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International Atomic Energy Agency

PROSPER Guidelines

2022 Edition

Guidelines for Peer Review and for Self-assessment of Operational Safety Performance Improvement Programmes at Nuclear Power Plants

Vienna, September 2022

IAEA Services Series 10 (Rev. 1)

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IAEA SERVICES SERIES No. 10 (Rev. 1)

PROSPER GUIDELINES

2022 EDITION

GUIDELINES FOR PEER REVIEW AND FOR SELF-ASSESSMENT OF OPERATIONAL SAFETY PERFORMANCE IMPROVEMENT PROGRAMMES AT NUCLEAR POWER PLANTS

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2022

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FOREWORD

PROSPER is the Peer Review of the Operational Safety Performance Improvement Programme. PROSPER — originally known as the Peer Review of Operational Safety Performance Experience — was formally established by the IAEA in 2003 as a service to assist operating organizations in assessing the effectiveness of internal and external operating experience feedback programmes of nuclear power plants and/or their corporate organizations throughout their life cycle, from construction, commissioning and operation to decommissioning.

A pilot PROSPER mission was conducted in 2000. On the basis of experience gained during the mission, in 2003 the IAEA published IAEA Services Series No. 10, PROSPER Guidelines. Several PROSPER missions were carried out from 2003 to 2008. In 2008, the operating experience feedback process was incorporated into the Operational Safety Review Team (OSART) programme review areas. Since then, the relevant review areas that were part of the PROSPER service have been delivered in the form of a flexible expert mission at the request of operating organizations and tailored to the requirements of the hosting organizations, including nuclear power plants and their corporate organizations.

Recognizing that the operating experience feedback programme was part of a more complex programme established for the continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (also referred to as 'performance improvement programme'), the IAEA initiated a review of its PROSPER service in 2019. A growing demand for PROSPER workshops and seminars resulted in an enhanced understanding of IAEA safety standards and a need to review the PROSPER guidelines to assist operating organizations implementing an integrated performance improvement programme.

This publication is a revision of IAEA Services Series No. 10, PROSPER Guidelines. The PROSPER service introduced in this publication is aligned with Requirement 9 of IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation, and covers the following areas of an effective performance improvement programme: corrective action programme; use of operating experience; management observations and coaching programme; human performance improvement programme; self-assessment and benchmarking; key performance indicators; integrated performance monitoring, assessment and review; and leadership and management for performance improvement. To reflect the expanded scope of the service, in 2022 PROSPER became the Peer Review of the Operational Safety Performance Improvement Programme.

The revised PROSPER Guidelines provide overall guidance on how to conduct PROSPER missions for both the international review team of experts and their counterparts in Member States to ensure consistency and comprehensiveness of the peer review service. These guidelines can also be used by Member States as self-assessment for the operational safety performance programme of nuclear power plants and their corporate organizations.

The IAEA officers responsible for this publication were D. Zahradka and H. Morgan of the Division of Nuclear Installation Safety.

EDITORIAL NOTE

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1. INTRODUCTION

1.1. BACKGROUND

International peer review is a useful tool for Member States to exchange experiences, learn from each other and apply good practices in different activities carried out throughout the lifetime of nuclear power plants. The Peer Review of the Operational Safety Performance Improvement Programme (PROSPER) supports Member States in enhancing the continuous monitoring and periodic review of the safety of the plant and of the performance of the plant operating organization and their corporate organizations.

The 2003 edition of the PROSPER guidelines provided advice and assistance to operating organizations of nuclear power plants to strengthen and enhance the effectiveness of operating experience feedback (OEF) programme only. The current revision presents an integrated approach that considers OEF along with other elements for the continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (also referred to as 'performance improvement programme'), as defined by Requirement 9 of IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation [1]. The way the nuclear industry has developed and applied performance improvement related processes has shown that preventing occurrence of consequential events and minimizing the risk of event reoccurrence is most effective when OEF is integrated with other elements of a performance improvement programme.

This revision of the PROSPER guidelines supersedes the 2003 edition of IAEA Services Series No. 10. It is based on experience gained from previous PROSPER missions and the review of the leadership and management for safety and operating experience feedback areas during the OSART missions. The revision takes into account the following:

1. Changes in IAEA Safety Standards, particularly SSR-2/2 (Rev. 1) [1] and IAEA Safety Standards Series Nos SSG-50, Operating Experience Feedback for Nuclear Installations [2], SSG-72, The Operating Organization for Nuclear Power Plants [3], GSR Part 2, Leadership and Management for Safety [4] and GS-G-3.5, The Management System for Nuclear Installations [5];

2. Extension of the PROSPER programme to include other elements of a system for the continuous monitoring and periodic review of plant safety and the performance of the operating organization (also referred to as 'performance improvement') as defined in Requirement 9 of SSR 2/2 (Rev. 1) [1];

3. New agreed definitions of 'recommendation', 'suggestion', 'encouragement', 'good practice' and 'good performance' and definitions from the IAEA Safety Glossary [6].

Under the revised PROSPER guidelines the nuclear power plant or its corporate organization does not need to perform a specific self-assessment prior to an on-site PROSPER mission.

1.2. OBJECTIVE

The revised PROSPER guidelines provide a basic structure and common reference for peer reviews of the effectiveness of the performance improvement programme of the operating organization (also referred to as 'hosting organization'). The guidelines are primarily intended for members of an IAEA PROSPER mission team but also provide useful guidance and inputs to the hosting organization preparing for a PROSPER mission. The PROSPER guidelines can be used as a source of reference by operating organizations planning to carry out their own comprehensive performance improvement programme reviews and self-assessments.

The Guidelines describe the elements of the PROSPER service, and the preparation and conduct of a PROSPER mission. The publication assists both the peer review team and the hosting organization in understanding and addressing the requirements, expectations and coordination of activities relating to successful preparation, conduct and follow-up of a PROSPER mission.

The guidelines are generic, recognizing that there are differences between hosting organizations and their corporate organizations and that the scope of the reviews may vary.

1.3. SCOPE

These guidelines cover the following performance improvement programme elements:

- Corrective action programme to identify causes of events with safety implications, and implementation of corrective actions to prevent recurrence or reduce the likelihood of recurrence;
- Use of internal and external operating experience to improve performance and prevent recurrence of events;
- Observation and coaching programme for reinforcing behavioural standards, and for identifying and closing human performance gaps;
- Human performance programme to improve error reduction skills of plant personnel;
- Self-assessment and benchmarking programme to identify gaps and opportunities for improving performance;
- Performance indicators for monitoring performance and timely identification of declining trends;
- Integrated performance monitoring, assessment and review to ensure that management expectations are effectively implemented and actions to improve safety are taken in a timely manner;
- Leadership and management for performance improvement.

1.4. STRUCTURE

Section 1 provides the background of the IAEA's PROSPER service, and describes the objectives, scope and structure of the PROSPER guidelines.

Section 2 provides a description of PROSPER elements, and organizational aspects of the PROSPER missions.

Section 3 provides a description of review techniques and reporting of review results.

Section 4 provides detailed information about each review area and subarea for nuclear power plants, relevant IAEA Safety Standards, expectations, evaluations, and examples of documents for use in the review.

Annexes I to VI provide additional information and templates for PROSPER mission preparations, conduct and reporting.

Annex VII provides a complete list of the IAEA basis documents listed in the 'Key References' in Section 4.

2. PROSPER SERVICE

2.1 PROSPER SERVICE OBJECTIVES

The PROSPER service focuses on the alignment of the hosting organization with relevant IAEA Safety Standards across several areas. These areas encompass the continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization, leadership and oversight of the programme, coordination and implementation of related activities, document control and human resources involved in the programme.

The key objectives of the PROSPER service is to provide the hosting organization with:

- An opportunity to review the effectiveness of its performance improvement programme and how well this is aligned with the IAEA Safety Standards by conducting a self-assessment and identifying possible gaps during the preparation phase prior to the mission;
- An objective peer review assessment of the effectiveness of the performance improvement programme with respect to the IAEA Safety Standards;
- Recommendations and suggestions in areas where the performance improvement programme does not meet the IAEA Safety Standards.

The PROSPER service determines whether an existing performance improvement programme meets the IAEA Safety Standards and the best internationally accepted practices and identify areas and opportunities for further improvement. The team of international experts identifies potential gaps in the performance improvement programme and opportunities for effective and efficient management, and assesses whether the desired expectations and standards are being achieved.

The performance improvement programme structure as depicted in Fig. 1 is consistent with Requirement 9 of SSR-2/2 (Rev. 1) [1] and the Annex of SSG-72 [3] and consists of activities and processes that collectively allow the organization to:

- Identify improvement opportunities and performance gaps between current levels of performance and management expectations and industry standards;
- Analyse underlying causes and develop targeted actions to address identified gaps and achieve desired improvement;
- Establish methods to assess the effectiveness of actions taken.

FIG. 1. The elements of the performance improvement programme.

Shortcomings in the application of these processes could result in the operating organization not being able to consistently identify and correct gaps before they are either externally identified or lead to events and other adverse outcomes.

These PROSPER guidelines are written such that the PROSPER service can be tailored to the requirements of the hosting organization. Detailed reviews can be requested for any subset of the group of performance improvement processes. Reasons for requesting a PROSPER mission from the IAEA would typically include one or more of the following:

- An operating organization is preparing for initial operation of a nuclear power plant or facility and would like to gain insights on whether the established performance improvement processes and practices would reasonably support plant operational safety performance;
- An external review (e.g. IAEA OSART or WANO peer review) has identified that an operating organization has weaknesses in one or more performance improvement processes that may be or are impacting plant safety;
- An operating organization has determined through internal events or self-assessments that weaknesses in one or more performance improvement processes are contributing to declining safety performance;
- The operating organization of a nuclear power plant or utility has recently implemented a dramatic change to one or more of the performance improvement processes and seeks independent evaluation of the effectiveness of the change.

Hosting organizations may benefit from combining the outcomes of the PROSPER review service with other IAEA review services. In particular, the IAEA Independent Safety Culture Assessment (ISCA) service provides insight into the drivers of organizational behaviours, safety consciousness and safety performance.

2.2 PROSPER REVIEW SERVICE ELEMENTS

The PROSPER service encompasses several elements that a Member State can request. Several options have been developed to ensure the service can best suit the needs of the requesting party.

2.2.1. PROSPER mission

The PROSPER mission provides:

- Key staff of the hosting organization an opportunity to discuss their practices with international experts who have experience in the same field;
- The PROSPER mission team members the opportunity to broaden their experience and identify good practices;
- All IAEA Member States with information regarding good practices identified during PROSPER reviews;
- An opportunity to promote the use of IAEA Safety Standards worldwide;
- An opportunity for the IAEA to identify areas where IAEA Safety Standards could be further strengthened.

The PROSPER mission consists of the following elements which will be discussed in more detail in coming chapters:

- Preparatory meeting for the PROSPER mission;
- PROSPER mission;
- PROSPER follow-up mission.

2.2.2. Workshops and training on relevant IAEA safety standards and PROSPER methodology

In addition to full service PROSPER missions, the IAEA offers capacity building activities that include PROSPER workshops and training to assist operating organizations in implementing an effective performance improvement programme.

Workshops or training use PROSPER methodology and IAEA Safety Standards applicable to performance improvement as a basis. The duration and programme of a PROSPER workshop or training is developed according to the hosting organization requirements, typically lasts 3-4 working days and can be requested any time.

Workshops and training are hosted by the hosting organizations to learn about relevant IAEA Safety Standards and PROSPER methodology and to exchange experience with IAEA experts. Targeted workshops and training can be organized on any topic within the scope of the PROSPER service (see Section 4).

2.2.3. Expert mission based on PROSPER guidelines

The hosting organization can request an expert mission that focuses on a specific reduced set of review areas of a standard PROSPER mission. One to eight review areas shown in Figure 1 can be requested by the hosting organization. The review process, methodology and reporting are in accordance with the PROSPER guidelines, but these can be also adapted to the needs of the hosting organization. The size of the team is adjusted to the number of requested review areas. Such an expert mission typically lasts 4-5 working days and can be requested any time.

2.2.4. Support mission

Support missions can be requested by the hosting organization to obtain assistance addressing recommendations and suggestions received from an OSART, ISCA or any other IAEA peer review mission based on operational safety standards. The scope of a support mission is agreed between the hosting organization and the IAEA and can include any topic within the scope of a standard PROSPER mission. The usual PROSPER process, methodology and reporting can be used but these can also be adapted to the needs of the hosting organization. The team usually consists of a team leader and 2–3 experts.

2.3 ORGANIZATION OF THE PROSPER MISSION

The following chapters in these guidelines address the preparation and conduct of a PROSPER mission.

2.3.1. Initiation

A PROSPER mission can be requested by the hosting organization, national nuclear regulatory authority, or other relevant governmental body (requesting party). A request for a PROSPER mission is sent to the IAEA Deputy Director General for Nuclear Safety and Security at least 12 months before the proposed date of the mission.

The following information is to be included in the request for a PROSPER mission.

- The name of the requesting and funding party;
- A point of contact (name, full address, telephone, email address of hosting organization);
- The proposed period of the PROSPER mission;
- The proposed scope of the review.

The requesting party may ask for a PROSPER mission to review any or all the areas of the performance improvement programme. The scope of the mission, and which areas are to be reviewed, are agreed on with the IAEA team leader during the preparatory meeting.

If a Member State would like to request an expert mission or support mission, they can do so by contacting the Operational Safety Section of the IAEA Division of Nuclear Installation Safety.

2.3.2. Preparations by IAEA

Upon receipt of a request for a PROSPER mission, an IAEA technical officer (who is typically also the mission team leader) is assigned to carry out the following:

- Establishment of liaison contacts with the hosting organization;
- Arrangement of a preparatory meeting with the hosting organization management and other staff involved;
- Recruitment of international experts for the IAEA mission team.

Concurrently, the hosting organization nominates a contact person with whom the IAEA technical officer will liaise.

