possible, including management and support functions. This will ensure a good cross-section of management and staff in the team from both technical and administrative backgrounds. Choosing team members with strong social and communication skills will also be an asset. The team members should be capable of playing an impartial role in self-assessment to avoid biases and maintain high ethical standards like confidentiality and trust. Ideally one or more of the team members will have a background in behavioural sciences. Depending on the size of the organization, the time frame for the SCSA and the applied methods the number of team members might typically be in the range of 8 to12 people.

During the self-assessment, team members should be fully engaged in the process. Adequate work planning should relieve the team members from the bulk of their normal duties during the self-assessment period.

It is important to educate and to train the team in advance of the self-assessment. It is advisable to ensure a good understanding of culture and cultural development as well as full training - with exercises in the data collection methods.

Team members will act during the data collection phase of the assessment as interviewers, moderators of focus groups, observers, and reviewers of documents. They will be involved in establishing and introducing questionnaires and in the analysis and interpretation of the data. It is therefore essential, that the team members have the necessary training in the relevant skills and, in particular, that they are trained in the methods and techniques used for data collection and the analysis.

The training programme will ensure that the team is proficient in the assessment methodologies as well as the approach to conducting the analyses. Additional behavioural, social sciences and organizational psychology resources may be useful to support the assessment process the first time it is used. These may come either internally, through contracts to external experts, and/or through support from organizations such as the IAEA.

It is strongly recommended that an external expert in safety culture with considerable experience in the data collection methods supports the team - particularly for regulatory bodies that do not have sufficient in-house competence in behavioural sciences. External expert involvement also brings in a fresh outside view on the organization and may compensate for blind spots that may be present if only internal reviewers are used.

For subsequent self-assessment cycles, it is recommended that experienced internal resources provide refresher training to ensure that all team members are proficient at carrying out their assigned tasks. In this way a high quality assessment is assured.

Assignment of individuals to Team Leader, Deputy Team Leader and team members is also addressed in this step. The Team Leader has an important role during the whole process. This person not only has to lead the team, but also to communicate with senior management and with staff members. It is important that the Team Leader exhibits good communication skills and is accepted as a person who can represent the views of the whole organization.

3.2.1.3. Preparing the staff

Special attention should be devoted to preparing staff of the regulatory body to participate in the self-assessment.

The essence of culture (the basic assumptions) is normally taken for granted. Questions and discussions about these may be perceived as difficult because they are fundamental tenets of the organization.

It is thus very important that senior management communicates the objectives of the planned activities as a means to improve the performance of the organization and makes it clear that it welcomes the questioning of fundamentals. The attitudes and support of senior management towards the staff should lead to openness and transparency. This is an important prerequisite for a good self-assessment. The presence of a senior manager to open and introduce training events and to attend selected team meetings and similar events can provide evidence that senior managers regard the subject to be discussed as very important.

Furthermore, staff must be made aware, that the interviews and focus groups are not a means to evaluate the performance of groups or individuals, but tools to explore the basic roots of thinking within the organization.

3.2.2. Preparation of the self-assessment

Once the team is established and trained, it will start the preparation of the self-assessment.

Depending on the size, the structure, the resources of the organization, and the reason for the self-assessment, full application of Safety Reports Series No. 83 [3]may not be appropriate and consideration may be given to ‘tailoring’ the scope of the process to meet the needs of the organization as discussed in Section 3.2.2.1.

3.2.2.1. Definition of scope and extent of the SCSA

The SCSA should allow the senior management as well as the whole staff to get an understanding of the strengths and weaknesses of the safety culture. It should provide sufficient knowledge to define actions to positively influence the culture.

It is accepted that regulatory bodies may consider that they have insufficient resources and expertise and/or have high priority tasks such that carrying out a full assessment in line with Safety Reports Series No. 83 [3] may be difficult to resource (at least in the short term), and in the relatively short period of time presented in Safety Reports Series No. 83 [3]. There is a danger that this may result in

continuing postponement despite the importance of the need to carry out such a review and it is suggested that, wherever possible, a date is set. It may be possible to begin the process of review with greater help from external expertise whilst retaining ownership and sufficient capability to understand and utilize the results. Consideration may be given to reducing the scope of the assessment and whilst this may be a possible option in some circumstances. The important point is that the review, when undertaken, should be sufficient to provide a basis for improvements in safety culture within the regulatory body and should have the support and commitment of leadership and staff with the aim of developing greater understanding of the issues and a resulting resourced programme to drive through improvements.
Before any decision to reduce the extent of the self-assessment is made, careful consideration by the regulatory body should be given (preferably with independent advice) to information such as:

- The regulatory body's recent performance for indications of a weakness in safety culture;
- Results of any existing questionnaires or staff feedback that may contain issues related to safety culture;
- The regulatory body's performance indicators;
- Minutes of meetings from bodies such as safety committees, the executive council and the advisory board for indications of weaknesses in safety culture;
- Results from any recent peer reviews and independent assessments, together with any feedback from licensees;
- The extent to which inspectors probe licensee safety culture and their knowledge and confidence in doing this.

Since organizational performance is a direct product of the organization's culture, this will provide evidence as to whether a reduced assessment is justified. The information can be very useful for deciding which methods would be the most suitable.

However, a reduction in the depth and scope of the SCSA is a decision which should not be taken lightly and requires careful consideration by senior management. It should not be taken as a 'short cut'. Reducing the coverage of the SCSA could result in a limited picture of the culture of the organization. If the decision is taken by the regulatory body to limit the extent of the SCSA, it is recommended that advice should be sought from an expert in safety culture with significant experience in the application of the data collection methods in order to ensure that the SCSA will still provide output which is meaningful and of value to the organization.