A preparatory meeting is led by the IAEA technical officer, at the hosting organization site or by using virtual tools, approximately 12 months prior to the main mission. It provides the IAEA, management of the hosting organization, counterparts and other organizations with adequate time to prepare for the mission. The meeting includes discussions and agreement on:

- Exact scope of the review;
- Composition of the review team;
- Mission programme;
- Role of the regulator during the mission;
- Logistical support including interpretation services, site access controls and on-site workspaces;
- Financial arrangements;
- Hosting organization preparatory activities;
- Hosting organization self-assessment using PROSPER guidelines (optional – as agreed during the preparatory meeting);
- Preparation of the advance information package (AIP);
- Schedule of preparation milestones;
- Initial discussions concerning the viability of a follow-up mission.

The IAEA technical officer prepares a draft preparatory meeting report for the PROSPER process, which is reviewed, discussed and finalized with the hosting organization during the preparatory meeting. This document includes the following items:

- Background and objectives;
- Scope of the PROSPER mission;
- Name of the PROSPER team leader, host plant peer and host administrative correspondent;
- PROSPER review team members and host counterparts (if known at the time of the preparatory meeting);
- Steps of the PROSPER service;
- Dates of the main mission and provisional mission schedule;
- Review basis and methodology;
- AIP format;
- Mission report format;
- Administrative and financial subjects and logistics;
- Public information and media interaction.

During the preparatory meeting a detailed presentation of PROSPER methodology is provided to the relevant staff of the hosting organization. They familiarize themselves with the PROSPER guidelines and the relevant IAEA Safety Standards related to performance improvement that form the basis of the PROSPER service. The preparatory meeting is designed to help the hosting organization conduct a self-assessment and prepare for the mission. The hosting organization is offered the opportunity to send observers to other PROSPER missions before its own mission, to gain practical experience on how a PROSPER mission is prepared and conducted.

The following provides an overview of key preparations expected to be taken by the PROSPER team and the hosting organization in the period between the PROSPER preparatory meeting and the commencement date of the PROSPER mission:

- No later than nine months before the mission:

  The IAEA nominates a team leader and a deputy team leader, if needed, both being IAEA staff members. At this time, the team leader assembles the mission team. Details of team composition are provided in section 2.3.6.

- Three months to two weeks before the PROSPER mission:

  The team leader maintains contact with designated host plant peer during this period to confirm that all arrangements are progressing as planned. The AIP is provided to the team members about a month before the mission.

- Prior to the start of the mission, the PROSPER team:

  - Checks that the local area network to be used by the PROSPER team is set up and that PROSPER common folders have been created, where all the information needed to perform the mission is uploaded. If no local area network is available, there needs to be alternative means of sharing the files during the mission;
  - Receives PROSPER team training from the team leader and deputy team leader.

2.3.3. Preparations by the hosting organization

The hosting organization management designates a host plant peer and one counterpart for each review area with the following characteristics, roles and responsibilities:

- Good English language skills (preferred);
- Released from other plant duties for the duration of the mission;
  Good overall knowledge of nuclear installation, review area and staff.

The host plant peer acts as a liaison between the hosting organization and the PROSPER team. During the mission the host plant peer participates in the PROSPER team meetings and advises the PROSPER team members when information may not be complete or correct. The host plant peer cannot act simultaneously as a counterpart.

As a part of preparations for the PROSPER mission, the hosting organization is encouraged to conduct a thorough self-assessment using the PROSPER guidelines, IAEA Safety Standards and working notes outlines (WNOs) as a basis. The results of the self-assessment may be included in the AIP in sufficient detail for the IAEA team members to understand any challenges which the hosting organization might be facing (see Annex III) and any gaps the hosting organization has identified.

While the specific methodology used to conduct the self-assessment is left to the hosting organization, the results of the self-assessment need to contain the following key components:

- For each review area, a description of how each individual expectation, as described in Section 4, is met;
- Specific gaps where performance or programmes do not fully align with IAEA Safety Standards are described as self-identified issues (use issue sheet template – see Annex V).

Arrangements have to be made by the hosting organization for the provision of the necessary support and facilities, including transportation of team members, hotel accommodation, translation and interpretation, and other logistical support as needed.

To the extent possible, the documents identified in the practical guidance in Section 4 are provided in English to facilitate the review by the PROSPER mission. However, it is recognized that their translation can be cost prohibitive, and therefore alternative arrangements can be made for their review, e.g. through nuclear power plant personnel competent in English. At all times during the mission at least one meeting room of suitable size and privacy is needed for use by the PROSPER team. Also, two small meeting rooms need to be available for discussions and the review of the self-assessment report (if available) with plant counterparts. Additionally, secretarial and interpretation services, PC hardware and software, and copying facilities are made available by the hosting organization throughout the review.

At least 30 days prior to the visit, the hosting organization needs to inform the team leader of any applicable conditions regarding plant access and any restrictions regarding electronic devices and the sharing of information.

Prior to the start of the mission, the hosting organization:

- Gives the PROSPER team required training by plant staff to grant them escorted access to the nuclear power plant;
- Completes a whole-body count for each member of the PROSPER team, according to the relevant plant procedures;
- Identifies primary counterparts for each performance improvement area that will be reviewed. These individuals will assist the PROSPER team members in conducting their reviews. For example, if the corrective action programme (CAP) is an area being reviewed, the organization identifies a CAP coordinator, supervisor or manager to be the counterpart to the IAEA team member who is reviewing that area (see section 2.3.6).

2.3.4. Advance information package

The AIP is prepared by the hosting organization and is used to communicate relevant information to the PROSPER team members in preparation for their review. The AIP contains:

- Administrative information (e.g. arrival logistics, accommodation, contact point and counterpart contact details, working places, site access requirements);
- General information (nuclear installation description, design information);
- For each review area, a description of how each individual key attribute as described in Section 4 is met (typically 3-5 pages of descriptive information for each review area);
- Attachments providing information about current performance (e.g. list of reportable events with event abstracts, root causes and corrective actions recorded in the last two years, status of key performance indicators or statistics of management observations);

- In the case of a PROSPER mission focused on a specific issue or issues identified by internal or external assessment, additional relevant information is provided, such as the assessment report.

The compilation of information in the AIP is based on and utilizes existing documents such as procedures, task plans, and routinely prepared reports. Focus on the content with limited effort on editing is encouraged. The AIP is provided in English as this is the official PROSPER working language.

To the extent possible, the format of the AIP follows the suggested table of contents provided in Annex III. A summary of the important information for each review area needs to be provided in English covering the topics in Annex III. Other plant documents in the facility's native operating language might be requested. This native language material is reviewed by the area reviewer, who may request help from their assigned plant counterpart to understand specific portions of this material during the mission.

If the hosting organization performed the self-assessment, results of it may be included in the AIP. The level of detail needs to be sufficient for the IAEA team members to understand any challenges which the hosting organization might be facing and any gaps the hosting organization has identified.

The standard approach is that the hosting organization sends the AIP in an electronic format to the IAEA at least 30 days before the review team arrives at the plant.

2.3.5. Schedule

A schedule of a typical PROSPER mission programme is provided in Annex I and a schedule of a PROSPER follow-up mission programme in Annex II. The typical duration is 8 working days but this can be adjusted to accommodate the scope of the review, local conditions such as airport transfer times, local rules, and the needs of the hosting organization.

2.3.6. Team composition and responsibilities

The team consists of a team leader and a deputy team leader, if needed, who are always IAEA staff members, and a number of experts appropriate to the scope and type of review. The team for a full scope PROSPER mission normally consists of five members: one or two IAEA staff and three or four external experts. The team size can be adjusted as necessary, normally assigning one or two individuals to a group of similar performance improvement areas being reviewed. Suggested assignments are as follows:

- Corrective action programme (CAP) and operating experience (OE) programme – two experts;
- Self-assessment and benchmarking (SA&BM) and key performance indicators (KPI) – one expert;
- Management observations and coaching (MO&C) and human performance (HU) programme – two experts.

The areas of 'Leadership and management for performance improvement' and 'Integrated performance monitoring, assessment and review' are not assigned to an individual. These areas are reviewed collectively by the team and any issues are formulated by the team leader or deputy team leader.

The team for a PROSPER follow-up mission normally consists of one IAEA staff member and two external experts. The team size is adjusted as necessary, depending on the number and complexity of issues identified by the prior PROSPER mission.

Up to two observers can be invited by the IAEA to join the PROSPER mission team if the hosting organization agrees. Observers are typically external experts from operating organizations, regulatory authorities or technical support organizations. The purpose of inviting observers is to train them to become PROSPER reviewers, share experience of hosting a PROSPER mission with future hosting organizations and share overall experience. The observers are team members and play an active part in the preparation and conduct of the mission under the leadership of assigned reviewers and team leaders.

The team members are selected by the team leader, to provide the team with an adequate depth and scope of expertise, both in the performance improvement programme and in the conduct of performance reviews. Ideally, the team composition also provides a cross-section of utility and regulatory insight. Consideration is also given to providing a balance of different cultures, together with reactor type experience, across the team. The team leader considers the proposals of the hosting organization for team members and observers. The team does not include members from the host country or experts who may have conflicts of interest.

The team leader and the deputy team leader are responsible for scheduling, pre-mission briefing, team training, leading of daily meetings, conducting meetings with hosting organization management and regulatory authority, control of issue development, preparation of the draft mission report, issuing the final mission report, and interfaces with the public and media. They may also participate in some of the specific areas of the review.

The remaining team members are the reviewers and are responsible for preparing for the mission by studying relevant information provided by the hosting organization in the AIP (but not limited to this), completing training, preparing detailed review schedules, and identifying potential strengths and weaknesses. Team members are required to attend all parts of the training led by the team leader. This provides an opportunity for them to meet and resolve any questions not covered in these guidelines. A short meeting with the counterparts is also arranged prior to start of the review process.

The role of the counterparts identified by the hosting organization is to help facilitate the team's information gathering, participate in discussions on potential issues that are identified, and align with the team on final recommendations or suggestions.

During the mission, the reviewers conduct interviews and site walkdowns, draft daily reports and working notes for their review area based on the templates provided, agree on findings and discuss issues and potential recommendations and suggestions with the counterpart, and draft their own part of the mission report. They also summarize the recommendations, suggestions, encouragements and good practices for their review area at the exit meeting.

The team members are also requested to provide written feedback on the mission preparation and conduct and application of the IAEA Safety Standards (e.g. methodology, which parts of the IAEA Safety Standards need to be updated, what issues were not covered by the standards).

3. REVIEW METHODOLOGY

3.1. EVALUATION CRITERIA

The focus of a PROSPER mission is on identifying gaps in the application of IAEA Safety Standards essential for performance improvement at the plant being reviewed. Other publications such as INSAG reports and IAEA Safety Series Reports also provide additional information relevant to the PROSPER mission and can be used to support review findings. However, these documents cannot be used as a basis for identified recommendations and suggestions.

The practical guidance provided in Section 4 includes references to applicable IAEA Safety Standards and other IAEA publications defining the expectations for a performance improvement programme. Ideally, the hosting organization has used these inputs to either create or benchmark its own performance improvement programme and processes. It is expected that nuclear power plant personnel use these processes, and that this is noticeable in observations of plant activities and review of relevant documents.

Each subsection includes links to the relevant part of the PROSPER WNOs containing evaluations (reference questions for the review). The practical guidance and WNOs are intended to help each expert formulate the review findings in the light of personal experience and in accordance with the IAEA Safety Standards. While the WNOs are very detailed, they are not meant to be completely prescriptive evaluation criteria. The experts are expected to apply judgment to decide which topics need more in-depth evaluation based upon the advance information provided, including the results of the hosting organization's self-assessment (where applicable) and the observations made during the review.

3.2. ACTIVITIES DURING THE REVIEW

On the first day, an entrance meeting is held with hosting organization counterparts and managers. The hosting organization provides an overview of the plant performance improvement programme that will be reviewed by the team and elaborates on any specific concerns that the team has been asked to assist with. Table 1 shows which mission activities each individual participates in.

TABLE 1. ACTIVITIES DURING THE PROSPER MAIN MISSION

PROSPER mission activities	Team leader/ deputy team	Team members	Plant management	Plant counterparts	Host plant peer
Entrance meeting	X	X	X	X	X
Team coordination meetings	X	X			X
Documentation reviews		X		X	
Interviews with counterparts		X		X	X
Interviews with plant staff		X		X	X
Plant walkdowns	X	X		X	X
Direct observations of process activities	X	X		X	X

PROSPER mission activities	Team leader/ deputy team	Team members	Plant management	Plant counterparts	Host plant peer
Compilation of report sections		X			
Preparation of mission report including documentation of recommendations, suggestions and good	X	X		X	X
Reporting of review results during the exit meeting	X	X	X	X	X

3.3. REVIEW TECHNIQUES

The team leader determines how to best use the team members to complete the peer review. Individual team members are assigned to each performance improvement area being reviewed to complete the review activities, normally 1-2 individuals (see Section 2.3.6) to each performance improvement area using practical guidance in Section 4 and related WNOs.

The review team primarily uses four methods to acquire facts needed to develop issues, recommendations, suggestions, encouragements, good practices or good performance, to evaluate self-identified issues (if applicable) and to prepare the PROSPER mission report. These are:

- Review of databases and written material such as procedures, performance review reports, causal analyses, self-assessments, or backlog lists (WHAT IS WRITTEN);
- Interviews with management, staff involved in the performance improvement programme and other personnel to assess understanding and communication of expectations, effectiveness of the processes and current challenges (WHAT IS SAID);
- Direct observations of the physical condition of structures, systems, and components of the nuclear power plant, personnel behaviour and working practices, and activities associated with the performance improvement processes to assess whether what is actually done is consistent with established standards and expectations (WHAT IS DONE);
- Discussion of evaluations and tentative conclusions within the team and with counterparts.

As illustrated in Fig. 2, fundamentally, the peer reviewers compare process documents against IAEA Safety Standards, industry standards and best practices, validate understanding of those written processes during interviews, and then validate that their implementation meets expectations through observations.

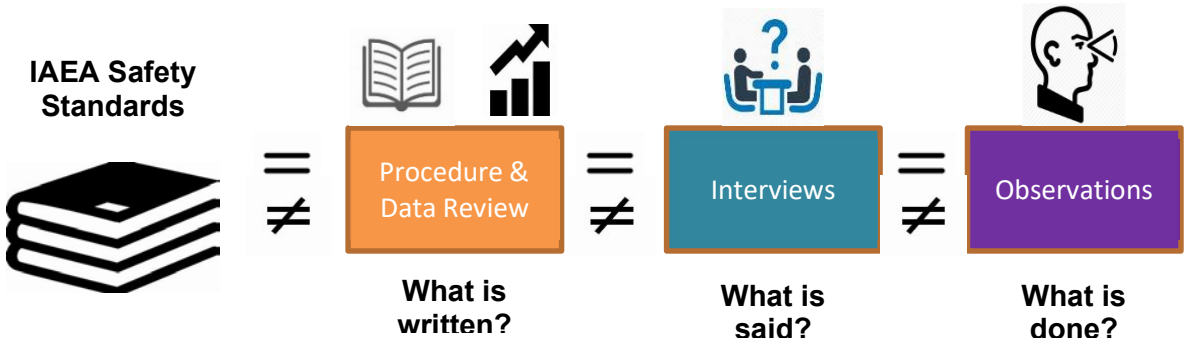

FIG. 2. Techniques for gathering facts during the PROSPER review.

Team members are expected to cover each topic's relevant material to the extent necessary to make an informed judgement, based on the questions contained in the WNOs for each review area. The WNOs are prepared based on references provided in Section 4 and their purpose is to enable reviewers to document their daily observations during the mission. Review findings need to be described and supported by accurate facts to the degree required to make the significance of findings understandable. Recommendations and suggestions are formulated based on the gaps identified compared to IAEA Safety Standards. Similarly, good practices encountered in the review are documented for the benefit of other Member States and described in the report in sufficient detail to be readily understandable.

The use of the review techniques mentioned above needs to be planned in advance for each day. Arrangements need to be made with the counterpart regarding how to hold the discussions and interviews and make observations.

Based upon the discussions and observations, the reviewer can, if necessary, modify his/her preliminary view. Document review, discussions, interviews and observations may need to take place more than once to accurately understand the situation and capture clear facts in order to form a judgment.

3.3.1. Review of written materials and databases

The PROSPER mission team members review plant policies and procedures, including performance improvement programme procedures, reports and databases to identify gaps, potential gaps and strengths in their respective review areas.

Examples of documents and other information for the review are shown in each subsection of Section 4. Other documents may be reviewed at the discretion of the team members and counterparts. In general, the team would not expect the hosting organization to create any new documents for this purpose, however reports/lists that are easily generated from nuclear power plant databases may be requested.

3.3.2. Discussions with counterparts and interviews with plant personnel

Discussions with counterparts involve the following activities:

- Entrance meeting;
- Daily planning;
- Daily review sessions;
- Debriefing;

- Discussion of conclusions;
- Exit meeting.

Immediately after the entrance meeting, during the initial sessions, working teams are established in all review areas. The working teams consist of the PROSPER reviewer, observer (if available), counterpart and other hosting organization staff. Each reviewer agrees, with the counterpart, on an overall review schedule for the whole mission and a detailed review schedule for the next day. The review schedule for each day is then confirmed as a first activity of each day.

The counterpart is informed daily about the reviewer's findings (facts). The reviewer and the counterpart need to reach an agreement on each fact observed. Based on facts identified during previous review steps, the reviewer develops tentative conclusions (e.g. preliminary recommendations, suggestions, encouragements, good practices and good performances) which are to be discussed and clarified with the counterpart.

Interviews are conducted by the PROSPER team to:

- Understand the work processes, duties and responsibilities;
- Gather additional information not covered by any documentation or not available in English;
- Seek answers to questions arising from the documentation review;
- Assess hosting organization staff's understanding of their duties and responsibilities;
- Assess hosting organization staff's competence, and awareness of and commitment to nuclear safety;
- Provide an opportunity for all important information to be exchanged between reviewers and counterparts.

These discussions and interviews follow a 'give and take' approach based on open questions; they are not an interrogation of the counterparts and plant personnel by the reviewers. Properly conducted, these discussions and interviews are the most important part of the PROSPER mission.

3.3.3. Observations

Direct observation of the activities carried out within the performance improvement processes are an important aspect of the review process. The observations cover:

- Use of documentation, procedures and instructions;
- Compliance with management expectations;
- Implementation of performance improvement processes and arrangements for ensuring they are effective;
- Collection, storage and retrieval of data;
- Management commitment, monitoring and control;
- Potential problem areas not previously recognized by the hosting organization;
- Physical condition of the plant and equipment.

From these observations, the PROSPER team forms a view of:

- The management policy on and commitment to performance improvement processes;
- The commitment of the plant personnel;
- The capability of the staff in terms of resources and technical knowledge and skills;
- Procedure adherence and adequacy;

- Organizational and individual safety culture with respect to learning lessons from experience;
- The effectiveness of vertical and horizontal lines of communication;
- The traceability of data;
- Record keeping and trend monitoring;
- Trending activities leading to the identification of unresolved significant safety issues;
- The development of corrective action plans and their inclusion into the plant overall business plan.

Some of the performance improvement processes depend on observations more heavily than others. For example, reviewing the management observations and coaching programme may require several field observations, while a review of the use of performance indicators may require fewer or no field observations. Attributes that need to be observed are identified within each of the specific guidelines provided in Section 4.

3.4. REPORTING RESULTS

3.4.1. Daily report

The PROSPER team has daily meetings in which the reviewers present their findings. Primary information gathered by the reviewers during the review is documented in the form of daily reports (see template of daily report in Annex IV). A new daily report per review area is prepared each day (information from the previous day is not repeated).

The daily reports do not contain general descriptions of the work performed by each reviewer. They contain only concerns/facts (negative) or good ideas/performance (positive) and are presented separately in the daily report. 'Other remarks' such as findings, inputs from or interfaces with other review areas, or requests for other team members' cooperation are also presented separately in the daily report. Concerns/facts need to be discussed and agreed between reviewer and counterpart prior to their presentation in the daily team meeting. If concerns/facts are not agreed between reviewer and counterpart prior to the meeting but the reviewer still considers it important to present them to the review team, this status is clearly indicated during the meeting with necessary follow-ups in the following days.

Daily team meetings create an opportunity for other team members to contribute their views, further strengthening the experience basis of the review team used for the evaluation. It is important that each reviewer comes to the meeting prepared to make a concise statement on his/her findings; this ensures enough time for the other review areas to be discussed at the same meeting.

The host plant peer attends the daily team meetings. His/her role is to listen, take notes and advise the team when information is incomplete or incorrect. The host plant peer also provides feedback to counterparts and requests them to provide relevant information to the team.

3.4.2. Working notes

WNOs for individual PROSPER mission areas follow the structure of practical guidance for conducting PROSPER mission in Section 4 of these guidelines. WNOs are available on the IAEA website and provided to reviewers by the IAEA team leader at the beginning of the mission. Reviewers use WNOs to record their observations and findings from the first day of the review and supplement it with new information every evening after the review sessions. Reviewers submit working notes to the team leader the next morning for review. The team leader returns them to

reviewers during the day with necessary comments and questions for clarification. Where appropriate, the team leader ensures transfer of findings from one review area to another.

The working notes are the 'field notes' of the individual reviewers and are considered by the IAEA to be restricted documents. They form the basis for the development of issues, encouragements, good performances and good practices. WNOs contain the reviewers' factual observations, with any necessary description, references (e.g. documents or databases reviewed, interviews performed) and clear conclusions.

In writing the working notes, the following approach is taken:

- Language is clear, concise, objective and impersonal;
- Sentences are short, direct and aid understanding;
- Official names are used to designate organizational units, positions and systems;
- Abbreviations or acronyms are written in full on their first use;
- Personal or company names are not used.

The working notes are written in English each day, beginning on the first day of peer review, and modified and supplemented, as necessary, through the entire review part of the mission.

3.4.3. Issue sheet

As the review progresses, the reviewers begin to analyse facts and group them, with the aim of identifying potential issues in individual review areas or any cross-cutting issues (such as leadership or resource challenges). If agreed by the review team, an issue is further examined by the relevant reviewer and documented on an issue sheet. Self-identified issues are considered by the relevant reviewer, supplemented as necessary in cooperation with counterparts and then processed the same way as normal issues. A template of the issue sheet is provided in Annex V.

3.4.4. Drafting the initial mission report

The initial draft mission report comprises the issue sheets and evaluative text from team members, prepared based on their working notes. Subsequently, a team meeting with the host plant peer and counterparts is organised to discuss and finalize the report.

The meeting is used to ensure the review team and counterparts are agreed on identified issues, including recommendations and suggestions to address them. Dynamic brainstorming and exchanges of opinions are expected at the meeting.

The report is treated by the IAEA as a 'restricted document'.

3.4.5. Exit meeting

An exit meeting is held in the morning of the last day of the mission and is an opportunity for each team member to formally give the hosting organization a brief summary of the issues they have identified. Attendees typically include team members, the hosting organization's management, counterparts, the regulatory authority, and any other concerned organizations. Prior to or during the exit meeting, the team leader hands over the initial draft mission report to the hosting organization's management and to the regulator.

Preliminary dates of the PROSPER follow-up mission are also discussed between the PROSPER team leader and the plant management. Upon completion of the exit meeting, a press conference may take place, if so requested and organized by the hosting organization.

3.4.6. PROSPER mission report

On completion of the review, the hosting organization reviews the initial draft mission report and sends its comments to the team leader within three weeks of the end of the mission.

The team leader then prepares the PROSPER mission report based on the initial draft mission report and comments from the hosting organization. The report summarizes the team's main observations and conclusions, including all recommendations, suggestions, self-identified issues and good practices. The report may also include encouragements for improvements on concerns that do not fulfil the definitions of recommendations, suggestions or self-identified issues. The report may also include good performances that do not fulfil the definition of good practices.

After IAEA internal QA approval, the team leader sends an electronic copy of the report for final review to the hosting organization and the regulator; if additional comments are provided within three weeks, the team leader takes a final decision on their acceptance. The team leader then sends an electronic copy of the final PROSPER mission report to the hosting organization and the regulator.

The final mission report is completed and issued by the IAEA within two months of the end of the mission. The IAEA restricts the distribution of the final mission report for 90 days. After that the report is derestricted, subject to the approval of the hosting organization. A standard table of contents is provided in Annex VI.

3.4.7. PROSPER follow-up mission report

The PROSPER follow-up mission usually takes place 18-24 months after the original mission. The duration of the follow-up mission is usually 3-4 days, depending on the number and complexity of issues identified during the original PROSPER mission.

The follow-up mission is led by the original PROSPER mission team leader or deputy team leader.

The PROSPER follow-up mission team leader determines the number of team members necessary for the mission, usually two external experts involved in the original PROSPER team. This number is also dependent on the number and complexity of issues identified during the original PROSPER mission.

The follow-up mission team leader liaises with the hosting organization to agree on dates, financing and the host plant peer for the follow-up mission.

Approximately three months prior to the follow-up mission, the IAEA produces the mission report to be completed by the plant in the relevant format, i.e. a Word document containing the original report with the following additions:

- A section entitled '[Plant Name] Self-Assessment for the follow-up mission' at the end of the MAIN CONCLUSIONS section, which the plant completes prior to the mission, and a section entitled 'PROSPER team follow-up main conclusions', which the team leader completes at the end of the mission;

- Sections entitled ‘Plant response/action’ (which the organization completes prior to the mission), ‘IAEA comments’ (which the follow-up team members complete following review of the actions taken by the plant on the issue) and ‘Conclusion’ (which is the team’s consensus opinion on the extent of resolution of the issue by the hosting organization) at the end of each issue, after the ‘IAEA Basis’ section.

This document is sent to the hosting organization to complete. Once it has been sent back to the IAEA, this document is used by the team leader to begin the follow-up review. This document is also sent one month in advance of the mission to all PROSPER follow-up mission team members.

At the start of the mission, the team members agree to the review schedule with their counterparts and proceed in determining the status of resolution of the issues in accordance with the definitions indicated below. A team meeting is held each day and the results of the review are discussed and agreed on where relevant. The host plant peer also participates in this meeting.

The PROSPER follow-up mission assessment of the progress with the resolution of PROSPER issues and self-identified issues is made in accordance with the following definitions:

- **Issue resolved**

  All necessary actions have been taken to deal with the root causes of the recommendation rather than to address each individual fact identified by the team. A management review has been carried out to ensure that actions taken have eliminated the root cause. Actions have also been taken to check that it does not recur. Alternatively, the issue is no longer valid due to, for example, changes in the hosting organization.

- **Satisfactory progress to date**

  Actions have been taken, including root cause determination, which lead to a high level of confidence that the recommendation will be resolved within a reasonable time frame after the follow-up mission. These actions might include budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc. This category implies that the recommendation could not reasonably have been resolved prior to the follow-up visit, either due to its complexity or the need for long-term actions. This category also includes recommendations that have been resolved using temporary or informal methods, and recent resolutions whose effectiveness has not yet been fully assessed.

- **Insufficient progress to date**

  Actions taken or planned do not lead to the conclusion that the issue will be resolved within a reasonable time frame. This category includes issues in response to which no action has been taken.

An exit meeting is held on the last day of the mission, where team members present their findings on each issue in their respective areas. The team leader gives a copy of the follow-up mission report to the plant manager and regulatory body for their comments within three weeks.

After the follow-up mission, the team leader reviews the comments provided in the same manner and over the same time frame as for the original PROSPER mission report. The team leader then sends an electronic copy of the final follow-up mission report to the plant management and regulator.

4. PRACTICAL GUIDANCE FOR CONDUCTING PEER REVIEW

This section provides detailed guidance to the review team for a PROSPER mission, focusing on areas relevant to the performance improvement programme. The scope of the review is divided into eight review areas (A–H) as follows:

A. Corrective action programme (CAP)[1]
B. Operating experience (OE) programme
C. Management observations and coaching (MO&C)
D. Human performance programme (HUP)
E. Self-assessment and benchmarking programme (SA&BM)
F. Key performance indicators (KPI)
G. Integrated performance monitoring, assessment and review (IPM)
H. Leadership and management for performance improvement (LMPI)

Practical guidance for conducting the review of individual performance improvement areas follows the same format and strategy and consists of the following elements:

- Key references and expectations: IAEA reference publications, including relevant paragraphs, citation of main IAEA expectations from IAEA Safety Standards;
- Description: A brief description of the philosophy and benefits of the particular performance improvement area;
- Evaluations: Key attributes of the particular performance improvement area and link to the relevant part of the WNOs containing 'How to review' questions;
- Examples of documents for use in the review.