Experience has shown [9] that an SCSA provides much more than just a picture of the existing safety culture and definition of further actions. If the SCSA is based on sound motivation across the whole organization, it induces a positive cultural change by initiating an ongoing self-reflection process within the organization.
Therefore, it is recommended that the SCSA should not be limited to a big effort over a short time, but that it should be extended over a longer period of time, allowing the members of the organization to familiarize themselves with the understanding of cultural issues, the methodology of SCSA and to also allow them to reflect on their own activities and behaviours.

A longer lasting SCSA has major advantages:

- The staff develop a better understanding of cultural issues, the SCSA process and their own organization;
- The SCSA process fosters communication between different organizational units over a longer period of time, leading to a better understanding of the functioning of the organization and greater transparency;
- The SCSA team is not stressed by a tight schedule allowing for some flexibility and the possibility to extend the scope of the SCSA according to new findings;
- Further methods may be selected in order to confirm certain findings;
- The workload produced by the SCSA process is spread out over a longer period of time, so, limited resources are no longer an argument to postpone an SCSA.

The extension of the time scale for the SCSA significantly reduces the burden on the regulatory body allowing a serious SCSA, which does not significantly interfere with the duties of the organization and keeps the necessary resources for SCSA on an affordable level.
However, if the SCSA lasts too long, some negative effects may arise:

- The organization may become 'tired' – the original enthusiasm and motivation may decrease;
- Senior management may lose the focus on the SCSA process (distraction by other high priority duties);
- Changes in the team may disturb the process;
- The results of the SCSA are no longer a snap-shot of the safety culture with clearly definable follow-up actions.

3.2.2.2. Example of areas to explore

Depending on the sources of information available to the regulatory body (experience, feedback from stakeholders, external experience from other organizations or other countries), the areas to explore and use as examples in interviews, focus groups, observations or in document reviews, should be selected from different working areas of the regulatory body. Examples of these are:

- Development of regulations and guides
  - Rigor in interpreting legal requirements
- Authorization and notification
  - Adherence to schedules for notifications, rigor in following up on open issues, diligence in reviewing reports and in following up on reported issues
- Review and assessment of facilities and activities
  - Application of regulations and laws, diligence in reviewing application, analyses and reports
- Inspection of facilities and activities
  - An inclusive and comprehensive approach to preparing and executing inspections, willingness to dig deeper in the light of uncertainties, applying regulations and laws in evaluating inspection results, more comprehensive reporting, and rigor in requiring corrective actions
- Enforcement of regulatory requirements
  - Approach to applying enforcement measures
- Communication and consultation with interested parties
  - Depth and openness in discussions, transparency of regulatory activities and decisions, and objectivity in reporting
- Event evaluation and classification (operating experience feedback)
  - Sufficient depth of analysis, care in reviewing the adequacy and the results of corrective actions, and rigor in requiring corrective actions and in applying schedules for these to be completed
- Collaboration within the regulatory body
  - How people collaborate in projects, the responsibility of the project leader, how decisions are made in the project team and how transparent these are, and how preparations are made for oversight activities (e.g. inspections, meetings with licensees)
  - How preparations are discussed internally and with licensees
- Activities relating to safety culture
  - To which extent this is currently discussed with licensees and how interaction with licensees' senior managers takes place over such issues

In the case of limited resources or for a repeated SCSA, the focus could be set on a selection of the above items, concentrating on the ones with a high probability for substantial output in applying the methods. The selection should be carried by people having a good overview of the subjects and their history, but who can bring to the selection a degree of independence.

3.2.2.3. Selection of methods

Safety Reports Series No. 83 [3] lists and describes in detail five methods for data collection:

- Questionnaire/survey;
- Observation;
- Document review;
- Interview;
- Focus group.

All methods have specific prerequisites and may be more or less suitable depending on the area to be explored. Safety Reports Series No. 83 [3] recommends the use of all methods in parallel and independently. Observations, surveys and document reviews are non-interactive methods, while interviews and focus groups are interpersonal methods involving high degrees of involvement of the respondents to capture the quality of interaction and experiences and to identify the deeper aspects of the culture. Experience has shown that interviews and focus groups are the most effective methods to explore the under lying aspects of the culture; they should thus form a substantial part of each SCSA.

A regulatory body doing a first self-assessment may decide to start with a limited set of methods in order to get a first impression of its culture. However, it has to be aware that the picture derived from a limited self-assessment can never be as comprehensive as the picture from a full analysis. The easiest and cheapest method - a survey using questionnaires - has important potential limitations when used alone.

Depending on the first results, further methods may be applied to go deeper into the subject or to confirm or reject specific findings. The SCSA team should be flexible enough to select and apply different methods during the SCSA process and also to allow for iterations if needed.

In the application of questionnaires and document review, there is no interaction with members of staff and they mainly work at the surface of culture at the level of the artefacts. The other three methods, particularly interviews and focus groups, provide a strong interaction with staff members. They are thus methods which dive further down ‘under the surface’. Only the combination of different methods and the verification of the results of one method with the findings from others, allow a valid interpretation of the culture to be obtained. It is important therefore that the people that use the methods have a deep understanding of culture as well as professional knowledge and experience in the application of the methods.

3.2.2.4. Self-assessment plan

After the definition of the areas to explore and the selection of the data collection methods to be applied, the team should prepare the initial draft of the self-assessment plan.

Before starting to draw up the plan, the necessary time for the individual phases and actions have to be estimated, especially the time allocated for the application of each method and for the analysis. In addition, the team should make sure that both expected and potential interferences from normal activities (daily business) of the involved staff have been considered while setting the time frame for accomplishment of each activity and the overall process of assessment. It is essential to secure availability of team members and identify potential time constraints by working with functional heads to identify time commitments that may interfere with the draft plan. Senior management should consider and, when satisfied, approve the proposed assessment plan and confirm the provision of the necessary resources prior to implementation.