Review areas A to F are reviewed vertically (review of separate performance improvement processes established by the hosting organization) using the detailed guidance and 'How to review' questions in the WNOs. The G and H areas are then reviewed horizontally (focus is not on separate performance improvement processes, but on the linkages between them and consistency in their use across the organization). Both areas integrate common findings from areas A to F. To avoid repetition, the key references listed only refer to the Safety Requirements for the horizontal review areas.

The PROSPER guidelines are provided as an aid to the reviewer in the assessment of the respective attribute to ensure a comprehensive and complete review of the performance improvement programme. However, team members can tailor document reviews, interviews and observations on the basis of the focus areas and feedback provided by the team leader and host plant peer. In addition to the IAEA requirements listed in each review area in this section, members of the PROSPER expert team may wish to review additional resources provided in

[1] In line with SSR-2/2 (Rev. 1) [1] and SSG-72 [3], the operating experience programme consists of the following elements:
(a) Reporting, screening, analysis and trending of internal events, and implementation of corrective actions resulting from analysis.
(b) Collection of internal and external operating experience, screening of operating experience for applicability in plant processes and its use in daily activities, dissemination, and exchange of operating experience with external organizations.
For the purposes of the PROSPER guidelines, the elements described in (a) are covered by the corrective action programme and the elements described in (b) are covered by the operating experience programme.

the bibliography for additional background on international industry practises in the area of performance improvement.

4.1. REVIEW AREA A - CORRECTIVE ACTION PROGRAMME

4.1.1 Key References

GSR Part 2 [4]: paras 4.8, 5.2, 6.3; SSR-2/2 (Rev. 1) [1]: paras 4.22, 4.31, 5.27–5.33; GS-G-3.1 [7]: paras 6.50–6.84; GS-G-3.5 [5]: paras 2.29, 3.21, 6.19, 6.40, 6.42–6.69; SSG-50 [2]: paras 2.1–2.80; SSG-61 [8]: para. 3.13.20.

4.1.2 Expectations

GSR Part 2 - Requirement 12: Fostering a Culture for Safety [4] states:

> **"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.**
>
> …….
>
> "5.2. Senior managers and all other managers shall advocate and support the following:
>
> …….
>
> "(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".

GSR Part 2 - Requirement 13: Measurement, assessment, and improvement of the management system [4] states:

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> …….
>
> "6.3. The causes of non-conformances of processes and the causes of safety related events that could give rise to radiation risks shall be evaluated and any consequences shall be managed and shall be mitigated. The corrective actions necessary for eliminating the causes of non-conformances, and for preventing the occurrence of, or mitigating the consequences of, similar safety related events, shall be determined, and corrective actions shall be taken in a timely manner. The status and effectiveness of all corrective actions and preventive actions taken shall be monitored and shall be reported to the management at an appropriate level in the organization."

SSR-2/2 (Rev.1) - Requirement 24: Feedback of operating experience [1] states:

> **"The operating organization shall establish an operating experience programme to learn from events at the plant and events in the nuclear industry and other industries worldwide.**
>
> "5.27. The operating organization shall establish and implement a programme to report, collect, screen, analyse, trend, document and communicate operating experience at the plant in a systematic way…

"5.28. Events with safety implications shall be investigated in accordance with their actual or potential significance. Events with significant implications for safety shall be investigated to identify their direct and root causes, including causes relating to equipment design, operation and maintenance, or to human and organizational factors. The results of such analyses shall be included, as appropriate, in relevant training programmes and shall be used in reviewing procedures and instructions. Plant event reports and non-radiation-related accident reports shall identify tasks for which inadequate training may be contributing to equipment damage, excessive unavailability of equipment, the need for unscheduled maintenance work, the need for repetition of work, unsafe practices or lack of adherence to approved procedures.

"5.29. Information on operating experience shall be examined by competent persons for any precursors to, or trends in, adverse conditions for safety, so that any necessary corrective actions can be taken before serious conditions arise.

"5.30. As a result of the investigation of events, clear recommendations shall be developed for the responsible managers, who shall take appropriate corrective actions in due time to avoid any recurrence of the events. Corrective actions shall be prioritized, scheduled and effectively implemented and shall be reviewed for their effectiveness. Operating personnel shall be briefed on events of relevance and shall take the necessary corrective actions to make their recurrence less likely.

"5.31. The operating organization shall be responsible for instilling an attitude among plant personnel that encourages the reporting of all events, including low level events and near misses, potential problems relating to equipment failures, shortcomings in human performance, procedural deficiencies or inconsistencies in documentation that are relevant to safety.

"5.32. The operating organization shall maintain liaison, as appropriate, with support organizations (e.g. manufacturers, research organizations and designers) involved in the design, construction, commissioning and operation of the plant in order to feed back information on operating experience and to obtain advice, if necessary, in the event of equipment failure or in other events.

"5.33. The operating experience programme shall be periodically evaluated to determine its effectiveness and to identify any necessary improvements."

4.1.3 Description

The general objective of a CAP is to drive continuous improvement and prevent significant events. Successful CAPs allow all individuals to identify and document all types of issues, including those related to human performance and equipment failures, include a process to screen all identified issues for impact, include techniques to evaluate complex issues, ensure that appropriate actions are taken to correct the identified issues, and provide the means to trend issues so that adverse trends can be identified and corrected before they become consequential events. A CAP is formal and rigorous, and requirements need to be strictly defined and enforced to ensure that a strong safety culture is established and maintained.

Management is responsible for encouraging employees to raise concerns and maintain a low threshold for issue reporting and ensure that the workplace environment remains supportive of problem identification and reporting.

Identifying and reporting all types of issues or concerns is important to a successful CAP process. Reporting typically includes events, near misses, non-conformances, gaps identified by internal and external assessment, self-identified or self-revealing deficiencies, equipment issues, plant and performance issues noted during observations of daily work activities, and safety concerns. All workers, including contractors, need to be encouraged to identify potential and actual problems at the earliest possible time before they become more significant.

The screening of problems that are reported needs to consider the actual and potential significance, complexity and impact of the problem on safety, equipment reliability and plant performance, organization, and workers. The rigour of investigations, cause analysis and corrective actions need to be commensurate with the significance of the issue. Root cause investigations are typically performed for significant conditions adverse to quality. Lower-level investigations are performed to identify and correct failed barriers that impact equipment, programmes and the organization.

Documentation needs to meet regulatory requirements, support aggregate review, and provide sufficient detail to ensure clear understanding.

4.1.4 Evaluations

Figure 3 depicts the key attributes of the corrective action programme. The attributes are evaluated using Area A of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

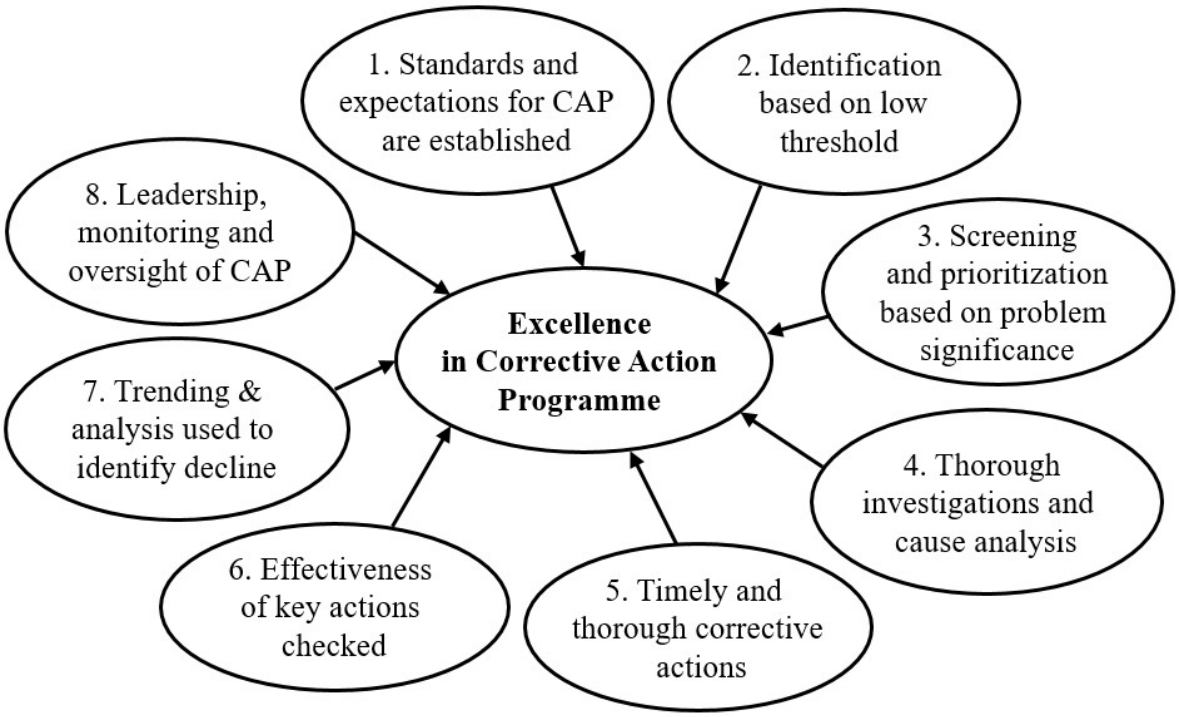

FIG. 3. Key attributes of the corrective action programme.

4.1.5 Examples of documents and other information for the review

- CAP organizational structure, staffing, training and qualification requirements for CAP positions and examples of relevant training records/materials;

- Policies and procedures for the implementation of CAP (e.g. identification, reporting, screening, analysis and trending of issues, development and tracking of corrective actions and review of their effectiveness, etc.);
- Description and use of CAP databases;
- List of CAP meetings (e.g. daily screening meeting, management review meetings, etc.);
- List of key events for the last two years and associated cause analysis;
- Sample reports for different levels of investigation and analysis;
- CAP self-assessment reports and reports on the status of CAP performance indicators;
- CAP data trend analysis reports, associated causal analysis and corrective actions;
- List of effectiveness reviews completed in the last year with several examples.

4.2. REVIEW AREA B - OPERATING EXPERIENCE PROGRAMME

4.2.1 Key references

GSR Part 2 [4]: paras 4.28, 4.32, 6.7; GSR Part 4 (Rev. 1) [9]: paras 4.27, 4.61; SSR-2/2 (Rev. 1) [1]: paras 4.4, 4.22, 4.44, 5.27, 5.29, 5.32, 5.33, 7.4, 8.5; GS-G-3.1 [7]: paras 2.46, 4.13; GS-G-3.5 [5]: paras 2.18, 3.21, 5.64, 5.76, 5.99, 6.8, 6.40; SSG-25 [10]: para. 5.7; SSG-50 [2]: paras 2.31, 3.31–3.32, 7.7–7.9, 7.16–7.19, 7.29, 7.41; SSG-61 [8]: para. 3.13.20; SSG-71 [11]: paras 2.9, 3.10.

4.2.2 Expectations

GSR Part 2 - Requirement 10: Management of processes and activities [4] states:

> **"Processes and activities shall be developed and shall be effectively managed to achieve the organization's goals without compromising safety.**
>
> "4.28. Each process shall be developed and shall be managed to ensure that requirements are met without compromising safety. Processes shall be documented, and the necessary supporting documentation shall be maintained. It shall be ensured that process documentation is consistent with any existing documents of the organization. Records to demonstrate that the results of the respective process have been achieved shall be specified in the process documentation.
>
> …….
>
> "4.32. Each process or activity that could have implications for safety shall be carried out under controlled conditions, by means of following readily understood, approved and current procedures, instructions and drawings. These procedures, instructions and drawings shall be validated before their first use and shall be periodically reviewed to ensure their adequacy and effectiveness. Individuals carrying out such activities shall be involved in the validation and the periodic review of such procedures, instructions and drawings."

GSR Part 2 - Requirement 13: Measurement, assessment and improvement of the management system [4] states:

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> …….
>
> "6.7. The management system shall include evaluation and timely use of the following:
>
> (a) Lessons from experience gained and from events that have occurred, both within the organization and outside the organization, and lessons from identifying the causes of events;
> (b) Technical advances and results of research and development;
> (c) Lessons from identifying good practices."

SSR-2/2 (Rev. 1) - Requirement 5: Safety policy [1] states:

"The operating organization shall establish and implement operational policies that give safety the highest priority.

…….

"4.4. The safety policy of the operating organization shall include commitments to perform periodic safety reviews of the plant throughout its operating lifetime in compliance with the regulatory requirements. Operating experience and significant new safety related information from relevant sources, including information on agreed corrective actions and on necessary improvements that have been implemented, shall be taken into account (see also Requirement 12)."

SSR-2/2 (Rev. 1) - Requirement 7: **Qualification and training of personnel [1] states:**

"The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons.

…….

"4.22. Operating experience at the plant, as well as relevant experience at other plants, shall be appropriately incorporated into the training programme. It shall be ensured that training is conducted on the root cause(s) of the events and on the determination and implementation of corrective actions to make their recurrence less likely."

SSR-2/2 (Rev. 1) - Requirement 24: Feedback of Operating Experience [1] states:

"The operating organization shall establish an operating experience programme to learn from events at the plant and events in the nuclear industry and other industries worldwide.

"5.27. The operating organization shall establish and implement a programme to report, collect, screen, analyse, trend, document and communicate operating experience at the plant in a systematic way. It shall obtain and evaluate available information on relevant operating experience at other nuclear installations to draw and incorporate lessons for its own operations, including its emergency arrangements. It shall also encourage the exchange of experience within national and international systems for the feedback of operating experience. Relevant lessons from other industries shall also be taken into consideration, as necessary.

…….

"5.29. Information on operating experience shall be examined by competent persons for any precursors to, or trends in, adverse conditions for safety, so that any necessary corrective actions can be taken before serious conditions arise.

…….

"5.32. The operating organization shall maintain liaison, as appropriate, with support organizations (e.g. manufacturers, research organizations and designers) involved in the design, construction, commissioning and operation of the plant in order to feed back

information on operating experience and to obtain advice, if necessary, in the event of equipment failure or in other events.