Time estimates and a sample high level work plan (Fig. 3) are given in Appendix III. However, it should be appreciated that this is only indicative and the time allocated to the different phases cannot

be given with precision. The time devoted to IAEA workshops and training is known however. These modules are prepared and have to be completed in a certain time frame due to the availability of IAEA staff and to minimize travelling.

Sufficient time should be allocated for all phases. The team should take into account the possibility that during data collection, new issues or findings may arise that require additional data to be collected for validation. Some flexibility is thus required and a periodic review of the self-assessment plan and any modification considered.

However, as discussed above, it is advisable not to extend the self-assessment over too long a period. This may result in a weakening of the effort and give the appearance that it is being given lower priority thus demotivating the staff involved.

The plan should be communicated to the whole organization before the involvement of all staff begins.

3.3. COLLECTION OF DATA

After the organization and the team are prepared and the self-assessment plan is established, approved and endorsed by senior management, the data collection phase may start. It is important to organize this process carefully since the activity requires substantial human resources and the availability of staff members and managers for interviews and focus groups.

A first method is likely to be the survey questionnaire - an inventory containing a set of questions to explore perceptions of the visible artefacts/manifestations of the organization's culture. A well-designed questionnaire with careful statistical analysis of the responses of the questionnaire gives insights into overall perceptions of the organization about its culture. As discussed above, statistical analysis is important and ideally the survey results should not be presented without supporting evidence from other methods.

A prerequisite for a successful self-assessment is ensuring voluntary participation, It is also important that the senior management give signs that the participation of staff members is highly appreciated because safety culture affects everyone Even more important is that the whole senior management participates themselves and leads by example.

Another very important issue is confidentiality for its participants. It should be stressed that the whole process is not to evaluate individuals, but to investigate what helps the organization to perform better. There is no need to trace back findings to individuals; the aim is to collect commonalities in behaviour and thinking within the organization. The ways in which confidentiality might be breached should be carefully considered before data collection begins and explicit measures put in place for protection.

A secure data base for maintaining data should be established and used by all team members as a common resource. Once data has been collected, the team can use it as a basis for planning, managing and conducting the analysis phase.

The following sections give an overview on the data collection methods and their application. Comprehensive descriptions of the methods and their application are given in Safety Reports Series No. 83 [3].

3.3.1. Questionnaire

Questionnaires are an effective means of collecting information from a large population. The respondents have the same set of questions, and have sufficient time to respond without any

interference. The data collected reflects perceptions on various topics including personal behaviour. It can be used to reveal the diversity of thinking of different sub-groups on certain topics.

However, questionnaires normally identify symptoms rather than causes, so it is not possible to understand the basis of underlying cultural beliefs and assumptions from the responses given. Questionnaires should therefore be a basis for further investigation but if used as the sole source of data or in the absence of findings from other methods, understanding of the organizational culture will almost certainly be partial and incomplete. Questionnaires are useful for establishing a baseline of information which may be tracked over time to observe cultural changes and confirm the effectiveness of the action plan.

It is important to allow staff sufficient and specific time during their work in order to consider and complete the questionnaire. Whilst addressing the key issues, it is also important that the questionnaire is not made too long and involved, or there is a danger that staff will be deterred from completing it. It is important to try to achieve a high response rate from across the entire organization.

The IAEA has developed a Safety Culture Perception Questionnaire that can be accessed by regulatory bodies.

3.3.2. Document review

The main visible products of regulatory bodies are documents such as regulatory guidelines and statements, annual reports, press releases, expert opinions on safety reviews, approvals of applications, inspection reports, directions to the licensees.

These documents may reflect the decision making process of the regulatory body and the way its opinions on safety issues are built up, indicating some of the underlying beliefs involved. The process of document review is not however an audit of document content or compliance with expectations and standards.

Documents and records in the regulatory body's management system provide information on formal approaches adopted by the organization. They also reflect the organization's thinking and intentions on a wide range of organizational dimensions, and may be helpful in identifying gaps between stated intent and actual practices.

To capture cultural facts, it is important to draw upon a broad set of documents. Documents reviewed may include the above mentioned products of the regulatory body, but also internal reports, notes, correspondence which is generated by various functional groups in their routine work, policy statements, consultancy reports, performance review reports, and the latest independent/self-assessment reports.

Document review is rather time consuming. Where there are limited resources, a focus on a selection of the documents containing results of decisions of the regulatory body like responses to applications, safety evaluations, inspection reports, event analyses, enforcements may be a good approach to reduce effort.

Document reviews are performed by single team members - both reviewing the document and taking notes.

3.3.3. Observations

Observations are a structured approach to gathering factual information about what is going on in real-time. They capture information on such things as the attitudes and behaviours of participants, the

shaping of resulting activities or actions, and visible reactions or consequences. They are conducted with as little interpretation as possible from the observer. Observations give insight into how people typically interact, prioritize, make decisions, and shape outcomes.

The possibility of carrying out observations of activities of a regulatory body in its dealings with licensees is likely to be limited. The main activities which might be observed are:

- Meetings leading to decisions on safety relevant issues (e.g. safety reviews, event classification, acceptance of an application, endorsement of inspection reports or enforcement decisions, preparation of press releases). Observations give insights into group dynamics and how people interact with each other. This may include how conflict is dealt with in the presence of positional power and in what ways decisions are made.
- Information involving the public. This might include meetings or presentations at local liaison groups and public hearings. The observers look, for example, at how the members of the regulatory body present themselves in front of the public, how openly they accept and respond to questions and remarks and how they interact.

Observation of the daily business of staff (besides the above mentioned points) is not likely to be effective because much of it does not involve interactions with others. Observation of inspections may be difficult since the inspectors could be distracted. It may also be difficult to explain the role of the additional observer to the licensee, and, inspectors themselves could perceive the observation as an evaluation of their inspection practices.

In order to ensure that resources are utilized as effectively as possible, concentrating on meetings where safety critical decisions have to be made is likely to be advantageous.

Observations can be carried out by one team member observing and taking notes. However, in more complex situations, two observers may be more appropriate.

3.3.4. Interviews

Interviews capture the views, experiences, personal feelings, perceptions and beliefs of individuals and can provide a deeper understanding of the psychological drivers within the organization. They are very useful when detailed insights are required from specific roles and for learning about potentially sensitive or controversial topics or to delve more deeply into important issues emerging from other methods such as questionnaires.

It has to be borne in mind that the interviewees may in some cases show strong allegiance to the organization, their group and their job. Because of this, answering delicate questions may be difficult for certain interviewees. They may develop a tendency to protect their organization and may perceive certain questions as intrusive. It is thus important to try to establish an atmosphere which is positive, protective of the views of the individual and which emphasizes the value of the individual's views and concerns to organizational development.

There are three fundamental types of interviews: structured; semi-structured and unstructured. Structured interviews are conducted on the basis of pre-determined questions with little or no variation in the questions asked, and with no follow-up questions for further elaboration. Consequently, they are relatively quick and easy to administer and may be of particular use if clarification of certain questions is required from the respondents. However, by their very nature, they only allow for limited participant responses and are, therefore, of little use in gathering cultural facts and exploring emerging issues in depth.

Unstructured interviews do not reflect any preconceived theories or ideas and are performed with little or no pre-determined questions. Such interviews typically start with an open question, such as 'What is your view of the organization's approach to encouraging its staff in reporting deficiencies and problem areas?' and questioning then develops into concrete examples and personal experience based on the response. Interviewers focus on the interviewee's point of view with minimal interference except inviting examples and further clarification. The use of this so-called 'funnel technique' - starting with an open question and proceeding to the more specific involves skill on the part of the interviewer which should be developed during training.

Semi-structured interviews are the most useful for gathering cultural facts. They are conducted on the basis of broad pre-defined thematic areas and allow for follow-up questions in response to the interviewee's story. The flexibility of this approach allows for the discovery or elaboration of information that is important to participants, but may not have previously been thought of as pertinent by the assessment team. If handled by a skilled interviewer, they can raise additional or complementary issues that can be a valuable contribution to the assessment findings.

The themes used in interviews may be selected from experience within the regulatory body. This can include certain critical decisions, reactions of the public to policy, and difficult interactions with licensees. They can be based on real events from the past or from realistic but hypothetical scenarios.

Interviewees should be selected from different areas of the regulatory body and from different hierarchical levels in order to get as comprehensive a picture of the culture as possible. Interviewing people from different departments may also reveal the existence of sub-cultures within the organization.

If the regulatory body has limited resources to perform an SCSA, it should ask others outside the organization to carry them out. Interviews are the most valuable source to gather cultural information and show a very low cost-benefit ratio.

Interviews should normally be carried out by two team members - one acting as interviewer, and the other taking notes. Some issues emerging may be complex and the presence of two observers allows post interview discussion where necessary.

3.3.5. Focus groups

Focus groups provide a means for real-time observation of human interactions within a carefully planned setting as well as capturing useful information. The location of a focus group is selected to ensure that participants are not distracted by noise, human traffic or other forms of interference. Normally scheduled for two hours, focus groups involve free-flowing conversation between participants, with as little interference as possible by the facilitators, in order to allow as natural an observation as possible.

Focus groups typically number between 8 and 12 people and can generate important information. To ensure that the focus groups capture representative information it is important to conduct at least three types:

- Groups consisting of senior leaders/managers;
- Those involving front-line staff from different functions;
- Focus groups involving staff from different organizational levels, including managers and senior managers.

These different focus groups will help to reveal power dynamics, prevailing stories, interaction patterns, and other aspects of the culture from across the organization.

As in the case of interviews, the themes for the groups may be selected from examples arising during the recent history of the regulatory body including critical decisions, reactions of the public to policy, and difficult interactions with licensees. This can, again, sometimes be most effectively achieved using the funnel technique referred to above. As a starting point the group can be asked opening questions such as 'What are the two or three things that you would most want to change in order to improve the safety culture of the organization? '. These are sometimes written collectively on a flip chart or similar and the facilitator can then use them as a basis for discussion and debate.

Because of the interaction among members, focus groups may reveal more details on culture than interviews.
Focus groups should again be performed by two team members, a facilitator and one person taking notes.

3.4. ANALYSIS OF DATA

The most important phase of the assessment process is the analysis of the data collected through the different methods. The analysis phase is expected to identify the strengths and weaknesses of the regulatory body safety culture, together with opportunities for improvement and the risks if action is not taken. It provides the basis for a formal assessment report and an action plan for improvement.

3.4.1. Descriptive analysis

Analysis will provide a description of the current state of the culture (this 'snapshot' is sometimes referred to as the 'safety climate'). The descriptive analysis involves extracting cultural themes from all the data sets independently, and then comparing the themes to identify common/recurring themes as over-arching themes. To ensure validity of the self-assessment, it is critical to perform the descriptive analysis as freely as possible from normative statements or judgments.

The result of the descriptive analysis is a set of themes that are found to be associated with basic assumptions that may be present in the investigated culture. Findings should be illustrated by examples in order to make them understandable to managers and staff who are not members of the SCSA team.

It is important to note that the result of the descriptive analysis is a **description** and not an evaluation of findings - a neutral picture of the culture.

The first step in the descriptive analysis is to identify cultural themes arising from the collected data. This is normally achieved by extracting discrete data points that reflect stories, events, explanations and ways of reasoning, and grouping them for commonality in terms of:

- Types of recurring comments e.g., 'mistakes are career stoppers' or 'I'm reluctant to raise concerns because nothing ever happens';
- Indirect indicators of potential work challenges e.g. 'information is not available when we need it';
- Frequently occurring explanations or solutions e.g. 'that's typical for this licensee' or 'that's not important'.