"5.33. The operating experience programme shall be periodically evaluated to determine its effectiveness and to identify any necessary improvements."

SSR-2/2 (Rev. 1) Requirement 31: Maintenance, testing, surveillance and inspection programmes [1] states:

"**The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented.**

…….

"8.5. The frequency of maintenance, testing, surveillance and inspection of individual structures, systems and components shall be determined on the basis of:

…….

(d) Operating experience."

4.2.3 Description

The operating experience programme is designed to effectively and efficiently apply lessons learned from internal and external operating experience to improve plant safety and reliability, and is essential to establishing a culture of continuous improvement. The governing procedure and supporting programme set out the relevant requirements, roles and responsibilities, and reinforce the importance of reporting and utilizing operating experience and how this supports a strong nuclear safety culture.

The proactive and effective use of operating experience contributes to the goals of reducing the frequency and significance of events. Lessons learned from operating experience need to be communicated to personnel, and appropriate action taken to prevent the re-occurrence of similar events, human performance errors, or problems resulting from weaknesses in plant processes, practices, procedures, training, and system or component design.

Managers need to foster an environment that makes the use of operating experience an essential part of the day-to-day operation of the plant/utility. The use of operating experience is integrated into key plant processes, including work management, job planning, decision-making, engineering and training. Workers need to utilize operating experience during pre-job briefings to identify the most likely errors, potential problems, and necessary actions.

The principal elements of the operating experience programme are reporting, screening, evaluating, and taking appropriate actions deemed necessary to strengthen barriers and preclude a similar occurrence of events and issues previously captured by the operating experience programme. Key to effective use of operating experience is the timely communication of operating experience information to those planning or performing work. Accordingly, such information is stored in a manner that makes it easy to retrieve and search by personnel.

4.2.4 Evaluations

Figure 4 depicts the key attributes of the operating experience programme. The attributes are evaluated using Area B of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

FIG. 4. Key attributes of the operating experience (OE) programme.

4.2.5 Examples of documents and other information for the review

- Operating experience programme organizational structure and staffing;
- Policies and procedures for the implementation of operating experience programme (e.g. for screening of external operating experience and reporting to external organizations);
- External sources of operating experience used at the plant or utility and relevant procedure for use;
- Description of plant operating experience databases and requirements for their use;
- Requirements for and examples of the use of operating experience in plant processes, e.g. conduct of operations, work management, design modifications, etc;
- Requirements for WANO Significant Operating Experience Reports and a sample of such reviews;
- Sample of external operating experience applicability reviews;
- Requirements and examples of just in time reports and lessons learnt communications;
- List of operating experience related meetings and a sample of minutes of the meetings;
- List of events reported to external organizations during the evaluation period and a sample of event reports for the external organizations (e.g. WANO, INPO or IAEA);
- Recent operating experience self-assessment reports and reports on the status of operating experience performance indicators.

4.3. REVIEW AREA C – MANAGEMENT OBSERVATIONS AND COACHING

4.3.1 Key references

GSR Part 2 [4]: paras 3.1–3.3, 5.2; SSR-2/2 (Rev. 1) [1]: paras 4.2, 4.35; GS-G-3.1 [7]: para. 2.34; GS-G-3.5 [5]: paras 2.15, 3.16, 6.3, 6.8, Appendix I; SSG-74 [12]: para. 2.19; SSG-75 [13]: paras 4.6, 5.14; SSG-76 [14]: paras 4.31, 4.33.

4.3.2 Expectations

GSR Part 2 - Requirement 2: Demonstration of leadership for safety by managers [4] states:

"Managers shall demonstrate leadership for safety and commitment to safety.

"3.1. The senior management of the organization shall demonstrate leadership for safety by:

(a) Establishing, advocating and adhering to an organizational approach to safety that stipulates that, as an overriding priority, issues relating to protection and safety receive the attention warranted by their significance;
(b) Acknowledging that safety encompasses interactions between people, technology and the organization;
(c) Establishing behavioural expectations and fostering a strong safety culture;
(d) Establishing the acceptance of personal accountability in relation to safety on the part of all individuals in the organization and establishing that decisions taken at all levels take account of the priorities and accountabilities for safety.

"3.2. Managers at all levels in the organization, taking into account their duties, shall ensure that their leadership includes:

(a) Setting goals for safety that are consistent with the organization's policy for safety, actively seeking information on safety performance within their area of responsibility and demonstrating commitment to improving safety performance;
(b) Development of individual and institutional values and expectations for safety throughout the organization by means of their decisions, statements and actions;
(c) Ensuring that their actions serve to encourage the reporting of safety related problems, to develop questioning and learning attitudes, and to correct acts or conditions that are adverse to safety.

"3.3. Managers at all levels in the organization:

(a) Shall encourage and support all individuals in achieving safety goals and performing their tasks safely;
(b) Shall engage all individuals in enhancing safety performance".

GSR Part 2 - Requirement 12: Fostering a culture for safety [4] states:

"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.

…….

"5.2. 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."

SSR 2/2 (Rev.1) – Requirement 5: Safety policy [1] states:

"The operating organization shall establish and implement operational policies that give safety the highest priority.

…….

"4.2. The safety policy shall stipulate clearly the leadership role of the highest level of management in safety matters. Senior management shall communicate the provisions of the safety policy throughout the organization. Safety performance standards shall be developed for all operational activities and shall be applied by all site personnel. All personnel in the organization shall be made aware of the safety policy and of their responsibilities for ensuring safety. The safety performance standards and the expectations of the management for safety performance shall be clearly communicated to all personnel, and it shall be ensured that they are understood by all those involved in their implementation."

SSR 2/2 (Rev.1) - Requirement 9: Monitoring and review of safety performance [1] states:

> **"The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization.**
>
> …….
>
> "4.35. Monitoring of safety performance shall include the monitoring of personnel performance; attitudes to safety; response to infringements of safety; and violations of operational limits and conditions, operating procedures, regulations and licence conditions. The monitoring of plant conditions, activities and attitudes of personnel shall be supported by systematic walkdowns of the plant by the plant managers."

4.3.3 Description

In order to become proactive and to maintain control over underlying or emerging problems, leaders are aware of what is going on in their areas of responsibility and assess actual performance against expectations. Leadership monitoring involves managers observing personnel performing work, posing informed and probing questions, and encouraging and reinforcing expected behaviour.

Observation and coaching are essential elements of performance improvement and demonstrate leadership commitment to identifying and resolving challenges with the safe delivery of work. They are embedded as safety culture attributes presented in GS-G-3.5, Appendix I - LEADERSHIP FOR SAFETY IS CLEAR [5].

The MO&C programme is a vital element of any defence-in-depth management system. It is driven by the concept of engaging employees to understand performance challenges and necessary improvement actions. This instils the culture where everyone is a partner in safety and shares responsibility for achieving it. It also strengthens the trust between employees and leadership and builds a collaborative work environment.

The MO&C programme is intended to derive improvements in both individual and team performance based on findings from observations. It is not intended to criticize or to judge people, but to review the quality and effectiveness of work preparation, policies, and work practices, as well as their implementation. The work activities of all personnel at an installation, particularly operators, maintenance, radiation protection, chemistry, engineering and technical support personnel, as well as contractors, are subject to observation and coaching.

The main objectives of MO&C are:

- Create a culture of continuous improvement and actively seeking learning opportunities;
- Identify gaps and opportunities for improvement in individual or team practices;
- Proactively identify and correct event precursors, error likely situations, weak barriers, and latent organizational weaknesses that affect behaviour or performance;
- Reinforce standards, expectations, and core values for safe and reliable performance;
- Provide timely coaching to correct inappropriate behaviour and sub-standard work practices;

- Provide a means to identify common issues and potential trends of performance weaknesses that may require management action;
- Initiate organizational improvements to enhance safety performance;
- Provide an opportunity for leadership development and learning from workers.

The conduct of MO&C includes the following steps:

- Prepare for task observation;
- Conduct observation using appropriate techniques;
- Provide feedback to effectively engage and coach the observed team;
- Write a report and take follow up actions on identified areas for improvement.

4.3.4 Evaluations

Figure 5 depicts the key attributes of the management observations and coaching programme. The attributes are evaluated using Area C of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

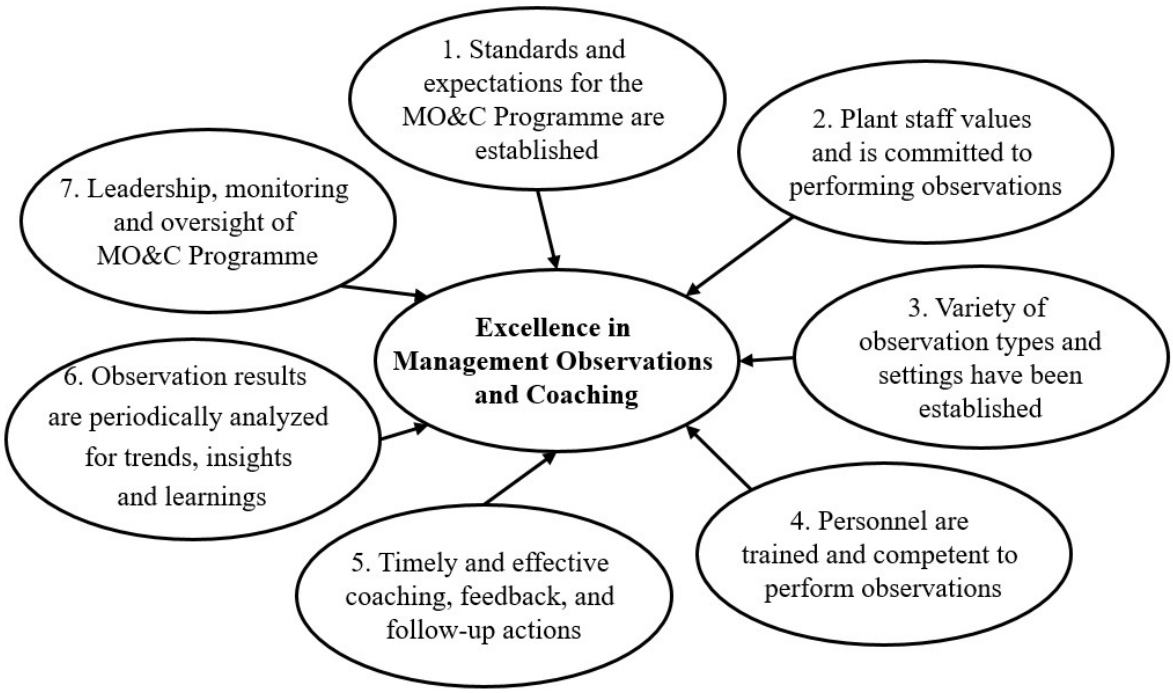

FIG. 5. Key attributes of the management observations and coaching programme.

4.3.5 Examples of documents and other information for the review

- MO&C programme organizational structure and staffing;
- Policies, requirements and procedures for the implementation of MO&C programme;
- Training requirements, materials and records for MO&C programme;
- Sample management observation cards, checklists or criteria;
- Reports of management observations trend analysis for plant and core departments (operations, maintenance, radiation protection, etc.);
- List of gaps identified in observations for the last year (e.g. condition reports generated from management observations);

- Schedules of management observations;
- MO&C related review meeting minutes;
- Recent MO&C self-assessment reports and reports on the status of MO&C performance indicators.

4.4. REVIEW AREA D - HUMAN PERFORMANCE PROGRAMME

4.4.1 Key references

GSR Part 2 [4]: paras 4.24–4.25; SSR-2/2 (Rev. 1) [1]:paras 3.5, 4.19–4.20, 4.29; GS-G-3.5 [5]: paras 2.32–2.37, 5.72, 6.54, Appendix I, (3) and (4); SSG-51 [15]: paras 7.1–7.4, 9.1–9.18; SSG-74 [12]: paras 4.18, 4.35, 4.37, 8.15; SSG-75 [13]: paras 3.4–3.5, 4.6, 5.4, 5.37, Appendices I and II; SSG-76 [14]: paras 4.31, 4.33, 4.45, 5.25, 7.25.

4.4.2 Expectations

GSR Part 2, Requirement 9: Provision of resources [4] states:

> **"Senior management shall determine the competences and resources necessary to carry out the activities of the organization safely and shall provide them.**
>
> …….
>
> "4.24. Competences to be sustained in-house by the organization shall include: competences for leadership at all management levels; competences for fostering and sustaining a strong safety culture; and expertise to understand technical, human and organizational aspects relating to the facility or the activity in order to ensure safety.
>
> "4.25. Senior management shall ensure that individuals at all levels, including managers and workers:
>
> (a) Are competent to perform their assigned tasks and to work safely and effectively;
> (b) Understand the standards that they are expected to apply in completing their tasks."

SSR-2/2 (Rev. 1), Requirement 2: Management system [1] states:

> **"The operating organization shall establish, implement, assess and continually improve an integrated management system.**
>
> …….
>
> "3.5. The management system shall integrate all the elements of management so that processes and activities that may affect safety are established and conducted coherently with other requirements, including requirements in respect of leadership, protection of health, human performance, protection of the environment, security and quality, and so that safety is not compromised by other requirements or demands."

SSR-2/2 (Rev. 1) - Requirement 7: **Qualification and training of personnel [1] states:**

> **"The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons.**
>
> …….
>
> "4.19. A suitable training programme shall be established and maintained for the training of personnel before their assignment to safety related duties. The training programme shall include provision for periodic confirmation of the competence of personnel and for

refresher training on a regular basis. The refresher training shall also include retraining provision for personnel who have had extended absences from their authorized duties. The training shall emphasize the importance of safety in all aspects of plant operation and shall promote safety culture."

SSR-2/2 (Rev. 1), Requirement 8: Performance of safety related activities [1] states:

"The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with harmful effects of ionizing radiation are kept as low as reasonably achievable.

…….

"4.29. Aspects of the working environment that influence human performance factors (such as workload or fatigue) and the effectiveness and fitness of personnel for duty shall be identified and controlled. Tools for enhancing human performance shall be used as appropriate to support the responses of operating personnel."