These data clusters are explored further by asking questions such as:

- What do the data points suggest is considered important in the organization?
- What does this tell us about relationship patterns, interpersonal dynamics, priorities and prevalent concerns?

- What contradictions are evident between perceptions, explanations and descriptions of what is done or what has happened?
- What basic assumptions appear to underlie the patterns of reasoning?

Bubble diagrams may be used to visually explore and cluster the data, and to attach non-evaluative labels. Possible linkages between the clusters can then be identified to capture the essence of the reasoning and relating patterns evident in the data.

Once the reviewers have formulated a set of cultural themes for each of the data gathering methods, they should work to identify commonalities, as well as noticeable inconsistencies across the full set of cultural themes and identify over-arching themes. This is typically achieved by:

- Identifying discrepancies across the data points within the same investigated area;
- Selecting examples that are representative of the organization's culture (e.g. quotations, anecdotes, stories or observations whilst carefully preserving anonymity) ;
- Noting the presence of subcultures across different groups and levels;
- Seeking to understand what is happening within the organization, and the potential implications for safety (e.g. motivation, beliefs, power dynamics, shared meaning, reasoning and decision making patterns);
- Exploring tendencies in the organization that indicate a default to unsafe behaviour or acceptance of degraded conditions, and
- Exploring the impact on people - how it affects levels of engagement, demonstration of competence and autonomy, willingness to put organizational needs ahead of their own, and organizational learning.

The over-arching themes derived in this way build an image of the culture that can be communicated to the organization as the precursor to safety culture improvement efforts.

3.4.2. Normative analysis

Normative analysis involves comparison of over-arching cultural themes against a normative identify compliance with, and gaps between, the existing and desired cultural patterns. This is an interactive process whereby each overarching theme is considered in the light of comparable parts of the normative framework to determine whether internationally recognized safety aspects are reflected by the theme and/or whether they are under-supported or violated. If an overarching theme is found to be in contradiction with aspects of the framework, this will be designated as an area for improvement and added to a list for improvement planning. If an overarching theme is found to be in alignment with an aspect of the framework it may be identified as a clear strength deserving of recognition and needing to be preserved as the organization undertakes other improvement efforts. Finally, overarching themes that are not captured in the framework are retained as part of the overall description of the organization's culture.

Once all overarching themes have been compared to the framework and their implications for safety determined, the team should consider priorities for action since it is important not to undertake too many changes at the same time.

3.5. PREPARATION OF THE SELF-ASSESSMENT REPORT

Once the team has finalized its analysis and carried out its comparison with the normative framework, a preliminary SCSA report is developed by organizing the information in such a way that it best suits the learning style of organization. As a minimum, the draft self-assessment report should include:

- How the assessment was carried out;
- How the analysis was conducted (descriptive and normative);
- A summary of the results;

- A preliminary action plan, with priorities and proposed means of follow up on progress and ongoing communication with management and other staff;
- Means to track progress, and evaluate the extent to which actions have been followed through and their outcome;
- A summary of lessons learned.

The results of the assessment should be shared with senior management who may choose to adopt or modify the preliminary action plan proposed by the team prior to communication of the results to the whole organization.

A sample report outline is given in Appendix IV.

3.6. COMMUNICATION OF FINDINGS

After senior management has approved the draft report and the preliminary action plan, the results of the SCSA should be communicated to the whole organization. The communication methods used should encourage interaction and discussion to deepen understanding. Discussion by the following groups should be considered:

- Senior management teams;
- The whole organization in cross-group seminars;
- Work-group specific.

Communication to the whole organization should be planned and performed carefully. Some concerns may be perceived to reflect on particular groups or functions and output may thus be sensitive. It is important, again, to stress that the findings are not intended to criticize but to be constructive and to improve the culture of the organization. Those involved should be given the opportunity to discuss the findings and sufficient time should be given to digest them and questions and/or feedback invited. This is important so that individuals and groups are able to develop ownership for the results and so that they are better able to understand and accept the importance of the follow-up actions.

Feedback from the staff during the communication campaign may be valuable and might be used for further self-assessments or might need to be included in the final assessment report if appropriate.

3.7. PREPARATION OF THE ACTION PLAN

Once shared understanding in the organization has been achieved, the final action plan will then need to be developed under the guidance of the team and with the participation of managers or additional staff members as appropriate. This will need to be effectively communicated to everybody in the organization and should contain clear priorities, milestones and timescales for delivery of the change and recommendations for keeping all staff informed about progress, where possible, involving senior management in order to reinforce their commitment to the process.

It is recommended that for each proposed action, any risks should be considered including potential overlap or interaction with other proposed or ongoing changes.

The prioritized action plan should be integrated in any continuous improvement programme within the management system of the regulatory body and should take into account time constraints and the ongoing functional activities of the organization although it is important to retain its focus and identity.

This final plan should be reviewed and endorsed by senior management and implemented to address identified challenges in the culture.

Again, involvement and participation of the staff is highly recommended since all staff members will be affected by the changes. This also develops a sense of ownership for the ensuing actions.

3.8. IMPLEMENTATION OF THE ACTION PLAN

The follow-up of the safety culture assessment is of utmost importance. The staff involved in the self-assessment will expect to see the outcome of this exercise and if effectively followed up, should perceive the effort spent as justified.

However, the self-assessment should never remain a single exercise. The follow-up of an SCSA should flow into a continuous Safety Culture Improvement Programme of the organization. Safety Culture Improvement should become part of the regulatory body's management system in the context of the continual improvement within a learning organization.

The Sponsor may become the process owner. It is essential that the owner of this process is a member of the senior management team. Organizational culture and Safety Culture are strategic areas which should be led by senior management. This guarantees that the process will be recognized as important, provided with the necessary resources and that there is a competent team with a senior sponsor to drive the programme forward.

Appendix I

IAEA STANDARDS AND OTHER PUBLICATIONS RELATED TO SAFETY CULTURE

This Appendix contains references to key IAEA publications that provide background to the current publication, including definitions and standards. They may be of particular value to those who wish to acquaint themselves with this for the first time or those who wish to remind themselves of the available material.

IAEA Safety Glossary [10]

This provides a definition of safety culture (first set out in INSAG-4 [7]: "Safety culture is the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, *protection and safety issues* receive the attention warranted by their significance.")

INSAG-4 [7] and INSAG-15 [11]

INSAG-4 [7] described for the first time the importance of safety culture and the concepts involved in relation to licensees as well as all other concerned organizations, including regulatory bodies. It highlights the key issues in strengthening safety culture in a regulatory body that has the safety of nuclear power plants within its purview and how an effective safety culture can influence its organization and its staff as well as that of licensees (section 3.1.1 of INSAG-4 [7]). INSAG-15 [11] considers the key practical issues involved and, in an appendix, suggests questions relevant to various levels of an organization "from the boardroom to the shop floor".

Principle 3 Leadership and management for safety [12]

This publication contains the following important statements:
"Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks."
"3.13. A safety culture that governs the attitudes and behaviour in relation to safety of all organizations and individuals concerned must be integrated in the management system. Safety culture includes:

- Individual and collective commitment to safety on the part of the leadership, the management and personnel at all levels;
- Accountability of organizations and of individuals at all levels for safety;
- Measures to encourage a questioning and learning attitude and to discourage complacency with regard to safety."

Principle 8 Prevention of accidents [12]

"All practical efforts must be made to prevent and mitigate nuclear or radiation accidents."
"3.32. Defence in Depth is provided by an appropriate combination of:

- An effective management system with a strong management commitment to safety and a strong safety culture."

Requirement 1: National policy and strategy for safety [13]

"The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Fundamentals."

“2.3. National policy and strategy for safety shall express a long term commitment to safety. The national policy shall be promulgated as a statement of the government’s intent. The strategy shall set out the mechanisms for implementing the national policy. In the national policy and strategy, account shall be taken of the following:
(g) The promotion of leadership and management for safety, including safety culture.”

Requirement 19: The management system of the regulatory body [13]

“The regulatory body shall establish, implement, and assess and improve a management system that is aligned with its safety goals and contributes to their achievement.”

“4.15. The management system of the regulatory body has three purposes:
(3) The third purpose is to foster and support a safety culture in the regulatory body through the development and reinforcement of leadership, as well as good attitudes and behaviour in relation to safety on the part of individuals and teams.”

Requirement 12 Fostering a culture for safety [2]

“Individuals in the organization, from senior managers downwards, shall foster a strong safety culture. The management system and leadership for safety shall be such as to foster and sustain a strong safety culture.

5.1. All individuals in the organization shall contribute to fostering and sustaining a strong safety culture
5.2. Senior managers and all other managers shall advocate and support the following:
(a) A common understanding of safety and of safety culture, including: awareness of radiation risks and hazards relating to work and to the working environment; an understanding of the significance of radiation risks and hazards for safety; and a collective commitment to safety by teams and individuals;
(b) Acceptance by individuals of personal accountability for their attitudes and conduct with regard to safety;
(c) An organizational culture that supports and encourages trust, collaboration, consultation and communication;
(d) The reporting of problems relating to technical, human and organizational factors and reporting of any deficiencies in structures, systems and components to avoid degradation of safety, including the timely acknowledgement of, and reporting back of, actions taken;
(e) Measures to encourage a questioning and learning attitude at all levels in the organization and to discourage complacency with regard to safety;
(f) The means by which the organization seeks to enhance safety and to foster and sustain a strong safety culture, and using a systemic approach (i.e. an approach relating to the system as a whole in which the interactions between technical, human and organizational factors are duly considered);
(g) Safety oriented decision making in all activities;
(h) The exchange of ideas between, and the combination of, safety culture and security culture.”

Requirement 14 Measurement, assessment and improvement of leadership for safety and of safety culture [2]

“Senior management shall regularly commission assessments of leadership for safety and of safety culture in its own organization.

6.9. Senior management shall ensure that self-assessment of leadership for safety and of safety culture includes assessment at all organizational levels and for all functions in the organization. Senior management shall ensure that such self-assessment makes use of recognized experts in the assessment of leadership and of safety culture.

6.10. Senior management shall ensure that an independent assessment of leadership for safety and of safety culture is conducted for enhancement of the organizational culture for safety (i.e. the organizational culture as it relates to safety and as it fosters a strong safety culture in the organization).

6.11. The results of self-assessments and independent assessments of leadership for safety and of safety culture shall be communicated at all levels in the organization. The results of such assessments shall be acted upon to foster and sustain a strong safety culture, to improve leadership for safety and to foster a learning attitude within the organization."

IAEA Safety Standards Series No. GSG-12 [14]

Section 3: Management for Safety

"Safety Culture

3.2. Requirement 12 of IAEA Safety Standards Series No. GSR Part 2, Leadership and Management for Safety [10] states that:
"Individuals in the organization, from senior managers downwards, shall foster a strong safety culture. The management system and leadership for safety shall be such as to foster and sustain a strong safety culture."

3.3. Expected attitudes and behaviours (including those of any external experts and technical support organizations) that promote a strong safety culture should be defined and communicated throughout the regulatory body.

3.4. A strong safety culture does not grow by itself; it should be fostered and sustained. The behaviour and commitment of leaders to safety influences the attitudes and behaviours of individuals. Therefore, a strong safety culture needs the strong commitment and engagement of senior management, with the support of the integrated management system.