4.4.3 Description

Human performance plays a key role in overall performance of an operating organization. Therefore, improving human performance has become a key element to ensure safe and reliable operation of nuclear power plants.

The general objective of a Human performance programme is to provide personnel of a nuclear power plant with specific soft skills supporting safe and reliable operation. It focuses on reducing human errors and strengthening barriers to prevent consequential events and/or mitigate their impact on the safe and reliable operation should they occur.

Initial industry efforts to improve human performance focused on worker behaviour and effective use of human performance tools, an approach that may still exist at some nuclear power plants. Organization and management influences on human behaviour are equally important, but often overlooked or underestimated. Experience has revealed that most human performance problems are caused by the work environment and organizational and programmatic weaknesses. To ensure successful performance at the job site, appropriate individual and leader behaviours need to occur in concert with appropriate organizational processes and values. These behaviours, processes and values need to work in unison during all phases of a task, from work identification through completion of documentation. Therefore, excellent human performance depends on the alignment of individual and leader behaviours and organizational processes and values.

Human performance forms an important part of the wider performance improvement model and offers significant general benefits including:

- Reduction in both the frequency and consequences of events;
- Increased involvement of individuals in helping the organization to achieve its goals;
- Improvement of core and supporting processes in the organization;
- Early warning of deviations from acceptable human performance;
- Improvement in quality and safety;
- Reduction of operating costs;
- Increased trust by stakeholders of the organization;

- Safety culture across the plant or utility;
- An indication of the effectiveness of personnel training;
- An indication of the reliability of the operating procedures.

The human performance programme is founded on the following concepts:

- Humans are fallible, even the strongest performers make mistakes;
- Error-traps are predictable, manageable and preventable;
- Human performance tools are used to minimize the frequency and severity of errors;
- Individuals achieve high levels of performance based largely on the encouragement and reinforcement received from supervisors, peers and direct reports;
- Understanding the reasons human errors occur and applying the lessons learned from past errors can prevent events;
- Organizational processes and values influence individual behaviour;
- Performance improves when members of the organization learn from their successes and failures.

Plant personnel need to be trained in how to recognize situations that are likely to give rise to errors, so that they can avoid making them. In addition, there are various tools that could be used on an individual basis to reduce errors. Human performance training needs to include such tools, such as:

- Pre-job briefings, to discuss the critical steps of the assigned activity, error-likely situations, defences in place to prevent events and previous operating experience;
- Self-checks applying the stop–think–act–review (STAR) concept and peer checks, having a second individual check the intended action prior to carrying it out;
- Three-way communication by which a message is communicated from one individual to another;
- Conservative decision making when there are no procedures in place or plans made for the activity.

The monitoring and assessment of human performance are conducted through the ongoing observation, recording, analysis and feedback of the actual human performance within the organization. The purpose is to identify those conditions which can lead to human error and correct them. The monitoring of human performance ideally begins at the start of plant life, during the design phase, and runs until the final decommissioning activities.

Human performance can be monitored both reactively and proactively:

- Reactively: through comparison of actual performance against metrics such as the IAEA safety performance indicators or safety case performance criteria, which provide a benchmark against which diagnostic analysis can be performed;
- Proactively: continuously through MO&C, and periodically through surveys or regular reviews of safety and independent oversight of operational safety performance.

The monitoring and assessment of human performance does not have to be performed by a single system, and indeed the elements that make up the human performance programme are often embedded within other performance improvement areas, for example management observations and coaching or the corrective action programme.

4.4.4 Evaluations

Figure 6 depicts the key attributes of the human performance programme. The attributes are evaluated using Area D of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

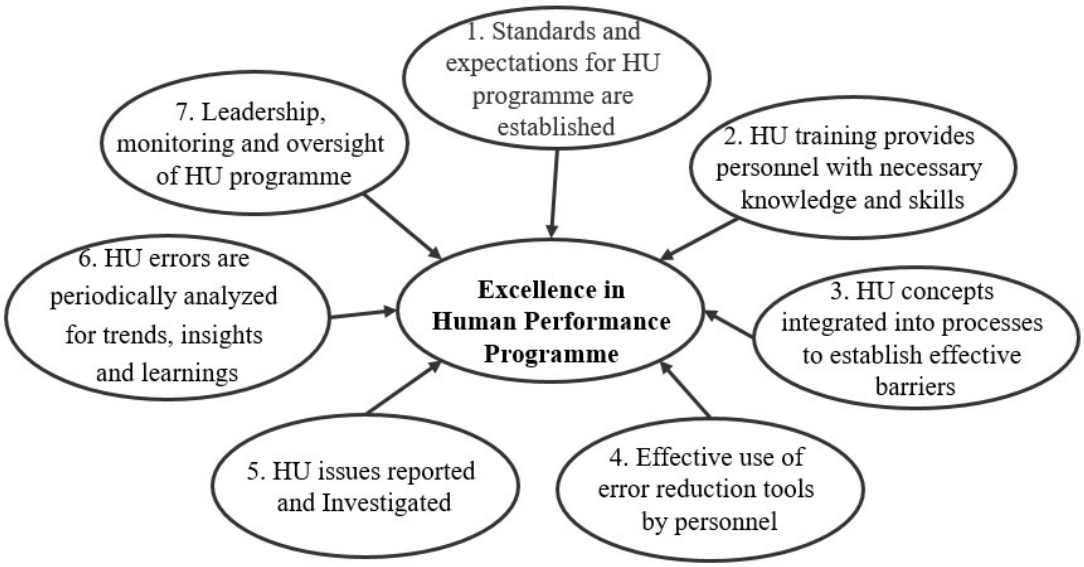

FIG. 6. Key attributes of the human performance (HU) programme.

4.4.5 Examples of documents and other information for the review

- Human performance programme organizational structure and staffing;
- Human performance programme related policies and strategic objectives;
- Human performance programme requirements, procedures and supporting documents – process and responsibilities;
- Expectations related to use of error reduction practices in various work activities;
- Personnel training on error reduction practices – expectations, materials and records;
- Plant/department human performance self-assessment reports and performance indicators;
- Recent human performance improvement plans;
- List of human performance events over the last two years and associated cause analysis;
- Sample of plant/corporate human performance programme review meeting minutes;
- Corporate/independent oversight reports related to reviews of the human performance programme;
- List of human performance trend codes and examples of trend analysis reports;
- List and sample of effectiveness reviews completed in the last year for human performance issues.

4.5. REVIEW AREA E - SELF-ASSESSMENT AND BENCHMARKING PROGRAMME

4.5.1 Key references

GSR Part 2 [4]: paras 6.4, 6.9, 6.11; SSR-2/2 (Rev. 1) [1]: para. 4.34; GS-G-3.1 [7]: paras 6.6–6.21; GS-G-3.5 [5]: paras 6.4–6.23; SSG-25 [10]: paras 5.114, 5.116, 5.117; SSG-72 [3]: para. 6.48.

4.5.2 Expectations

GSR Part 2, Requirement 13: Measurement, assessment and improvement of the management system [4] states:

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> …….
>
> "6.4. Independent assessments and self-assessments of the management system shall be regularly conducted to evaluate its effectiveness and to identify opportunities for its improvement. Lessons and any resulting significant changes shall be analysed for their implications for safety."

GSR Part 2, Requirement 14: Measurement, assessment and improvement of leadership for safety and of safety culture [4] states:

> "**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.
>
> …….
>
> "6.11. The results of self-assessments and independent assessments of leadership for safety and of safety culture [16] 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."

SSR-2/2 (Rev. 1), Requirement 9: Monitoring and review of safety performance [1] states:

> "**The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization.**
>
> …….
>
> "4.34. Self-assessment by the operating organization shall be an integral part of the monitoring and review system. The operating organization shall perform systematic self-

assessments to identify achievements and to address any degradation in safety performance."

4.5.3 Description

Self-assessment is a process of proactively analysing and evaluating existing performance against established standards to determine areas for improvement.

The intent of the self-assessment programme is to identify gaps compared to the international standards and excellence in operational safety performance. During self-assessment, current performance is compared to management expectations, industry highest standards and national regulatory requirements to identify strengths, weaknesses and improvement opportunities.

Self-assessments used as part of an overall improvement programme are effective in enhancing nuclear safety and are a tool that can be developed and used by any nuclear power operating organization. SA&BM can also be used to improve other key business objectives such as industrial/radiological safety, equipment reliability and cost-effectiveness. Experience has shown that when organizations objectively assess their own performance against standards of excellence, the understanding of the need for improvements is increased and the feeling of ownership is significantly enhanced.

Benchmarking is conducted to ensure organizations do not become isolated but stay connected to the rest of the industry. Another application of benchmarking is to seek how others have solved problems that the operating organization is currently experiencing. High-performing organizations seek and draw from the experience and good practices of other organizations that are achieving success, both within and outside the nuclear industry. Very few problems are unique to one organization, and other businesses have more than likely addressed and resolved the problem at their facilities.

Continuous learning is one of the traits associated with a healthy nuclear safety culture. Self-assessment and benchmarking, along with operating experience and training, make up the key attributes of continuous learning.

4.5.4 Evaluations

Figure 7 depicts the key attributes of the self-assessment and benchmarking programme. The attributes are evaluated using Area E of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

FIG. 7. Key attributes of the self-assessment and benchmarking programme.

4.5.5 Examples of documents and other information for the review

- Procedures governing SA&BM and if applicable, include guidelines that are specific to corporate assessment groups;
- Reports from SA&BM conducted over the last two years, including actions taken as follow-ups to SA&BM;
- Key performance indicators regarding self-assessment and benchmarking;
- Self-assessment and benchmarking schedule for the next 12-24 months (SA&BM plan);
- List of the plant's top priorities and senior management's expectations resulting from SA&BM activities;
- Training materials that are used to train personnel performing self-assessment or benchmarking activities.

4.6. REVIEW AREA F - KEY PERFORMANCE INDICATORS

4.6.1 References

GSR Part 2 [4]: paras 4.4–4.5, 6.1–6.2; SSR-2/2 (Rev. 1) [1]: para. 4.34; GS-G-3.1 [7]: paras 2.36, 5.17, 5.31–5.33, 6.4; GS-G-3.5 [5]: paras 6.3, 6.6, 6.21, 6.23, 6.28, Appendix I (5.f); SSG-25 [10]: para. 5.99; SSG-72 [3]: paras 5.20–5.22.

4.6.2 Expectations

GSR Part 2, Requirement 4: Goals, strategies, plans and objectives [4] states:

> **"Senior management shall establish goals, strategies, plans and objectives for the organization that are consistent with the organization's safety policy.**
>
> …….
>
> "4.4. Senior management shall ensure that measurable safety goals that are in line with these strategies, plans and objectives are established at various levels in the organization.
>
> "4.5. Senior management shall ensure that goals, strategies and plans are periodically reviewed against the safety objectives, and that actions are taken where necessary to address any deviations."

GSR Part 2, Requirement 13: Measurement, assessment and improvement of the management system [4] states:

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> "6.1. The effectiveness of the management system shall be monitored and measured to confirm the ability of the organization to achieve the results intended and to identify opportunities for improvement of the management system."

SSR-2/2 (Rev. 1), Requirement 9: Monitoring and review of safety performance [1] states:

> **"The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization.**
>
> …….
>
> "4.34. …Where practicable, suitable objective performance indicators shall be developed and used to enable senior managers to detect and react to shortcomings and deterioration in the management of safety."

4.6.3 Description

A set of key performance indicators is established that collectively provides an accurate and comprehensive perspective of plant operational safety performance and/or the safety performance of the operating organization.

The indicators are aligned with the organization's strategies and are used to establish specific performance goals and objectives to drive performance towards excellence and compare with the best international practice.

Managers use performance indicators for the monitoring and review of plant safety performance and/or the performance of the operating organization against a set of defined goals and trends. Identified declining trends and degraded performance are analysed and addressed by necessary actions to improve performance and achieve desired outcomes.

The hierarchy includes higher tiered indicators to measure the overall plant safety and the performance of the operating organization; middle tiered indicators to measure achievement of the organization's specific objectives and performance in key processes; and lower tiered indicators to build a broader understanding of performance at the department or unit level. Performance indicators include both leading and lagging indicators. Improvements in leading indicators lead to an improvement in lagging indicators.

A procedure is put in place to control the performance indicators programme. Performance indicator data are managed by means of efficient and reliable systems.

Results of performance indicators are communicated to personnel to help them align themselves with the organization's goals and objectives.

Senior management periodically reviews the effectiveness of the performance indicators programme to ensure that the indicators used remain relevant and effective and contribute to identifying issues, and that necessary improvements are made in relation to plant safety and the performance of the operating organization.

4.6.4 Evaluations

Figure 8 depicts the key attributes of the key performance indicators programme. The attributes are evaluated using Area F of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

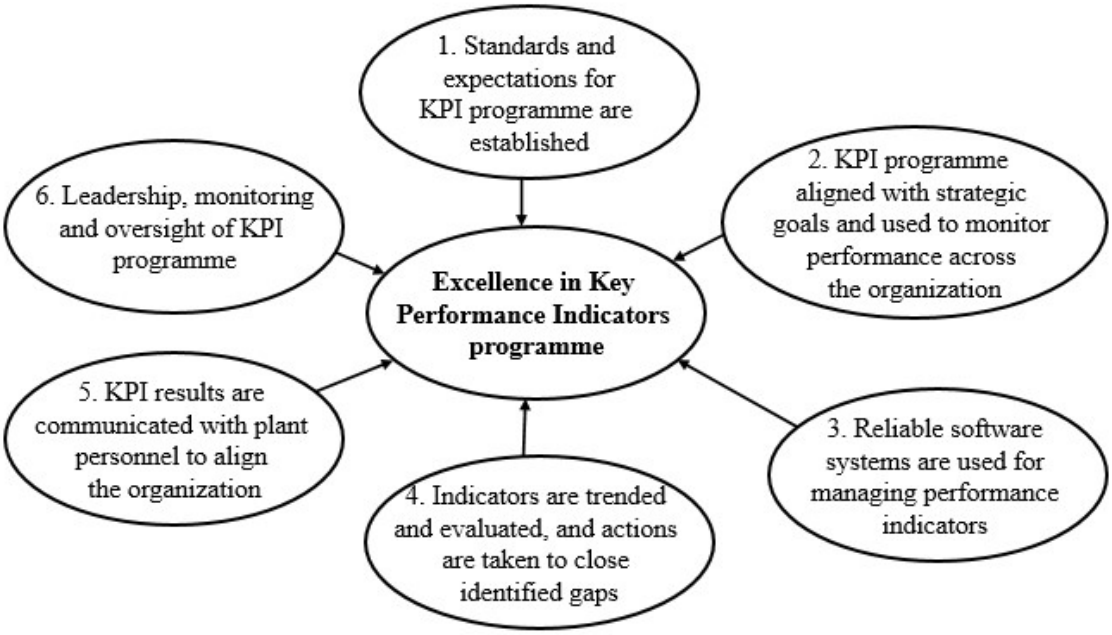

FIG. 8. Key attributes of the key performance indicators programme.