3.5. Everyone in the regulatory body, from senior management down, should contribute to promoting and maintaining a strong safety culture by adopting specific behaviours as routine ways of working.

3.6. A strong safety culture of a regulatory body has the following important attributes:
- Safety is a clearly recognized value.
- Leadership for safety is clear.
- Accountability for safety is clear.
- Safety is integrated into all activities.
- Safety is learning driven.

3.7. These attributes should permeate the entire regulatory body and should be reflected in the integrated management system so that individuals demonstrate a questioning attitude, feel responsible and are supported in identifying safety concerns.

3.8. Attitudes and behaviours that support a strong safety culture in the regulatory body include the following:
- Individual and collective commitment to safety;
- Acceptance by individuals of personal accountability for their attitudes and conduct with regard to safety;
- An open attitude that encourages trust, collaboration and free communication, and that values the reporting of problems;
- The prompt acknowledgement of and feedback regarding identified problems and suggestions for improvement;

— Continuously seeking to develop and improve safety and the safety culture;
— Encouraging a questioning and learning attitude and discouraging complacency at all levels in the regulatory body with regard to safety;
— A common understanding of the key aspects of safety and safety culture within the regulatory body;
— An awareness of the potential consequences of regulatory activities, including risks and hazards associated with them;
— Ensuring that all factors that might impact safety are taken into account in the regulatory decision making process and other regulatory activities.

3.9. The regulatory body should establish and maintain a programme to develop, foster and evaluate its safety culture. Such a programme should include safety culture self-assessments, workshops and seminars for defining improvement programmes, as well as training and support."

Appendix II

ROLES AND RESPONSIBILITIES

Directors / Managers / Supervisors

Staff in supervisory positions of the functional areas is responsible for supporting SCSA as requested by the Team Leader. They should work to motivate the staff to cooperate with the assessment team and ensure their active participation during the assessment process. They should be actively involved in developing the action plan and support its effective implementation.

Senior Management

Senior Management is responsible for (but role may not be limited to):

- Positioning the self-assessment project, including defining the scope of the assessment and gaining the commitment of staff working, where necessary, with line managers;
- Maintaining ownership by giving approval for implementation of the SCSA process and following up progress;
- Allocating resources to support the conduct of SCSA activities, including communication on its importance and progress being made;
- Appointing the Team Leader, Deputy Team Leader and team members and achieving the required competencies and skills;
- Approving the final SCSA Report and the strategy for addressing the results of the self-assessment, and ensuring implementation of the action plan;
- Implementing a Safety Culture Improvement Programme in the integrated management system of the regulatory body.

Team Leader and Deputy Team Leader

The Team Leader is responsible for (but role may not be limited to):

- Interfacing with, and providing coordination with, the IAEA for training and competency development of the team;
- Determining team size, requirements, and types of staff required to perform the assessment;
- Interfacing and coordinating with management units to obtain staff resources at the required level of engagement;
- Coaching team members on the Self-Assessment process, the application of different data gathering methodologies, and assigning clearly defined roles and responsibilities;
- Developing the self-assessment plan with the team - including schedule, logistics, communication;
- Providing team leadership and keeping the team focused and on schedule;
- Regularly communicating with the senior management team to update them on progress;
- Securing access to documents for the document review process (e.g. procedures, regulatory guides, corrective actions reports, previous assessment findings) which the team will need to review;
- Facilitating day-to-day interaction between the SCSA team members and with others, as required;
- Ensuring that data gathered is stored securely to preserve confidentiality;
- Working with the team to develop the final self-assessment report;
- Communicating the results of self-assessments to senior management and the rest of the organization;
- Monitoring progress with agreed actions and their implementation and effectiveness.

Team Member

The Team Member is responsible for (but role may not be limited to):

- Participating in the self-assessment training to develop required skills;
- Supporting preparation of the SCSA plan to conduct the assessment activity;
- Supporting the awareness campaign within the organization;
- Carrying out their personal preparation requirements to ensure capability in the performance of assigned tasks;
- Gathering data using the different methods in accordance with the assessment work plan;
- Promptly entering data gathered from various methods into a secure database and maintaining the confidentiality of the data and data providers;
- Notifying the Team Leader about any issue requiring the immediate action of the parties involved where observations indicate the need for prompt intervention to avoid any unsafe conditions (while maintaining the confidentiality of the source);
- Participating actively in the descriptive and normative data analyses avoiding personal biases and agendas;
- Participating in the development of the final report and action plan;
- Assuring engagement with the process even after completion of activities to make the implementation of the action plan more effective.

All regulatory staff

Regulatory staff are collectively and individually responsible for fully participating in all periodic Safety Culture Assessment activities as requested by the assessment team and to question their own attitudes and behaviours in the context of developing an improved safety culture across the organization.

Appendix III

SAMPLE SELF-ASSESSMENT PLAN AND TIME ESTIMATES

In order for the organization to plan work programmes and resource requirements, this Appendix provides indicative information of likely activities and potential resource requirements.[1]

Time to be allocated for the application of the methods may be estimated taking into account the following considerations

- Questionnaire
  The total time required for this activity will depend on such factors as the size of the questionnaire (e.g. number of questions), number of staff to be involved in filling out the questionnaire and the time to be allocated for each staff member to fill out the questionnaire. About one hour per staff member may be appropriate;
- Document review
  The required time for this activity will depend on the nature and number of documents to be reviewed. One to several hours per document and one team member per document may be required;
- Observations
  The total time will depend on the nature of the activities to be observed and the number of activities observed. One to two hours per observation and one team member for observation and taking notes may typically be required;
- Interviews
  The time allocation will depend on the role of the staff to be interviewed (e.g. department, hierarchical level) and the number of staff members to be interviewed. An allowance of one to two hours per interview with one interviewer and one other team member taking notes may be appropriate);
- Focus groups
  Total time involved will again depend on the role and backgrounds of the staff to be interviewed (e.g. departments, hierarchical levels) and the numbers of staff members in each focus group. It is suggested that two hours per focus group with a facilitator and a further team member taking notes may be an appropriate basis for resource estimation.

Against this work breakdown, the following planning assumptions have been applied:

Resourcing Levels:

A safety culture assessment team of eleven members, including Team Leader and Deputy Team Leader might typically be required. Their personal involvement may entail:

- Team Leader: 50 % time over ~30 days
- Deputy Team Leader and team members: forty working days for these 10 team members working full time - leading to an estimate of 400 person-days in total

Project Scope:

A typical project might involve the following activities, but will clearly be dependent on the size of the regulatory body and the nature of its activities:

[1] The Swiss Federal Nuclear Safety Inspectorate (ENSI) spent a total of ca. 8,000 person-hours to perform an SCSA (organization size: 150 employees). The SCSA was completed in 2014. At that time Safety Reports Series No. 83 [3] had not been published, however, ENSI used similar methods. The whole process was spread over a period of 3 years (the project team suggested that in hindsight that this was too long for such an exercise). However, the insights gained were very valuable and were implemented through the action plan [9].

- Full questionnaire coverage
- 30 interviews (3 per team member - carried out in pairs)
- 10 focus groups (1 per team member - carried out in pairs)
- 50 observations (5 per team member)
- 50 documents (5 per team member)
- Team meetings
- Weekly status reports to Senior Management Sponsor

Time Estimates for Analysis and Report Preparation:

- Descriptive analysis - 10 working days for 10 team members: 5 working days for Team Leader
- Normative analysis - 5 working days for 10 team members: 2.5 working days for Team Leader
- Report preparation - 5 working days for 10 team members: 2.5 working days for Team Leader

PHASES	STEPS	INITIAL TRAINING			SELF- ASSESSMENT PROCESS									Safety Culture Improvement Program
		WK -3	WK -2	WK -1	WK 1	….	….	….	….	….	….	….	….	….
First time application	3. Senior management workshop													
First time application	4. Team training Module 1 & 2													
Phase 1	*1.* Prepare the organization													
	2. Prepare the team													
	3. Prepare self-assessment plan													
	4. Conduct the pre-launch													
Phase2	*5.* Conduct self-assessment						(*) Questionnaire							
							(*) Document review							
							(*) Observations							
							(*) Interviews							
							(*) Focus Groups							
Phase 3	6. Analyse the results								(*) Descriptive Analysis					
												Normative Analysis		
	7. Prepare report						Start							
	8. Communicate findings												Start	
Phase 4	9 Develop actions													Start
Phase 5	10 Implement actions& follow-up													Start

(*) Different methods may be used in sequence or in parallel depending on the need. Results of the descriptive analysis may require additional data collection (e.g. by other methods) either to confirm findings or to widen the view to other areas. Data collection and descriptive analysis may be an iterative process.

FIG. 3. Self-Assessment plan

Appendix IV

SAMPLE REPORT OUTLINE

This Appendix provides a sample template for a final self-assessment report. The following headings should be used as a suggestion only.

EXECUTIVE SUMMARY
1. INTRODUCTION
   1.1. Culture and its relevance to safety
   1.2. Normative framework
   1.3. Scope and extent of self-assessment
2. OVERALL SELF-ASSESSMENT METHODOLOGY AND APPROACH
3. RESULTS
   3.1. Document analysis
      3.1.1. Method summary
      3.1.2. Results
         3.1.2.1. Theme 1
         3.1.2.2. Theme 2
         3.1.2.3. Theme 3
      3.1.3. Analysis and interpretations
      3.1.4. Conclusions
   3.2. Questionnaire
   3.3. Observations
   3.4. Focus groups
   3.5. Interviews
4. CONCLUSIONS
   4.1. Method summary
   4.2. Overall themes
      4.2.1. Theme 1
      4.2.2. Theme 2
      4.2.3. Theme 3
   4.3. Any identified important anomalies, inconsistencies and/or contradictions and comments on the above
   4.4. Conclusions: Key cultural characteristics
5. COMPARISON WITH IAEA SAFETY CULTURE FRAMEWORK
   5.1. Method summary
   5.2. Framework headings
      5.2.1 Safety is a clearly recognized value
      5.2.2 Leadership for safety is clear
      5.2.3 Safety is integrated into all activities
      5.2.4. Accountability for safety is clear
      5.2.5. Safety is learning driven
   5.3. Conclusions
6. SUGGESTED NEXT STEPS
   6.1. Communication strategy to the whole organization
   6.2. Development of improvement strategies and plans
7. PROCESS IMPROVEMENT PROPOSALS
   7.1. Brief description of the SCSA process
   7.2. Successes and lessons for the next SCSA
   7.3. Areas to explore in future SCSAs
8. OVERALL CONCLUSIONS

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CONTRIBUTORS TO DRAFTING AND REVIEW

Bilic Zabric T.	INKO Consulting, Slovenia
Engstroem D.	International Atomic Energy Agency
Frischknecht A.	Consultant, Switzerland
Khatoon A.	International Atomic Energy Agency
Peloli L.	Federal Nuclear Safety Inspectorate, Switzerland
Rycraft H.	International Atomic Energy Agency
Ryser C.	Federal Nuclear Safety Inspectorate, Switzerland
Soare G.	International Atomic Energy Agency
Taylor R.	Safety Systems Research Centre, University of Bristol, United Kingdom
Watts G.	Intelligent Organizational Systems, Canada
Zubair M.	Pakistan Nuclear Regulatory Authority, Pakistan

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