4.6.5 Examples of documents and other information for the review

- Procedures governing the KPI programme, if applicable, including guidelines that are specific to corporate assessment groups;
- List of performance indicators and their evaluations during last two years;
- A sample of periodic reports on the status of leading performance indicators used for monitoring of performance in core plant processes;
- Procedures for conducting relevant activities (definitions of performance indicators, data collection, how to calculate, responsibilities, frequency of reporting, level of reporting, etc.);
- Sample of department/plant/corporate performance indicator review meeting minutes;
- Performance indicators database structure/specification, sample of data sources;
- Analysis reports and action plans to address issues identified by performance indicators, e.g. KPIs which do not meet targets;
- Training requirements/records for performance indicator related activities.

4.7. REVIEW AREA G - INTEGRATED PERFORMANCE MONITORING, ASSESSMENT AND REVIEW

4.7.1 Key references

GSR Part 2 [4]: paras 6.1–6.8, 6.9; SSR-2/2 (Rev. 1) [1]: paras 3.2, 4.33.

4.7.2 Expectations

GSR Part 2, Requirement 13: Measurement, assessment and improvement of the management system [4] states

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> …….
>
> "6.3. The causes of non-conformances of processes and the causes of safety related events that could give rise to radiation risks shall be evaluated and any consequences shall be managed and shall be mitigated. The corrective actions necessary for eliminating the causes of non-conformances, and for preventing the occurrence of, or mitigating the consequences of, similar safety related events, shall be determined, and corrective actions shall be taken in a timely manner. The status and effectiveness of all corrective actions and preventive actions taken shall be monitored and shall be reported to the management at an appropriate level in the organization.
>
> "6.4. Independent assessments and self-assessments of the management system shall be regularly conducted to evaluate its effectiveness and to identify opportunities for its improvement. Lessons and any resulting significant changes shall be analysed for their implications for safety.
>
> "6.5. Responsibility shall be assigned for conducting independent assessments of the management system. The organizations, entities (in-house or external) and individuals assigned such responsibilities shall be given sufficient authority to discharge their responsibilities and shall have direct access to senior management. In addition, individuals conducting independent assessments of the management system shall not be assigned responsibility to assess areas under the responsibility of their own line management.
>
> "6.6. Senior management shall conduct a review of the management system at planned intervals to confirm its suitability and effectiveness, and its ability to enable the objectives of the organization to be accomplished, with account taken of new requirements and changes in the organization.
>
> "6.7. The management system shall include evaluation and timely use of the following:
>
> (a) Lessons from experience gained and from events that have occurred, both within the organization and outside the organization, and lessons from identifying the causes of events;
> (b) Technical advances and results of research and development;
> (c) Lessons from identifying good practices.

"6.8. Organizations shall make arrangements to learn from successes and from strengths for their organizational development and continuous improvement."

SSR-2/2 (Rev. 1), Requirement 1: Responsibilities of the operating organization [1] states:

"The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant.

…….

"3.2. The management system, as an integrated set of interrelated or interacting components for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner, shall include the following activities:

…….

"(e) Review activities, which include monitoring and assessing the performance of the operating functions and supporting functions on a regular basis. The purpose of monitoring is: to verify compliance with the objectives for safe operation of the plant; to reveal deviations, deficiencies and equipment failures; and to provide information for the purpose of taking timely corrective actions and making improvements. Reviewing functions shall also include review of the overall safety performance of the organization to assess the effectiveness of management for safety and to identify opportunities for improvement. In addition, a safety review of the plant shall be performed periodically, including design aspects, to ensure that the plant is operated in conformance with the approved design and safety analysis report, and to identify possible safety improvements."

SSR-2/2 (Rev. 1), Requirement 5: Safety policy [1] states:

"The operating organization shall establish and implement operational policies that give safety the highest priority.

…….

"4.5. The safety policy of the operating organization shall include a commitment to achieving enhancements in operational safety. The strategy of the operating organization for enhancing safety and for finding more effective ways of applying and, where feasible, improving existing standards shall be continuously monitored and supported by means of a clearly specified programme with clear objectives and targets."

SSR-2/2 (Rev. 1), Requirement 9: Monitoring and review of safety performance [1] states:

"The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization.

"4.33. An adequate audit and review system shall be established by the operating organization to ensure that the safety policy of the operating organization is being implemented effectively and that lessons are being learned from its own experience and from the experience of others to improve safety performance."

4.7.3 Description

Performance gaps or improvement initiatives resulting from application of continuous improvement tools need to be continuously assessed, monitored and prioritized until completion to ensure the most effective way to improve safety performance.

Performance monitoring involves the collective analysis of information obtained from the wide spectrum of performance improvement activities. The organization integrates and monitors at different levels (department/plant/fleet) all the outputs (problems/issues/improvement opportunities) that result from various performance improvement tools. As such, through performance monitoring activities, the organization defines performance gaps, creates or adjusts action plans, and develops organizational alignment and understanding. The most visible outcome is an organizational focus on the top gaps to excellence that, if addressed effectively, will have the most impact on performance.

4.7.4 Evaluations

Figure 9 depicts the key attributes of performance monitoring, assessment and review. The attributes are evaluated using Area G of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

FIG. 9. Key attributes of integrated performance monitoring, assessment and review.

4.8. REVIEW AREA H - LEADERSHIP AND MANAGEMENT FOR PERFORMANCE IMPROVEMENT

4.8.1 Key references

GSR Part 2 [4]: paras 3.2–3.3, 4.1–4.2, 4.4–4.5, 4.9, 4.21–4.26, 4.28, 5.2, 6.1, 6.4, 6.6, 6.7; GSR Part 4 [9]: paras 3.1–3.7; SSR-2/2 [1]: para. 3.5.

4.8.2 Expectations

GSR Part 2, Requirement 2: Demonstration of leadership for safety by managers [4] states:

"**Managers shall demonstrate leadership for safety and commitment to safety.**

…….

"3.2. Managers at all levels in the organization, taking into account their duties, shall ensure that their leadership includes:

(a) Setting goals for safety that are consistent with the organization's policy for safety, actively seeking information on safety performance within their area of responsibility and demonstrating commitment to improving safety performance;

…….

"3.3 Managers at all levels in the organization:

…….

(b) Shall engage all individuals in enhancing safety performance".

GSR Part 2, Requirement 3: Responsibility of senior management for the management system [4] states:

"**Senior management shall be responsible for establishing, applying, sustaining and continuously improving a management system to ensure safety.**

"4.1. Senior management shall retain accountability for the management system even where individuals are assigned responsibility for coordinating the development, application and maintenance of the management system [16, 17].

"4.2. Senior management shall be responsible for establishing safety policy."

GSR Part 2, Requirement 6: Integration of the management system [4] states:

"**The management system shall integrate its elements, including safety, health, environmental, security, quality, human-and-organizational-factor, societal and economic elements, so that safety is not compromised.**

…….

"4.9. The management system shall be applied to achieve goals safely, to enhance safety and to foster a strong safety culture by:

(a) Bringing together in a coherent manner all the necessary elements for safely managing the organization and its activities;
(b) Describing the arrangements made for management of the organization and its activities;
(c) Describing the planned and systematic actions necessary to provide confidence that all requirements are met;
(d) Ensuring that safety is taken into account in decision making and is not compromised by any decisions taken."

GSR Part 2, Requirement 9: Provision of resources [4] states (footnote omitted):

"Senior management shall determine the competences and resources necessary to carry out the activities of the organization safely and shall provide them.

"4.21. Senior management shall make arrangements to ensure that the organization has in-house, or maintains access to, the full range of competences and the resources necessary to conduct its activities and to discharge its responsibilities for ensuring safety at each stage in the lifetime of the facility or activity, and during an emergency response [1, 18, 19].

…….

"4.24. Competences to be sustained in-house by the organization shall include: competences for leadership at all management levels; competences for fostering and sustaining a strong safety culture; and expertise to understand technical, human and organizational aspects relating to the facility or the activity in order to ensure safety."

GSR Part 2, Requirement 12: Fostering a culture for safety [4] states:

"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.

…….

"5.2. Senior managers and all other managers shall advocate and support the following:

…….

"(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;

…….

"(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)".

GSR Part 2, Requirement 13: Measurement, assessment and improvement of the management system [4] states:

> **"The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.**
>
> …….
>
> "6.6. Senior management shall conduct a review of the management system at planned intervals to confirm its suitability and effectiveness, and its ability to enable the objectives of the organization to be accomplished, with account taken of new requirements and changes in the organization.
>
> "6.7. The management system shall include evaluation and timely use of the following:
>
> (a) Lessons from experience gained and from events that have occurred, both within the organization and outside the organization, and lessons from identifying the causes of events;
>
> …….
>
> "(c) Lessons from identifying good practices."

SSR-2/2 (Rev. 1), Requirement 2: Management System [1] states:

> **"The operating organization shall establish, implement, assess and continually improve an integrated management system**
>
> …….
>
> "3.5. The management system shall integrate all the elements of management so that processes and activities that may affect safety are established and conducted coherently with other requirements, including requirements in respect of leadership, protection of health, human performance, protection of the environment, security and quality, and so that safety is not compromised by other requirements or demands."

4.8.3 Description

The performance improvement programme supports the achievement of the fundamental safety objective. Leadership expectations for the performance improvement programme are clearly defined and are part of the organization's vision, goals, strategies, plans and objectives. The management system also has to ensure the fostering of a strong safety culture, the regular assessment of safety performance and the application of lessons from experience. The management system also supports the development of proactive and responsive management. Good leadership, backed by robust procedures and documentation, guides and oversees the programmes that use and track operating experience, corrective actions and KPIs and ensures that these programmes harmoniously feed into each other. Leaders' use of self-assessments, benchmarking and observations ensures that all programmes benefit from continuous learning and improvement through the effective application of the human performance programme and other processes.

4.8.4 Evaluations

Figure 10 depicts the key attributes of leadership and management for performance improvement. The attributes are evaluated using Area H of the WNOs (available on the IAEA website: https://www.iaea.org/services/review-missions/peer-review-of-operational-safety-performance-experience-prosper).

FIG. 10. Key attributes of leadership and management for performance improvement.

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[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Operating Experience Feedback for Nuclear Installations, IAEA Safety Standards Series No. SSG-50, IAEA, Vienna (2018).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, The Operating Organization for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-72, IAEA, Vienna (in preparation)

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016).

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Nuclear Installations, IAEA Safety Standards Series No. GS-G-3.5, IAEA, Vienna (2009)

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, IAEA Safety Glossary: Terminology Used in Nuclear Safety and Radiation Protection (2018 Edition), IAEA, Vienna (2019)

[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006).

[8] INTERNATIONAL ATOMIC ENERGY AGENCY, Format and Content of the Safety Analysis Report for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-61, IAEA, Vienna (2021).

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016).

[10] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-25, IAEA, Vienna (2013).

[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Modifications to Nuclear Power Plants, IAEA Safety Standards Series No. SSG-71, IAEA, Vienna (in preparation).

[12] INTERNATIONAL ATOMIC ENERGY AGENCY, Maintenance, Testing, Surveillance and In-Service Inspection in Nuclear Power Plants, IAEA Safety Standards Series No. SSG-74, IAEA, Vienna (in preparation).

[13] INTERNATIONAL ATOMIC ENERGY AGENCY, Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-75, IAEA, Vienna (in preparation).

[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Conduct of Operations at Nuclear Power Plants, IAEA Safety Standards Series No. SSG-76, IAEA, Vienna (in preparation).

[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Human Factors Engineering in the Design of Nuclear Power Plants, IAEA Safety Standards Series No. SSG-51, IAEA, Vienna (2019).

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[17] INTERNATIONAL ATOMIC ENERGY AGENCY, Convention on Nuclear Safety, Legal Series No. 16, IAEA, Vienna (1994).

[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. SSR-4, IAEA, Vienna (2017).

[19] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

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Managing Human Performance to Improve Nuclear Facility Operation, IAEA Nuclear Energy Series No. NG-T-2.7 (2013).

Root Cause Analysis Following an Event at a Nuclear Installation: Reference Manual, IAEA-TECDOC-1756 (2014).

INTERNATIONAL NUCLEAR SAFETY GROUP, Management of Operational Safety in Nuclear Power Plants, INSAG Series No. 13 (1999).

- Improving the International System for Operating Experience Feedback, INSAG Series No. 23 (2008).

WORLD ASSOCIATION OF NUCLEAR OPERATORS, Traits of a Healthy Safety Culture, WANO PL 2013-01 (2013).

ANNEX I - PROSPER MISSION SCHEDULE

The below is an example schedule that could be appropriate for a full scope PROSPER mission.

Day 0		Arrival of mission team members at the hotel 18:00 – 20.00 The PROSPER team briefing at the hotel
Day 1	AM	07:30 Departure from the hotel 08:00 – 09:00 Entrance procedure at the plant 09:15 – 10:00 The IAEA mission team training 10:30 – 11:15 Entrance meeting 11:15-12:00 Meeting with counterparts - introduction, discussions about the review schedule
	PM	13:00 – 16:00 Plant walkdown[2] 13:00 – 16:00 Parallel sessions in review areas – plant observations, interviews and discussions 16:00 – 16:30 Debrief with counterparts 16:30 – 16:55 Preparation for team meeting 17:00 – 17:50 Team meeting with host plant peer 18:00 Departure to the hotel
Day 2	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions in review areas – plant observations, interviews and discussions
	PM	13:00 – 16:00 Parallel sessions in review areas – plant observations, interviews and discussions 16:00 – 16:30 Debrief with counterpart 16:30 – 16:55 Preparation for team meeting 17:00 – 17:50 Team meeting with host plant peer 18:00 Departure to the hotel
Day 3	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions in review areas – plant observations, interviews and discussions
	PM	13:00 – 16:00 Parallel sessions in review areas – plant observations, interviews and discussions 16:00 – 16:30 Debrief with counterpart 16:30 – 16:55 Preparation for team meeting 17:00 – 17:50 Team meeting with host plant peer 18:00 Departure to the hotel 20:00 – 21:00 Team meeting in the hotel – refresher training on issue development and discussion of potential issues and good practices
Day 4	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions in review areas – interview & discussion
	PM	13:00 – 13:30 Debrief with counterpart 13:30 – 17:00 Development of issues, good practices and evaluative section of report 17:00 – 17:50 Team meeting with host plant peer 18:00 Departure to the hotel

[2] Plant Walkdown will be organized for team leader and deputy team leader and will be optional for reviewers based on their requests.

Day 5	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions in review areas – interview & discussion
	PM	13:00 – 13:30 Debrief with counterpart 13:30 – 17:00 Development of issues, good practices and evaluative section of report 17:00 – 17:50 Team meeting with host plant peer 18:00 Departure to the hotel
Day 6		Free day
Day 7	AM	Team meeting in the hotel 08:00 – 10:00 Discussion of potential issues and good practices 10:00 – 12:00 Drafting of issues, good practices and evaluative section of the report
	PM	Team meeting in the hotel 13:00 – 18:00 Drafting of issues, good practices and evaluative section of the report 20:00 Deadline for sending issues to the IAEA for 'cold body review'
Day 8	AM	08:00 – 12:00 Team meeting with host plant peer and counterparts – issues, good practices and evaluative section of report presentation, discussion and agreement by team 12:00 Deadline for response from IAEA 'cold body review'
	PM	13:00 – 17:00 Team meeting with host plant peer and counterparts – issues, good practices and evaluative section of report presentation, discussion and agreement by team 17:00 Deadline for any changes in draft report 17:00 – 18:00 Preparation of exit meeting speeches 18:00 Departure to the hotel 19:00 Official farewell dinner with counterparts
Day 9	AM	08:30 Departure from the hotel 09:00 – 09:45 Rehearsal of exit meeting speeches, clear-out of offices 10:00 – 11:00 Exit meeting (including plant management)
	PM	12:00 Transportation of the team to the airport organized by counterpart

ANNEX II - PROSPER FOLLOW-UP MISSION SCHEDULE

The below is an example schedule that could be appropriate for a follow-up PROSPER mission.

Day 0		Arrival of team members to the closest international airport before Transportation from the airport to the hotel organized by counterpart 18:00 IAEA team briefing at the hotel
Day 1	AM	08:00 Departure from the hotel 08:30 – 09:30 Plant access formalities 09:30 – 10:30 IAEA team training 11:00 – 11:30 Entrance meeting 11:30-12:00 Meeting with counterparts - introduction, discussions about the review schedule
	PM	13:00 – 16:30 Parallel sessions – reviewers and counterparts 16:30 – 17:00 Debrief with counterpart and preparation for team meeting 17:00 – 17:20 Team meeting with host plant peer 17:30 Departure to the hotel
Day 2	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions – reviewers and counterparts
	PM	13:00 – 16:30 Parallel sessions – reviewers and counterparts 16:30 – 17:00 Debrief with counterpart and preparation for team meeting 17:00 – 17:20 Team meeting with host plant peer 17:30 Departure to the hotel
Day 3	AM	07:30 Departure from the hotel 08:00 – 12:00 Parallel sessions – reviewers and counterparts
	PM	13:00 – 14:30 Updating of issue sheets 14:30 – 15:30 Agree on the updated issues with counterparts 15:30 – 18:00 Finalization of draft report 18:00 Departure to the hotel 19:00 Official farewell dinner with counterparts
Day 4	AM	07:30 Departure from the hotel 08:00 – 09:00 Finalization of draft report and preparation of exit meeting speeches 09:00 Deadline for any changes in draft report 09:30 – 10:00 Rehearsal of exit meeting speeches 10:30 – 11:30 Exit meeting (including plant management)
	PM	12:00 Transportation of the team to the airport organized by counterpart

ANNEX III - STRUCTURE AND CONTENTS OF ADVANCE INFORMATION PACKAGE

The following information is to be included in the advance information package. Please try to ensure the format of the package is consistent with the table of contents presented in this Annex.

III-1. ADMINISTRATIVE INFORMATION

1. Arrival logistics (airport, hotel, plant)
2. Transportation airport-hotel, hotel-plant
3. Hotel accommodation information (name, telephone number, website address, availability of internet)
4. Contact points at the plant and list of counterparts (names, email addresses, phone numbers)
5. Site resources (site access control, controlled area access, meeting rooms, PROSPER offices, clerical/interpretation support, office equipment and lunch arrangements)
6. Summary of site specific radiological, industrial and fire safety rules, and emergency response provisions.

III-2. GENERAL INFORMATION

1. Plant description

   - Overall site, plant description and which units are to be reviewed
   - Brief plant operating history
   - Current utility/plant organizational charts
   - Arrangement of major plant structures and buildings (layout schematics)

2. Design information

   - Major process and safety systems
   - Key design parameters
   - Unique safety features

III-3. INFORMATION FOR AREA REVIEWERS' PREPARATION

For each review area, a description of how each individual expectation, as described in Section 4, is met. This information is typically presented on 4–5 pages (can be simplified if self-assessment results are included in the AIP).

1. Corrective action programme (CAP)

2. Use of operating experience
3. Management observations and coaching (MO&C)
4. Human performance programme
5. Self-assessment and benchmarking programme (SA&BM)
6. Key performance indicators (KPI)
7. Integrated performance monitoring, assessment and review (IPM)
8. Leadership and management for performance improvement (LMPI)

III-4. SELF-ASSESSMENT RESULTS (optional for the hosting organization – only if performed)

- For each review area, a description of how each individual expectation, as described in Section 4, is met. This information is typically presented on 2–3 pages;
- Specific gaps where performance or programmes do not fully meet the IAEA Safety Standards can be described as self-identified issues on an issue sheet (see template in Annex V). Information is provided about corrective actions taken to close the identified gaps (budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc.).

III-5. ATTACHMENTS

The evaluation period is two years before the PROSPER mission.

- Status of plant key performance indicators (for the last two years);
- Status of indicators for monitoring of PROSPER processes (corrective actions, operating experience, management observations, human performance programme, self-assessment and benchmarking);
- List of reportable events and associated event abstracts, root causes and corrective actions taken;
- List of external events screened out for internal use and respective corrective actions;
- List of events reported to industry external organizations;
- Statistics of management observations conducted;
- Recent human performance trend analysis reports (plant/department level);
- SA&BM activities conducted, both internally and externally, with summary descriptions of actions taken;
- Lists of performance gaps and improvement initiatives at department level and plant level;
- Recent periodic plant performance monitoring, assessment and review reports (overall performance trends, identified gaps).

ANNEX IV - DAILY REPORT TEMPLATE

Use the following template form for daily reports.

[PLANT] PROSPER [YEAR]

Daily Team Meeting – Review Status

Reviewer:	
Review Area:	
Date:	
Discussed with Counterpart	**Yes / No**
Concerns/ Facts:	
Good Performance:	
Other Remarks (interfaces):	
Reminder: <u>Before the daily meeting</u>, provide daily report to the team leader.	

ANNEX V - ISSUE SHEET TEMPLATE

Use the following template form for Issue Sheets.

ISSUE IDENTIFICATION	**Issue Number:**
REVIEW AREA/ ATTRIBUTE:	
ISSUE TITLE:	
FUNDAMENTAL OVERALL PROBLEM:	
TEAM OBSERVATIONS	**Date:** D1/M1/ YYY1
FACTS: **F1)** **F2)** **F3)** **F4)**	
SAFETY CONSEQUENCE:	
RECOMMENDATION/SUGGESTION: **R)** The plant should…. **S)** The plant should consider …	
IAEA BASIS:	

ANNEX VI - STRUCTURE AND CONTENTS OF THE PROSPER MISSION REPORT

The following table of contents is used for the development of the PROSPER mission report.

ANNEX VII - IAEA BASIS PUBLICATIONS FOR THE PROSPER SERVICE

Annex VII provides a complete list of IAEA basis publications listed in the 'Key References' in Section 4 and is intended as a reference for use during a peer review.

1) INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016).

2) INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016).

3) INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016).

4) INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006).

5) INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Nuclear Installations, IAEA Safety Standards Series No. GS-G-3.5, IAEA, Vienna (2009).

6) INTERNATIONAL ATOMIC ENERGY AGENCY, Format and Content of the Safety Analysis Report for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-61, IAEA, Vienna (2021).

7) INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-25, IAEA, Vienna (2013).

8) INTERNATIONAL ATOMIC ENERGY AGENCY, Operating Experience Feedback for Nuclear Installations, IAEA Safety Standards Series No. SSG-50, IAEA, Vienna (2018).

9) INTERNATIONAL ATOMIC ENERGY AGENCY, Human Factors Engineering in the Design of Nuclear Power Plants, IAEA Safety Standards Series No. SSG-51, IAEA, Vienna (2019).

10) INTERNATIONAL ATOMIC ENERGY AGENCY, Modifications to Nuclear Power Plants, IAEA Safety Standards Series No. SSG-71, IAEA, Vienna (in preparation).

11) INTERNATIONAL ATOMIC ENERGY AGENCY, The Operating Organization for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-72, IAEA, Vienna (in preparation).

12) INTERNATIONAL ATOMIC ENERGY AGENCY, Maintenance, Testing, Surveillance and In-Service Inspection for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-74, IAEA, Vienna (in preparation).

13) INTERNATIONAL ATOMIC ENERGY AGENCY, Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, IAEA Safety Standards Series No. SSG-75, IAEA, Vienna (in preparation).

14) INTERNATIONAL ATOMIC ENERGY AGENCY, Conduct of Operations at Nuclear Power Plants, IAEA Safety Standards Series No. SSG-76, IAEA, Vienna (in preparation).

GLOSSARY

The definitions given below may not necessarily conform to definitions adopted elsewhere for international use.

encouragement. If an item does not have sufficient safety significance to meet the criteria of a 'recommendation' or 'suggestion', but the expert or the team feels that mentioning it is still desirable, the given topic may be described in the text of the report using the phrase 'encouragement' (e.g. the team encouraged the plant/research reactor to…).

facts. A fact is something that is known to have happened or to exist, especially something for which proof exists, or about which there is information. A fact is evidence of a deficiency in programmes or performance. Based on the grouping of facts of similar nature, each reviewer develops an issue stated as a fundamental overall problem which can have a safety consequence.

fundamental overall problem. A fundamental overall problem is a generic deficiency in programmes or performance which is supported by multiple, agreed facts, stated in terms that are consistent with the facts, agreed by the team and which can lead to a safety consequence.

good practice. A good practice is an outstanding and proven programme, activity or equipment in use that contributes directly or indirectly to operational safety and sustained good performance. A good practice is markedly superior to that observed elsewhere, not just the fulfilment of current requirements or expectations. It needs to be superior enough and have broad enough application to be brought to the attention of other operating organizations and be worthy of their consideration in the general drive for excellence. A good practice is novel; has a proven benefit; is replicable (it can be used at other nuclear installations); and does not contradict an issue. Normally, good practices are brought to the attention of the team on the initiative of the plant. An item may not meet all the criteria of a 'good practice', but still be worthy to take note of. In this case it may be referred as a 'good performance' and documented in the text of the report.

good performance. A good performance is a superior objective that has been achieved or a good technique or programme that contributes directly or indirectly to operational safety and sustained good performance, that works well at the nuclear installation. However, it might not be necessary to recommend its adoption by other nuclear installations, because of financial considerations, differences in design or other reasons.

issue. An issue is an identified problem or an area of improvement, which has been identified based on the IAEA Safety Standards. It is documented in the mission report in a format of an issue sheet. An issue has a safety consequence that justifies the review team making a recommendation or suggestion.

peer review service. An examination or review of commercial, professional or academic efficiency, competence, etc., by experts in the relevant field. An IAEA peer review service is a process designed to facilitate the review of the degree of conformance of selected regulatory and technical elements of the national infrastructure for nuclear safety, with the IAEA Safety Standards. The review is conducted by a team of experts and coordinated by IAEA staff.

recommendation. A recommendation is advice on what improvements in operational safety needs to be made in the activity or programme that has been evaluated. It is based on inadequate conformance with the IAEA Safety Standards and addresses the general concern rather than the symptoms of the identified concern. Recommendations are specific, realistic and designed to result in tangible improvements.

safety consequence. A safety consequence is an adverse effect on safety that could result from deficient programmes or poor performance.

self-identified issue. A self-identified issue is documented by the PROSPER team in recognition of hosting organization actions taken to address inadequate conformance with the IAEA Safety Standards identified in the self-assessment made by the hosting organization prior to the mission and reported to the PROSPER team. Credit is given for the fact that actions have been taken, including root cause determination, which lead to a high level of confidence that the issue will be resolved within a reasonable timeframe. These actions need to include budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc. It is documented in the mission report in a format of an issue sheet (see Annex V).

suggestion. A suggestion is advice on an opportunity for safety improvement not directly related to inadequate conformance with the IAEA Safety Standards. It is primarily intended to make performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to ongoing work.

LIST OF ABBREVIATIONS

AIP	advance information package
CAP	corrective action programme
HU	human performance
INPO	Institute of Nuclear Power Operations
IPM	integrated performance monitoring, assessment and review
ISCA	Independent Safety Culture Assessment
KPI	key performance indicator
LMPI	leadership and management for performance improvement
MO&C	management observations and coaching
OE	operating experience
OEF	operating experience feedback
OSART	Operational Safety Review Team
PROSPER	Peer Review of the Operational Safety Performance Improvement Programme
SA&BM	self-assessment and benchmarking
WANO	World Association of Nuclear Operators
WNOs	working notes outlines

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